

**FARM BILL POLICY PROPOSALS  
RELATING TO FARM AND RURAL  
ENERGY ISSUES AND RURAL DEVELOPMENT**

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**HEARING**

**【BEFORE THE】**

**COMMITTEE ON AGRICULTURE,  
NUTRITION, AND FORESTRY  
UNITED STATES SENATE**

**ONE HUNDRED TENTH CONGRESS**

**FIRST SESSION**

**MAY 9, 2007**

Printed for the use of the  
Committee on Agriculture, Nutrition, and Forestry



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# **FARM BILL POLICY PROPOSALS RELATING TO FARM AND RURAL ENERGY ISSUES AND RURAL DEVELOPMENT**

**Wednesday, May 9, 2007**

U.S. SENATE,  
COMMITTEE ON AGRICULTURE,  
NUTRITION, AND FORESTRY,  
*Washington, DC*

The Committee met, pursuant to notice, at 9:30 a.m., in room SR-328A, Russell Senate Office Building, Hon. Tom Harkin, Chairman of the Committee, presiding.

Present: Senators Harkin, Lincoln, Stabenow, Nelson, Salazar, Brown, Casey, Klobuchar, Chambliss, Coleman, Thune, and Grassley.

## **STATEMENT OF HON. TOM HARKIN, A U.S. SENATOR FROM IOWA, CHAIRMAN, COMMITTEE ON AGRICULTURE, NUTRI- TION, AND FORESTRY**

Chairman HARKIN. The Senate Committee on Agriculture, Nutrition, and Forestry will come to order. I got word that my Ranking Member said to go ahead and start without him. He will be here shortly.

Today we hear additional testimony on two topics that are high on the opportunity side of the ledger for rural America: energy and rural development. One message has been consistently clear throughout the preparation for this farm bill, and that is, the new legislation must provide strong support for energy initiatives and for rural economic development.

Of course, record gasoline prices are only one indicator that our Nation is facing critical energy challenges. We have long known of our vulnerability arising from our overdependence on oil. We now import over 60 percent of the oil we use, and the nations with the largest oil reserves and production capabilities are generally nations that are not especially friendly to us or they are politically unstable or a little bit of both.

Our Nation's agricultural sector has already demonstrated impressive biofuels production capabilities, and there is evidence it can do a lot more. Senator Lugar and I are just two of the believers. We introduced the Biofuel Security Act in January, calling for 30 billion gallons of renewable fuels by 2020 and 60 billion gallons by 2030. And I am pleased to see that a number of others, including President Bush and the Energy and Natural Resources Committee, are calling for very similar targets.

Now, if we achieve these levels of biofuels production, it will involve tens of millions of acres devoted to producing biomass feedstocks. This could mean some very significant shifts and changes in agriculture in America. I know there are some who fear that greater biofuels production will disrupt supplies or prices of other agricultural products, and certainly these concerns must be heeded and addressed. However, if we do the research and formulate the technology and market policies carefully, I think we can capitalize on this tremendous opportunity to produce energy in addition to supplies of food and feed and fiber. And, again, this will be beneficial to rural America, and it can provide a lot of rural economic growth and development and investment in rural America.

Our first panel brings energy to the table alongside rural economic development. Economic development is much more than just a byproduct of rural energy production. It must be a priority that cuts across these two important farm titles. In particular, we must foster local and regional initiatives using available resources with the Federal Government serving as a partner and leader in driving these rural economic opportunities.

On the second panel, we will speak about the future of biofuels, both the technology developments and the roles that cellulose is going to play in the future development.

The Farm Security and Rural Investment Act of 2002 was the first farm bill ever to include an Energy Title. We enacted that with strong bipartisan support. We will hear testimony today about energy achievements that resulted from that title. That will also help us frame a sound farm bill program and policy to help manage our energy systems in the future.

Finally, I always like to hear from folks that are utilizing our programs in their farming and their businesses, so we were able to include a couple of witnesses today actively engaged in the energy business in rural America.

I will at this point leave the record open for any opening statement that Senator Chambliss might have or any other Senators who arrive.

We will turn to our witnesses on our panel one. We will just go down the line, and I will just recognize each here. We have the Honorable Glenn English, National Rural Electric Cooperative Association. Glenn served ten terms in the House as Representative from Oklahoma. We came together in the class of 1974 and served together there for a few years. I was there for five terms in the House before coming over here. So Glenn is an old friend, and we served together on the Ag Committee over in the House of Representatives. Mr. English will talk about the NRECA's experiences and views on both energy and rural development programs and policies in the farm bill.

For each of you, all your statements will be made a part of the record in their entirety. I am going to ask if you could sum up in, oh, 5 to 7 minutes, something like that, and then we can get into a discussion afterwards.

So we will start with Mr. English, and we will just go down the line. Glenn, welcome back to the Committee again.

**STATEMENT OF HON. GLENN ENGLISH, NATIONAL RURAL  
ELECTRIC COOPERATIVE ASSOCIATION, ARLINGTON, VIR-  
GINIA**

Mr. ENGLISH. Thank you very much, and I appreciate it, Mr. Chairman. Let me also thank you very, very much for the great support that you provide rural development. In fact, this entire Committee has been very supportive of rural development, and I know that has certainly made a big difference.

The first thing I want to bring to the attention of the Committee, Mr. Chairman, is really the impact that, of course, electric power has on all of rural development. We have a lot of new ethanol plants that are being developed across this country. They are energy intense and provide a lot of electric power. The other part of the reality that we are facing as far as the electric utility industry is concerned is we are out of capacity, so we are going to have to build a lot more capacity, particularly over the next decade. And this is going to be the most expensive generation that we have built in the history of this program, and we have already been telling the membership out there that they are going to see significant rate increases throughout the next few years. So this is something that is going to have an impact on all rural consumers. It is certainly going to have an impact as far as rural development is concerned. It is something that we are very concerned about, and part of what I want to talk to you today about is what the Congress can do to kind of help minimize this as we move forward.

Certainly one of the prospects is making sure we have adequate financing. We are talking about some \$42 billion that is going to be necessary over this next decade to deal with infrastructure problems, some upgrades, transmission and certainly generation capacity. If the Congress would be supportive of authorizing Farmer Mac to buy electric cooperative loans that would be another avenue of financing, another way in which we could help make sure we do have adequate financing out there.

The REDLG program is one that certainly this Committee has been extremely supportive of, and we are deeply appreciative of that. Of course, we have used this as a means in which electric cooperatives can pay back their loans early. We take that money, and then we are able to loan that out to the community and help out on rural development. Mr. Chairman, I know you have been very supportive of this effort.

What we would suggest is, as we move forward in the field of renewables, this may be one way that we can use some of the REDLG money to develop renewables. So it would be helpful if the Committee is willing to authorized REDLG funds to be used for renewables through electric cooperatives, doing this directly.

Also, it would be helpful if the Committee would speak to some other Members of Congress, both in the House and Senate side, that seem to want to take some of the REDLG money and use it for other purposes. We have got \$244 million, Mr. Chairman, that has been utilized for other programs, not rural development, and that would otherwise have been leveraged into over \$1 billion worth of rural development projects out there. So this would be something that would be helpful as well, making sure that this

REDLG money goes to REDLG projects and not to other projects in agriculture.

And renewables in particular is something that I know has the attention of this Committee, and a lot of members of this Committee, I have spoken to several of you in the past, and you have spoken to me. I am a member of the 25x25 steering committee that has a goal of 25-percent renewables by the year 2025 for all energy, and we think that is a good objective.

We have been trying to figure out now what can electric cooperatives do to advance this cause, and as you look at this, of course, most renewables are going to be produced in rural America. That is where it is going to come from; that is what it is all about. Many are looking at this as a rural development project. And we have got some of our generation and transmission cooperatives now that are looking at coming together and maybe forming a single generation transmission entity that would do nothing except produce renewables for this country, make a contribution.

Now, we cannot do it all ourselves, obviously, but this would be a way in which you could have cooperatives all across this Nation. And we are in 47 States, and we are serving some 40 million consumers. It would be a way of those 40 million owners to come together and pool their resources and develop those renewable projects where it makes sense, when it makes sense, and where we can get the most productivity out of it. And also, of course, it would be a way in which we could expand this and move forward and make it available to the rest of the country.

It would be a heck of a rural development project, Mr. Chairman. It would be a way in which rural America could make a major contribution, move power, renewable power from rural America into some of the urban areas that are being served, and would be a way in which all rural Americans could participate in this effort. And I think it would be a very big plus.

Also, I dealing with suggest that this is a way in which those States that may not have an opportunity today to participate in renewables, it is just not feasible, does not make sense where they are from, this would be a way that they could also participate in this effort and make that kind of a contribution.

The other thing that is extremely important, I would suggest, in order to move this renewable power into these urban areas, is that we need more transmission built. We are going to have to have transmission built from the areas where we establish this concentration of renewable energy and move it so it can be delivered to some of the major metropolitan areas in this country, export that power from rural America.

One thing that would be very helpful in that manner would be some tax-exempt bonds. Now, what we would suggest is that if the Congress sees fit to move in that direction, tax-exempt bonds in building transmission should be made available to everybody. We are not just suggesting that it be done for electric cooperatives, but it should be for anybody who is willing to go out and build that transmission, and it should be dedicated to renewable energy, that transmission should.

So I think that there are some ways in which that can enhance rural development. There are some ways in which we can make

even greater contributions on the electric utility side as well as on the ethanol side, and I think this is a way, Mr. Chairman, which, quite frankly, we can do this in a manner that makes a lot of sense and do it in a most efficient manner possible.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. English can be found on page 59 in the appendix.]

Chairman HARKIN. Thank you very much, Glenn, and I will have some questions later on, after we finish the panel, on REDLG. Your statement sparked a lot of interest here. I read it last evening. I think there are a lot of things in it that command this Committee's attention. But we will get into that later.

I would yield now to my friend from Georgia, our Ranking Member, Senator Chambliss, for an opening statement and an introduction.

**STATEMENT OF HON. SAXBY CHAMBLISS, A U.S. SENATOR  
FROM GEORGIA**

Senator CHAMBLISS. Well, thank you, Mr. Chairman. I have got an opening statement which I will submit for the record, but I just want to thank you again for holding a hearing on such an important issue as energy and rural development. You have been very diligent in covering a broad spectrum of subjects as we prepare to write this 2007 farm bill and provide a safety net for our farmers and ranchers across America, and at the same time we are addressing critical goals, such as conservation, energy security, nutrition, and rural development. And certainly this panel today as well as our next panel are going to provide some valuable information for us to deal with the issues involving water and energy as well as rural development.

I particularly want to take the opportunity to introduce my longtime dear friend, Mr. Jimmy Matthews, from Barnesville, Georgia. Jimmy is Executive Director of the Georgia Rural Water Association, and Jimmy is Mr. Rural Water in Georgia and the Southeast. He has appeared before many congressional committees over the years. He is a man who is very focused and professional and is addressing an issue regarding the issue of rural water, and I am very pleased he is here today.

I am also pleased to see my good friend, Glenn English. Glenn, obviously, in his capacity with our co-ops, represents an area that is extremely important to all of rural America. His constituency, as he says, covers 47 States, and that is pretty significant.

As a rural co-op attorney for 24 years, I have a significant and particular parochial interest in co-op work, and I am very pleased that we have several members of Georgia co-ops who are here today: my former staffer, who now worked for the Georgia Electric Membership Corporation, Matt Sawhill; Randall Pugh is CEO of Jackson EMC; Mike Goodroe, CEO of Sawnee EMC; Ralph Brummelow, the Director at CFC; as well as Gary Miller, CEO of GreyStone Power. Gentlemen, we are pleased to have you all here today.

I look forward to your testimony, and, Jimmy, welcome back to Washington and great to see you.

Mr. MATTHEWS. Thank you, sir.

Senator CHAMBLISS. Thank you, Mr. Chairman.

**STATEMENT OF JIMMY MATTHEWS, GEORGIA RURAL WATER ASSOCIATION, BARNESVILLE, GEORGIA**

Mr. MATTHEWS. Good morning. I would first like to thank Chairman Harkin and Ranking Member Chambliss, Ranking Member Chambliss for inviting me to testify today. I feel it is a great honor to be asked to represent the many communities in the Nation who depend on rural water systems to provide the most basic of needs. As Executive Director of the Georgia Rural Water Association, I hear from rural communities in need of assistance to bring water to their community on a daily basis.

I speak to you today on behalf of the National Rural Water Association, known as NRWA. The NRWA is a nonprofit federation of State Rural Water Associations. Our mission is to provide support services to our State associations who have more than 26,000 water and wastewater systems as members. NRWA and its State associations are on the front lines every day ensuring water is safe and available each time someone in rural America turns on the tap. I would like to outline for you today several items which are of importance to NRWA and how we feel they can best be addressed in the upcoming farm bill.

The first issue that I would like to discuss is the current USDA Water and Wastewater Grant and Loan Program. While this program continues to provide needed assistance, an ever-present backlog for the funding shows that the need far outstretches the funding availability. This Committee, and Chairman Harkin in particular, committed ample resources during the 2002 farm bill to address this backlog, and yet it remains and continues to grow. I would ask the example I referenced in my written testimony which outlines specific issues related to the backlog.

NRWA understands the difficulties that face this Committee with drafting this upcoming farm bill, and we encourage you to find creative ways of addressing this backlog and ensuring its demise. As you know, the program is based on packaging together grants and loans to offer the best possible situation to rural communities in search of water infrastructure. We would encourage the Committee to take a serious look at mandating in statute a minimum level of grants in this program. This would give communities the ability to plan ahead and know exactly how much their package would be in hard dollars while giving them the ability to better know the level of loan they would be expected to assume.

How can fewer dollars be made to work in a larger way to assist rural America? The answer may be as simple as letting some of the dollars under this farm bill work for you not just once, but for years to come. We feel this can be done through the enactment of a nongovernmental, nonprofit entity to make loans to rural communities, which could work in unison with the current program. The National Water Finance Assistance Corporation was established to do just that. By taking Federal seed money, the National Water Finance Assistance Corporation can match it four to one and make loans to rural communities in order to get the financing out the door quickly. This allows the same dollars to be spent on a revolving basis to eat away at the current backlog and help alleviate it



not only over the life of this farm bill, but for years to come. We feel this concept represents some creative thinking without asking for a huge amount of additional dollars and a way to help solve the problem so it does not remain on the Committee's plate for years to come.

The next item I would like to address and discuss is the USDA Circuit Rider Program. In 49 states, circuit riders and wastewater technicians assist and train water system personnel in all areas of management, compliance, operations, and maintenance. They have also established themselves as first responders in times of need for systems throughout the country. This was evident in the aftermath of Hurricanes Katrina and Rita. Rural water circuit riders from all over the country descended on those States hit by these disasters and got systems up and running in a matter of days, delivering safe drinking water to those citizens left. I have attached a letter which illustrates the acts of these tireless workers to my written testimony and ask that it be included in the record. We ask the Committee for an expansion of the authorized levels for this program from the current level of \$15 million annually to \$25 million annually.

The last item I would like to bring to the Committee's attention is the Source Water Protection Program. This program administered by the Farm Service Agency, is the single most effective tool rural communities have in planning for the future of their water sources. By working with community leaders, farmers, ranchers, and other stakeholders, source water protection plans are developed to address the threats envisioned and the protections needed well in advance of these issues reaching critical stages. We have had great success in my home State of Georgia with this program, and I would like to submit a copy of a recently completed plan for the record, should any Senators like to see exactly what is accomplished by this program: an increase of authorization for this program to \$20 million with a one-time mandatory appropriations of \$10 million to ramp up activities which would address the current need.

In conclusion, the USDA employees who administer the programs that I have discussed today are second to none. Their professionalism and dedication to rural America cannot be measured. They have a true love for rural communities and a desire to see them reach their greatest potential. Mr. Chairman, Senator Chambliss, members of the Committee, I thank you today for listening to my testimony, and more than that, I thank you for your deep care for rural America. Without the hard work of yourselves, your staff, and the other members of your body, none of these programs would be possible. And I would like to specifically thank Richard Bender and Todd Batta of Chairman Harkin's staff and Dawn Stump and Matt Colley of Senator Chambliss' staff for their time and consideration in reviewing each of the proposals that I have set forth today.

Thank you again, and I would be happy to address any question you might have for me.

[The prepared statement of Mr. Matthews can be found on page 96 in the appendix.]

Chairman HARKIN. Mr. Matthews, thank you very much for your testimony and for recognizing the people who do the real work around here—our staff. Thank you for that.

Now we will turn to Mr. Robert Grabarski, National Council of Farmer Cooperatives, from Arkdale, Wisconsin. Mr. Grabarski is a dairy farmer and a board member of CHS, a farmer-rancher-cooperative-owned Fortune 500 company. Bob will talk about CHS' experiences with bioenergy production and marketing, as well as producing energy from livestock manure.

Mr. Grabarski, welcome to the Committee. Please proceed.

**STATEMENT OF ROBERT GRABARSKI, NATIONAL COUNCIL OF FARMER COOPERATIVES, ARKDALE, WISCONSIN**

Mr. GRABARSKI. Thank you, Mr. Chairman, members of the Committee, and thank you for your interest in developing rural renewable energy. Again, my name is Bob Grabarski. I am a dairy farmer and a member of the Board of Directors of CHS, the country's largest farmer-owned cooperative. Today I am here representing the National Council of Farmer Cooperatives, the national trade association representing the nearly 3,000 farmer cooperatives across the Nation.

Cooperatives help meet the food, feed, fuel, and fiber needs of consumers and help farmers to improve their income from the marketplace. A number of NCFC members, including CHS, refine and produce both conventional and renewable fuels. In the last few years, farmer cooperatives have made substantial commitments to rural America and bioenergy by investing in ethanol and biodiesel facilities and building additional terminal storage for renewable fuels in strategic locations. CHS has been in the renewable fuels business for nearly 30 years. We now market more than 500 million gallons of ethanol-blended fuels yearly. As an over-20-percent owner in the new U.S. bioenergy, CHS now also produces ethanol as well.

CHS is also active in the biodiesel market, having sold—largely through our member cooperatives—the equivalent of 2 million gallons of biodiesel. On the whole, the renewable fuels boom has been very important for CHS as a cooperative and for our farmer owners. Working through our cooperative, thousands of farmer members have been able to participate in this growing industry, and rural communities have greatly benefited.

Renewable energy and animal agriculture. With nearly 80 percent of all U.S. milk being marketed by cooperatives, NCFC has been investigating opportunities to provide animal agriculture a stake in the renewable fuels industry by maximizing the use of manure as a feedstock for renewable energy.

In partnership with the National Rural Electric Cooperative Association, NCFC is working on the development of a template for the generation of electricity from manure. We hope to identify needed incentives and hope that Congress will support the generation of renewable energy from manure, much like you have supported the research incentives, infrastructure, and Federal policy which helped build the ethanol and biodiesel industries.

Using just a fraction of the manure generated on this country's swine and dairy operations would generate enough electricity to

power the homes in Iowa's capital of Des Moines for nearly 6-1/2 years, or Atlanta for 3 years, or the homes in our Nation's capital for 2 years. Applying this technology to all sizes of livestock operations would vastly increase the production of renewable electricity, could add millions of dollars annually to farm income, and could address expensive environmental management issues which include odor and wastewater concerns, and could help in managing greenhouse gas issues.

To achieve this, policy and incentives must be in place, much like it has been for the ethanol and biodiesel industry. To drive the production and the market using manure as a feedstock and applying anaerobic digestion technology is clearly a win-win for U.S. agriculture and taxpayers alike.

As Congress continues to provide leadership to the renewable fuels industry and as you prepare for the farm bill and other energy legislation, I would like to share our recommendations to continue the momentum. These include:

- Strengthen current Energy Title provisions to encourage development, production, and use of renewable energy from crops and livestock. In the case of livestock, this includes dedicating the needed resources in the form of research, incentives, grants, and loans to support efforts to drive the market and production of all forms of renewable energy, including electricity, from manure;

- Support an increase in the Renewable Fuels Standard beyond 2012 and the goals of the 25x25 initiative, a movement working toward securing 25 percent of our energy from renewable by the year 2025;

- Support more research into the development of cellulosic ethanol;

- Maintain and strengthen Federal procurement, loan, grant, and research and promotion programs;

- Maintain and strengthen energy-related research programs; and extend all the current renewable motor fuel tax incentives.

In conclusion, farmer cooperatives are a vital player in this country's quest for energy independence and in ensuring that producers are able to capitalize on expanded market opportunities. Ethanol, biodiesel, and manure conversion, along with conservation, are important tools in securing a more affordable and accessible domestic renewable energy supply. We appreciate the opportunity to share with the Committee ways in which agriculture and cooperatives are investing in renewable energy. We appreciate this Committee recognizing the contributions that the American farmers and ranchers are having in the renewable energy industry and look forward to working with you in the future.

I will welcome any comments and questions. Thank you.

[The prepared statement of Mr. Grabarski can be found on page 69 in the appendix.]

Chairman HARKIN. Mr. Grabarski, thank you very much for a very thought-provoking statement. I hope that we will have a lot of questions on that area when we get to you.

Mr. Steve Slack, Director of the Ohio Agricultural Research and Development Center at Ohio State University, is representing the new North Central Bio-economy Consortium. This is a group of State-level entities from 12 Midwestern States that have banded together to work toward the development of greater energy inde-

pendence, utilization of biomass feedstocks, and robust bioeconomies. Mr. Slack will talk about the group's plans and how it relates to the Federal policies in the upcoming farm bill.

Mr. Slack, welcome to the Committee.

**STATEMENT OF STEVE A. SLACK, DIRECTOR, OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER, THE OHIO STATE UNIVERSITY, WOOSTER, OHIO**

Mr. SLACK. Thank you, Mr. Chairman and members of the Committee. I am here to talk today about the North Central Bio-economy Consortium. As indicated, this consortium is a 12-State collaborative effort between the commissioners, directors, and secretaries of the State Departments of Agriculture, Cooperative Extension Services, and University Agricultural Experiment Stations. Together these three institutions from the States of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin have pledged to work together to guide our North Central region and the Nation to greater use of bio-based fuels, energy, and products.

Each organization in the consortium has agreed to contribute funding to the operation of the consortium, and a private foundation—the Energy Foundation—has provided matching funding. The Great Plains Institute is partnering with the consortium to provide staffing and facilitation. The North Central Bio-economy Consortium has also recently agreed to collaborate with the Midwest Governor's Association on policy review and development for a proposed Energy Summit to be held later this year.

Although this effort currently focuses on one region in the United States, we believe that our efforts will benefit the entire Nation and may serve as a model for other regions. As we continue down the path toward greater energy independence from the use of bio-based feedstocks to supplement limited supplies of fossil fuels, the consortium hopes to advance the general knowledge about processing technologies, crops, economics, and logistics that will be useful nationwide.

As to the farm bill, we are very pleased to be asked for our input and would like to take this opportunity to share with the Committee what we see as three crucial priorities for the 2007 farm bill: first is in the area of bio-based product procurement; second would be regional feedstock demonstrations; and third would be local economic development.

In addition, we have appendices, first from the 12 State Departments of Agriculture, which is part of the National Association of State Departments of Agriculture, whose President-elect is the North Dakota Agriculture Commissioner Roger Johnson. That is appended as Attachment 2, and likewise, the land grant system through the National Association of State Universities and Land Grant Colleges, or NASULGC, has made several recommendations for Committee consideration. That is attached as Attachment 1.

As to the bio-based product procurement, we would coordinate the development of a regional bio-based product procurement program for the North Central Region consistent with FB4P, a system under which Federal agencies must purchase designated bio-based

products that are available and cost competitive with fossil-based equivalents.

In this regard, we would urge the Committee to reauthorize Section 9002 of the 2002 farm bill dealing with the Federal procurement of bio-based products and to provide the U.S. Department of Agriculture with the resources it needs to support the development of a regional program.

As to regional feedstock demonstrations, the next generation of the biofuels industry depends on the successful deployment of a variety of new biomass feedstocks and continual improvement of existing feedstocks. At the same time, significant questions exist regarding potential sources of biomass.

The only way to answer these questions and to solve the problems are is with commercial-scale demonstrations for a variety of proposed biomass materials, which will reduce risk and will also improve efficiency of the process. And this is a process for which the North Central Region is well suited. There are projects by State that are also appended as Attachment 4 to the testimony.

We welcome the opportunity to partner with public and private partners and with partners in other regions to assure that we learn as a Nation how to make the best use of resources producing energy and products from plants.

Third, the local economic development. Developing a bio-economy is crucially important for energy security, but it is also important because it will improve the economies of our States, bring jobs to rural areas, revive our Nation's manufacturing base, and improve the lives of individuals and our communities. This is essential to the missions of all consortium. As such, we would hope that the mechanisms are in place in the 2007 farm bill to assure that the benefits of the developing bio-economy can accrue to the local communities throughout our region. We anticipate that research conducted in our region can have value to the entire Nation and that our model will be useful for other regions of the U.S. as well.

In conclusion, we would like to offer ourselves as a resource to this Committee as it drafts the 2007 farm bill. Given our geographic and institutional representation, we are uniquely situated to offer information and guidance about the developing bio-economy in the region where it is developing the fastest.

Let me reiterate that although the consortium is a regional project, we welcome the opportunity to collaborate with other regions and hope that the lessons learned in our region are applicable around the country as our Nation continues down the current path toward greater use of bioenergy to support energy independence, local economic development, and environmental protection.

Thank you for your commitment to the health and vibrancy of agriculture in this country.

[The prepared statement of Mr. Slack can be found on page 107 in the appendix.]

Chairman HARKIN. Thank you very much, Mr. Slack. We will begin a round of questioning now, 5-minute rounds. We will not hold too fast to that.

I just have one basic question for all the witnesses. We are facing a very serious budget issue since we tried to write this year's farm bill. We do not have the baseline that we had 5 years, 6 years ago.

And yet I think we all understand that our energy situation is critical. And as you all pointed out, our agricultural sector offers one of the most important opportunities to improve our energy security and our energy economy, which also benefits rural development.

Now, some energy actions are more appropriate for other committees. Obviously, we have an Energy Committee, and there is the Finance Committee, and Environment and Public Works. So there are a bunch of different committees that have different jurisdictions. Yet, there are a number of activities appropriate for consideration in this farm bill.

So, again, some of it will be repeating what you have already said, but that is OK. Again, for the record, in your opinions, what are the two or three or four energy program priorities that you would see for this farm bill? Again, you might repeat some of the things you said earlier, but that is OK. That is fine. Drive it home. Glenn?

Mr. ENGLISH. Thank you very much, Mr. Chairman. I recognize and understand and appreciate the problems that the Congress has with regard to budgets. I have been through that myself. But it does come down to a question of priorities, and I think we have got a couple of priorities here.

One is the question of trying to reduce dependence on foreign energy. I think we all recognize that is a great goal.

The second thing, obviously, are environmental issues. Climate change is getting to be a big issue that I know the Congress is very concerned with, is wrestling with, and how do we come to grips with that.

And I think you have got to step back from some of the individual programs, and you are going to have to try to figure out, OK, how can we get at some of these big problems that we have got, and how do we do that with a very targeted approach, one of limited funds. True, you are not going to be able to fund everything. And so I guess to reduce it down, you are looking for the biggest bang for the buck, is what you are really coming down to. That is what this is all about.

There are some items, I think, that do not cost money. We were suggesting, for instance, we are going to have big rate increases, huge rate increases for electric cooperatives all across the country. So is the rest of the electric utility industry, and this is going to, quite frankly, have a dampening impact as far as rural development is concerned because that is going to affect electric bills, all those new businesses we are trying to start out there.

One thing you can do, I think, as I mentioned, is to open up Farmer Mac and let them buy loans from electric cooperatives, open up some different financing, give us a little more competition for funds. That really would not cost much in the way of money. I think the REDLG financing that already exists, that is money that electric cooperatives are paying into the program as we pay back those loans early, so that, you know, is another one that minimizes that. And that can be used, I think, for renewable energy; if you open it up and let cooperatives use that for renewable energy, that would be another way of doing it. And, quite frankly, you can talk to some of your colleagues and stop them from raiding the fund. That would be helpful, too. You know, if \$244 million goes

out of rural development and goes elsewhere—if we could hold onto that, that would be helpful. That is \$1 billion plus that we could leverage that money to. That would not really cost a whole lot of money.

The other thing I think we can get into is this question of really looking at how we can organize. The National Council of Farmer Cooperatives, we are talking about how we are working together on biomass that would have a positive impact as far as water quality is concerned, as far as livestock production is concerned. We can, I think, concentrate that in the right areas where it makes sense, where it is viable, and use that to generate electric power, to not only take care of our own needs but, as I said, to see out of rural America. That is another way in which I think we can address this.

So I think there is much that can be done that is really not that costly, but it is going to call for us doing things a little differently than what we have done in the past.

Chairman HARKIN. Good enough.

Mr. Matthews, two or three things.

Mr. MATTHEWS. Yes, sir. First of all, we would hope that the Committee would not enhance other priorities at the expense of the current programs. Rural development must be in place to provide the infrastructure needed to provide this energy. But as Mr. English just said, you know, when power goes up in the cost of producing safe drinking water, it is going to have an effect on the power that it takes to produce the safe drinking water and also to treat the wastewater before we return it into the streams. So it is a double-edged sword.

But I would submit to you that my friends back home at Oglethorpe Power, MEAG, and Georgia Power, the southern companies, sponsored a program with Georgia Rural Water on an energy and water conservation program that had some phenomenal numbers as to the power saved over a long period of time if we put these programs in place. So there is a system in place for leak detection in these water systems of the massive amount of water that we are losing through old infrastructure that needs to be replaced.

Chairman HARKIN. That is true.

Mr. Grabarski, two or three things most important to the farm bill, energy?

Mr. GRABARSKI. Thank you, Mr. Chairman.

Chairman HARKIN. You mentioned some in your testimony.

Mr. GRABARSKI. Yes, I did. Renewable energy developed in the country is not a cheap thing to do. To lessen our dependence on foreign oil, certainly that is a way to do that, but it does not come without a cost. As far as driving the costs out of some of these issues, I am not sure that can be done to any great extent. There certainly will be developing cost return on these through tax base, jobs, a number of other things. I think it will be a sustainable program, but it certainly needs to get some incentives to get started.

Chairman HARKIN. Right. Thank you.

Mr. Slack, again, a couple things, three things.

Mr. SLACK. Thank you, Mr. Chairman. The items that I would re-emphasize, first of all, would be the reauthorization of procurement of bio-based products.

Chairman HARKIN. The 9002 program.

Mr. SLACK. Yes. The second item would be to put emphasis on biomass research and development. In particular, I mentioned the large-scale demonstration projects to increase efficiency and develop appropriate biomass materials.

The third one would be the idea of bioenergy development grants which would help in the area of rural development.

Chairman HARKIN. I would also like to ask if you have any suggestions, not right now but maybe the next round, if there are any changes in 9002 that you think we ought to be making. Thank you all very much.

Now I will recognize our distinguished Ranking Member, Senator Chambliss.

Senator CHAMBLISS. Thank you, Mr. Chairman.

Mr. English, the Washington Post recently ran a front-page story on USDA, the overall scope and mission, and it implied that three of our co-ops in Georgia—Sawnee, Jackson, and GreyStone—should not be eligible for RUS financing because they are no longer rural. What is your reaction to that type comment?

Mr. ENGLISH. Well, I did take note of the fact that that was a general attack on rural development, quite candidly. I was disappointed to see that in the Washington Post, but that is what it was. The items you mentioned were the very bottom on the second page, so I guess they were not attaching too much significance to it.

The fact of the matter is that we have been blessed with some growth in some of the areas that are served by electric cooperatives. But those are still very rural areas. For instance, I do not know of a single electric cooperative in this country that has half the population, half the meters of, say, investor-owned utilities, and not anywhere close to what some of the municipals are. And anytime we have that kind of growth, it benefits those rural people in particular because we have such a huge amount of infrastructure across this country we have got to maintain. We have got about 42 percent of all the distribution infrastructure of the Nation and only 12 percent of the population.

If you took the particular cooperatives that were mentioned in this case, there is not a single one of them that I am aware of that is half the size of what investor-owned utilities are, not even close to reaching what the municipals are. These are still rural areas. And we have been blessed with some growth, we have been blessed with some economic development, and this helps those rural folks in that district keep the rates down.

Quite frankly, it does not make a whole lot of sense. I guess you could start looking at some of this stuff and say, well, the glass is half-full or half-empty. But I guarantee you that those rural folks in there are very pleased that this is benefiting them and benefiting—sharing that burden of paying for that infrastructure.

Senator CHAMBLISS. And they did not mention the cost of service per mile anywhere in the article.

Mr. ENGLISH. They did not anywhere in the article, no mention of cost per mile. And you have got such a small number of people. We have got on average seven people per mile to pay for 42 percent of this infrastructure out there. And investor-owned utilities have



got 35 people, 35 persons per mile. And you get over to municipal, and it is 47 persons per mile.

So when you start looking at 42 percent of the infrastructure, seven folks per mile paying for all this, you know, goodness sakes, I hope some more of these cities come out there and develop. We need all the help we can get. And when you look at the fact that on an average our rates are higher than the neighboring investment-owned utilities, you know, and this is all at a time we are trying to do something for rural development.

And let us not forget one other point, and I think this is extremely important, and it gets overlooked, and it definitely was not in this article. That is, half of the electric cooperatives will have above average number of people who are living below the poverty line. So you have got some of the poorest people in this country living in these rural districts, and they are paying the highest rates already. You know, any help they can get, wherever it can come from, you know, that is great. Any help they can get in paying for this infrastructure, that is great. And anything we can do to develop rural America I think we ought to be doing that.

So, you know, I think they ought to be just as happy as they could be for those folks that are living in those areas in which we have had some growth out that has been able to help those people living—the rural folks living in those areas pay for that infrastructure. Quite frankly, it gets me, it strikes me, it does not make any sense to me as to why they want to come kick around folks in rural America. And I do not know what this is all about. You know, it makes me wonder if this is not a deal, well, golly gee, it is a rural versus urban thing. You know, I want to take money away from rural folks to give it to urban folks.

I know there is not as many votes out there in the rural areas as there are in the urban areas. But they make a major contribution to this country and make a major contribution to keep this country fed and make a major contribution to keep this country clothed, and we ought to recognize that from time to time.

Senator CHAMBLISS. I think it probably has more to do with welcome to the year we write the farm bill.

Mr. ENGLISH. I think that is exactly right.

[Laughter.]

Senator CHAMBLISS. Mr. Matthews, you mentioned that a \$10 million annual increase in the Circuit Rider Program would make it possible to provide an additional circuit rider in each State. How many circuit riders are currently supported nationwide?

Mr. MATTHEWS. Yes, sir, Senator Chambliss, we have 120 circuit riders nationwide at this time through this program, and with additional support from some States that have some State circuit riders also. And the Circuit Rider Program began in 1980 with five circuit riders, and soon it expanded to 21 States. And in 1988, it was the first NRWA program to cover the contiguous 48 States at that time. Today it continues to run from coast to coast and covers both Alaska and Puerto Rico.

Senator CHAMBLISS. Great. Thank you, Mr. Chairman.

Chairman HARKIN. Thank you, Senator Chambliss.

Senator Salazar?

Senator SALAZAR. Thank you very much, Chairman Harkin, and I want to just at the outset say thank you to you, Chairman Harkin, for coming out to the National Renewable Energy Lab in Colorado and to be a part of recognizing all these technological breakthroughs that are really putting energy at the forefront of our agenda.

For me, in my State of Colorado, 2 years ago there was really not much at all going on with respect to renewable energy and that future. And I was just looking over some of the statistics. I think since the last 2 years that we have looked at rural America as a way of growing our way to energy independence, we now have an ethanol plant in Windsor at 40 million gallons, an ethanol plant in Sterling at 48 million gallons; we have one in the southeast part of Colorado with 3 million gallons; we have Sterling Ethanol planning one for 60 million gallons; we have Panda Energy for 100 million gallons; we have U.S. Bio in Fort Morgan at 100 million; we have done a lot with solar, and the list kind of goes on, biodiesel and a whole host of things.

I say that only as an example that I think there is this revolution underway that you have all talked about in terms of how we deal with energy, I think driven both by the national security mandate that we need to address, the environmental security mandate, and economic security issues. And so I very much look forward to working with this Committee and with the other committees that I sit on with some of my colleagues on this Committee, the Finance Committee as well as the Energy Committee, to move this agenda forward. I think this may be the single most important opportunity that we have seen in rural America, perhaps in my lifetime, perhaps in the last century.

Let me ask a question first to Glenn English. You are a supporter of the 25x25 resolution which Senator Grassley and I and other members of this Committee have been pushing for a long time. Can you comment on the importance of that initiative and what your involvement from the cooperative standpoint is and how we can be helpful in pushing that forward?

Mr. ENGLISH. Well, I am the only from the electric utility industry on that steering committee and am very proud to be a part of it representing NRECA. There is no question that establishing the goal of 25-percent renewable by the year 2025 for all energy—this is all energy combined—we think makes a whole lot of sense. And, obviously, we have talked a little bit about reducing our dependence on foreign energy. That makes a whole lot of sense.

From an economic development standpoint—and I will be honest with you, most folks on that steering committee, you know, have got a big eye toward that economic development aspect and what we can do for rural America. But we think it makes a whole lot of sense—if we do it right.

They accompanied that resolution or that goal with an implementation plan. We felt it was not good enough to just say, well, we ought to have this goal, Congress, you ought to pass this, establish the goal. We have that all the time. I remember back years ago we used to pass resolutions about every other year about balancing the budget, and we all voted for it, and then we all, you know, would not necessarily hold to that.

So we need to do a little more than that. We need an implementation plan, and that implementation plan is a very important part of that, and I think that would certainly be something that would not cost that much money if we started focusing on how we are going to do this stuff. And we need a partnership between Congress—and I know we are reaching out as far as this Committee is concerned and over in the House, and trying to develop a partnership. How do we get a plan that makes some sense? How do we get the most efficient use out of approaching this stuff? And how do we achieve this goal of 25-percent renewable by the year 2025?

I hope every member on this Committee, if they have not signed on, I hope they will do it now. I have put in my commercial on that.

Senator SALAZAR. Then let me ask you a question. This is a tremendously interesting panel. I think we could spend all day talking to each of you because all of you have so much information to share with us. I know there is a lot on the fuel side in terms of ethanol and cellulosic ethanol and the like. Let me come back on the electric side.

If you were to name the one single thing—the one single thing—that we could help the REAs with, what would that be as we move forward with these high aspirational goals that we have with respect to renewable energy? The one thing.

Mr. ENGLISH. I can only name one?

Senator SALAZAR. Just one thing.

Mr. ENGLISH. Well, if I had to name one thing, the one thing that you need, obviously, to fully develop this, you need transmission. You need transmission. We have got to site these plants where it makes the most sense, and if we are talking about wind, the wind does not—

Senator SALAZAR. Let me push you on that. We need transmission.

Mr. ENGLISH. Yes, sir.

Senator SALAZAR. We all agree that that is one of the hindrances that we have in terms of wind and solar and other possibilities out in rural areas. What is your view in terms of what it is that we can do to help bring about that possibility?

Mr. ENGLISH. Well, this is one that, unfortunately, costs a little money. But I think you have got to provide tax-exempt bonds to anyone who will build that transmission to link up those areas where we can maximize the production of renewable energy and be able to move that power into the urban areas. Quite frankly, that is what has got to go.

Senator SALAZAR. So you would be supportive of tax-exempt bonds for that enhanced transmission capacity as well as other financial incentives to create that transmission—

Mr. ENGLISH. Indeed. I think it makes a whole lot of sense.

Senator SALAZAR. That has got to be the key.

Mr. ENGLISH. Yes, sir.

Senator SALAZAR. Thank you, Mr. Chairman. I will have some other questions if we get another round.

Chairman HARKIN. Thank you, Senator Salazar.

Senator KLOBUCHAR?

Senator KLOBUCHAR. Thank you, Mr. Chair, and I want to welcome Mr. Grabarski. CHS is headquartered in Minnesota, and as

Senator Salazar was going through all the ethanol plants in Colorado, Senator Coleman and I just looked at each other and said, "We have more." And a lot of it is because of the good——

Senator SALAZAR. We are on your tail. We are going to catch up. [Laughter.]

Senator KLOBUCHAR. But the good work that you have done out there. And I had a few questions as we look at these exciting possibilities for our State and the rest of the country with this energy revolution and the jobs we can bring to rural America.

I guess first to you, Mr. English, as you talked about one of the issues of the transmission lines. One of the things I have heard from a lot of our rural business is the rail rates and how expensive they have become to ship. We have a bill out there—there are a number of bills to try to get some control over these rates. Have you encountered this issue?

Mr. ENGLISH. Oh, my goodness, yes. The abuse is unbelievable. For 20 percent of the shippers, we are supposed to be protected under the Staggers Rail Act—Mr. Chairman, do you remember that, back in 1980, we passed that Staggers Rail Act? We put a provision in there to protect 20 percent of the shippers for which competition was not going to exist. He knew it was not going to exist and knew that these people could be abused under a monopoly. And that is exactly what has happened, and we have had year after year after year excuses as to why we got to abuse the captive shippers. And to give you some idea how bad that abuse is, where there is competition, it is my understanding you have got 6- to 8-percent profit being made by the railroads.

For those folks who fall into this category—and this is an awful lot of farmers who have got to ship. You have got people in the chemical industry, electric cooperatives, utility industry, wood products—go across the board. For those that fall under that category where there is even a single amount of no competition, a single amount, the profits that are being reaped off of that on the contracts that are being signed today are anywhere from 350 to 450 percent. Now, that is abuse. That is a monopoly.

Also, keep in mind that these folks are exempt from most of the antitrust laws. Only baseball and the railroads are exempt from antitrust laws. Now, tell me the sense of that. And on top of that, these guys are making profits, big money. I mean, they are the darlings of Wall Street. They are getting written up on Wall Street. That is who you have got to go and invest in, is the railroads.

Well, guess why they are making those profits? They are ripping us off. There is no two ways about that. And it is wrong, and they no longer have that excuse. The railroads are making the money. They have got a profit now, and it is time to fulfill that legislation and making sure that we do indeed protect those people where there is no competition.

Senator KLOBUCHAR. Well, thank you. I think you will be a good witness at our hearing.

[Laughter.]

Senator KLOBUCHAR. Mr. Grabarski, I wanted to ask you just about—in your testimony you talk about some of the issues with ethanol. Obviously, on our Committee we are working hard to go to the next stage of ethanol, cellulosic ethanol. But you talk about

ethanol being produced in the Midwest, yet a lot of it is blended in refineries on the coasts and the fear that foreign ethanol is going to come in on those areas. Could you talk a little bit about the obstacles you see to ethanol production across the country and how you think we can solve them with the infrastructure issues, with the pumps and things like that?

Mr. GRABARSKI. Thank you, for the question. Absolutely, that is a huge issue. The infrastructure has to be addressed. Pipelines cannot be reversed. They are full coming into our area, and they cannot be turned around.

Having said that, we need to develop an east-west pipeline. We need to figure out those railroads that say that they can handle the ethanol production. Our major problem is that we are producing it in the Midwest, and yet the people live on the coast. And so certainly we need that as a huge issue. We need to figure out how to move ethanol back to where the people live, primarily.

Senator KLOBUCHAR. Have you thought about the infrastructure issue with the pumps and the fact that I think we have like a thousand of them nationally—306 are in Minnesota—what kind of incentives we can put in to promote that?

Mr. GRABARSKI. Are you talking about the multi-grade type of pumps where—

Senator KLOBUCHAR. Any kind of pumps. We are just trying to get more E85 pumps around the country beyond the E10.

Mr. GRABARSKI. All right. We have talked somewhat. There was an issue brought up at our last annual meeting, at the CHS annual meeting, and we talked about—I think that came out of South Dakota. They had brought a resolution forward. And their concern was that they wanted to be able to choose the amount of ethanol that they would put in a vehicle or a flex vehicle. Well, a huge issue seemed to be at the time how much ethanol or percent was left within the hose.

Well, you know, if we go back to the old days when we grew up, we would empty the hose in a bucket and dump it in the tank. Well, I do not think that is going to work very well at this stage of the game. So certainly that would be an issue, how to make these pumps so they can blend that at the island. There has been some research done on that. I think that that could happen. There is no reason why we have to use E85 nationwide. E10 needs to be used nationwide. That would probably use up 14 billion gallons of ethanol production, and that is probably where we are going to peak out as far as getting it from the corn source. After that we have to figure out different sources, whether it is biomass, cellulosic, whatever.

Senator KLOBUCHAR. Thank you, and we are going to be making some major efforts toward that goal, to move toward the biomass.

Thank you.

Chairman HARKIN. Thank you very much, Senator Klobuchar.

Senator Nelson?

Senator NELSON. Thank you, Mr. Chairman.

Mr. Grabarski, I want to thank you for your testimony and your thoughts regarding the production of biogas from anaerobic digesters. I share your interest in the potential that this anaerobic digestion system holds for biofuels production, the importance of diversi-

fyng our national biofuels. That is why I introduced the Biogas Production Incentives Act, S. 1154. For my colleagues here, that is S. 1154.

In your testimony, you discuss biogas production specifically for electricity generation, and I wanted to get your thoughts on the concept that is in my bill, which provides incentives, a production tax credit, for the production of biogas, similar production incentives for other biofuels.

Understanding the problems with trying to get electricity production through transmission lines and onto the grid, it seemed to me that this could be considered a biofuel and that the Government should encourage that production and then allow the biogas to be used to power ethanol plants or electric generators, whichever the market wanted.

What are your thoughts on this approach and what the market may require? And have you looked at the potential for production of biogas as a renewable fuel source rather than as renewable electricity generation? In other words, not specifically limited to electric generation, but all over as a renewable fuel as well.

Mr. GRABARSKI. That is quite a question. What I am going to suggest is that I think it has merit, and our whole renewable energy business today and how we are going to actually approach it, I am not sure that we will end up with a home run. We may end up with a lot of singles.

When we talked about methane gas, generating electricity, putting it on the grid, you know, I have talked to some of the people that are involved, and it is my understanding—and I think Mr. English could allude probably a little bit more accurately on this. But it is my understanding that that grid is built to go from the transmission out to the rural area. And so the lines may start out big and get smaller.

So today, if we are putting methane digesters and generating electricity and trying to put them on the grid, that may not be conducive to the way the grid is built. Having said that—

Senator NELSON. Getting back to the transmission issues that you mentioned, Mr. English.

Mr. ENGLISH. Yes.

Mr. GRABARSKI. And having said that, quite possibly the answer lies in producing the gas and capturing the gas and taking it to production facilities. And if it is at ethanol production facilities or other facilities that generate renewable energy, I think that has merit. But somehow we have to get it from the farm. There is a huge amount out there, but we need to figure out a practical way, economic way, to put this into the system.

Senator NELSON. I have a bill also that would capture the tax that we have—the tariff, the tax—on incoming ethanol so that we could use that for development, research and development. Would it be appropriate to look at what kind of research and development would be required to be able to cost effectively capture that biofuel and then find a way in which we can use it either for transmission or for other uses as well? Would that be an appropriate use for some of that tariff money?

Mr. GRABARSKI. I am not sure that I have the qualifications to answer that.

Senator NELSON. But could you use it? I mean, I guess, in other words, I am sure you could use it, but would it not be an appropriate use to try to find a way to cost-effectively move that fuel so that it has a commercial value?

Mr. GRABARSKI. To me that sounds like a very good solution. Again, I am not sure I know the right answer to that.

Senator NELSON. Does anybody else have a thought about that? I know you are—Mr. English?

Mr. ENGLISH. I would have to give you a response for the record on that, Senator.

Senator NELSON. OK.

Mr. ENGLISH. I am not sure I feel comfortable with that response, either.

Senator NELSON. All right. The first time I have had people not want to use the money, but that is—

[Laughter.]

Senator NELSON. This is a town where that is an odd—no, I am just kidding. But it seems to me that if we could find a way to move the biofuels from the stockyard, from wherever, I mean the feedlot or wherever it is, the hog confinement operation cost effectively, we do not waste the waste. As a matter of fact, that is what I have said about the bill. Let us just not waste the waste. Let us find a way to do it, and this would be one of the ways.

Thank you, Mr. Chairman. Thank you, Mr. Grabarski. Thank you, Mr. English.

Chairman HARKIN. Thank you, Senator Nelson.

Senator Thune?

Senator THUNE. Thank you, Mr. Chairman, and I want to thank our panelists today for their testimony. This is an important part of the farm bill, and I think the farm bill, we all know, as a production component of that, the Commodity Title is awfully important to the producers in South Dakota. But I think people look to the farm bill, too, as being more than just a Commodity Title. It is about the rural economy and what things we can do to improve the quality of life. Whether that is water, wastewater, infrastructure, power, broadband, all those sorts of things I think come into play in the farm bill, and so your testimony today with regard to some of those issues is important.

We have one thing in South Dakota that we have more of than any other State here, and there is nothing that my colleagues from Colorado or Minnesota can do about that, and that is wind. They have more actual production, I think, but we actually have more wind. One of the problems is we have not figured out away—and, Mr. English, you touched—

Senator SALAZAR. Is that true among its politicians as well?

[Laughter.]

Senator THUNE. It is definitely true in this room. But you touched on, Mr. English, I think, the real issue and that is transmission. I have introduced a bill that would extend the production tax credit to the year 2012 because I do not think there is enough certainty when it comes to investment in wind energy. Now, that is not something that your members benefit from because you are not-for-profits. But that bill also expands and lengthens the time for the clean renewable energy bond program that came out of the

2005 energy bill. My understanding is that that is something that RECs have used rather extensively.

You mentioned tax-exempt financing or bonding authority being the key issue when it comes to building transmission facilities. Does the CREPs program give you what you need to do that?

Mr. ENGLISH. Well, we need, obviously, a huge expansion of the CREPs program to do that, or the production tax credit. The reason that we came up with the tax-exempt bonding approach is really that is something that opens it up to everybody. And the building of transmission, you know, we are not saying, well, only electric cooperatives should be able to do this or only investor-owned. That should be opened up, and we ought to encourage whoever is willing to come in and build that transmission that is desperately needed.

Obviously, we are going to need help as far as siting is concerned. That is an issue as well. We also are getting some help from the Federal Energy Regulatory Commission these days. We are delighted about that in that they are setting aside some of the existing transmission for renewable energy—you know, whether there is enough or not.

We have also got problems with regard to the existing transmission that will also play into this in that, quite frankly, you have got some road blocks out there, you have got some little difficulties, and it plays into some people's advantage competitively.

Well, we have got to open up this system so that we can move this power, and that is basically what it comes down to. And I think that we have just got to focus on getting the infrastructure right if we want to go in and be serious about doing renewables. If you do not do that, all you are doing with renewable energy, it becomes a very localized affairs, and it is really not benefiting the country.

So, you know, we are interested in economic development on this rural development hearing, and if we are going to do that, then we have got to have ways—and that is what we are encouraging, is giving ways for electric cooperatives in all parts of the country, whether they are situated in an area that is conducive to producing wind energy or not—and a lot of areas are not. Let them invest in South Dakota in an industry that would allow us to develop these renewables and be able to move that power outside of those regions and into Chicago and other large cities around the country. That becomes an economic development project for rural America. That I think makes a lot of sense, and it does something for the country, the same thing we are trying to do with regard to ethanol.

Senator THUNE. I think we need a national approach to this when we look at the grid, and you are right, I mean, a lot of the energy that is developed today is localized because of some of the issues you mentioned. We have this pancake at the South Dakota border that basically doubles the rate to get the power into Minnesota, and I think we have got to come up with, working with the regulatory authorities, with FERC and with WAPA and others, to get some of these barriers out of the way.

Mr. ENGLISH. Could I add one other thing, Senator?

Senator THUNE. Yes.

Mr. ENGLISH. There is another thing that needs to be understood. In looking at this, as I mentioned earlier, our rates are going



to go up like gangbusters. We are going to have substantial rate increases over the next few years just because we are out of this capacity and it is going to be extremely expensive. Renewables can also be very expensive, and we are still just in the beginning of this new industry, some of the technology in some of these areas. We are working with regard to the whole biomass trying to develop how do you put together this infrastructure. Cost-wise, this energy has to be competitive if it is going to work, and so, you know, we have got to focus on how do we do this thing right.

We have got 40 million people out there that are members of electric cooperatives. All 40 million of those folks should have an opportunity to invest in this kind of an effort, and that is what we hope the Congress will do.

Senator THUNE. Thank you. One other quick question, if I might, Mr. Chairman, to Mr. Grabarski. In looking at the whole ethanol corn base, transitioning to cellulosic, and what are the things that we need to be doing to get the incentives out there to develop that industry further, there are several things, and Senator Salazar and I have a piece of legislation we have been working on to try and get more pumps installed, E85 pumps installed around the country, because I think that is a big issue. And the oil companies have got a stranglehold on a lot of these small convenience stores and fuel retailers that keep them from installing these pumps, and it is expensive to do that. So we think that is an important part of the infrastructure.

But in terms of the overall big picture policy, increasing the RFS, going from E10 to E20, which of those things makes the most sense in terms of this Committee or the Energy Committee or other committees that are going to be dealing with this issue? I am a big believer that we need to go from E10 to E20. The car manufacturers are pushing back against that. And if we increase the RFS beyond 2012, what should we increase it to?

Mr. GRABARSKI. If there is a priority, I would guess that it would be to increase it from E10 to the next level. That may not be E20. It may be E15; it may be E20. I do not know.

As far as the E85 throughout the Nation, up until this point the market has not driven the E85 pump to any great degree because ethanol has been somewhat expensive. So the blend, when the market drives the E85, it is a wonderful opportunity. Car manufacturers are responding. They are getting more flex-fuel vehicles out there. But at our local co-op, when we decided to try and put in an E85 pump, we mentioned that there was probably about six cars in the county that could actually use that. It is a small county.

Since that time, some of the car manufacturers have responded. We have a General Motors dealer, and he has got in almost exclusively, when he can, flex vehicles. And at this point in time, we have put in an E85 pump. I think the market has to drive that to a certain degree.

So, having said that, I would suggest that the E10's, the E15s would probably be more practical at this point in time to drive the usage of ethanol across the Nation.

Senator THUNE. Thank you, Mr. Chairman.

Chairman HARKIN. Thank you, Senator Thune.

Senator Coleman?

Senator COLEMAN. Thank you, Mr. Chairman.

Just reflecting on the questions of my colleagues from Colorado and South Dakota and Minnesota, we take great pride on what we have done. I think we have 16 ethanol operations. Now we are going to double our renewable fuel capacity I think in the next 5 to 10 years. We pride ourselves on being the Saudi Arabia of wind. Xcel Energy is our largest utility in the State. They have got a 30x25 mandate, and they are—SNC the other day, it is going to beat it by wind. By saying all that—and I associate myself with the comments of my colleague from South Dakota—we cannot do it without a tax credit, and we cannot do it without infrastructure. And as a former mayor, an urban mayor, I get infrastructure. It is very critical.

Now, Mr. English, you made the comment about any help we can get to pay for infrastructure. Senator Pryor and I have been working for the past couple of years on what we call “World Renaissance.” The idea is that at this point we are looking at \$400 million in tax credit bonds, similar to the CREPs, renewable energy bonds. What you get from this would be leveraged Federal dollars, electric co-ops, interest-free loans.

So my question, just on that—and, again, I would much rather they be grants, try to get the money out there. But can interest-free loans, would that be a valuable source of dollars for the infrastructure that we need?

Mr. ENGLISH. Indeed, it would, Senator. We would love to see that program funded more. Of course, that is what we are all struggling with, is getting the funding for it. But we think that is a good concept, a good idea, and we appreciate it. We sure do.

Senator COLEMAN. We will continue to push and work on that.

Mr. ENGLISH. Thank you.

Senator COLEMAN. Now, Mr. Slack, one of the challenges that we all face as we embrace renewables, we do see some of the pressure now from our livestock people. I think Minnesota is the largest turkey producer in the Nation, and so we are seeing some of that pressure.

I have gone to our folks over at Minnesota’s AURI, our agricultural research folks, and asked them to help us on this issue. They have come back. We are looking at, you know, what can we do with DDGs to increase protein content.

They have come back and developed a report, and they talk about—this may be getting hyper-technical, but I just want to get a sense of whether we all think we are moving in the right direction. They are showing a near-term promise in crude glycerine in terms of kind of looking at some way to ease the tension between livestock folks and the ethanol folks. Can you give me a little perspective on either work that you are doing on this? Or do you think our AURI folks are looking in the right direction?

Mr. SLACK. Senator, thank you very much for the question. Indeed, as we look at changes in the food supply for our livestock industries, we are seeing a lot of these kinds of questions come up, and certainly the dry distiller grain question is an important issue in Ohio, just as it is in Minnesota. We are looking at a number of issues. One is just simply looking at the nutritive quality that comes out of it as a byproduct and ask the question: Do we have

to add things back to get a balanced feedstock? How does that vary with monogastrics versus other animals and so forth?

So it is a complex issue in part because, as you look from plant to plant, the quality of the byproduct that comes out is not uniform. It is going to vary. We have to have some testing methodology to make that uniform.

That being said, you mentioned glycerine, and glycerine, of course, is one of the major byproducts that we are seeing come out. And to the degree that we can utilize that in our systems, then that is going to be an offset that will be useful.

So I think that they are right on, and, again, this is one of the reasons that we do try to communicate across States because we do have a vested interest in assuring that information.

Senator COLEMAN. I mean, I hope we could work together. They are looking at things like crude glycerine as a feed adjunct for turkey diets, crude glycerine as a feed adjunct for lactating cows, et cetera. So I would hope that kind of a Nation we would look at this, because there is great opportunity, but there are challenges. And certainly, Mr. Matthews, your folks are going to be involved. We talk about energy and ethanol. Water is a huge issue. In southwest Minnesota, we have some big issues with that, so we want to promote the renewables, but we have got to deal with some of the issues, including water.

I do not have a question. I just want to say thank you for what you do. People forget about what rural water does, and without the technical assistance that they are getting, you know, they would have some real—I mean, they have real issues, but you do serve an important function. I just want to say thanks for that.

The last question in the time I have is for you, Mr. Grabarski, and that is, we are talking about—there is a lot of discussion about what we can do with anaerobic digestion, that we have a nice operation around the Princeton, Minnesota, area. But there was a 2002 Sense of Agriculture. According to that, in Minnesota 96 percent of our dairies are 200 cows or less, and I understand most experts believe that you need approximately 500 cows in order to make a viable anaerobic digester operation.

What can we do in Congress to make this technically affordable for smaller operations? It is Minnesota, it is Wisconsin, it is, you know, throughout the Nation. We are just not at that capacity. Can we do things to make that option available to those with smaller operations?

Mr. GRABARSKI. Thank you, Senator. I believe that that could happen. It has to happen on more of a wide scale, though, for a smaller operation. If we can build some efficiencies into that production where, again, it does not become part of a generating plant unless it is self-sustaining or self-sufficient; otherwise, we need to figure out a way to capture that gas and actually make the gas the product that we sell. And that does not come without a cost.

Somehow, as we build these units—and there are companies that will do this, probably with some grants and some investment programs that could make these on a smaller scale and make them more applicable to a smaller family type farm, whether it be 100 or 200 cows versus that 500 to 700 or more.

Senator COLEMAN. I hope we can add focus to this issue and put some resources into developing a solution.

Thank you, Mr. Chairman.

Chairman HARKIN. Thank you, Senator Coleman.

I have just been informed that we have four stacked votes at 11:30, so there is no way that we are going to do that and come back. So we have to finish the next panel before 11:30, so I am really going to have to ask Senators to keep it to 5 minutes. I hate to say it, but we do have these stacked votes at 11:30.

Next is Senator Brown.

Senator BROWN. Thank you, Mr. Chairman. I will certainly do that.

Glenn, nice to see you. Welcome.

Mr. ENGLISH. Thank you very much, Senator.

Senator BROWN. Thank you for the good work you do at Rural Electrics.

Dr. Slack, thank you for joining us and thank you for the work you do with alternative energy and rural development at the Wooster Ag Center. Thank you very much for that. It has a proud history, as you know.

Talk to us, if you would, about the bioproducts incubator and how you are doing the sort of partnership with small companies and larger companies. And where does that put Ohio's niche, if you will, in where we go with that?

Mr. SLACK. Thank you, Senator Brown, for the question. There are two things that I think about when you ask that question. The first one is going back to some of the issues having to do with by-products we put together through actually funding from the State, through the Third Frontier Initiative that you would be aware of. Looking to the future is an Ohio Bioproducts Innovation Center, and what that really does is it brings the university together along with the commodity groups, in this case particularly the Soybean Council, and then Battelle, which is a large grant-driven operation in Ohio as well, along with the various companies in the State and brings them together around the table to look at how we can utilize byproducts coming out of the biofuels industry. In part, that is driven because, as you know, we have almost 3,000 biopolymer companies in the State of Ohio. So these things come together quite nicely in a State like we have in Ohio.

The other thing I would mention a little bit—and I think it goes back to the last question of efficiency—is that we have tried to get at that by looking at building an anaerobic digesting system that is really scalable. The tendency is to go large on a lot of these things for all the reasons that all of the other panelists have talked about. But the other issue is the one that Senator Coleman has brought up, and that is, how do you go smaller? And if you really think about an anaerobic digester, it is a mechanical cow. And what we have to do is find a way to be as efficient as the cow is, but under our terms.

And so what we have tried to really do is look at modeling that system in terms of what we can do in terms of waste systems, particularly utilizing waste out of animal systems. We have a very big food-processing industry, as you are aware, in the State, using waste streams out of that, and then modeling that system to not

only produce methane but then conversion of that methane, in particular using the fuel cell technology, into electricity—the idea being that conceptually this would be a good on-farm use for small units.

It is clearly at the development stage, but I agree we have to really do things that make things efficient on the small scale as well as the large scale to make this really usable across our rural communities.

Senator BROWN. Thanks.

Thank you, Mr. Chairman.

Chairman HARKIN. Thank you, Senator Brown.

Senator Lincoln?

Senator LINCOLN. Thank you, Mr. Chairman. We certainly appreciate your leadership here and bringing us together on rural development.

Just to kind of tie that, I guess to take that one more step, so in terms of smaller operations and the ability to use the digesters in a smaller operation, it is really the issue of an economy of scale. Is that correct?

Mr. SLACK. It is both an economy of scale, but it is also—the issue of scalability even goes to the fact of keeping those digesters operable. In other words, the smaller you go with the unit, the more sensitive it is to changes. For example, if it goes acidic, you have got a problem. And so how you balance that and as you change feedstocks within that digester, how do you keep it sustainable?

Senator LINCOLN. All right. But having a big enough economy of scale so that it is obviously making sense or profitable would be important, along with those other issues.

Mr. SLACK. Yes, absolutely.

Senator LINCOLN. Mr. Grabarski, I know that you mentioned—a lot of the digesters has been discussed in regard to dairy operations. I have got a good dairy industry in my State, but I have got a huge poultry production. I do not know if you all have talked about whether that technology transfers and what opportunity might exist through the poultry industry.

Mr. GRABARSKI. The difference between poultry waste and large-animal waste is entirely different. For the poultry, it is much drier. You do not have the solution that you would need in order to generate the digester. So my guess is that that is not applicable in the poultry industry. That would have to be something different, and I do not know what that is. But I do not believe a methane digester would work.

Senator LINCOLN. OK. Mr. Matthews, thank you for your testimony. You touch on a variety of ways, I think, that the Committee could help address the issues facing rural water systems, and those of us that have lived in rural America understand that there still are people out there who need access to good, healthy rural water systems and good, healthy water.

I never will forget at one of our dedications, a woman came up to me and she said, “Honey, I have had colored sheets long before colored sheets was popular.” She said, “I am just so glad to have some nice white sheets now with our rural water system in place.”

Maybe you might elaborate a little more specifically on the challenges for communities and rural Americans and what they deal with in terms of their water supply, or maybe the lack thereof in terms of what water is actually out there.

Mr. MATTHEWS. Well, of course, we are experiencing in Georgia, anyway, and some other Southern States, a severe drought right now.

Senator LINCOLN. Right.

Mr. MATTHEWS. As you saw this morning on the news, Lake Okeechobee is at its lowest levels since they have been keeping records, and that is having a tremendous effect on the Everglades and the ecosystem and that kind of thing. Well, we are suffering with the same thing at home in Georgia. And, again, the bottom line is sometimes money will solve the problem, but where we cannot get reservoirs to have an adequate rural water supply from surface water, then there is a lot of well exploration that is going on, even in the metro areas there in Atlanta now, to simply supplement golf course needs, things like that for recreation. Lake Lanier seems to be holding, I think. My friends from Georgia tell me that Lake Lanier is doing a little bit better than it has in the past because of better management, but it is dropping some, of course.

I asked a friend one time, I said, "Do you think it is going to rain?" And he says, "It always has."

[Laughter.]

Mr. MATTHEWS. So I guess we can just pray for rain to replenish our surface water. And, of course, as you know, when the drought gets severe, it affects the groundwater table too.

Senator LINCOLN. Well, that is certainly a big issue for us, and we have got a lot of ground of surface water, but we also are seeing an added pressure on our aquifers, and making sure that there is a good balance there is critically important because we have certainly known that one feeds on the other. There is no doubt that our aquifers can help feed surface water, but surface water definitely replenishes in those aquifers. So getting a balance is critically important and making sure those resources are there. There are also opportunities that we are exploring in terms of recirculation of the water and other ways that we can help conserve.

Mr. MATTHEWS. And I know the Water Conservation Program that you have in your State through your Arkansas Rural Water Association, they have a greater Water Conservation Program there, as does Minnesota and others. But we worked with Oglethorpe Power back home, and Oglethorpe is our largest corporate booster in terms of providing funds for us to do energy conservation work, because they realize the more water that is pumped and leaked, it is just costing electricity and electrical power. So water conservation is going to be more key in the future than ever.

Senator LINCOLN. Right. Well, we appreciate it, and we appreciate our folks with Rural Water. They do a great job. Thank you.

Chairman HARKIN. Thank you very much, Senator Lincoln.

Senator Stabenow, and I have just been informed that the votes have been moved from 11:30 to 11:50. But, still, I would appreciate—we have another panel to go through. Thank you very much.

Senator STABENOW. Well, thank you, Mr. Chairman, and I have many questions. I will only ask one in the interest of time. But I do want to state first that USDA Rural Development has been so critical, I know, in Michigan and all of our rural areas in the Upper Peninsula. It has made the difference in communities in terms of many infrastructure issues, quality-of-life issues. And so now as we look at energy, we have so many opportunities to be able to build on that.

Mr. Slack, you mentioned in your testimony the possibility of cellulosic demonstration projects in places like Michigan, plants that may be able to use wood or forest products as feedstock. And I wonder if you could speak a little bit more about that. We do not hear about forestry products as much, as we talk about ethanol, cellulosic ethanol, and I wonder if you might talk about how this type of ethanol could change the economies in rural communities that have a lot of forest resources, like we have in the Upper Peninsula.

Mr. SLACK. Thank you very much for that question, and actually you mentioned USDA and Department of Energy, and I was remiss in my earlier comments, too, on our pilot plant operation that we have had investment from USDA and DOE, and certainly working together with them has been very important.

I think as we move forward, as you are pointing out, and we start transitioning into the cellulose, it is going to be important to bring the technology at all levels together on that. We certainly have as a major resource in the country utilization of our forests and managing those. Now, it is not going to be an easy situation. Part of that is the technology in moving, you know, into bioprocessing of the cellulose, but some of it also comes back to the same issues that we deal with when we deal with our prime agricultural crops. You are going to have to manage those forests. You are going to have to handle things in an environmentally positive manner.

So all these things will go hand in hand, but the reality is for us to really utilize the vast potential of biomass as part of our solution. The forests are going to have to be a core part of that process.

Mr. SLACK. Thank you, Mr. Chairman.

Chairman HARKIN. You are yielding back all that time?

Senator STABENOW. I am yield back to my Chairman.

Chairman HARKIN. My goodness. Thank you very much.

Well, since we have had a little back-up, I did have one last question I wanted to ask Mr. English. I did not think I was going to have a chance to ask it, but I have the time back.

This is sort of a little bit different, but along the lines of what Senator Chambliss asked earlier about this Washington Post article that came out, dated April 30th. It reports on the financial condition of the National Rural Utilities Cooperative Finance Corporation, referred to as "CFC." The article suggests that CFC is having financial difficulties and indicates that its equity has dropped by some 23 percent in the 6 months preceding November 30th of last year.

Three bond rating agencies continue to rate CFC highly but one. Egan-Jones Ratings has sharply downgraded CFC bonds.

Now, Egan-Jones, I do not know anything about them except they tout themselves because they were the ones that gave the alarm on Enron and WorldCom and a few other things like that.

So they kind of think of themselves as the canary in the coal mine, I guess.

Have you examined this matter? And if so, is there any merit to the Egan-Jones analysis? And what are the principal facts and arguments that you might make to counter their analysis on the merits? And what has been the effect of the article on capital markets?

Mr. ENGLISH. Mr. Chairman, I have got to say that I read that article as well. CFC is a sister organization. They are not a part of NRECA.

Chairman HARKIN. Right.

Mr. ENGLISH. So it would probably be better if they speak for themselves. But I would just say this: that the SEC, as you point out, of all the rating agencies they have that they recognize, I think C is an A-plus or better. That is about the best in the industry. I do not know who these other folks are, to be honest about it, and I guess from what I understand, they are not recognized by the SEC. I do not know what their objective is, and like you, I read with interest that this individual holds as his credentials that he was one of the first to warn about Enron. But to be honest about it, anybody that met Jeff Skilling I think could have made that prediction. I do not know what kind of dealings this fellow had, and I do not know his financial background, and I am certainly no financial expert. But I was kind of puzzled by the whole article, and I think Senator Chambliss had it right. This just seems to kind of be a series during farm bill time, that we just kind of come up, it is anti-rural, anti-farm, and this one did not make any sense. I would just be honest with you. It just flat did not make any sense.

Chairman HARKIN. It sounds like it revolves around one individual that came up—

Mr. ENGLISH. I think it might. I do not know.

Chairman HARKIN. His businesses seemed to come up a cropper, and—

Mr. ENGLISH. They also make telephone loans as well as making loans to electric wire—

Chairman HARKIN. Now, if they could—

Mr. ENGLISH. There was a loan that was made, and evidently it has gone into bankruptcy, and this fellow is taking it kind of personal. I do not know what is going on. But as I said, I probably should not be speaking on any of it, other than just make the observation that the SEC, the people they think have the expertise and knowledge about this business, they give them A-plus or better, which I think some of the best if not the best in the industry, and that is all I think we can hang our hat on. And this other fellow maybe does not know anything about co-ops. I do not know what is going on with it, but I do not know anything about it, have not run into anybody that knows anything about it. So it is a strange story, I will have to agree. It is just a strange story.

Chairman HARKIN. Strange, because in the 2002 farm bill, as you know, we did provide some more authority for them to get low-interest lending.

Mr. ENGLISH. That is right.

Chairman HARKIN. For a good purpose. And so obviously when these stories come out, we wonder if they are doing the right thing.



And all we can do is basically rely upon similar agencies to tell us what is going on.

Mr. ENGLISH. That is true.

Chairman HARKIN. And as you say, most of them give them a very high rating. I just wanted to get your further thoughts on that.

Mr. ENGLISH. Well, I appreciate it, and as I said, all I could figure out is the SEC probably knows better than anybody else as to who is credible and who is not.

Chairman HARKIN. Sure hope so.

Thank you all very much for your testimony, and thank you for coming, and now we will shift to our second panel.

We welcome our second panel to today's hearing, and as before, all your statements will be made a part of the record in their entirety. And I will ask you to keep your comments to 5 minutes or so and just highlight the basic thrust of your testimony.

First we will recognize Dr. Lee Lynd, Dartmouth College, Thayer School of Engineering, in Hanover, New Hampshire. Mr. Lynd is a pioneer in the research and development of cellulosic biofuels. He will talk about the status and outlook for cellulosic ethanol technology and the potential role that biofuels can be expected to play in the future.

I read your testimony over last night, and it was very enlightening and encouraging, Dr. Lynd. So welcome to the Committee, and please proceed.

**STATEMENT OF LEE R. LYND, DARTMOUTH COLLEGE, THAYER SCHOOL OF ENGINEERING, HANOVER, NEW HAMPSHIRE**

Mr. LYND. Good morning, Senator. Good to see you again, and thank you, Mr. Chairman and Senator Chambliss, for the opportunity to testify at this hearing.

Among various forms of plant biomass, cellulosic biomass—including perennial grasses, woody crops, winter cover crops, and various residues from the agricultural and forest industries—have the greatest potential for energy production and will be the focus of my remarks. I will address two topics today: the potential of cellulosic biofuels, and strategic observations and recommendations on policies impacting biofuels.

At the representative price of \$50 per metric ton, cellulosic biomass costs \$3 a gigajoule, which is equal to oil at \$17 a barrel. The immediate factor impeding the emergence of an industry converting cellulosic biomass into liquid fuels on a large scale is the high cost of processing rather than the cost and availability of feedstock. Large reductions in processing costs are clearly possible and indeed likely given a sufficiently large and well-targeted effort. Production of ethanol and other fuels from cellulosic biomass can reasonably be expected to be cost-competitive with fuels from oil at \$30 a barrel once cellulose conversion technology is mature. The central issue to be addressed is improving technologies to overcome the recalcitrance of cellulosic biomass—that is, converting cellulosic biomass into reactive intermediates such as sugars.

I know of no informed difference of opinion with respect to the proposition that the fossil fuel displacement ratio is decidedly fa-

avorable for production of ethanol from cellulosic biomass in a well-designed process representative of anticipated industrial practice.

I note that there are many indications that construction will begin within the coming year on multiple industrial facilities producing cellulosic ethanol on an unprecedented scale.

Looking beyond industry emergence to large-scale application, the second central challenge implicit in developing a large-scale biofuels industry is sustainable production of cellulosic biomass using a feasible amount of land. Projected future increases in biomass production per unit land and fuel production per unit biomass could together result in a roughly tenfold increase in land fuel yield compared to today, enabling scenarios in which biofuels play a very large energy supply role.

How large? I offer the following examples of what could be achieved based on expected results of ongoing analyses I am involved in with others:

No. 1, cellulosic biofuels could conceivably provide for the entire current U.S. vehicular mobility requirement using little or no land beyond that now devoted to agriculture, with little or no decrease in food and feed production, and with substantially increased farm income and profitability, decreased crop payments, net removal of greenhouse gases from the atmosphere, and improved soil fertility and other environmental metrics compared to the status quo.

No. 2, biofuels could be a substantial part of broader strategies leading to approximately zero net greenhouse gas emissions from U.S. transportation and utility sectors. Measures to realize these outcomes are described in my written testimony. Although the changes are large, so are the benefits and so is the cost of not rising to the energy challenges we face.

In a policy dimension, there is an unprecedented opportunity to align farm, energy, and environmental agendas in a way that vastly broadens support for biofuels. However, biofuel and farm advocates will have to earn this support by meaningfully incorporating energy and environmental objectives into policies aimed at fostering the development and expansion of biofuels industries. If we do this right, we can dramatically and, indeed, historically improve the outlook for rural America while also addressing pressing energy security and climate issues. If we do not do it right, the current wave of enthusiasm will pass us by and will likely be difficult to rekindle.

Advocates for biomass energy and farm interests need to focus our attention, as well as that of the media and our skeptics, on farm-based options that have potential to make a contribution on a scale large enough to have a meaningful impact on energy security and sustainability.

Congress should avoid overincentivizing corn ethanol production to the point that the costs are perceived as outweighing the benefits and we risk a backlash that will, again, likely negatively impact all biofuels.

Realizing the clear potential for environmental benefits from biofuels will be fostered by rigorous evaluation and exploration of alternative production and management practices, crops and cropping systems responsive to local circumstances, and policies that reward environmentally desirable outcomes.

Policies aimed at increasing fuel production from sources other than petroleum must not increase greenhouse gas emissions and should recognize the value of emission reductions.

There are strong public benefits from increasing energy efficiency, and correspondingly large public costs for failing to do so. Recent proposals by the President and others to increase CAFE standards and/or adopt market-driven “feebate” mechanisms are encouraging signs that these realities are at last being recognized. Following through on these proposals by enacting aggressive measures to increase energy utilization efficiency in transportation as well as other energy sectors should be a very high priority.

Briefly, Congress and agencies need to adjust policy formulation in response to the new reality of a private sector that is now active in investing in biofuels and other alternative energy technologies.

And, finally, I note that the collective genius of the United States research community has in the past been engaged in the biomass energy field to a profoundly limited extent, and particularly in America’s universities. The three large bioenergy centers solicited by the DOE Office of Science will be significant steps forward and should be fully funded. Providing broadly accessible opportunities for investigators and institutions not part of those centers would further increase the engagement of the research community and should be a priority.

Thank you.

[The prepared statement of Mr. Lynd can be found on page 91 in the appendix.]

Chairman HARKIN. Thank you very much, Dr. Lynd.

Now we will turn to Dr. Ugarte, who is an ag economist at the University of Tennessee, part of a team that has been conducting research and economic analyses of biomass and bioenergy potential that focus on the agricultural and economic implications of the 25x25 resolution.

Dr. Ugarte, welcome again to the Committee.

**STATEMENT OF DANIEL DE LA TORRE UGARTE, AGRICULTURAL POLICY ANALYSIS CENTER, THE UNIVERSITY OF TENNESSEE, KNOXVILLE, TENNESSEE**

Mr. UGARTE. Thank you, Mr. Chairman. Thank you, Senator Chambliss. First of all, I am here not in representation of 25x25, but just in our condition of making the analysis for them.

The 25x25 goal implies basically by the year 2025 the production of 86 billion gallons of ethanol—ten times what we expect to produce this year—and 1.1 billion gallons of biodiesel, and about 962 billion kilowatt hours of electricity, roughly 16 percent of our electricity needs.

Now, how can this be accomplished within the agricultural sector and the forestry sector? First of all, to achieve these goals, we have to incorporate a broader set of feedstocks, and here the cellulose-to-ethanol path is key.

Second, we not only have to look at transportation fuels but also, as the goal has stated, look at electricity and other sources of energy and energy services.

One thing that we have to take into account—and we already have experienced that—is that the rate of growth and the cor-

responding incentives in achieving these goals have to be consistent with the technology development and the availability of the feedstock at the time. And that is one of the reasons that we have faced in these last 2 years, especially last year, a run-up in corn prices of about \$4.

To achieve these goals, definitely there will be a significant level of changes in land use. What we would expect to see is a graduate decrease in the land planted to soybeans, wheat, and corn—soybeans by about 20 million acres, wheat by 9 million acres, and corn 3 million acres. We do not expect these changes to happen in the heart of the Corn Belt or in the Midwest. What we expect these changes is to happen in the areas that are marginal for this growth of these crops, basically in the Southeast of the U.S.

At the same time, the analysis implied the introduction of a new energy crop like switchgrass for about 100 million acres by the year 2025. How can this be achieved? Well, one, by the shifting of the crops that I just mentioned, and second, by an increasing intensity and management of the cropland in pasture, cropland in hay, and the land in grasslands. Increasing the management and the intensity of those arable lands will significantly release and allow for the transition of that acreage toward switchgrass.

Taking into account this broad set of feedstocks and the objectives, we do not expect to see huge impacts in prices. Moreover, what we expect to see is about 35-percent price increases based on the 2006 USDA baseline, well below what we see today and well within the range of prices that we have seen within the last 10 or 15 years.

Net farm income is expected to grow for the whole period for about \$100 billion, \$37 by 2025. Government payments could be reduced by keeping the legislation in 2006 but up to \$100 billion to the year 2025, all depending what we do with the direct payments, and all these benefits will be totally distributed across the Nation. We are not focusing only on the Midwest strategy but on a nationwide strategy of feedstock production and energy conversion.

In terms of economic activity and impact to the rural communities, we will expect to see a new industry that is able to generate \$700 billion in new output and will employ roughly 5.2 million new jobs.

These opportunities, of course, do not come with any challenges. Some of the challenges that are underlining this strategy is the immediacy of having to bring a cellulose-to-ethanol path. Our assumption in this example was that a cellulose-to-ethanol path would start to make contributions by the year 2012. We have to continue investing in agricultural research, not only in traditional crops but also in dedicated energy crops. We have to define public incentives that ensure environmental sustainability and enhance benefits to rural communities. We also will have to look at the agribusiness sector that is able to generate the inputs and the knowledge to plant these 100 million acres of switchgrass.

We have to disseminate this information through the extension service to farmers, and at the same time provide the means to solve key issues in the supply of feedstock to biorefineries, including pre-treatment, transportation, storage, and handling of those feedstocks. The achieving of this goal also implies the construction

of between 700 and 1,200 biorefineries, which is not an easy task for this whole period. And, finally, we have to define what will be the role of trade.

Thank you very much.

[The prepared statement of Mr. Ugarte can be found on page 133 in the appendix.]

Chairman HARKIN. Dr. Ugarte, thank you very much for your statement.

Now we will turn to Mr. Howard Learner, Executive Director of the Environmental Law and Policy Center. He was actively engaged in promoting an Energy Title in the farm bill in 2002 and its implementation since then. Mr. Learner will talk experiences with the Energy Title programs and policies and recommendations for this year's farm bill.

Mr. Learner, welcome again to the Committee and please proceed.

**STATEMENT OF HOWARD A. LEARNER, EXECUTIVE DIRECTOR,  
ENVIRONMENTAL LAW AND POLICY CENTER, CHICAGO, IL-  
LINOIS**

Mr. LEARNER. Thank you, Mr. Chair. First, I would like to commend you, Senator Harkin, and Senator Lugar for your vision in the 2002 farm bill and the rest of the Committee that created the new Energy Title that has proven to be a success. When it comes to developing new clean energy in rural communities, it is a win-win-win. It is good for farmers, good for rural economic development, good for the environment, as well as helping to enhance our national energy security. In the parlance of the trade, "You have done well," and we are very pleased to have worked with all of you to accomplish this.

I will focus my comments this morning on one very important successful part of what the Committee did in 2002. That is the Section 9006 Renewable Energy and Energy Efficiency Improvement Program. That has been the cornerstone of the farm bill's success. It is a program that has been a winner. Senator Harkin, you asked earlier about priorities, and to use Senator Salazar's language a couple minutes ago, the single most important clean energy improvement that this Committee and Congress can consider in this farm bill is to increase from \$23 million a year to at least \$250 million a year the Section 9006 program. It has been successful, it has worked, it is a winner.

So why is such a major increase justified at a time in which the budget is tight? We all know that. We are not insensitive to it. The reason is this is an example of investing and reinvesting in a proven winner, and whether it is Warren Buffett's Berkshire Hathaway or Google, all of us wish we had invested in something that was a winner. This is a winner whether it is investing your personal assets, a pension fund, or public policy investments to achieve a big bang for the buck. You know, this is a program that has been a winner. You have recognized this, and the Committee has recognized it.

Mr. Chair, you and other members on a bipartisan basis sponsored Senate bill 3890, the Renewable Energy for America Act, last year. That would increase the funding to \$250 million annually.

Last week, Representatives Herseth, Sandlin, and Fortenberry over in the House introduced House bill 2154, which would likewise increase the program funding to \$250 million per year.

The 25x25 Action Plan that former Representative English talked about and I know you are all familiar with came out with its recommendations. It recommended that the Section 9006 program be increased to \$250 million a year because it works, and that is a recommendation from utilities, from rural electric co-ops, from environmental groups, from farm groups, from commodity groups. You know the broad coalition behind 25x25. And we are also informed that that the National Commission on Energy Policy, the so-called Dole-Daschle Commission, which is coming out with its report later this month, we are told they will be recommending \$500 million per year for the Section 9006 program. That is not final. I am not advancing their report. But I have been told that we can inform the Committee of that.

The reason for all of this is because Section 9006 is regarded as a proven success. Since 2003, farmers, ranchers, and rural small businesses have used over \$115 million for more than 800 wind power, anaerobic digester, biofuels, energy efficiency projects in 42 States around the country. It has leveraged nearly \$1 billion of investment.

Unfortunately, the program is a victim of its own popularity and success. Applications for this program have exceeded the amount of funding by more than 3 to 1. We have gotten reports upon reports of farmers, small family farmers, mid-sized farmers and ranchers, who have good projects, cannot get funding. They have a reasonable application. And they have said to USDA and they have said to the 25x25s and everyone else, "This is a program that works. We need it to work for us. Can you put more funding into it?"

So what would you get? If this program went up to \$250 million a year, we believe at that funding level it could produce annually more than \$1,000 megawatts of wind power, more than 5 billion gallons of biofuels, tens of millions of dollars in annual energy savings, more than 10 million tons reductions in carbon dioxide. That is an enormous payoff, and we can provide the numbers behind that if you and your staff would like us to do so.

I will very briefly mention the Section 9005 program that you also created in 2002. For 5 years, it has gone without funding. It is important—energy audits and renewable energy assessments for farmers and ranchers. This would be a good time to put some funding into that program to get it going.

Rural America is the source of much of our Nation's renewable energy potential. You have heard that from all the witnesses today. It cuts across State lines. We think this is the time to reinvest in the programs that are working very well and can work even better for the future.

Thank you for the opportunity to join you today. We would be pleased, like others, to answer any questions that you may have for us.

[The prepared statement of Mr. Learner can be found on page 76 in the appendix.]

Chairman HARKIN. Thank you, Mr. Learner. These potentials you mentioned, was that based on \$500 million or \$250 million?

Mr. LEARNER. 250. Simply put, if it were \$500 million, it would be about 2,200 megawatts of wind power. The rest of the numbers double up.

Chairman HARKIN. Thank you very much, Mr. Learner.

Mr. LEARNER. You are welcome.

Chairman HARKIN. Now we turn to Neil Rich, President and CEO of the Riksch Biofuels in Crawfordsville, Iowa. Prior to founding this company in April 2005, Neil was Vice President of Rich Pumping, LLC, a custom fertilizer application business servicing all of southeast Iowa. Neil began doing research on biodiesel in late 2003, a year later had successfully created a small-scale biodiesel reactor, and was running the fuel in his business and all his personal vehicles. Very interesting.

Welcome to the Committee, Mr. Rich.

**STATEMENT OF NEIL RICH, PRESIDENT AND CHIEF EXECUTIVE OFFICER, RIKSCH BIOFUELS, CRAWFORDSVILLE, IOWA**

Mr. RICH. Thank you, Mr. Chairman, and thank you, Mr. Chambliss, and any other members of the Committee that may join us later on. I would like to thank you for the opportunity this morning to appear before you on the importance of the biodiesel industry to rural development and the importance of including our proposed Biodiesel Incentive Program in the 2007 farm bill.

My name is Neil Rich. I am the President and CEO of Riksch BioFuels. We are a 10-million-gallon biodiesel facility which started production in December of 2006. We were able to create 14 high-quality jobs in a small community in southeast Iowa, which in the past decade and a half has seen little to no positive job growth. Our project was funded by private investment from local producers and local ag businessmen, along with, to echo Mr. Learner, the 9006 program that was in the 2002 farm bill. We were the first recipient of both the grant and the loan guarantee program. We are pleased with that. I can only hope to sit here this morning and have biodiesel be a significant part of the 2007 farm bill. It is very important.

In order to take advantage of the many benefits of biodiesel and ensure a domestic production industry, the National Biodiesel Board and the American Soybean Association are supporting authorization of a Biodiesel Incentive Program in the farm bill. This program would operate similarly to the CCC Bioenergy Program, which has worked well in encouraging expanded biodiesel production in recent years. Our industry very much appreciates your leadership, Mr. Chairman, in championing authorization of the Bioenergy Program in the 2002 farm bill.

It is important to understand that every renewable fuel program worldwide is supported through government funding. Moreover, a number of countries subsidize biodiesel production or offer incentives to encourage exports. For example, Argentina has an incentive worth 43 cents per gallon for Argentine soybean processors to convert soybean oil into biodiesel for export. Just last week, a shipment of 1.2 million gallons of Argentine biodiesel exports to the U.S. was announced in the trade press. U.S. biodiesel producers need an incentive that offsets this subsidy in order to compete in our own market.

In addition to competing with subsidized imports, the U.S. biodiesel industry is struggling to establish itself at a time of extremely volatile energy markets, and to assist with this, the newly created volumetric biodiesel fuel tax credit, which must be extended, enables the domestic biodiesel to compete when prices for soybean oil and petroleum diesel reflect their traditional relationship. Although recent petroleum prices have reached historic highs, they are subject to rapid changes as a result of the foreign policy decisions as well as other economics. Although the price of soybean oil has climbed to well over 30 cents per pound, the markets anticipate a possible loss of up to 8 million U.S. soybean acres to corn in 2007. A safety net is needed for biodiesel to offset these uncertainties, which discourage investment for future biodiesel production.

To provide this protection to the domestic industry, we are requesting authorization for the Biodiesel Incentive Program. Similar to the CCC Bioenergy Program, the reimbursement would be established at a level that would offset the foreign subsidy. At the current price of soybean oil of 30 cents per pound, and with 7.5 pounds per gallon going into biodiesel, the amount of the reimbursement would be set at 43 cents per gallon of biodiesel produced.

Based on the U.S. projections of 250 to 300 million gallons in 2007, if the incentive was paid on every gallon produced, the cost of the reimbursement this year would be between \$107 and \$129 million. By comparison, in the 2002 farm bill the authorization funding of \$150 million per year was created. Separately, it is necessary to continue funding the USDA's Biodiesel Fuel Education Program at a level of \$2 million per year. Already the program has achieved substantial results in improving consumer awareness, but it must be continued if we plan to educate consumers about biodiesel.

The testimony has been distributed to you previous to this meeting this morning. The environmental benefits of blending biodiesel with petroleum fuel are unmistakable. The value of being more energy independent can also not be argued. However, the total value added to agriculture is one that comes up for debate, and it is not if or when, it is just how much.

The USDA stated 50 million gallons of biodiesel will add to the prices of soybeans by 1 percent, and biodiesel has and will continue to have a positive impact on agriculture and specifically rural development. Our plant, with the help of programs like the one proposed today, will have a great effect on the local economy in southeast Iowa and many others like it. Biodiesel is creating a new economic vitality, bringing new jobs and infusing many rural communities with new consumer activity.

I urge you today to not let biodiesel be left behind. The biodiesel industry is emerging at a very rapid pace, as you all know, and this program would spur the continued development of new companies and allow those companies such as mine that are in production to develop technologies to make ourselves more efficient.

I urge you to continue your support in this farm bill to advance and promote an industry that increases energy independence, improves our environment, benefits farmers, and benefits rural economic development.



Thank you very much.

[The prepared statement of Mr. Rich can be found on page 104 in the appendix.]

Chairman HARKIN. Thank you all very much for just great statements, and also for your written testimony. They contained a lot of really good, vital information.

I think there is a general understanding, an agreement, an interest among this Committee and I think on the House side also for moving ahead very aggressively in cellulose and also in biodiesel. On the cellulose side, though, we are trying to grapple with how we do that. What are the policies that we need to put in place?

I have often likened it to the fact, Dr. Lynd, that we have a chicken-and-egg situation. Now, some of your testimony refutes what I am about to say, and we will get into that. But it has sort of been like it is hard to get private investment in cellulose now because the private investors, the equity investors, say, well, where is the feedstock? And you go to the farmers to raise the cellulose material, and they say, well, where is the market? So you have kind of got two things there, and it seems to me you have got to bring both along. You have got to build the plants at the same time that you get farmers to start converting and doing and growing energy crops.

I wonder if you could comment on that. Is that a decent analysis, a good analysis? Or is there plenty of equity money out there to build the plants now regardless of where the feedstock comes from?

Mr. LYND. Good questions. My sense is that, you know, when things are not moving as fast as people would like them to, it is perhaps convenient to look to chicken-and-egg explanations. My personal view is that the conversion technology has been the limiting factor, and I think as the conversion technology appears in the short term, feedstocks will not be limiting.

Now, in the longer term—in other words, there is a lot of locations in this country where I think the feedstock will rapidly materialize. That is for getting started. For growing a big industry, feedstock issues are vitally important, and they need some lead time to solve them.

Chairman HARKIN. Might I interrupt you there? Growing feedstocks is one thing. Farmers are used to growing wheat or corn or beans or cotton or rice or whatever. Or maybe they have pasture land; they are grazing cattle on pasture land. So it takes a while to shift. I mean, you do not know what that income is going to be. Plus, don't you have to have a plant within a certain mile radius? You cannot transport that stuff 100 or 200 miles?

Mr. LYND. Yes, but there are sources of cellulosic biomass that are accumulating right now—mountains of gas in Louisiana, for example, waste paper sludge, paper mills, things of that kind. So the fact that those are not—if those were being converted and we were stuck at the transition point of going to actual grown feedstocks, then I think that would support your argument. But the fact that you have got accumulating cellulosic biomass produced 365 days a year and those are not being converted suggests to me that it has been the conversion technology which has not been ready to run. I do not think it has been limitations of feedstock.

Now, again——

Chairman HARKIN. So the private equity is not coming in because the conversion is just too expensive.

Mr. LYND. Yes, but, you know, a huge tipping point happened. I mean, prior to about 18 months ago, the venture capital community looked at this or any equity investor looked at this, and it was like, gee, it depends on the weather, the price of the oil, and governmental regulations, too many unknowns for me, I will go invest in cell phones or software or what have you.

And so I think that as long as people looked at this with a project finance model, it looked pretty grim, and lots of people have recited all the reasons that cannot happen. At this point, though, private equity is being placed in these companies, and it is because people are looking at it with a venture finance model because fundamentally they are convinced that this is the way the world wants to go.

So I think the train is moving. That is not to say there cannot be things done to accelerate it. I think the notion of having incentives indexed to the price of oil is a tremendously good idea. I think ways to leverage private investment for first-of-a-kind technology that has compounding risks is also a great idea, and there are things that need to be done on the research side. So there are things to do, but it is very different than it was 2 years ago when if the Government did not push the ball, it was not going to happen.

Chairman HARKIN. You mentioned a tenfold increase in fuel per acre.

Mr. LYND. Yes.

Chairman HARKIN. I want to know more about that. What is your baseline? What land productivity do you project in dry tons per acre? And what conversion yields do you project in gallons per dry ton to get to that figure?

Mr. LYND. Well, in round numbers, many project that within 10 to 20 years we can produce 15 dry tons per acre per year of cellulosic biomass across a broad range of sites, and if you combine ethanol with other——

Chairman HARKIN. As an average?

Mr. LYND. As an average, yes, that is exactly right. And if you combine ethanol with fuels that can be co-produced with it, which include diesel fuels from cellulosic biomass, you can get between 105 and 110 gallons per dry ton.

In round numbers, the calculation is pretty simple. Most people make current cellulosic biomass—5 tons per acre per year is the typical number. That is about threefold lower than the number I mentioned. And there are certainly some studies by the DOE and others that point to current technology being about 35 gallons per ton, so that is threefold less than 100, 3 times 3 is 10, round number, broad brush. So there is no great mystery to the numbers.

Chairman HARKIN. But you are talking about 105 to 110 gallons per dry ton.

Mr. LYND. Correct.

Chairman HARKIN. That is a threefold——

Mr. LYND. Correct, threefold on conversion, threefold on per acre production.

Chairman HARKIN. Well, how convinced are you that we can get there? I mean, how long a period of time?

Mr. LYND. It depends how much and how smart we invest, but I am pretty sure we can get there.

Chairman HARKIN. My time is running out. Just one follow-up on that. So should we be thinking in this ag bill about putting more in research on this end in terms of conversion? And I have heard the others, enzymatic conversion, yet there is a heat process. Which is the best?

Mr. LYND. Two questions. No. 1, again, we are very under-invested in research in this area worldwide, frankly, and particularly on the more fundamental side that provides the support for the applied work. Research in this field has been acting as if it has been 2 years away for 20 years. We are just not engaging, as I said, the collective genius. So there does need to be more there.

The second part of your question—remind me, please. You asked about should we be spending more on research, but there was another point.

Chairman HARKIN. Yes. I have been told there are basically two processes. One is an enzymatic process, the other is a heat process.

Mr. LYND. Yes. The short answer is everybody looks at that as an either/or, and I am pretty sure it will be an “and,” and the reason is that current biological conversion uses a sufficient quantity of the energy in the biomass that will never be converted to ethanol, at least—will never be fermented to ethanol, anyway, the lignin in the residues. Most of that is necessary to make the biological processing happen. However, as the biological processing improves, which it surely can, most of that energy is then available for the thermal process and with greatly resulting economies and efficiencies.

So my sense is in the near term these are competitors, but in the long term they complement each other. And, therefore, it is worth learning about both pieces, and then eventually integrating them very much to the benefit of the country and the technology.

Chairman HARKIN. Thank you very much.

Senator Chambliss?

Senator CHAMBLISS. Dr. Lynd, we are pretty excited down our way with respect to cellulosic production. We have got a \$250 million investment that has already been announced in Soperton, Georgia, where we are going to be using pine trees, which I am sure you are familiar with the process, may be familiar with that plant. This is an area that we in the Southeast have an awful lot of resources for as compared to the grain feeds that we do not have a lot of.

Given our limited resources and budgetary constraints, what is the single most important thing we can do in the farm bill to promote the cellulosic ethanol industry?

Mr. LYND. I do not know if it is exactly the farm bill, but I think probably the single biggest thing that could be done is to appropriate what has been authorized. There is an awful lot of—and what is being discussed as being authorized. There is an awful lot of good ideas out there, and there are some pretty—there are some trails of tears in the history of some of this legislation in the past

in terms of where it was intended to go and where it ended up going. So that would be one issue.

But I think, you know, on the—I think the simple answer is the farm bill needs to have aggressive R&D, and particularly targeting R&D that the private sector is not likely to do. And there is a lot of work on feedstocks that comes into that category, and I think it needs incentives in the form of cost-sharing capital. But, again, this notion of indexing price supports to the price of oil gives incredible robustness, avoids spending dollars in an unnecessary way, and will really accelerate this industry.

Senator CHAMBLISS. Is technology in the cellulosic end of ethanol production moving at as fast a pace as technology on the grain feed side?

Mr. LYND. Well, arguably, it is moving faster, and the reason is the technology on the grain feed side is reasonably mature. We are to the point that additional benefits are small. In cellulose, there are still large steps that can be taken.

Senator CHAMBLISS. Right.

Mr. LEARNER. Senator, if I might respond very briefly?

Senator CHAMBLISS. Sure.

Mr. LEARNER. You asked some of the things that could be done in the context of the farm bill. Section 9003 of the farm bill that passed in 2002 has a set of provisions for biorefineries. With regard to one of the comments that the Chair made a moment ago, whether it is the Southeast or the Midwest, you could link funding under Section 9003 to an area where there are feedstocks locally available. So, therefore, when USDA decides which proposal from a biorefinery using cellulosic ethanol to fund, one of the criteria is: Are there feedstocks locally available? That gives the refinery proponent some skin in the game in terms of going to the local farm organizations and the local farmers, saying if you can work it out over here, I may be able to get some support from USDA to put a biorefinery right near you. And it creates that sort of cooperative arrangement that gets you around the chicken and egg, whether it is the Southeast or the Midwest that the Chair was talking about.

You take the 9003 program, which is already authorized, and put that selection criteria in there. Then you pull the two together, the chicken-and-egg problem.

Senator CHAMBLISS. Dr. Ugarte, the impacts of higher feed prices are significant, obviously largely concentrated in the swine and poultry sector right now. Your testimony indicates that the model cannot fully capture the effects of the high degree of vertical integration in these sectors.

Could you expand on that a little bit? And is one of the net results of our biofuels policy to promote concentration in the livestock sector?

Mr. UGARTE. Well, that is one of the challenges that we face, especially in the poultry and hog industry, in which, to make it simple, we only have between two and three producers—Smithville, on the one hand, and on the other hand, we have Tyson and Perdue. So it is very difficult to see how are they going to react. I mean, they have a significant market power to really absorb and transfer the whole cost of the additional feedstock into the consumer. So in terms of the adjustment, they are in a much better position than

the cattle industry, although at the same time the hog and poultry industries are mostly affected because, being monogastric animals, they cannot take full advantage of the dry grains.

Now, whether or not it is going to increase concentration, I think you can find two arguments. One of those is that by increasing the cost of the feedgrains, what you are going to try to promote is concentration away from the feedlots, meaning trying to have the animals, especially in the cattle sector, spend much more time on the farm or in pasture, which is what we used to do 15 or 20 years ago. So, in that sense, that will contribute to move away from the concentration in feedlots.

In the case of the poultry and hogs, it cannot be any more concentrated anymore. So, in that sense, I do not think that the damage—the possibility for damage is there. Again, the reverse impact could start happening because now with this new demand for energy, the prices of corn and other feedgrains are going to be at the higher level and then are going to return to the farmer the ability to compete with the large integrations.

So I think that it opens the opportunity for reducing pressure or integration and maybe to bring back profitability for farmer-grown poultry, hogs, and livestock.

Senator CHAMBLISS. Mr. Learner, I agree the Section 9006 program is very successful. There is a demonstrated need for more resources, obviously, for this in the farm bill if we can find the money. However, the approach you advocate is somewhat different than that put forth by the administration in its recent farm bill proposals.

Should the program continue to focus on small-scale projects? And given the limited budgetary resources, are loan guarantees and larger production platforms better vehicles to increase production of renewable energy in rural America?

Mr. LEARNER. Senator, this program was designed in 2002 to be aimed principally at small and medium-sized farmers, ranchers, and rural small businesses. We do not object to some of the funds being used for loan guarantees as a way of leveraging larger projects. But the majority of the funds in this program should go for grants, for some of the reasons that Senator Coleman talked about before in terms of who you reach through the program. So it is not an either/or; it is a both/and. But the majority of the program funds should be used for grants, and on that we respectfully disagree with the USDA suggestion that it all move into loan guarantees and the grant program go over to Section 9010.

Section 9006, is a proven winner, and Congress should put more resources into it. Most of the funds should go to grants; some can be used for loan guarantees. They both have value. They reach out to different types farmers.

Senator CHAMBLISS. Mr. Rich, I do think it is very important we continue to support the biodiesel industry and obviously domestic production, and we look forward to dialoguing with you. And your situation is unique in some ways, but in Georgia, actually, we have got a comparable situation to yours where a small producer of biodiesel arose out of a somewhat average sod production farm. And it is kind of interesting to see innovative and creative folks like you develop this industry.

You mentioned in your testimony the projected decrease in 2007 soybean acres and the increase in price of soybean oil. What constraints will declining acreage and increasing prices of vegetable oil have on our ability to grow the biodiesel production in the future?

Mr. RICH. The feedstock availability to biodiesel is definitely finite. The biodiesel industry is aware of that. The potential decrease in soybean acres will have to be picked up by alternative feedstocks that are out there, and the biodiesel manufacturers will have to adapt to those changes. Some of them are able to, and some of them are not able to.

At this point, where the biodiesel industry is, there is feedstock out there and it is available. The potential acreage shift, I guess we will see how everything plays out, but at this point the rising cost of soybean oil and the somewhat level price of diesel fuel is just not enough to sustain the biodiesel industry the way it is today, let alone have it expand. So there needs to be something else additionally done.

When we got our project off the ground, the CCC Bioenergy Program was alive and well and funded. And when we came into production, it was no longer. So something needs to happen for these companies to survive, in order to be more efficient down the road, and we can only be more efficient if we are able to survive during these somewhat high prices.

Senator CHAMBLISS. Well, I thank all of you for your testimony. Obviously, we can sense the energy that each of you feel relative to this issue, and it is a fascinating and fast-developing segment of our agriculture economy that I think has a huge potential for farmers all across America. Historically in the Southeast, obviously, ethanol has not been a major factor from a production use standpoint. But today we are seeing ethanol plants under construction as well as biodiesel plants, and I think with folks like you giving your ideas to us certainly moves us in the direction of wanting to make sure that we make the right decisions so we expand this fast-growing segment of our agricultural economy.

So thank you very much for your input.

Mr. RICH. Thank you.

Chairman HARKIN. I join with Senator Chambliss in just sort of, I think, repeating for emphasis' sake that I think energy—biodiesel, ethanol, cellulose—is going to be a big part of this farm bill. I mean, people are asking us to do something and to move the ball forward.

Again, you have added a great deal to our thought processes, and we need your continued input in this as we move ahead. But we see cellulose ethanol basically as something that is nationwide. Corn ethanol is obviously based in the upper Midwest where we grow a lot of corn, obviously, but cellulose can be anywhere, and especially in the Southeast where they have a lot of timber. We had that wonderful guy that you brought up, Saxby, from Georgia Tech, I think, who testified about the wood pulp industry down there that used to feed the paper industry. But the paper industry is no longer around, I guess.

Senator CHAMBLISS. It moved to Southeast Asia.

Chairman HARKIN. It moved someplace. But he said that just from that small segment alone—I remember the figure. He said 4

billion gallons a year of cellulosic ethanol. So, see, we have to be thinking about how we start moving ahead in that area, too. I think a lot of people have thought about cellulose—well, maybe it is just—you know, people think about their own different areas and stuff. I think in the Midwest we think about celluloses, the corn stover and wheat straw and that kind of thing, switchgrass obviously. But the whole wood pulp industry, the whole wood industry in this country, and when we think about the millions of acres of private forests, private forestland in this country that could be used to provide cellulosic ethanol.

Now, when you say that—I have said that once and someone accused me of wanting to cut down all the timber in this country, and that is not what I am saying. But well managed, this could be very productive. And as you know, as you grow those trees, they do a wonderful thing. They take carbon dioxide out of the atmosphere. So it is no net greenhouse gas thing.

So we have just got to think about how we use this bill, and Section 9000 of Title IX is there. Mr. Learner, I asked for your continued input that, suggestions on how we use that title, Mr. Lynd also, Dr. Lynd. Look at that title. What can we do in there that may really push us forward in cellulose ethanol and in biodiesel?

We have just hardly scratched the surface in biodiesel in this country, and most people think it comes only from soybeans, but there is a lot of other oils that can be grown in a lot of different parts of this country, plus the fact that we have something called renewable biodiesel now—or, no, that is the wrong phrase. Renewable diesel. And there is some contention about that right now from the biodiesel people, renewable diesel being where they are taking animal fats left over. I think Tyson's Foods just made a big contract with an oil company to do that, to provide that kind of renewable diesel.

Do you know much about that, Mr. Rich? And do you have any thoughts on that? I just ask openly. I do not know if you looked into that at all.

Mr. RICH. I do have some comments on it, and I would like to talk about them off the record.

[Laughter.]

Chairman HARKIN. Oh, well, all right. That is fine.

Mr. RICH. The environmental benefits and some other things are not there, as they are with biodiesel.

Chairman HARKIN. Well, we would like to know more about that. I have got to tell you, my reaction is always, well, there is room for everybody here. And if it is something that replaces imported petroleum, it is cleaner burning, it is renewable, what is wrong with that? It all sounds good to me. So if you have got some other thoughts, I would like to know about it.

But we also need data on the conversions. Dr. Lynd, you mentioned that. Dr. Ugarte, you are an expert in that area. Because a lot of people are going to get concerned about how fast we are moving on this. Well, I do not think we are moving fast enough. What I would like to know is what can we go, what can Senator Chambliss and I do in this farm bill so that at the end of 5 years, we have really pushed this country ahead in cellulose where it is providing income to rural America, where it is not degrading the

environment but conserving crops, where we build transportation systems to get this fuel from one part of the country to the other.

Now, a lot of that is not in our jurisdiction, but there is a lot we can do here to incentivize farmers to move in that direction. They are not all going to move next year. But if we can start getting them moving in the next 5 years and to think about how they might grow wood for this fast-growing—poplars or pines or whatever, and how we grow switchgrass, which is almost—the more I read about it, it is almost becoming like a miracle crop in that there are more Btus per pound in switchgrass than there is a pound of coal, I am told. There is also protein in switchgrass. If you can extract the protein, then you have got all that left over. Plus it is a perennial. You do not have to fertilize it very much every year. So there is a lot that can be done on conservation ground that could be an energy reserve situation in this country.

We just need your best thoughts. You are the best thinkers on this, and look at Section 9000, tell us what we need to do there, if we need to add something. Maybe we need to add something. But how do we move that ball down the field.

Now, R&D, yes, we are going to have to put in more money in R&D. I do not know exactly sitting here today right not to tell you exactly what the R&D is. But I know what we have got to do in terms of investigating and doing research in the conversion process and how it becomes more efficient. And you are the first one I have heard say, Dr. Lynd, that it is an “and” between the thermal process and the other one. I have always thought it was either/or, but maybe you are right. Maybe there is an “and” to it. This is enlightening to me to learn this.

So these are the things that we are thinking about, and I think this is going to be the major part, as I have said before, of the farm bill. And it is going to have a lot of impact on rural economic development.

One last thing I would just say before I close, I do not know who mentioned it here—let me think. Was it Dr. Lynd, maybe, or Dr. Ugarte—who talked about pegging the incentives to the price of oil. I assume you mean in an inverse relation type.

Mr. LYND. That is right. The highest the price of oil, the lower the incentive.

Chairman HARKIN. That is right. So that way they could not pull the rug out from underneath us, so to speak.

Mr. LYND. Yes.

Chairman HARKIN. I would like to see some figures on that, too.

Mr. LYND. Well, we obviously have a lot we can communicate about. One of the interesting things is if biofuel production ever did hypothetically drive oil prices down, that would be one of the greatest macroeconomic benefits seen in history. So sort of incentivizing things so the industry does not have to hedge against that possibility is a really good idea. It helps biofuels and, to the extent that the incentivization happens, then everybody wins economically. So I would be happy to communicate with you on that, as well as many of the other issues you raised.

Chairman HARKIN. OK. So look at Section 9000. Tell us what we have got to do. Mr. Learner, you have been a leader in that area looking ahead. You mentioned 9003.



We have got to go. I have 4 minutes left on the vote. I could continue this discussion for another hour.

Thank you all very much. The Committee will stand adjourned.  
[Whereupon, at 12:01 p.m., the Committee was adjourned.]



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## **A P P E N D I X**

MAY 9, 2007

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Statement of Senator Thad Cochran

Senate Committee on Agriculture,  
Nutrition, and Forestry

May 9, 2007

Mr. Chairman, thank you for holding this important hearing. I welcome the panel to the Committee and thank you for your testimony.

The energy title of the new farm bill will be an important part moving this nation towards energy independence. An issue that should be addressed in the new farm bill is to develop incentives to further expand the renewable fuel industry. President Bush, in his State of the Union speech, put forward an ambitious goal of reducing America's dependence on foreign sources of oil.

President Bush has asked Congress to set a mandatory fuel standard requiring 35 billion gallons of renewable and alternative fuels by 2017 and to reduce domestic consumption of gasoline by 20 percent. It is estimated that we use 380 million gallons of gasoline each day. At this consumption rate, the reduction would equal 70 million gallons each day.

The farm bill can help facilitate renewable energy production through various resources including: expanded research, rural development grants and low interest loans, and production incentives. I am pleased that our farmers will play a vital role in producing the future fuel supply of our nation.

The Rural Development Agency plays an important role in helping rural communities improve economic opportunities for their residents. The Rural Development Agency also assists rural communities in gaining access to communication and broadband technologies that provide valuable educational and economic benefits. The new farm bill should continue to provide rural America with access to these critical infrastructure programs.

I thank the panelists and look forward to your testimony.

**Senator Mike Crapo**  
**Energy Issues and Rural Development Farm Bill Hearing**  
**Senate Agriculture, Nutrition and Forestry Committee**

Mr. Chairman, thank you for the opportunity to share a few words. Also, thank you to the witnesses for being here with us today to discuss rural development and energy issues for the Farm Bill.

The importance of rural development programs to Idaho cannot be overstated. Rural development programs have been a vital resource in Idaho for improving water infrastructure, encouraging economic development and building homes. In 1950, four out of every ten rural people lived on a farm, and almost a third of the nation's rural workforce was engaged directly in production agriculture. Today, however, farm households depend more on off-farm income. In addition, rural America is challenged with finding innovative ways to compete in the global market. Thus, as we begin the task of rewriting the Farm Bill, we should work to build on the successes of the 2002 Farm Bill while addressing the changing needs of rural America. We should write a Farm Bill that enables rural communities to build on their economic base, capitalize on their assets, and retain and attract population and employment.

It has become increasingly apparent that small rural communities are having problems complying with federal rules and regulations due to a lack of funding. They want clean water and to protect the environment, but they simply cannot shoulder the financial burden with limited resources. In the 2002 Farm Bill, I authored a program called Project SEARCH (Special Environmental Assistance for Regulation of Communities and Habitat) which would disperse grants to small rural communities across the nation of 2,500 or fewer residents to assist them in compliance. In 1999, Project SEARCH was implemented in Idaho as a pilot program, and it was extremely successful in helping rural communities gain access to much-needed funds. Project SEARCH was authorized in the 2002 Farm Bill, but it was never funded. I would like to see this program reauthorized in the 2007 Farm Bill and funded.

The State Rural Development Council in Idaho has a strong record of success and works with a number of stakeholders to accomplish much to support rural Idaho. The National Rural Development Partnership, which was authorized in the 2002 Farm Bill, should be reauthorized as written in the 2002 Farm Bill.

Ethanol and other alternative fuels and renewable energy sources provide rural communities with a wonderful opportunity for revitalization and growth, and the Farm Bill is an excellent vehicle by which the federal government can provide incentives to expand agricultural participation in energy development. I am pleased that Iogen is the recipient of one of six Department of Energy awards to build a cellulosic ethanol plant in Shelley, Idaho. The plant is expected to use

wheat, barley and rice straw, switchgrass, and corn stover to produce cellulosic ethanol.

Rural development programs and energy production have the potential to work hand-in-hand in contributing to the economic success of rural communities nationwide. I look forward to discussing ways to support rural development programs while enhancing our nation's energy portfolio, and I again thank everyone for being here to contribute to the dialogue.

Thank you for the opportunity to share my thoughts.



**United States Senate**  
**Committee on Agriculture, Nutrition and Forestry**  
**Full Committee Hearing on Energy & Rural Development**  
**May 9, 2007**

Thank you Mr. Chairman for holding today's hearing on energy and rural development. I want to commend you on the breadth of the committee hearings you have held before we start drafting the 2007 farm bill. The past several months have been very interesting and enlightening. These hearings provide us a good record upon which to write a farm bill with a strong safety net for farmers while at the same time address critical national goals such as conservation, energy security, nutrition and rural development.

These last two topics will be an important part of the debate and will affect the future of the agriculture economy. The rural development and energy titles are critical tools in the effort to lay a strong foundation.

Since 1930, the United States Department of Agriculture (USDA) has partnered with organizations such as the Georgia Rural Water Association and the Rural Electric Cooperatives to provide some of the nations most remote and disadvantaged communities access to basic services.

Today, the Rural Development mission area of USDA has expanded to over 40 programs that assist rural families, businesses, communities, and nonprofit organizations. While many of these programs are designed to ensure that business development and technology are available in rural America, we must remember that the proper establishment and maintenance of utility systems is the most basic function of USDA's rural development portfolio.

I am particularly pleased to have Jimmy Matthews of Barnsville, Georgia, here today to represent the rural water associations. Folks like Jimmy are on the ground everyday assisting communities with the challenges inherent of providing services in rural areas.

On the matter of energy, I would like to point out that the energy title is part of a larger effort in the Congress to address energy security and lessen our dependence on imported oil. This Committee has a critical role to play along with others to promote the production of renewable fuels.

However, as I have mentioned in the past, we must develop policy that not only addresses the production challenges of growing fuel on our farms but at the same time hold harmless as much as possible other sectors of the agriculture economy.

Today we will hear from witnesses studying the potential and various impacts resulting from some of the most aggressive production schedules. These are important studies and we should give them careful evaluation. At the same time, we need to critically analyze whether their recommendations are possible to

achieve if many of the price and production impacts are occurring right now.

Much depends on technological innovations not yet realized and we need to be mindful of our needed ability to adapt to changing circumstances should things not work out as we assume. As any farmer knows, Mother Nature is the single largest determinant of making a crop. Weather is driving the commodity markets this year as farmers rush to plant many acres of corn to meet expected demand.

I am particularly looking forward to learning how the upcoming energy title can provide a comprehensive and integrated approach to energy production, which includes all sectors of the agriculture economy. We need a balanced yet aggressive approach. I believe this is possible and I look forward to working with the Chairman on this important and exciting challenge. Thank you in advance and I welcome the witnesses.

Testimony of

**Honorable Glenn English**  
Chief Executive Officer

National Rural Electric Cooperative Association

Farm Bill Policy Proposals Relating to  
Farm and Rural Energy Issues and Rural Development

before the

Senate Committee on Agriculture, Nutrition and Forestry  
U.S. Senate

May 9, 2007

### **Introduction**

Mr. Chairman and Members of the Committee:

My name is Glenn English, and I am the Chief Executive Officer of the National Rural Electric Cooperative Association (NRECA). As a former member of the House Agriculture Committee, I fully appreciate your responsibility to oversee the programs of the Department of Agriculture. I am honored to be invited to add my perspective here today on a variety of programs involving the Department of Agriculture and challenges facing electric cooperatives.

### **Background on Electric Cooperatives**

NRECA is the national service organization representing the interests of cooperative electric utilities and their consumers. In addition to advocating consensus views on legislative and regulatory issues, NRECA provides health care, pension, financial investment and many other programs for its members.

Electric cooperatives are not-for-profit, private businesses governed by their consumers (known as "member-owners"). Today, 930 electric cooperatives serve 40 million consumers in 47 states. Cooperatives are a unique sector of the electric utility industry, serving an average of only 7 consumers per mile compared with the 35 customers per mile served by investor-owned utilities (IOUs) and 47 customers per mile served by municipal utilities. To put this in greater perspective, electric cooperatives serve only 12% of the population -- but maintain 42% of the nation's electricity distribution lines covering three quarters of the land mass. Cooperative revenue per mile averages only \$10,565, while it is more than six times higher for investor-owned utilities, at \$62,665 and higher still for municipal utilities, at \$86,302 per mile. As a result,

cooperatives have far less dollars than the other electricity sectors to support much more of the distribution infrastructure. In addition, electric cooperative households generally have less income than the rest of the nation.

The electric utility industry has an obligation to meet the future needs of our consumers, and as cooperatives we take that responsibility very seriously. NRECA is also committed to meeting the twin challenges of strengthening our nation's energy security and protecting our natural environment. NRECA strongly supports the responsible development of cost effective renewable resources. The use of those resources can achieve all these important goals and boost rural economies.

#### **Affordable Private Sector Financing for Cooperatives**

We estimate that electric cooperatives need to invest \$42 billion in infrastructure upgrades, transmission and generation capacity to meet the increasing demand for electricity over the next 10 years. Over the past five years, approximately 60 percent of electric cooperative financing has come from private sources, while the other 40 percent is provided through the Rural Utilities Service loan program.

One private sector cooperative lender, the National Rural Utilities Cooperative Finance Corporation (CFC) is partnering with Farmer Mac to help obtain the necessary financing. In keeping with its public policy mission, Farmer Mac is providing a secondary market for qualified electric cooperative loans through the purchase of securities backed by electric cooperative loans made by CFC. This public-private partnership has increased availability of competitively priced private capital to electric cooperatives thus creating growth and opportunity in rural America.

Yet, rural communities are not realizing the full economic benefits that Farmer Mac can provide. The Committee can strengthen this partnership by authorizing Farmer Mac to treat loans to electric cooperatives as qualified program loans in the same manner as other rural and agricultural loans. This program purpose treatment would lower the cost of capital for our electric cooperative members and help ensure that rural families will have access to affordable and reliable electric service well into the future.

**REDLG: A Partnership for Rural America and a Boost to Renewable Energy**

Electric cooperatives meet community needs other than electrification through their economic and community development efforts, facilitated largely through USDA's Rural Economic Development Loan and Grant (REDLG) program. This highly successful program should be expanded to help cooperatives bring affordable, reliable renewable resources to the communities we serve.

Through REDLG, electric cooperatives work in partnership with business and local leaders to provide zero-interest loans for many types of community and economic development projects. According to USDA, the REDLG program has provided more than \$350 million in zero-interest loans or grants to help finance these projects, and has leveraged well over \$2 billion in private funds to invest in rural communities while creating or retaining nearly 37,000 jobs. The importance of REDLG for these efforts cannot be overstated.

Yet our members face two major challenges in fully utilizing this program. Electric cooperatives fund the REDLG program by making advance payments on their RUS loans, and through fees paid by our private sector cooperative lender. Nonetheless, these funds – over \$244 million in the last two years -- are being redirected to other



USDA programs. In addition, USDA has told certain electric cooperatives they are no longer eligible to help their communities through the REDLG program.

These challenges have stopped many qualified rural economic and community development projects in their tracks. The investment that electric cooperatives have made in the REDLG is lost, and our members are denied the opportunity to help their local communities. It is critical that Congress stop this redirection of REDLG funds away from community and economic development projects, and we would ask this committee to ensure that all electric cooperatives are eligible to participate in REDLG.

The flexible REDLG program can also play a key role in advancing our nation's energy security and climate change goals. Electric cooperatives already have several biomass projects on line, producing renewable power and providing a positive solution to our farmers' environmental and water quality issues. However, these projects are costly and difficult to finance. Whereas the REDLG program has been used in the past to help finance both ethanol and soy-diesel projects, biomass projects owned by electric cooperatives are presently not eligible for funding. We ask the Committee to authorize USDA to provide REDLG financing – with an emphasis on grants -- for these biomass projects owned by not-for-profit electric cooperatives.

Finally, as the Committee moves forward with the Farm Bill, we believe that the USDA Guaranteed Underwriter needs to be reauthorized. This program provides private funding for REDLG through fees paid by not-for-profit cooperative lenders – at no cost to the taxpayers.

**Electric Cooperatives: Leaders in Affordable Renewable Energy**

Electric cooperatives are developing innovative programs to meet our consumers' power needs. Dairyland Power Cooperative (DPC), in La Crosse, Wisconsin, serves part of the Chairman's home state of Iowa. DPC is expanding its Evergreen Renewable Energy Program<sup>SM</sup> and is on track to reach 10 percent renewable generation by 2015. Dairyland has 17 MW of wind generation, 10.4 MW of landfill gas-to-energy plant, and 22 MW of hydroelectric power. In addition, Dairyland's animal waste-to-energy program utilizes manure from dairy and swine farms within the DPC system in anaerobic digesters to produce methane for conversion to electricity. Currently 3 MW of "cow power" are online and DPC has plans to bring up to 25 MW of digester plants online over five years.

In the Ranking Member's home state of Georgia, cooperatives have developed a program to acquire the renewable energy they sell to their member-owners. Twenty-eight cooperate in Green Power EMC—an entity that exists to provide renewable energy to its member cooperatives for sale to approximately 1.2 million cooperative households in Georgia.

Electric cooperatives strongly support and encourage the 25x'25 coalition's goal of producing 25 percent of our nation's energy supply from renewable sources by 2025. The Senate is currently considering a resolution in support of the 25x'25 goals (S.Con.Res. 3).

As the sole electric utility representative on the 25x'25 steering committee, I worked closely with representatives of the farm, ranch and forestry communities to develop a roadmap to achieving this goal —the *25x'25 Action Plan: Charting America's Energy Future*. The Action Plan provides a strong policy framework to increase national

energy security, foster rural economic opportunity, and benefit the environment -- without additional federal mandates. Rural electric cooperatives will play an important role by providing safe, reliable electric power at the lowest possible cost to the fledgling rural businesses that are expected to supply one-quarter of our nation's energy. As an example of the potential for this partnership, electric cooperatives provide electricity to approximately 122 current or planned ethanol plants and 38 current or planned biodiesel plants.

#### **The Clean Renewable Energy Bond Program**

Electric cooperatives are playing an important role in increasing renewable electricity production. But without tax incentives comparable to those provided to for-profit electricity generators, renewable generation is unaffordable for most electric cooperatives' member-owners. Electric cooperatives cannot utilize the PTC or solar investment tax credits because they are not-for-profit and therefore have no federal tax liability from which to deduct the tax credit. However, electric cooperatives have proven that given the necessary incentives, they will tap available renewable resources. The Energy Policy Act of 2005 established a ground-breaking incentive tailored for electric cooperatives and municipal utilities— the Clean Renewable Energy Bond (CREB). In essence, a clean renewable energy bond provides electric cooperatives and public power systems with interest-free loans for financing renewable energy generation.

The CREB program has proven to be as successful as the PTC in getting new renewable resources in the ground. In its first year, the CREB program funded 78 electric cooperative projects and was well balanced across many technologies, including wind, biomass, landfill gas, hydropower and solar. The CREB program will expire

January 1, 2009, along with the PTC. Electric cooperatives are urging Congress to extend and expand the CREB program. Members of this Committee have been instrumental in supporting and creating the CREBs program.

**Transmission: Key to Expanding Affordable, Reliable Renewable Electricity**

The successful CREB program is a model Congress should adapt to create transmission needed for renewable generation. A significant challenge facing renewable energy is transmission adequacy. Most renewable generation resources are located far from population centers where there is little demand for electricity and little transmission infrastructure. If large quantities of wind generation are to be built in those regions, it will be necessary to also site, fund and construct large amounts of additional transmission capacity to move the power to urban centers.

To address the funding issues, NRECA is advocating for renewable transmission bonds. The Federal Government should authorize the issuance of tax-exempt bonds to fund the construction of transmission facilities or expansion of existing transmission facilities where such construction or expansion is required to facilitate the interconnection of renewable generation to the grid and/or the delivery of renewable resources to consumers.

Congress should remove current restrictions on the ability of private entities to benefit from tax-exempt financed transmission infrastructure, where such construction or expansion is needed to facilitate the interconnection of renewable generators or to deliver renewable energy to consumers. Under the proposal, loans would also be permitted from governmental entities that are eligible to issue tax-exempt bonds to any private entity seeking to finance eligible transmission infrastructure.

**The Importance of Rural Telecommunications**

As cooperatives work to achieve many of the goals I've discussed with you today, we realize that technology will be the key to success in many areas. Advanced telecommunications will be an integral part of the energy systems of the future. Already, cooperatives are industry leaders in demand response and automated meter reading. These applications enhance metering and load management systems with telecommunications capabilities. Cooperatives can see load fluctuations and manage outages in real time. Cooperatives use this information to make short and long term decisions about load growth and generation planning. The system efficiencies will only grow in the future as advanced or "smart metering" systems become more commonplace and expand to include the consumer's home and appliances.

With our partner organization, the National Rural Telecommunications Cooperative (NRTC), we are working to make sure that rural consumers have access to advanced telecommunications services in their homes and businesses. Satellite technology provides an alternative where cable modem and DSL providers do not serve. Many rural electric providers offer WildBlue Communications' service which has helped stimulate economic development and provide vital services.

In Wisconsin, Richland Electric Cooperative helped a Madison-based publisher of board games relocate to a rural town where he could operate his company using WildBlue. Ouachita Electric Cooperative in Camden, Arkansas rushed WildBlue equipment to the Gulf region following Hurricane Katrina. Linemen in the area used it to set up a communications center and for a time, satellite broadband was their only link to the world. Earlier this year, when a tornado ripped through Dumas, Arkansas, Ouachita

again offered WildBlue equipment to set up a mobile communications center for local and state police.

WildBlue now has two satellites in service, making it possible to deliver service to as many as 750,000 homes and businesses in rural America. If the Committee pursues a rural broadband program in the pending Farm Bill, cooperatives would urge that the program be technology neutral and allow satellite broadband to serve rural areas.

**Conclusion**

We appreciate the continued leadership of the Committee and the United States Department of Agriculture on electric cooperative issues. This Committee and the Department of Agriculture have worked together for many years to anticipate and meet the needs of our rural citizens and electric cooperatives. We look forward to working with you in the future.

I would like to thank the Committee for the opportunity to testify here today. I look forward to answering any questions you may have.



TESTIMONY OF ROBERT GRABARSKI  
On behalf of the  
National Council of Farmer Cooperatives  
Before the Senate Agriculture Committee  
Washington, DC  
May 9, 2007

*"Farm Bill Policy Proposals Relating to Farm and Rural Energy Issues and Rural Development"*

Thank you Chairman Harkin, Ranking Member Chambliss and members of the Committee. My name is Robert Grabarski. I am a dairy producer and member of the Board of Directors of CHS, which was formerly Cenex Harvest States Cooperatives. CHS is the country's largest farmer-owned cooperative, owned by over 350,000 farmers and ranchers, through over 1,000 local cooperatives in over 30 states. CHS is also a member of the National Council of Farmer Cooperatives (NCFC), which I am representing here today.

The National Council of Farmer Cooperatives (NCFC) is the national trade association representing the nearly 3,000 farm cooperatives across the United States whose members include a majority of our nation's more than 2 million farmers. These farmer cooperatives work to meet the food, feed, fuel and fiber needs of consumers at home and abroad. Additionally, their business structure enables farmers to improve their income from the marketplace and capitalize on new market opportunities.

Farmer cooperatives combine the strength of numerous producers to meet globalized marketplace demands. In so doing, they allow producers to better control their futures by exercising ownership and leadership of these outstanding businesses.

Farmer cooperatives provide consumers with many of the brands they have grown up on: Sun-Maid raisins, Welch's grape juice, and Land O'Lakes butter to name a few. Across the U.S., these farmer cooperatives provide nearly 250,000 jobs with a combined payroll over \$8 billion. Many of these jobs are in rural areas where employment opportunities are often limited.

In short, we strongly believe that farmer cooperatives offer the best opportunity for America to realize the farmer-focused ideal of an enduring competitive agriculture industry.

I serve on NCFC's Farm Bill Task Force and its Conservation & Environment Committee and am also on their Waste-to-Wealth Task Force, a group working to identify the opportunities and obstacles for the conversion of cow manure into renewable energy products such as liquid fuel, gas and electricity. I appreciate very much the opportunity to appear before you and to share my views on the renewable fuels industry and its impact on my cooperative and rural America.

#### **THE FARMER-OWNED COOPERATIVE**

Cooperative businesses are based on three fundamental operating principles: governance by farmer members, ownership of the business by those who use it, and the return of earnings to farmer members in proportion to their use of the cooperative.

Farmer cooperatives play a key role in agriculture and rural America. In recent history, cooperatives have been used by producers to respond to the rapidly changing economic forces that affect their livelihoods. Cooperatives not only provide access to markets not otherwise reached, but also provide member-owners with an opportunity to negotiate better prices for their commodities and improve their income from the marketplace.

It is also important to note that farmer cooperatives, being farmer owned and controlled, are really a collection of individual small businesses. While farmer cooperatives themselves can vary in size, the real difference between a large and small cooperative is just that the larger cooperative generally has more farmer members.

For rural communities, cooperatives are much more than just a local employer. Co-ops add significant value to the tax base through their own operations and the value they bring to their members' operations. They often foster an attitude of self-initiative in a community. Because of its contributions to the local economy, a cooperative may trigger the need for new housing and improvements in local schools and other community facilities. Cooperatives may also increase the unity of a community by providing local meeting places and a greater sense of community pride. In many rural areas, the cooperative has become the social and economic hub of a community, sponsoring the local little league team and creating scholarships for deserving high school students.

Farmer owned cooperatives and limited liability companies (LLCs) account for nearly half the ethanol production in the United States. It is this farmer-ownership and local decision making in the industry that should ensure that rural America -- and not just the short-term investors of Wall Street -- benefit from this country's new interest in domestically produced renewable fuels.

A September 2006 report by Mr. John Urbanchuk, Director of LECG LLC, noted that *"Since a farmer-owned cooperative ethanol plant is literally a member of the community, the full contribution to the local economy is likely to be as much as 56 percent larger than the impact of an absentee owned corporate plant."*<sup>1</sup> This is attributed to many

<sup>1</sup> Urbanchuk, John, *Economic Impacts on the Farm Community of Cooperative Ownership of Ethanol Production*, September 2006, p.1



factors, including the fact that administrative and market functions are provided for locally, as opposed to a corporate headquarters in a non-rural area. Also, profits are distributed back to the cooperative's farmer-owners, who spend that increased income in their local communities, generating new jobs and increased tax revenue and decreasing the migration to larger urban areas.

#### **CHS**

The company on whose Board I serve, CHS, headquartered in Minnesota, was founded over 75 years ago as an agricultural supply cooperative, based on the need to ensure that farmers were supplied the resources to raise and market their crops, dairy products and livestock.

Among the several major components of our supply business, energy is our most critical. Today, CHS is one of a few farmer cooperatives that own petroleum refineries and fills key agricultural and rural market niches. CHS is the sole owner of a refinery in Montana and holds 75 percent of another in Kansas with two other co-ops. In addition, we have an extensive fuel distribution system that includes crude oil and product pipelines, trucking fleets and terminals through which we sold over three billion gallons of fuel last year. We are also the nation's largest fuel supplier when it comes to on-farm use.

#### **ETHANOL & BIODIESEL**

Like CHS, a number of NCFC members refine conventional fuel and grow, process and blend renewable fuels. In the last few years, a number of NCFC's member cooperatives have made substantial commitments to rural America and bio-energy by investing in ethanol and biodiesel facilities and building additional terminal storage for renewable fuels in strategic locations.

CHS has also been extremely active in the renewable fuels business for nearly 30 years, blending ethanol into gasoline and soy esters into biodiesel. In 2006, we marketed more than 450 million gallons of ethanol-blended fuels, the vast majority of it unleaded gasoline with 10 percent ethanol. In addition, we blended both E85 (85 percent ethanol) and RFG, which is a 7.8 percent blend. Today, 200 of our nation's 1,000 E85 stations carry our Cenex brand. But now we have expanded into ethanol production as well. Just last year we invested in ethanol production by becoming a 22% owner in USBioEnergy. We expect that by 2009 USBioEnergy will become this nation's second largest ethanol producer. We understand the decades-old system of blending renewables and the bumps and hurdles in this start-up industry of massive renewable fuel production.

CHS is also very active in the biodiesel market, having sold – largely through our member cooperatives – the equivalent of two million gallons of soy ester. Typically, this is blended at 2 percent, so that quantity would result in nearly 85 million gallons of B2 biodiesel.

On the whole, the renewable fuels boom has been very important for CHS as a cooperative and for our farmer owners. At the same time, CHS has been very good for the renewable fuels boom. Working through our cooperative, thousands of farmer

members have been able to participate in this growing industry, and rural communities have greatly benefited.

#### **RENEWABLE FUEL POLICY**

As this committee prepares to write the next Farm Bill and looks at various renewable energy proposals, there are a number of items I would like to mention that will be important for the continued growth of this industry.

The tax incentives for renewables and the Renewable Fuels Standard mandate helped jump-start the renewables market, especially in ethanol production. These programs have worked and should be allowed to continue. They provide a stable foundation for these new products to flourish.

We support the current tax incentives for ethanol blending and production and E85 pumps. However, problems are emerging in the distribution and infrastructure systems for ethanol and the relative positioning of ethanol production versus its usage.

For example, there are very few large bulk terminals for ethanol. Additionally, the barge and pipeline systems needed to run ethanol east and west, do not exist. Also, the physical locations of the large petroleum refiners, blenders and importers who are required by the Energy Policy Act of 2005 to blend ethanol are mostly on our nation's coasts near our largest cities. However, the ethanol production is located in the states in the center of the nation.

Therefore, unless incentives are put in place to move the U.S. supply to the coastal demand we may see a Midwest glut of domestic ethanol or over-supply of foreign ethanol to the coasts, both with negative consequences for this fledgling industry. In addition, this nation does not yet have a renewables infrastructure such as our petroleum and natural gas systems have to move renewables economically.

#### **RENEWABLE ENERGY AND ANIMAL AGRICULTURE**

Cooperatives play an especially vital role in the dairy industry as nearly 80% of all milk produced in the U.S. is marketed through a cooperative. In order to provide the greatest possible benefits and opportunities for our dairy producers, as well as to provide environmental benefits, NCFC has been investigating opportunities to provide animal agriculture a stake in the renewable fuels industry by maximizing the use of manure as a feedstock for renewable energy.

According to USDA, the 1.6 billions of ethanol produced in 2000 consumed 6% of all corn harvested. In 2006, an estimated 5 billion gallons of ethanol were produced, accounting for 20 percent of the 2006 corn harvested. As the renewable fuel industry increases profitability for corn farmers, those higher corn prices translate into higher feed prices for the livestock and poultry sector. It has been estimated that the cost of production for dairy producers has increased by \$2.00 per hundredweight due to increased feed and energy costs. Federal policies and funding are desperately needed to jump-start the waste to energy, or methane capture, market, as we have with the ethanol and biodiesel markets. This will help restore profitability in animal agriculture,

help producers more effectively deal with waste issues, and allow them to participate in the renewable energy boom.

To produce renewable energy from manure, a producer must purchase and install a costly anaerobic digester. Anaerobic digestion harnesses and contains methane gas, through the naturally occurring process of anaerobic decomposition. This methane gas can be scrubbed into pipeline quality natural gas, used to generate electricity, or can be converted into a liquid fuel. According to the U.S. Environmental Protection Agency (EPA), there are currently 101 operational digesters in the U.S. and 84 digesters in the planning or construction phase.

The technology currently exists to convert the two billion tons of manure derived yearly from cattle, pigs and chickens into fuel, gas and electricity. What the industry still lacks is affordable technology for all sizes of operations. In addition, we are lacking the government support in the form of further research, grants, loans and tax incentives specific to manure conversion to energy to drive production and the marketplace.

In partnership with the National Rural Electric Cooperative Association (NRECA), NCFC is exploring the development of a template for the generation of electricity from manure, including wheeling the electricity onto the grid and ensuring dairy producers fair compensation. We are hoping to identify where the incentives need to be and in what form and in what amount. We hope to be able to provide Congress with this information so that you can support this effort, much like you have supported the incentives which helped build the ethanol and biodiesel industries.

According to information gathered from the EPA's AgStar Program<sup>2</sup>, anaerobic digestion is technically feasible on about 7,000 swine and dairy operations in the U.S. which could generate up to 6 million megawatt-hours (MWh) of electricity each year<sup>3</sup>. According to the U.S. Environmental Protection Agency, an average home uses approximately 11,000 kilowatt-hours (kWh)/year. Potentially, electricity generated from these swine and dairy operations could power approximately 550,000 homes annually. Mr. Chairman, that is the equivalent of providing electricity to the homes in Iowa's capital of Des Moines for nearly six and a half years, to the Ranking Member's home state capital of Atlanta for three years, or to the homes in the Nation's capitol for two years. If the technology were more affordable and more applicable to smaller operations, the amount of renewable electricity produced would have an even greater impact. Additionally, at a fair market price of \$.08 per kWh, this could add millions of dollars annually to the incomes of U.S. dairy and swine producers.

In addition, there has been increased interest and concern over global climate change. The EPA notes that, in the United States, energy-related activities account for three-

<sup>2</sup> The AgSTAR Program is a voluntary effort jointly sponsored by the U.S. Environmental Protection Agency (EPA), the U.S. Department of Agriculture, and the U.S. Department of Energy. The program encourages the use of methane recovery (biogas) technologies at the confined animal feeding operations that manage manure as liquids or slurries. <http://www.epa.gov/agstar/>.

<sup>3</sup> U.S. Environmental Protection Agency, *Market Opportunities for Biogas Recovery Systems: A Guide to Identifying Candidates for On-Farm and Centralized Systems*, [http://www.epa.gov/agstar/pdf/biogas%20recovery%20systems\\_screenres.pdf](http://www.epa.gov/agstar/pdf/biogas%20recovery%20systems_screenres.pdf) (2004)

quarters of the human-generated greenhouse gas emissions, mostly in the form of carbon dioxide emissions from burning fossil fuels. More than half the energy-related emissions come from large stationary sources such as power plants, while about a third comes from transportation. Agriculture can help reduce greenhouse gas emissions. Specifically, dairies with digesters could offset use of coal power, reducing greenhouse gases that would have otherwise been emitted. These dairy producers and their cooperatives could then also become eligible for a carbon credit, which could be traded on the Chicago Climate Exchange or directly to an interested buyer.

Mr. Chairman, there are approximately 200,000 dairy cows in Iowa and over 16 million hogs. We are anxious to apply these technologies to all sizes of farms, maximize environmental benefits and realize a higher income to dairy and other producers across the state.

More work is needed in this area both by the public and private sector, and by researchers and policy makers at the local, state and federal level. Using manure as a feedstock to produce gas, fuel or electricity, would positively address many very important issues. First, we will be increasing this country's ability to produce its own energy. Second, we will be addressing an expensive environmental management issue which includes odor and waste water concerns. Third, we will be capturing methane gas and decreasing carbon dioxide emissions. This is clearly a win-win for U.S. dairy producers and consumers in urban areas alike.

#### **THE NEXT STEP IN FEDERAL POLICY**

As Congress continues to provide leadership to the renewable fuels industry and as you prepare for the Farm Bill and other energy legislation, I would like to share our recommendations to continue the momentum.

The NCFC asks Congress to:

- Strengthen current energy title provisions to encourage development, production and use of renewable energy from crops and livestock. In the case of livestock, this includes dedicating the needed resources in the form of research, incentives, grants and loans to support efforts to drive the market and production of all forms of renewable energy, including electricity, from manure.
- Support an increase in the Renewable Fuels Standard beyond 2012 and the goals of the 25x25 initiative, a movement working towards securing 25 percent of our energy from renewable by the year 2025;
- Support more research into the development of cellulosic ethanol, which is produced from a wide variety of cellulosic biomass feedstocks, including agricultural plant wastes, plant wastes from industrial processes, and energy crops grown specifically for fuels production, such as switchgrass;
- Maintain and strengthen federal procurement, loan, grant and research and promotion programs;
- Maintain and strengthen energy related research programs;
- Extend all the current renewable motor fuel tax incentives.

#### **CONCLUSION**

Farmer cooperatives are a vital player in this country's quest for energy independence and in ensuring that producers are able to capitalize on expanded market opportunities. Ethanol, biodiesel, and manure conversion, along with conservation, are important tools in securing a more affordable and accessible domestic renewable energy supply.

We appreciate the opportunity to share with the committee ways in which agriculture and cooperatives are investing in renewable energy. We appreciate this committee recognizing the contributions of the American farmer and rancher in the renewable energy industry and look forward to working with you in the future.



**ENVIRONMENTAL LAW & POLICY CENTER**  
ENVIRONMENT MIDWEST

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**SECURING ENERGY SECURITY, ECONOMIC PROGRESS  
AND ENVIRONMENTAL QUALITY THROUGH THE  
FARM BILL'S CLEAN ENERGY DEVELOPMENT PROGRAMS**

**TESTIMONY OF HOWARD A. LEARNER  
EXECUTIVE DIRECTOR,  
ENVIRONMENTAL LAW AND POLICY CENTER**

**FOR THE**

**UNITED STATE SENATE  
COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY**

**May 9, 2007**

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Richard Day - Chairperson Howard A. Learner - Executive Director

Mr. Chairman, Senator Chambliss, and Members of the Committee,

I am Howard A. Learner, the Executive Director of the Environmental Law and Policy Center of the Midwest (ELPC), which is the Midwest's leading clean energy advocacy and eco-business innovation organization. ELPC commends this Committee's leadership in developing successful new clean energy development program opportunities for farmers, ranchers and rural small businesses. Americans are looking to obtain environmental quality and national energy security benefits from more clean energy development, and farmers and rural communities can provide them while achieving local economic benefits at the same time. More renewable energy and energy efficiency in rural America helps to meet our energy needs while improving local economies, strengthening our nation's energy security and improving environmental quality.

Clean energy development is a win-win-win for farmers, rural economic development and the environment, as well as a winner for enhancing our national energy security. Wind power and other renewable energy, and clean energy crops, can produce a new income stream for farmers, enhance rural economies, and provide environmental quality benefits for everyone. Today, I will testify on some sound ways for this Committee to improve and expand upon the innovative new clean energy development programs adopted in the 2002 Farm Bill.

ELPC worked with members of this Committee and its staff, and then with the U.S. Department of Agriculture, to help develop and then implement the successful new clean energy development programs in 2002 Farm Bill. I had the pleasure of appearing before this Committee in June 2001, at the request of Senators Harkin and Lugar, to testify at the first set of public hearings on the 2002 Farm Bill. We encouraged the Committee to create a new Energy Title that would include focused and achievable clean energy development policies to secure healthy farming communities, a stronger agricultural economy, national environmental benefits, and economic growth. We were very pleased when Congress for the first time included a new Energy Title IX in the Farm Security and Rural Investment Act of 2002 and also included renewable energy development provisions in the Rural Development Title VI and the Research Title of the 2002 Farm Bill.

# **I. Introduction**

Much has changed since I testified before the Committee in 2001, and these changes underscore the need for assertive and consistent federal investments in clean energy development across Rural America. High energy prices and the uncertainty surrounding foreign oil supplies are restricting economic growth and spurring demand for cleaner biofuels and clean electric power. Farmers are seeking new income through community wind developments and clean energy crops. Clean renewable energy and energy

efficiency development is also an important strategy for helping to solve our global warming problems.

Farms have always provided food for our nation's breadbasket, fiber for our clothing, and feed for our livestock. Farms now have the near-term potential to supply a significant portion of our nation's energy needs, with electricity generated by wind turbines and other sources, biofuels from a range of energy crops, and much better energy efficiency that can cut farm operating costs and boost incomes.

ELPC has five overall clean energy recommendations for the Committee to consider in shaping the next Farm Bill. I will summarize these recommendations here and then describe them in more detail in the following parts of my testimony:

1. Increase funding and improve the successful Section 9006 Renewable Energy and Energy Efficiency Improvements Program. Section 9006 has proved its worth and value. It is a popular and very successful program. Congress should consider increasing Section 9006 funding from its current \$23 million annual appropriation to at least \$250 million by 2012. Indeed, we believe that the Section 9006 program could be reasonably ramped up to a \$500 million annual appropriations level. We also recommend some specific enhancements to the program design and the removal of an unintended obstacle involving an offset from the federal production tax credit.
2. Fund Section 9005 on-farm energy efficiency audits and renewable energy assessments to spur on-farm investments. This program remains unfunded five years after passage in the 2002 Farm Bill even though it could provide essential tools for helping farmers and rural businesses to identify cost-effective renewable energy systems and energy efficiency improvements, and even though diesel and fertilizer costs have more than doubled in cost since 2002. It's time to fund this program and get it moving.
3. Bring energy crops to market by expanding development and use. Perennial energy crops are expected to produce a significant amount of the cellulosic ethanol in the next 10 years. Yet energy crop commercialization has made little progress during the current Farm Bill. It's time to move beyond research and to more demonstration and development.
4. Establish a sustainable biofuels program by re-designing Section 9010 as a Sustainable Biofuels Production program to provide feedstock purchase incentives to assist developers of new generation cellulosic ethanol plants and to encourage the substitution of biomass for natural gas or coal as an energy source at ethanol and other biofuels facilities.



5. Congress should consider creating a new Undersecretary for Energy and Bio-Based Products to clarify and strengthen the agency's farm-based energy research, development, demonstration and commercialization implementation and oversight.

Farming the land represents some of the highest ideals of American culture. Innovation, independence, and entrepreneurial enthusiasm all help to drive American agriculture. These ideals are just as suited to achieve clean energy development in rural America. In 2001, only a relative handful of members of Congress and others had the vision to realize that clean energy development could contribute to a better, more prosperous future for farming. Now, there is a broad national consensus that clean energy can help drive economic development, energy security and environmental quality. Through the next Farm Bill, Congress can translate that broad consensus into specific action, and take the critical next steps towards achieving the 25 x '25 goals.

The Committee is familiar with the 25 x'25 Action Plan, which has strong and broad support from a coalition of agriculture, energy and environmental groups. ELPC is pleased to be part of, and work closely with, the 25 x '25 alliance. There is widespread agreement that producing 25 percent of our nation's energy from renewable energy resources, and conserving our use of all energy, will yield significant economic development, national security and environmental benefits. Achieving the 25 x '25 goal will:

- Increase farm income by \$180 billion.
- Generate \$700 million in new economic activity.
- Create 4 to 5 million new jobs.
- Reduce oil consumption by at least 10 percent.
- Reduce carbon dioxide pollution by 1 billion tons – about two-thirds of the projected emissions growth by 2025.

The potential is now real, with technology innovations now catching up with demand. Advanced wind power and other electric power generation technologies, new achievements in biofuels production technologies, and energy efficiency improvements that reduce energy demand and costs are all emerging today.

We now have the opportunity to ramp up production of 21<sup>st</sup> century clean energy from agriculture. Our national circumstances demand it, and with the right investments and consistent commitments, we can achieve more economic and energy independence and a cleaner environment.

## **II. The 2002 Farm Bill's Energy Title Programs: Positioning Agriculture Energy for the Future**

With this Committee's leadership and only a modest financial investment, the 2002 Farm Bill took vital first steps toward achieving energy independence through rural clean energy development. The Farm Bill's Energy Title programs are a model for successful agriculture and energy policy. Those programs which have received appropriations have been successful. For example, the Section 9002 Biobased Products program is beginning to seed demand for new biorefineries, and the Section 9006 clean energy development program has resulted in more than one billion dollars in leveraged investment for projects in 42 states. These and other programs should serve as the foundation for improving and expanding clean energy development initiatives in the next Farm Bill. They are a win-win-win-win for farmers and ranchers, rural economic vitality, national energy security and the environment:

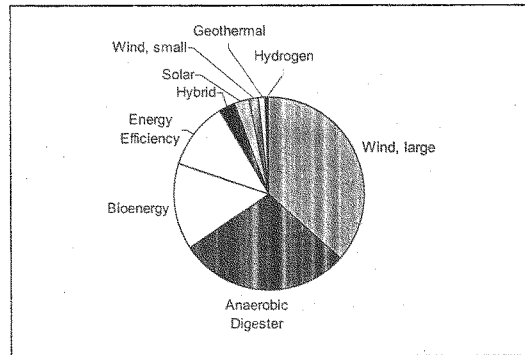
- *New income streams for family farmers.*
- *More rural economic vitality through new jobs and investments in rural communities.*
- *Stronger energy security with diverse, resilient and distributed energy systems.*
- *Better environmental quality and soil and water resource protection.*

The Section 9006 Renewable Energy Systems and Energy Efficiency Improvements Program is the cornerstone of the 2002 Farm Bill's clean energy development programs. Section 9006 authorizes the USDA to award up to \$23 million in grants, loan guarantees and loans each year to eligible farmers, ranchers and rural small businesses.

Section 9006 is widely regarded as a proven success. Since 2003, farmers, ranchers and rural small businesses have used over \$115 million in grant and loan guarantee awards to develop more than 800 wind power, anaerobic digester, biofuels, energy efficiency, solar and other projects in farm communities across the country worth nearly \$1 billion.

Section 9006 is truly a nationwide program, with projects awarded in at least 42 different states. Over the past four years, the USDA has done an admirable job of issuing awards for a wide range of renewable energy and energy efficiency projects:

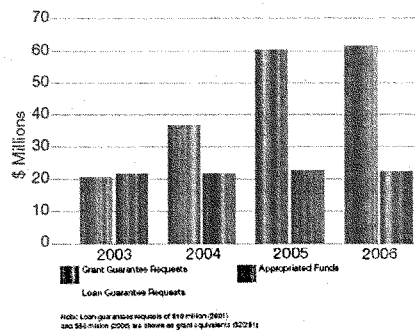
### Section 9006 Grants by Technology 2003-2006



ELPC's report -- *An American Success Story: The Farm Bill's Clean Energy Development Programs* -- spotlights some successful Section 9006 projects across the country and their economic, energy security and environmental benefits. I am pleased to include a copy of this report for the record of this hearing.

Unfortunately, Section 9006 risks becoming a victim of its own popularity and success. Applications continue to outpace available funding, and hundreds of millions of dollars in projects have gone unfunded. Entrepreneurial opportunities and visions are left unfulfilled. A substantial authorization and appropriations increase for the Section 9006 program will reap a new crop of clean energy projects across rural America for a brighter future for agriculture.

### Section 9006 Popularity Outpaces Resources



### **III. The 2007 Farm Bill: Seizing the Opportunity to Achieve Clean Energy Development, Energy Independence and Environmental Quality**

Working with farm, economic development and clean energy and environmental groups, the Environmental Law and Policy Center has developed a number of clean energy policy priorities for the next Farm Bill that respond to our nation's energy, economic and environmental challenges and point the way to a cleaner, independent energy future.

We propose improving and expanding several of the core Energy Title programs created in the 2002 Farm Bill, such as the cornerstone Section 9006 renewable energy and energy efficiency development program. In just four years, Section 9006 has leveraged \$1 billion of investment for hundreds of projects in 42 states throughout the country.

Recognizing the importance of accelerating the commercialization of cellulosic ethanol, we propose programs which will assist farmers in the production of energy crops and build commercial experience in the transport, processing and utilization of these superior feedstocks. We hope Congress will set a goal for developing perennial energy crops as a commercial practice before the end of this 2007 Farm Bill. We also support consistent, targeted R&D spending on advanced cellulosic ethanol and biodiesel production.

We propose new programs to help farmers reduce their direct energy costs, through education, technical assistance and support of new energy-saving technologies such as precision agriculture equipment.

Finally, while we recognize that the Committee is operating under difficult budget constraints, predictable and mandatory appropriations for clean energy development should be a priority within a fiscally responsible Farm Bill. The 2002 Farm Bill clean energy programs received only a very small fraction of total Farm Bill appropriations. Some programs never received funding, and other programs have faced yearly appropriations fights to secure their funding.

As the Committee develops clean energy development programs for the next Farm Bill, we suggest the following policy improvements:

#### **Recommendation #1: Increase Funding and Improve the Successful Section 9006 Renewable Energy Systems and Energy Efficiency Improvements Program**

Section 9006 is the largest Farm Bill energy program that directly funds small and medium-sized farmers, ranchers and rural small businesses. Section 9006 also promotes

and encourages community ownership of energy projects, which generates the best job and income benefits for the community.

Section 9006 can become the driving force to meet the 25 x '25 objectives. For example, with the improvements recommended below, and based on the first four years of performance, we estimate that the Section 9006 program could achieve the following high levels of *annual* success with a \$250 million funding level:

- 1,100+ megawatts of wind power and other clean energy.
- 5.5 billion gallons of biofuels.
- Tens of millions of dollars annually in energy savings.
- 10 million tons in CO2 reductions.

**The single most important improvement to the Section 9006 program would be to boost funding from its current \$23 million annual appropriation to at least \$250 million by 2012.** Indeed, we believe that the successful Section 9006 program could be reasonably ramped up to a \$500 million annual appropriations level.

Section 9006 has proved its worth and value. It is a popular and very successful program. Applications for Section 9006 grants continue to outpace available funding by at least a three to one margin, and hundreds of millions of dollars in projects have gone unfunded. ELPC has received numerous reports of farmers, ranchers and rural small businesses not applying due to insufficient funding.

Ramping up funding over the next five years would allow the Section 9006 program to expand to meet current growth and expected greater growth from the program changes recommended today. Funding could be ramped up as proposed in last year's S.3890 legislation sponsored by the Chairman and Senators Lugar, Durbin, Hagel and Nelson, and as proposed in H.R. 2154, the "Rural Energy for America" legislation sponsored by Representatives Herseth Sandlin and Fortenberry:

- \$71 million (2008)
- \$90 million (2009)
- \$130 million (2010)
- \$180 million (2011)
- \$250 million (2012)

Given the size of the energy and environmental challenges that we face, and the large number of farms, ranchers and rural small businesses, which want to use the program to build new clean energy power generation and improve the energy efficiency of their

operations, these funding levels will help agriculture meet the 25x25 goal. Our commitment must match our vision.

A significant funding boost for Section 9006, beginning with \$71 million in FY08, is reasonable because:

- Current program demand exceeds \$60 million annually.
- The President's Farm Bill proposal calls for \$71 million in annual funding for Section 9006.
- S.3890, last year's bipartisan Section 9006 expansion legislation, called for \$60 million for the program in FY08, rising to \$250 million by 2012.
- The broad-based 25 x '25 Ag Energy Steering Committee Action Plan calls for \$250 million/year for Section 9006.

We also recommend a number of other improvements to the Section 9006 program, including:

1. Create a block grant rebate program (up to 25% of total program funds) to encourage more low-cost, turnkey energy efficiency and renewable energy applications such as lighting, heating, motors, and small wind and solar projects. USDA would issue competitive block grants to appropriate state agencies which would then use these funds for technology-specific rebates. This would also relieve USDA's administrative burden of handling so many applications.
2. Solve the "PTC offset" problem that occurs with grants to utility-scale wind and anaerobic digester projects, which sell their power to utilities. These projects lose some of the value of the federal production tax credit (PTC) based on the amount of the Section 9006 grant. Restructuring the Section 9006 grants as production-based payments, as a number of state grant programs already have done, would avoid this unintended consequence.
3. Expand eligible applicants for the Section 9006 program to include all farming operations, including those in non-rural areas such as commercial greenhouse operators in suburban areas.
4. Provide competitive grants to support feasibility studies and market development plans for renewable energy projects. These grants would help farmers assess project feasibility prior to incurring large out of pocket expenses, and they would also help get more new projects into the development pipeline.

5. Increase loan guarantee limits to encourage more development. Loan guarantees are a desirable financing tool for larger wind power and bioenergy projects. USDA's current Section 9006 loan guarantee limit is \$10 million. We recommend a \$25 million maximum loan guarantee limit for most projects, and a \$100 million limit for advanced cellulosic ethanol developments.

Apart from these changes, we urge the Committee to continue to maintain strong support for the program's grant and loan guarantee components. Each serves a particular purpose. Competitive grants lower a project's capital cost, which is especially important for smaller projects. Grants also help to leverage private capital and help to raise other capital for the project because the grant award demonstrates USDA's confidence in the project. Grants help level the playing field for energy investments. Loan guarantees reduce banks' loan risks, and they also improve access to capital.

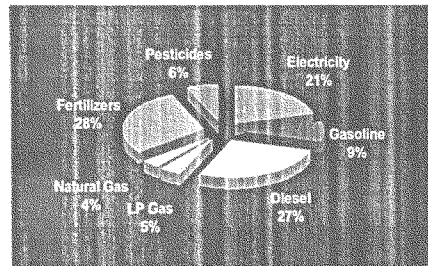
We are concerned that USDA's implementation of the Section 9006 program is moving towards favoring loan guarantees at the expense of grants. This year's award application cycle, for example, set aside only 25% of total funding for grant awards. Although loan guarantees are an important component of the Section 9006 program, grants are equally important, especially for smaller projects and for small and mid-sized farmers and for a wide range of projects. There is broad and strong support across the country for maintaining a strong grant program for Section 9006, and for growing it over time.

ELPC does not support the Administration's proposal to essentially bifurcate Section 9006 into two different programs, with the grant program under the Biomass Research and Development Act and the loan guarantee program under USDA's Business & Industry authorities. The Section 9006 program is for market-ready projects; it is not for research, development or demonstration projects. Since many project applicants seek both grants and loan guarantees, bifurcating the program would create confusion and implementation challenges.

#### **Recommendation #2: Fund Section 9005 Energy Efficiency Audits and Renewable Energy Assessments to Spur On-Farm Investments**

Section 9005, the Energy Audit and Renewable Energy Development Program, remains unfunded five years after passage in the 2002 Farm Bill. This is the situation even though energy audits and assessments are essential tools for helping farmers and rural businesses to identify cost-effective renewable energy systems and energy efficiency improvements, and even though diesel and fertilizer costs have more than doubled in cost since 2002.

### U.S. Farm Energy Use by Source



To address high on-farm energy costs, Congress should retain Section 9005's existing focus on energy audits and assessments, and add additional energy cost education components to the program. The new educational programs would be funded with competitive, multi-year block grants to eligible entities. Congress should ramp up funding for the program from \$5 million in 2008 to \$25 million by 2012.

While small in cost, this program would yield major energy savings benefits for farmers and all consumers. Funded at our recommended levels:

- Farmers and rural businesses would save at least \$3.5 billion dollars over five years (through an overall 2% reduction in ag energy expenses for fertilizer, pesticide, electricity, diesel).
- Approximately 7.6 billion pounds of carbon dioxide emissions would be avoided in the same five-year period.

In addition to the existing authorities in Section 9005 for audits and assessments, ELPC proposes to add to this Section:

1. Environmental management system (EMS) plans incorporating the recommendations of audits and assessments to create a whole-farm/whole-business method for continually improving the environmental performance and energy efficiency of the operation.
2. Farm demonstrations, in partnership with the private sector, showcasing cost-effective high efficiency equipment and energy management practices such as precision agriculture and conservation tillage
3. Grant training workshops to better prepare participants to apply for energy-related grant and loan guarantee opportunities, such as the USDA's Section 9006 program.



**Recommendation #3: Bringing Energy Crops to Market:  
Expanding Development and Use**

Perennial energy crops are expected to produce a significant amount of the cellulosic ethanol in the next 10 years. Yet energy crop commercialization has made little progress during the current Farm Bill. Given the increasing hopes pinned on energy crops, we need to step up federal efforts to develop the resource.

Federal efforts have too often been long on research and short on demonstration and development. The often observed “Valley of Death” faced by technology entrepreneurs in moving from research to market is especially vexing in the energy field. While energy crop research is ongoing and a few isolated demonstration projects have occurred (such as the Chariton Valley, Iowa biomass energy project), there is not yet a viable market for energy crops and, therefore, too little incentive for farmers to grow them.

When the federal government has pursued commercialization or demonstration projects, the emphasis has too often been on developing large plants from the outset. Proving these new concepts on a larger scale increases challenges and reduces prospects for success. Commercialization efforts can sometimes succeed better by starting small and scaling up as challenges are addressed and surmounted. The wind industry already has successfully demonstrated this pathway.

An excellent near-term opportunity to ramp up commercialization of energy crops involves using biomass (energy crops and ag wastes) for electricity generation and thermal energy (steam, hot water, process heat). With effective and targeted federal support, these existing energy uses offer near-term opportunities to implement energy crops. This approach develops the commercial viability of energy crops in parallel with cellulosic ethanol production technologies.

ELPC recommends enhancing and amending the Biomass Research and Development Act (BRDA) in the 2007 Farm Bill to direct and fund agencies to pursue energy crop demonstration projects of varying sizes, while continuing research activities. An effective energy crop commercialization program should include incentives for the entire fuel cycle of growing, harvesting, transport and usage. The goal is a program that establishes a public-private partnership to encourage innovators to take reasonable risks, shared by society, to enhance energy crop viability.

We expect that successful proposals would come from a consortium of fuel growers, plant owners, researchers and other interested parties collaborating at a local level. (For example, an ag research university teaming up with local growers.) Given the many different types of eligible institutions and the need to coordinate with owners of the end-use boiler or other facilities, the program should be stand-alone rather than an agglomeration of different programs.

The expanded BRDA program would have two incentive components: one for farmers and one for end-users of energy crops. On the growing side, we suggest that policies for early adopters should include, as a minimum, the following:

- Grants for up to 50% of the establishment costs and lost revenue related to converting a portion of land to energy crop production. Grants for lost income would be based on the producer's previous income per acre, and a contract or established local market for the harvested energy crop.
- Incentive payments to cover the difference in net income between the farmer's usual crop and the energy crop. Payments would decline over time, and should cover the first several years of production. Crop residues would not be eligible.
- Allow harvesting of Conservation Reserve Program (CRP) acreage for sale to energy crop end-users only if conservation and biodiversity goals are not compromised, while forfeiting only a small portion (if any) of contracted CRP payment rates.

For end-users, we recommend targeting existing gas and coal-fired boilers and heating systems that could modify their systems to accommodate biomass fuels, whether through gasification, direct combustion or co-firing. There are thousands of these systems at ethanol plants, universities, schools, hospitals, municipal facilities and industrial plants in rural areas throughout the country.

Using energy crops at existing facilities will allow growers and more people to address challenges with the biomass fuel infrastructure and develop experience at a more manageable scale. Targeting smaller projects reduces the cost of learning lessons as compared to starting with larger projects. Also, by targeting smaller projects, the available funding can support a greater number of projects in different geographic regions and use a wider variety of energy crops. We do not propose disqualifying larger projects if developers propose sound and realistic proposals.

For boiler owners, the enhanced BRDA program incentives would consist of several options:

- Engineering and Feasibility Grants: The program would provide funding on a 50% cost-share basis (up to \$350,000) for these upfront "soft" costs, with no guarantee for future support. Boiler owners have identified study and permitting costs as a significant early barrier.
- Grants and loan guarantees to help owners modify their boilers to accept solid fuel energy crops as a fuel source. Necessary modifications would

include fuel storage, boiler modifications, construction of a biomass gasifier, and any related ash and waste handling systems.

- Periodic incentive payments to boiler owners based on energy crop fuel use and tied to natural gas benchmark costs. The boiler owner would not receive any funding if the price of the energy crop fuel was less than a pre-determined spread below the price of natural gas.

#### **Recommendation #4: Establish A Sustainable Biofuels Program**

Section 9010 of the Farm Bill authorizes continuation of the Commodity Credit Corporation's incentive program for producers of ethanol and biodiesel (collectively, "biofuels") derived from corn, wheat and other agricultural commodities, and cellulosic feedstocks (such as hybrid poplars and switchgrass), and fats, oils, greases and certain animal byproducts. It provided feedstock support for year-over-year change in production by biofuels facilities and was intended to improve facilities' cash flow during early production years when debt loads were high.

Because of the strong market for ethanol, Section 9010 funding was eliminated in 2006. Section 9010 could, however, be re-designed as a Sustainable Biofuels Production program in two ways.

1. Provide feedstock purchase incentives to assist developers of new generation cellulosic ethanol plants in purchasing cellulosic biomass materials such as corn stover, wood chips and energy crops. Farmers need to receive net income per acre that is comparable with growing conventional crops while cellulosic plant operators need lower feedstock costs to offset the higher anticipated capital and operating costs of first generation cellulosic ethanol plants. Redirecting the Section 9010 program towards these plants is a way of achieving these objectives.
2. Encourage the substitution of biomass for natural gas or coal as an energy source at ethanol and other biofuels facilities. Ethanol plants have become a significant user of natural gas, and high gas prices are leading some new plants to consider using coal which has negative environmental consequences. Using biomass as a heat input would help to build the biomass market infrastructure for eventual use in cellulosic ethanol and would make conventional ethanol production more sustainable from an energy balance and environmental perspective. This program would provide feedstock purchase support for the documented usage of biomass in renewable fuels facilities.

Funding for this program should be \$10 million per year in 2008, ramping up to \$50 million per year in 2012 as more plants begin to use biomass as either a heat input or for cellulosic ethanol production.

#### **Recommendation #5: Improve USDA's Organization**

Finally, Congress should consider creating an Undersecretary for Energy and Bio-Based Products within the USDA. Currently, at least three different Undersecretaries manage different aspects of farm-based energy development at USDA -- Natural Resources and Environment (for CSP and other programs that currently involve or may involve energy development); Rural Development (for Rural Utilities and Rural Business Cooperative Service) and Research, Education and Economics (for research and extension activities). Creating a new Undersecretary for Energy and Bio-Based Products would clarify and strengthen the agency's farm-based energy research, development, demonstration and commercialization implementation and oversight, and it would eliminate duplicative responsibilities that run throughout the agency.

#### **Conclusion**

The next Farm Bill can build upon the successful innovative clean energy development programs created in the 2002 Farm Bill and achieve major energy, economic and environmental progress for our country. Apart from the improvements suggested above for the existing Energy Title programs, ELPC supports renewed authorization and appropriations for the Section 9002 Biobased Products program, for additional research in carbon sequestration to fight global warming challenges, and for other targeted improvements to the Conservation, Rural Development and Research Titles that promote sustainable energy development.

Rural America is the source of much of our nation's renewable energy potential, and that potential cuts across state and regional boundaries. Strategic new investments can spur billions of dollars of investment in new bioenergy, wind energy, solar and energy efficiency projects throughout rural America for the benefit of all Americans.

Thank you for the opportunity to discuss these important issues with you today and for your consideration of the suggestions that I have presented. The Environmental Law & Policy Center looks forward to working with the Committee to find ways to benefit both farmers and the broader public by expanding and improving the Farm Bill Energy Title in the next Farm Bill.

**Testimony Before the Senate Committee on Agriculture, Nutrition, and Forestry**

**Hearing on Farm Bill Policy Proposals Relating to Farm and Rural Energy Issues and Rural Development**

**May 9, 2007**

**Lee Lynd**

**Focus of my remarks.** Thank you Mr. Chairman and distinguished committee members for the opportunity to testify at this hearing.

Among various forms of plant biomass, cellulosic biomass – including perennial grasses, woody crops, winter cover crops, and various residues from the agricultural and forest industries – have the greatest potential for energy production and will be the focus of my remarks. I will address two topics today: the potential of cellulosic biofuels, and strategic observations and recommendations with respect to policies impacting biofuels. I note at the outset that plant biomass is the only foreseeable sustainable source of organic fuels, chemicals, and materials.

**My perspective.**

I am an expert on conversion and utilization of plant biomass for energy. My perspective is shaped by:

- Over 25 years experience as an academic doing laboratory research on advanced biomass conversion technology as well as analysis of big picture issues related to biomass production and utilization;
- Co-leader, with Nathanael Greene of the Natural Resources Defense Council, of a project entitled “The Role of Biomass in America’s Energy Future”, the most comprehensive analysis of mature biomass conversion technology and biomass-intensive energy futures to date;
- Co-founder and Chief Scientific Officer of Mascoma Corporation, a prominent start-up company in the cellulosic biofuels field.

**I. The Potential of Cellulosic Biofuels.**

**a. Conversion technology.** At the representative price of \$50 per metric ton, cellulosic biomass costs \$3/GJ, which is equal to oil at \$17/barrel. The immediate factor impeding the emergence of an industry converting cellulosic biomass into liquid fuels on a large scale is the high cost of processing rather than the cost or availability of feedstock. Large reductions in processing costs are clearly possible and indeed likely given a sufficiently large and well-targeted effort. Analysis carried as part of the Role of Biomass in America’s Energy Future project indicates that production of ethanol and other fuels from cellulosic biomass can reasonably be expected to be cost-competitive with production of gasoline and other fuels from oil once cellulose conversion technology is mature. The central issue to be addressed is improving technologies to overcome

the recalcitrance of cellulosic biomass - that is, converting cellulosic biomass into reactive intermediates such as sugars. This is true not only for ethanol but also for other biofuels produced by fermentation, since the cost of converting cellulosic biomass to sugars must be lowered in order to have a cost advantage relative to sugar production from more easily-processed raw materials such as corn.

I know of no informed difference of opinion with respect to the proposition that the fossil fuel displacement ratio is decidedly favorable for production of ethanol from cellulosic biomass in a well-designed process representative of anticipated industrial practice.

All indications are that construction will begin within the coming year on multiple industrial facilities producing cellulosic biomass on an unprecedented scale. These include, but are by no means limited to, the 6 projects recently funded by the DOE. Thus, the nascent cellulosic biofuels industry is being launched and will soon be informed by experience.

**b. Biomass feedstocks.** Looking beyond industry emergence to large scale application, the second central challenge implicit in developing a large-scale biofuels industry is sustainable production of cellulosic biomass using a feasible amount of land. Attention thus far has focused largely on crops and cropping systems that were chosen and developed for production of production food, feed, or fiber rather than energy. This likely will change as processing challenges are overcome. Achieving high land fuel yield is a key objective in order to both improve feedstock economics and minimize the ecological footprint of biofuel production. Projected future increases in biomass production per unit land and fuel production per unit biomass could together result in a roughly 10-fold increase in land fuel yield compared to today, enabling scenarios in which biofuels play a large energy service supply role. New crops and cropping systems will likely be developed that are conducive to coproduction of feedstock and feed in response to new demand for non-nutritive cellulosic biomass. In short, we have a historic opportunity to reimagine agriculture to accommodate large scale energy production.

**c. Addressing national needs.** *How much land would be required to meaningfully impact energy security and sustainability using biofuels? In light of competing land uses, is it appropriate to look to biomass energy as a major contributor as we seek paths to a sustainable and secure energy future?* One can find widely disparate answers to these important questions among knowledgeable analysts. Recently, my colleagues and I have published an analysis that documents this disparity and attempts to understand it. We conclude:

Ultimately, questions related to the availability of land for biomass energy production and the feasibility of large-scale provision of energy services are determined as much by world view as by hard physical constraints. If the question is: "In a world motivated to solve sustainability and security challenges, assuming that innovation and change responsive to this objective are possible, could biomass make a large contribution to provision of energy services?" We think that the answer is unequivocally "Yes". On the other hand, biomass can make a much more limited contribution to energy supply in a world based on current or extrapolated realities with respect to important technical and behavioral variables determining biomass requirements and availability. To a substantial degree, the starkly different conclusions reached by different analysts on the biomass

supply issue reflect different expectations with respect to the world's willingness or capacity to innovate and change. However, change is our only option if we are to achieve a sustainable and secure future, whether we are talking about biomass or all renewable energy sources.

Rejecting energy service supply options because they require innovation and change decreases the set of alternatives that can make a meaningful contribution markedly, and perhaps to zero. Such rejection also denies the essence of our current situation: that we cannot extrapolate the current unsustainable and insecure present and get to a sustainable and future. The scenarios most conducive to biomass playing a significant energy service supply role involve complimentary combinations of several changes, with the largest contributions made possible by a combination of technical advances and behavioral changes. We suspect that this is not limited to biomass and indeed is true of most if not all paths to a sustainable future. Studies that project a small role for biomass generally change only the source of fuel and leave other variables constant. This, however, amounts to projecting that technologies and behaviors that arose in a world largely unconstrained by energy availability will continue in the future. This is unlikely if one believes that energy sustainability and security challenges will become yet more pressing as we move forward – a proposition for which more support is accumulating daily.

I offer the following examples of what could be achieved based on expected results of ongoing analyses I am involved in with others:

1. Cellulosic biofuels could conceivably provide for the entire current U.S. vehicular mobility requirement using little or no land beyond that already devoted to agriculture, with little or no decrease in food and feed production, and with substantially increased farm income and profitability, decreased crop payments, and improved soil fertility and other environmental metrics compared to the status quo. Available information indicates that these results could be realized by:

- High but achievable efficiencies with respect to feedstock production, conversion of feedstocks to fuels, and utilization of fuels in vehicles;
- Integration of energy feedstock production into agriculture. There are many strategies by which this could be accomplished, including feed protein and feedstock coproduction from grasses, crops and cropping systems designed to maximize feedstock coproduction (e.g. large biomass soy), and expanded use of winter cover crops. Many of these strategies would be market-driven if there were a demand for non-nutritive cellulosic biomass to feed cost-competitive conversion processes.

2. Biofuels could be a substantial part of a broader strategy leading to approximately zero net greenhouse gas emissions from the U.S. transport and utility sectors. Available information indicates that this could be realized by:

- Production of 1/3 of transportation fuel from cellulosic biomass;

- Production of 40% of electrical power demand from sources that do not emit greenhouse gases;
- Tripling the efficiency, that is miles per gallon, of the transportation sector;
- Taking advantage of opportunities to capture and sequester carbon arising from the production and processing of cellulosic biomass.

Although the changes implicit in these two examples are large, this is equally true of the benefits.

## **II. Observations and Recommendations on Policies Relevant to Biofuels.**

*Today there is an unprecedented opportunity to align the farm, energy, and environmental agendas in a way that vastly broadens support for biofuels. However, biofuel and farm advocates will have to earn this support by meaningfully incorporating energy and environmental objectives into policies aimed at fostering the development of a biofuels industry. If we do this right, we can dramatically improve the outlook for rural America while also addressing pressing energy security and climate issues. If we do not, the current wave of enthusiasm will pass us by and will likely be difficult to rekindle.*

Advocates for biomass energy and farm interests need to focus our attention, as well as that of the media and our skeptics, on farm-based options that have potential to make a contribution on a scale large enough to have a meaningful impact on energy security and sustainability. Indiscriminate support of feedstock and fuel combinations that are inherently limited to a small energy contribution will invite impeachment of all biofuels as being a provincial indulgence of the farm lobby rather than an appropriate response to national energy challenges.

Congress should avoid over incentivizing corn ethanol production to the point that the costs are perceived as outweighing the benefits and we risk a backlash that will, again, likely negatively impact all biofuels.

While it is reasonable to expect that environmentally advantageous biofuel production from cellulosic feedstocks can be achieved, this outcome should not be taken for granted. Realizing the clear potential for environmental benefits will be fostered by rigorous evaluation and exploration of alternative production and management practices, crops and cropping systems responsive to local circumstances, and policies that reward environmentally desirable outcomes.

Policies aimed at increasing fuel production from sources other than petroleum must not increase greenhouse gas emissions and should recognize the value of emission reductions. If we do not consider greenhouse gas emissions as incentives and standards aimed at alternative fuels are formulated, we will likely have to reverse course as the climate imperative becomes ever more urgent. Such consideration is not picking winners, but rather avoiding losers.

There is a strong public interest in increasing energy efficiency, and correspondingly large public costs for failing to do so. Recent proposals by the President and others to increase CAFE standards and/or adopt a market-driven “feebate” mechanism, are encouraging signs that these



realities are at last being recognized. Following through on these proposals by enacting aggressive measures to increase energy utilization efficiency in transportation as well as other energy sectors should be a very high priority. Increasing energy efficiency is our most effective near-term option to respond to the twin challenges of energy security and sustainability, and is an indispensable element of any comprehensive strategy to address these challenges. In addition, increased energy efficiency leverages the fractional impact of new supply technologies.

Congress and agencies need to adjust policy formulation in response to the new reality of a private sector that is newly active in investing in biofuels and other alternative energy technologies. In particular, public funds should be used to accelerate the emergence of a biofuels industry (e.g. by cost sharing commercial deployment of first-of-a-kind technology), and we should keep a close eye on things that need to be done but the market may not adequately motivate – for example research on new crops and cropping practices that integrate biofuel feedstock production into agriculture, better understanding and documentation with respect to possibilities for soil carbon sequestration, and research on fundamentals and high-risk innovation related to biomass conversion and production.

The collective genius of the United States research community has in the past been engaged in the biomass energy field to a very limited extent, particularly in America's universities. The three large bioenergy centers solicited by the DOE Office of Science will be a significant step toward rectifying this situation and should be fully funded. Providing broadly accessible opportunities for investigators and institutions not part of the Office of Science Centers would further increase the engagement of the research community and should also be a priority.

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*Lee R. Lynd is Professor of Engineering at the Thayer School of Engineering at Dartmouth, Adjunct Professor of Biology at Dartmouth, Professor Extraordinary of Microbiology at the University of Stellenbosch, South Africa, and co-founder and Chief Scientific Officer of Mascoma Corporation. Professor Lynd is a recipient of the National Science Foundation Presidential Young Investigator Award, the Charles A. Lindberg award for seeking a balance between technological advancement and preserving the human and natural environment, the Charles D. Scott award for distinguished contributions to biotechnology for fuels and chemicals, and she is the inaugural winner of the Lemelson-MIT Foundation award for sustainability.*

**Mr. Jimmy Matthews**

**Executive Director, Georgia Rural Water Association  
Before the  
Senate Committee on Agriculture, Nutrition and Forestry**

**May 9, 2007**

**Hearing on  
Farm Bill Policy Proposals Relating to Farm  
and  
Rural Energy Issues and Rural Development**

**Senator Tom Harkin, Chairman  
Senator Saxby Chambliss, Ranking Member**

I would first like to thank Chairman Harkin and Ranking Member Chambliss for inviting me to testify today. I feel it's a great honor to be asked to represent the many communities in the nation who depend on rural water systems to provide the most basic of needs. As Executive Director of the Georgia Rural Water Association, I hear from rural communities in need of assistance, who work to bring water to those without it on almost a daily basis. Some of these communities would not be in existence without the USDA programs we discuss today. Water is the key to any life, and the work of this Committee and its counterpart in the House, along with that of USDA has created more opportunities in Rural America than any other.

I speak to you today on behalf of the National Rural Water Association (NRWA). The NRWA is a non-profit federation of State Rural Water Associations. Our mission is to provide support services to our State Associations who have more than 25,735 water and wastewater systems as members.

Member state associations are supported by their water and wastewater utility membership and offer a variety of state specific programs, services, and member benefits. Additionally, each state association provides training programs and on-site assistance in areas of operation, maintenance, finance, and governance. Whether a rural system needs help developing a new rate schedule, setting up proper testing methods, maintaining or upgrading their operator license, or even understanding those ever-changing and complex governmental regulations, state rural water associations and NRWA are the first and best source for assistance to these systems.

NRWA's support for a clean and healthy environment is second to none. Our State Associations have historically trained over 40,000 water and wastewater system personnel a year for over two decades and provided over 60,000 on-site technical assistance visits a year. Over 2600 ground water protection plans have been adopted by local communities, and another 2300 are in the process of being adopted. NRWA and its state associations are on the front lines every day ensuring water is safe and available each time someone in rural America turns on the tap.

I would like to outline for you today several items which are of importance to NRWA and how we feel they can best be addressed in the upcoming Farm Bill. These items and programs represent tried and true means of getting assistance to those who need it, and some new ideas to improve the system currently in place.

#### **Water and Wastewater Loan and Grant Program**

The first issue I would like to discuss is the current USDA Water and Wastewater Grant and Loan Program. No other program has allowed rural water systems to access the financing they need like this program from USDA. It has a rich history and has served rural communities well. While this program continues to provide needed assistance, an ever-present backlog for the funding shows that the need far outstretches the funding availability. This Committee, and Chairman Harkin in particular, committed ample

resources during the 2002 Farm Bill to address this backlog and yet it remains and continues to grow. We hear stories every day of communities whose applications have been submitted and cleared who then wait three to five years to receive the funding. By the time the funding does reach the project, several things have happened. The first is that the portion of the package dedicated as a grant has dropped and the loan portion has increased. This means a community must automatically assume more debt than it had planned. This is only compounded by the rise in construction cost since the financing package was submitted, sometimes in the range of a 50% increase. For example, a community may be approved for a \$10 million grant and loan package through the program. Then, after a four year wait, the financing becomes available through USDA and instead of \$4 million in grant, they only receive \$2 million in grant and \$8 million in loan. Couple this change with an increase in construction costs during the wait for funding of \$5 million and the community who initially thought they would be borrowing \$6 million from USDA and now must borrow \$13 million to build the project simply because of the delay caused by the backlog and the drop in grant level. NRWA understands the difficulties that face this Committee with drafting this upcoming Farm Bill and we encourage you to find creative ways of addressing this backlog and ensuring its demise.

As I just mentioned, we have also noticed over the past several years a disturbing trend in the current program. As you know, the program is based on packaging together grants and loans to offer the best possible situation to rural communities in search of water infrastructure. Storage, distribution lines and water treatment are just a handful of examples of how this funding is used. However, as the demand for dollars grows with the backlog, the amount of grants in the program has shrunk. In an effort to increase the program level, the percentage of dollars in the grant portion of funding has fallen. Where in the past communities may have qualified and received 25-45% grant on a financing package, they now are doing good to receive 20%. This puts extremely needy communities and those without the ability to finance or borrow loans from USDA at a distinct disadvantage. They cannot borrow the money, and because of the reduced level of loans available, the wait for them gets longer and longer. We would encourage the Committee to take a serious look at mandating in statute a minimum level of grants in this program. This would give communities the ability to plan ahead and know exactly how much of their package would be in hard dollars while giving them the ability to better know the level of loan they would be expected to assume.

#### The National Water Finance Assistance Board

How do we address this backlog in a creative fashion? How can fewer dollars be made to work in a larger way to assist rural America? The answer may be as simple as letting some of the dollars under this Farm Bill work for you not just once, but for years to come. The question becomes how to provide funding in a way which helps alleviate the need now, and the needs of tomorrow, without these dollars being lost once they are sent out the door of USDA. We feel this can be done through the enactment of a non-governmental, nonprofit entity to make loans to rural communities, which could work in unison with the current program.

The National Water Finance Assistance Corporation (NWFAC) was established to do just that. By taking federal seed money, NWFAC can match it four to one and make loans to rural communities in order to get the financing out the door quickly. It is a nonprofit which would take both the interest paid on the seed money and the repayments made by borrowers and make more loans to rural systems. The interest rate on loans would be comparable to that of USDA and unlike the current USDA program, when loans are made, the borrower pays back the NWFAC instead of the Treasury. This allows the same dollars to be spent on a revolving basis to eat away at the current backlog and help alleviate it not only over the life of this Farm Bill, but for years to come. The wait time for financing would shrink, thus the backlog and amount of funding needed to complete a project would shrink as well. We feel that this concept represents some creative thinking without asking for a huge amount of additional dollars and a way to help solve the problem so it does not remain on the Committee's plate for years to come. The seed money for such a venture needs to be large to create the backlog reducing impact the Committee would want, but if \$500 million as is proposed in the President's Farm Bill proposal was invested in this program, you would see at least \$2 Billion in initial loans which would then build and continue to eat away at the backlog.

#### Circuit Rider Program

The next item I would like to discuss is the USDA Circuit Rider Program. Managed by NRWA and operated by state rural water associations, this program provides on-site, hands-on assistance to rural and small community water and wastewater systems. In the 48 contiguous states, Circuit Riders and Wastewater Technicians assist and train these systems in all areas of management compliance, operation and maintenance. Circuit Riders provide the primary assistance small communities need to operate safe and clean water supplies, and to comply with EPA water regulations. Circuit Riders are in the field every day helping systems (with compliance, operations, maintenance, management, rates, and training) and promoting local responsibility for protecting water resources. They have also established themselves as first responders in times of need for systems throughout the country. No more was this more evident than in the aftermath of Hurricanes Katrina and Rita. Rural Water Circuit Riders from all over the country descended on those states hit by these disasters and got systems up and running in a matter of days. I have attached a letter which illustrates the acts of these tireless workers to my written testimony and ask that it be included in the record. Whether it's showing a system operator the proper way to test his water, teaching them how to fill out paperwork, or getting in the ditch and manning a shovel, the Circuit Riders are the first line of response when rural water systems experience problems. We ask the Committee for an expansion of the authorized levels for this program from the current level of \$15 million annually to \$25 million annually. While this would be an increase in the authorization, and not one in mandatory funding, this expansion would allow for an additional Circuit Rider in each state to assist rural systems.

#### Source Water Protection Program

The last item I would like to bring to the Committee's attention is the Source Water Protection Program. This committee had the foresight to establish this program under the 2002 Farm Bill and it has truly been a success. This program, administered by the Farm Service Agency, is the single most effective tool rural communities have in planning for the future of their water sources. By working with community leaders, farmers, ranchers, and other stakeholders, source water protection plans are developed to address the threats envisioned and the protections needed well in advance of these issues reaching critical stages. Source Water Protection is a relatively new concept to many communities in the United States. The goal is to protect water systems from the recharge area to the consumer, so safe, potable water can be provided for each member of the community. Source Water Protection addresses the need to identify and provide safeguards to prevent current and future threats to a water system. By identifying the recharge areas for a communities' ground water and/or surface water sources and recognizing potential threats which are currently not impacting the water sources but could in the future, the opportunity to remove the threat exists. SWP allows regulation at the community level where local concerns can be addressed. We have had great success in my home state of Georgia with this program, and I would like to submit a copy of a recently completed plan for record should any Senators like to see exactly what is accomplished by this program. This program's success is only limited by its funding. For example, in Iowa, the specialist working on this program completes roughly 19 plans a year, however, that state has an estimated 320 communities in need of this assistance. This need brings us to request an increase in the current authorization from \$5 million to \$20 million along with a one-time mandatory appropriation of \$10 million in the first year of the new Farm Bill. This one time mandatory increase would allow a ramp-up of the program.

#### Conclusion

The USDA employees who administer the programs I've discussed today are second to none. Their professionalism and dedication to rural America cannot be measured. They have a true love for rural communities and a desire to see them reach their greatest potential. Mr. Chairman, Senator Chambliss, Members of the Committee, I thank you today for listening to my testimony, and more than that, I thank you for your deep care for Rural America. Without the hard work of yourselves, your staff, and the other Members of your body, none of these programs would be possible. I would like to specifically thank Richard Bender and Todd Batta of Chairman Harkin's staff and Dawn Stump and Matt Colley of Senator Chambliss' staff for their time and consideration in reviewing each of the proposals I set forth today. Thank you again, and I would be happy to address any question you might have for me.

# ATTACHMENT

## **COAST WATERWORKS, INC.**

Lakeside Utilities Division

100 Meadows Blvd.

Slidell, LA 70460

(985) 641-7932

February 14, 2006

Mr. Patrick Credeur  
Executive Director  
Louisiana Rural Water Association  
Post Office Box 180  
Kinder, Louisiana 70648

Dear Mr. Credeur:

Hurricane Katrina wrecked wholly terror on the Coast Waterworks, Inc.'s system at Eden Isles/Oak Harbor. Our office, blower room, chlorination room and sulphur dioxide building were completely blown away. The 560,000 gallon extended areation plant and traveling bridge filter were heavily damaged and put out of commission. Thirty two of our thirty six lift stations went under water which means motors and control panels were ruined. Fifteen of the lift station buildings had storm damage. Of the fifteen, five have to be completely re-built. All of the two thousand houses and apartments in Eden Isles had at least three feet of water. The strength of the storm surge caused numerous broken water lines. The negative impact on our water and sewer system and our customer base was astronomical.

Prior to the storm, we had five field employees. Post Katrina saw us with one field employee. We have since added an employee who is doing fine but is still learning the fundamentals. So you can imagine my surprise and relief that through Meryl Fagan at the Department of Health & Hospitals we were allowed to utilize two Kentucky Rural Water Association volunteers. They helped us to take water samples and turn off water meters where the customer lines were broken. It was sure a help to get this done.

Not too long after the Kentucky volunteers left, Mr. Robert Dugas with the Louisiana Rural Water Association met me at our mobile home office and made a gesture to provide assistance with three Louisiana Rural Water Association volunteers and two Arkansas Rural Water Association volunteers. I immediately indicated that would be wonderful but I quickly indicated we didn't need anymore assessments we need people who know how to use shovels. That is what we got. The volunteers were certainly not afraid to get dirty and to truly physically help. They helped us to make water line repairs, clean sewer manholes and replace as well as repair manhole covers and repairs.

That still wasn't the end of their help. Three LRWA volunteers made arrangements to come back again. One of the volunteers could only stay one day but the other two stayed and helped make more sewer and water repairs.



Mr. Pat Credeur  
February 14, 2006  
Page 2

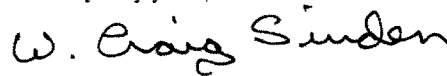
I have been attending the LRWA training sessions for several years and will be attending the sessions more. These sessions have helped me to retain my required water and sewer certifications. The sessions have always provided some new information. As with any class, some are better than others, but I have always felt my time was well spent.

It is refreshing to have instructors that practice what they preach. The physical work matches the teaching skills.

I hereby give the members of Congress my permission to use some of my tax money to continue the good work of the Rural Water Associations throughout the nation.

Keep up the good work, Pat.

Very truly yours,

A handwritten signature in black ink that reads "W. Craig Sinden". The signature is written in a cursive, flowing style.

W. Craig Sinden  
General Manager  
Lakeside Utilities Division

WCS/pjw

**TESTIMONY OF NEIL RICH BEFORE THE  
SENATE AGRICULTURE COMMITTEE**

**Farm Bill Policy Proposals Relating to Farm  
and Rural Energy Issues and Rural Development**

May 9, 2007

Good morning Chairman Harkin, Ranking Member Chambliss, and Members of the Committee. I want to thank you for the opportunity to appear before the Committee to testify on the importance of the biodiesel industry to rural development and the importance of including our proposed Biodiesel Incentive Program in the 2007 Farm Bill.

My name is Neil Rich, I am the President and CEO of Riksch BioFuels. Riksch BioFuels is a ten million gallon per year biodiesel facility which started production in December of 2006. We were able to create 14 high quality jobs in a small community in Southeast Iowa, which in the past decade and a half has struggled with positive job growth. Our project has been funded by private investment from local producers and local Ag businessmen. Today I stand here to testify that the construction of our biodiesel facility is the direct result of the successful programs from the 2002 Farm Bill. I can only hope that I can help to enable Biodiesel to be a significant part of the 2007 Farm Bill.

Using cutting edge technology Riksch BioFuels produces a high-grade biodiesel (B100) fuel for consumption in the Midwest. Our goal is to become a regionally recognized leader in fuel production through quality products and unquestionable business integrity. Riksch BioFuels will produce products that help reduce pollutants that affect air quality and reduce our reliance on fossil fuels while utilizing the Midwest's vast resources of soybean and vegetable oils. We are partners with our customers, our employees, our community, our environment, and we take personal responsibility in our actions towards each.

**Positive Impacts of the U.S. Biodiesel Industry**

Riksch is not unique in the U.S. biodiesel industry. In fact, we are quite typical. There are currently 105 biodiesel plants with a total production capacity of 864 million gallons. That equates to an average plant capacity of about 8 million gallons. While small in size, these biodiesel plants combine to make a big economic impact. According to economic analysis by LECG completed last Fall, America's biodiesel industry will add \$24 billion to the U.S. economy between 2005-2015. Biodiesel production will create over 39,000 new jobs, many of them in rural communities, and it will keep \$13.6 billion in America that would otherwise be spent on foreign oil.<sup>1</sup>

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<sup>1</sup> Urbanchuk, John. "Contribution of the Biodiesel Industry to the Economy of the United States." LECG, LLC. September 30, 2006.

Of particular interest to this Committee, biodiesel has created additional demand for soybean and vegetable oils, as well as other agricultural feedstocks. Analysis conducted by the U.S. Department of Agriculture indicates that every 50 million gallons of biodiesel raises soybean prices one percent. Long-term forecasts expect biodiesel demand to increase average soybean prices nearly 10 percent by 2015. These benefits have helped raise average price received by soybean farmers from \$5.89 per bushel in 2005 to \$6.31 per bushel through the first six months of 2007. These increased prices not only raise farm revenues, they help minimize farm program payments and save taxpayer dollars.

Biodiesel also has many environmental benefits. Biodiesel is nontoxic and biodegradable. Tests sponsored by the USDA confirm that biodiesel is ten times less toxic than table salt. One of the most significant benefits of biodiesel is its reduced carbon dioxide emissions. The overall life cycle emissions of carbon dioxide, a major greenhouse gas, are 78% lower from biodiesel than they are from petroleum diesel. This significant reduction in the major source of greenhouse gas emissions should be of great interest to policymakers.

There are additional environmental benefits from biodiesel as well. In 2000, biodiesel became the only alternative fuel in the country to have successfully completed the EPA required Tier I and Tier II health effects testing under the Clean Air Act. These tests demonstrated that biodiesel reduces virtually all regulated emissions. Biodiesel contains no sulfur and results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter. Biodiesel also has a positive energy balance. For every unit of energy needed to produce a gallon of biodiesel, 3.24 units of energy are gained.

#### **Biodiesel Incentive Program**

In order to take advantage of the many benefits of biodiesel and ensure a viable domestic production industry, the National Biodiesel Board and the American Soybean Association are supporting authorization of a Biodiesel Incentive Program in the 2007 Farm Bill. This Program would operate similarly to the CCC Bioenergy Program, which worked well in encouraging expanded biodiesel production in recent years. Our industry very much appreciates your leadership, Mr. Chairman, in championing authorization of the Bioenergy Program in the 2002 Farm Bill.

Unlike ethanol, biodiesel is not protected by a secondary import tariff that offsets the value of its tax incentive. As a result, biodiesel importers pay a nominal 4.5% *ad valorem* U.S. tariff and are eligible to receive the \$1.00 per gallon tax incentive. Moreover, a number of countries subsidize biodiesel production or offer incentives to encourage biodiesel exports. Argentina taxes biodiesel exports at 5% compared to 24% for soybean oil exports. This 19% Differential Export Tax (DET) creates an incentive worth \$0.43 per gallon for Argentine soybean processors to convert soybean oil into biodiesel prior to export. Just last week, a shipment of 4,000 metric tons of Argentine biodiesel exports to the U.S. was announced in the trade press. U.S. biodiesel producers need an incentive that offsets foreign subsidies in order to compete in their own market.

In addition to competing with subsidized imports, the U.S. biodiesel industry is struggling to establish itself at a time of extremely volatile energy markets. The \$1.00 tax incentive enables domestic biodiesel to compete when prices for soybean oil and petroleum diesel reflect their traditional relationship. However, recent petroleum prices have reached historic highs, and are subject to rapid changes as a result of foreign policy decisions as well as economics. Also, the price of soybean oil has climbed to over \$0.30 per pound as markets anticipate the possible loss of up to eight million U.S. soybean acres to corn production in 2007. A safety net is needed to offset these uncertainties, which discourage investment in U.S. biodiesel production.

To provide this protection to the domestic industry, we are requesting authorization of a Biodiesel Incentive Program in the 2007 Farm Bill. Similar to the previous CCC Bioenergy Program, the Commodity Credit Corporation would use commodities to reimburse U.S. biodiesel producers on all biodiesel production. The reimbursement would be established at a level that offsets foreign subsidies provided to imported biodiesel, using the subsidy value of Argentina's Differential Export Tax (DET) as the benchmark. At the current soybean oil price of \$0.30 per pound, and with 7.5 pounds of oil used to produce one gallon of biodiesel, the amount of the reimbursement would be equivalent to \$0.43 per gallon of biodiesel produced ( $\$0.30 \times 7.5 \times 19\% \text{ DET}$ ).

Based on projected U.S. biodiesel production of 250-300 million gallons in 2007, if the incentive was paid on every gallon produced, the cost of the reimbursement this year would be \$107-129 million. By comparison, the 2002 Farm Bill authorized funding of \$150 million per year for the CCC Bioenergy Program.

#### **Impact on Small Biodiesel Producers**

This Biodiesel Incentive Program would allow Riksch and other U.S. biodiesel plants to remain economically viable by allowing domestic producers to compete with foreign manufacturers on a level playing field. This program will allow small producers, to be quite frank, the ability to survive in the environment we now find ourselves immersed in. With historical high soybean oil prices, and alternative feedstocks following a similar trend, both small and large biodiesel manufacturers will need this program to get off the ground and have the potential for growth in the future.

#### **Conclusion**

I urge your continued support for the U.S. biodiesel industry and hope that you will use the opportunity that this Farm Bill presents to advance and promote an industry that increases our energy independence, improves the environment, benefits farmers, and spurs rural economic development.

Thank you again for the opportunity to testify. I look forward to answering any questions you may have.

**United States Senate  
Committee on Agriculture**

**Testimony of Steven Slack  
Member of the North Central Bio-economy Consortium Planning  
Committee  
Associate Vice President for Agricultural Administration  
Director, Ohio Agricultural Research and Development Center  
The Ohio State University**

**Hearing on USDA Farm Bill Energy Programs  
Washington, D.C.  
May 9, 2007**

Mr. Chairman and Members of the Committee, thank you for the opportunity to discuss the energy title of the farm bill. I am Steven Slack, Associate Vice President for Agricultural Administration and Director of Ohio Agricultural Research and Development Center at the Ohio State University and speaking today on behalf of the North Central Bio-economy Consortium.

The North Central Bio-economy Consortium (NCBEC) is a 12-state collaborative effort between the directors of the State Departments of Agriculture, Cooperative Extension Services and University Agricultural Experiment Stations. Together these three institutions from the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin have pledged to work together to guide our North Central region and the nation to greater use of bio-based fuels, energy, and products.

Each organization in the Consortium has agreed to contribute funding to the operation of the Consortium, and a private foundation – The Energy Foundation – has provided matching funding. The Great Plains Institute is partnering with the Consortium to provide staffing and facilitation. The North Central Bio-economy Consortium has also recently agreed to collaborate with the Midwest Governor's Association on policy review and development for a proposed Energy Summit to be held later this year.

Members of the Consortium are making considerable efforts to partner with industry as well. As just two examples, Conoco-Phillips recently announced it will fund a \$22.5 million biofuel research program at Iowa State University. BP recently announced it will fund a \$500 million joint biofuels research program – the Energy Biosciences Institute - involving the University of California at Berkeley, Lawrence Berkeley National Laboratory and the University of Illinois at Urbana-Champaign.

Our 12 North Central states already lead the nation in biofuel production and have the potential to lead the nation in producing other biomass feedstocks for the next generation of cellulosic biofuels and bioenergy (including feedstock materials such as switchgrass, crop residues, woody crops, mill residues and wood residues).

We believe the potential to use multiple biomass feed stocks for cellulosic bioenergy development casts the region into a leadership role as Congress considers federal farm policy that will help shift the nation's energy reliance away from unstable foreign sources.

Although this effort currently focuses on one region in the United States, we believe that our efforts will benefit the entire nation. As we continue down the path towards greater energy independence from the use of bio-based feedstocks to supplement limited supplies of fossil fuels, the Consortium hopes to advance general knowledge about processing technologies, crops, economics and logistics that will be useful nation-wide. We hope that our model of collaboration may be useful in dealing with other challenges the nation may face in the future.

### **Importance of the Consortium**

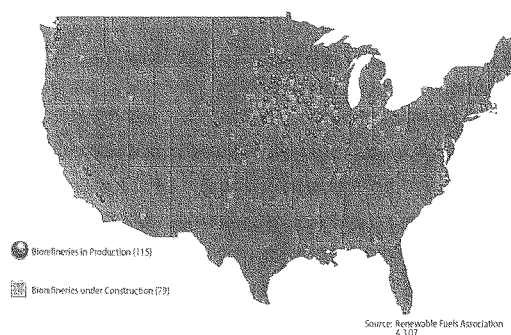
The NCBEC is working to coordinate the efforts of all the major state-level public sector entities that serve agriculture, and is the first effort of its kind. The combination of leadership and policy from the State Departments of Agriculture with research and education from the land grant system creates an effective mechanism for helping to manage an agriculture sector revolution.

The challenge that a rapidly-growing bio-economy represents is the sort of challenge that the Land Grant system was designed to handle. The Land Grant institutions in the North Central region already have extensive research and extension programs dedicated to the bio-energy challenge, and are working to expand this work as resources allow.

The rationale for forming a regional Consortium is that the 12 North Central States in the NCBEC are the hub of the growing U.S. bio-energy industry: the region contains 112 out of 115 existing ethanol plants, as well as 64 out of 79 currently under

construction.<sup>1</sup> Nearly 90% of ethanol production capacity – including both existing plants and plants currently under construction – will be in the North Central states.<sup>2</sup>

### U.S. Ethanol Biorefinery Locations



The North Central region is also likely to play a strong role in developing new biofuel resources –

particularly our nation's cellulosic biomass resource. According to two studies, the North Central states contain around 50% of the nation's cellulosic biomass resource,<sup>34</sup> including more than 70% of the nation's perennial energy crops and crop residues.<sup>5</sup>

<sup>1</sup> [http://www.ethanolrfa.org/objects/documents/plantmap\\_040307.pdf](http://www.ethanolrfa.org/objects/documents/plantmap_040307.pdf)

<sup>2</sup> <http://www.ethanolrfa.org/industry/locations/>

<sup>3</sup> Walsh, M.E., R.L. Perlack, A.T. Turhollow, D. de la Torre Ugarte, D.A. Becker, R.L. Graham, S.E. Slinsky, D.E Ray. 1999 Biomass Feedstock Availability in the United States: 1999 State Level Analysis.

<sup>4</sup> Milbrandt, Anelia, 2005: "A Geographic Perspective on the Current Biomass Resource Availability in the United States", National Renewable Energy Laboratory, Golden, CO.

<sup>5</sup> Milbrandt, Anelia, 2005: "A Geographic Perspective on the Current Biomass Resource Availability in the United States", National Renewable Energy Laboratory, Golden, CO.

Many members of the Committee represent states outside of our region, and we look forward to finding opportunities to partner with State Departments of Agriculture, Land Grant Universities, and other partners in your states. The great promise of cellulosic biofuels is that they can be produced from whatever cellulosic material is best suited for your region. Just as the Consortium sees the value in better regional coordination and information sharing, we hope to benefit from collaboration with other regions to learn together how to make the best use of a wide range of biomass materials.

### **NCBEC and the Farm Bill**

The NCBEC is honored to be asked for its input into the 2007 Farm Bill, and would like to take this opportunity to share with the Committee what it sees as three crucial priorities where the Farm Bill could demonstrate real progress: 1) Bio-based Product Procurement; 2) Regional Feedstock Demonstrations; and 3) Local Economic Development.

The twelve state departments of agriculture in the NCBEC are part of the National Association of State Departments of Agriculture (NASDA), which is chaired in 2007 by North Dakota Agriculture Commissioner Roger Johnson, a member of the NCBEC. NASDA's Farm Bill priorities are attached (attachment 2)

#### **1) Bio-based Product Procurement**

The NCBEC will coordinate the development of a regional bio-based product procurement program for the North Central region. The US Department of Agriculture and the US Department of Energy, following authorization in the 2002 Farm Security and Rural Investment Act, has created a system under which federal agencies must purchase designated bio-based products that are available and cost-competitive with fossil-based equivalents. This provision intends to create new domestic demand for agricultural commodities, spur the industrial base through value-added agricultural processing and manufacturing, and enhance the nation's energy security by substituting domestically-produced biobased products for those made from fossil energy-based products.



The NCBEC regards the creation of a regional bio-based procurement system as “low hanging fruit” for stimulating regional bio-economy development. Creation of a regional system would dovetail with federal efforts, given that a list of products has already been designated, and the USDA has already learned many lessons from a series of rule-makings. A bio-based product procurement system for state governments would not pose an undue burden on taxpayers or administrators because of the requirement that bio-based products be available and cost-competitive with fossil-equivalent products. Finally, the region has a head-start in creating a regional bio-based product procurement program because two states have already passed legislation – ND in 2007 and IL in 2006.

Creation of a regional system has distinct advantages as well. Agreement on system design would allow any state to designate a product as “bio-based” and allow it to be adopted into the procurement system. Just as Iowa State University played a leading role in performing life cycle testing on bio-based products for the federal procurement system, any land grant university in the North Central region could test and approve products for a regional procurement system.

In this regard we would urge the Committee to reauthorize section 9002 of the 2002 Farm Bill dealing with the Federal procurement of bio-based products, and to provide the US Department of Agriculture with the resources it needs to support the development of a regional program. We would also call to the Committee's attention several other recommendations for the Energy title of the Farm Bill that have been recommended by the land grant system, through the National Association of State Universities and Land Grant Colleges (NASULGC). (attachment 1) These proposals are all designed to maintain and improve current Energy Title programs that encourage research, education, and extension efforts related to renewable energy development. A brief summary of these proposals is attached to my testimony. We would be pleased to provide the Committee with the legislative language to carry out these proposals.

## **2) Regional Feedstock Demonstrations**

The North Central Region proposes creating collaborative feedstock

demonstrations involving multiple states and partnerships between industry, producers, Land Grant Universities, State Departments of Agriculture, and federal agencies.

**Background:**

The next generation of the biofuels industry depends on successful deployment of a variety of new biomass feedstocks and continual improvement of existing feedstocks. Biomass materials like switchgrass and crop residues may potentially be available, but there are major hurdles exist in bringing them to market. Challenges exist at all levels including establishment, harvesting, densification, transportation, storage, handling, and pre-processing. Many companies developing biofuel processing technologies report challenges in assembling adequate feedstock for demonstration and commercial-scale projects.

At the same time, significant questions exist regarding potential sources of biomass. Can crop residues be removed without negative long-term impacts on soil quality and soil carbon? How can native grass crops best be managed to balance yields with wildlife habitat and maximize yield over the long-term? Will it be practical to manage perennial mixtures for biomass production? Is it economical to harvest forestry thinnings? What equipment improvements can bring down the cost of harvesting tree crops like poplar and willow? These are only a sampling of the questions regarding the utilization of our region's biomass resource at scale.

The only way to answer these questions is with commercial scale demonstrations for a variety of proposed biomass materials, including crop residues (corn stover, wheat straw, sugar beet pulp, rice straw), perennial crops (switchgrass, miscanthus, alfalfa), forestry residues, dedicated tree crops (hybrid poplar and willow), urban wood waste, mill residues, methane from landfills and sewage treatment, manure, and other non-perennial crops (sugar beets, sweet sorghum, grain sorghum, canola, winter canola, wheat).

The North Central Region is well-suited for large-scale regional demonstrations of feedstock. It has the capacity to produce about 90% of ethanol in existence or under construction. Our 12 states contain about 50% of the total national

biomass feedstocks. The region maintains an active Land Grant research system, a strong existing biofuels industry, and political leadership in biofuels. We lead the way in demonstrating feedstock at a sufficient scale to ensure successful development of the biofuels industry's next generation.

Demonstrating biomass feedstocks at commercial scale will answer questions and solve problems that are applicable throughout the country as we set a course towards greater energy independence. We welcome the opportunity to collaborate with other regions as they seek to demonstrate appropriate feedstocks.

### **Principles for Regional Demonstration Projects**

- **Draw on existing research and demonstration projects within the region.** Every state in the North Central region has research programs in bio-energy feedstocks, and many have some type of demonstration project. We propose taking advantage of existing strengths to create regional demonstration projects.
- **Partner with energy producers to guarantee a market for biomass.** Every state has energy projects that are proposed or in existence that could utilize cellulosic biomass, but all of them will need support in doing so. In many cases the use of cellulosic biomass will enhance the profitability and lower the risks for conventional biofuel plants. Attachments list technologies that could use biomass in a more comprehensive and detailed way (attachment 3) and specific research projects in each North Central state (attachment 4). These are a few examples of existing projects that could be leveraged:
  - **Indiana**
    - Purdue University has a variety of feedstock development and conversion research projects that are bringing advances in biofuels closer to commercialization and could provide important lessons for a demonstration project.
  - **Iowa/South Dakota:**
    - Poet Companies – based in Sioux Falls, SD, has announced

that it will expand a corn ethanol plant in Emmetsburg, IA to produce cellulosic ethanol, and was recently selected as one of six cellulosic bio-refinery projects to receive federal funding.

- **Iowa:**
  - The Chariton Valley Biomass Project in Chillicothe, IA has developed experience in co-firing switchgrass in a coal-fired power plant, but may need additional support to continue and expand this effort.
- **Kansas:**
  - Abengoa Bioenergy, LLC, of Chesterfield, MO, like Poet , was selected to receive Department of Energy funding to build a cellulosic ethanol plant. Their plant will be located in Kansas
- **Michigan:**
  - Michigan has a number of existing wood-burning power plants that could be utilized in demonstrating new cellulosic feedstocks to the benefit of any bio-energy project that wishes to use them.
- **Minnesota:**
  - Three corn ethanol plants in Minnesota are experimenting with the replacement of natural gas with biomass – in the form of stillage, corn stover, and wood chips.
- **Nebraska:**
  - USDA-ARS Lincoln has performed more than 10 years of research on native grass biomass, and has many research plots that could be leveraged to create a larger demonstration project.
- **North Dakota:**
  - North Dakota has many biomass research initiatives at North Dakota State University and University of North Dakota – EERC. They are detailed in an attachment. The Lignite Energy Council recently completed a favorable feasibility study evaluating co-firing switchgrass and wheat straw in lignite coal-fired power plants.
- **Ohio:**

- Ohio State University is installing a pilot plant to convert oil and protein to electricity through anaerobic digestion with US Department of Energy and Ohio Third Frontier funding. This technology has broad applicability for a variety of conventional and cellulosic feedstocks and agricultural wastes.
- **Partner with producers to reduce their risk in experimenting with new bio-energy crops and harvesting methods.** The risks involved in demonstrating experimental feedstocks cannot be borne entirely by producers. They cannot, for example, risk losing their crop histories, going without crop insurance, or bear undue risk of not selling a crop due to factors outside their control. The 2007 Farm Bill must make experimentation with bio-energy feedstock production profitable for producers if large-scale demonstrations will be possible.
- **Partner with equipment producers, custom harvesters, manufacturers, and any other commercial entities that can provide services that improve cost-effectiveness and efficiency of feedstock production.**
- **Involve State Departments of Agriculture and Land Grant Research and Extension in projects**
  - The Land Grant system can offer their expertise in a variety of ways, including creating new crop germplasm, developing new cropping systems, and development and deployment of new harvesting and collection equipment
  - Land Grant researchers can evaluate harvesting impacts on soil carbon, water quality and wildlife. They recommend best practices and evaluate project impacts on local communities.

The North Central Bio-economy Consortium welcomes the opportunity to partner with the members of this Committee, with Federal and State Agencies, with industry partners, and with partners in other regions to assure that we learn, as a nation, how to make the best use of resources for producing energy and products from plants.

### **3) Local Economic Development**

I have spent much of my time discussing the technical, logistical, and economic challenges in developing the bio-economy, but the local impacts cannot be overlooked. Developing a bio-economy is crucially important for energy security, but it is also important because it will improve the economies of our states, bring jobs to rural areas, revive our nation's manufacturing base, and improve the lives of individuals and our communities. This is essential to the missions of all of our members – the State Departments of Agriculture, Experiment Stations, and Extension. As such, we would hope that mechanisms are in place in the 2007 Farm Bill to assure that the benefits of the developing bio-economy can accrue to local communities throughout our region. The NCBEC has identified assuring local benefits as one of our priorities, and many of our members are conducting research to evaluate the impacts of existing projects. We hope that research conducted in our region can have value to the entire nation.

### **Conclusion**

The NCBEC would like to offer itself up as a resource to this Committee as it drafts the 2007 Farm Bill. Given our geographic and institutional representation, we are uniquely situated to offer information and guidance about the developing bio-economy in the region where it is developing the fastest. I have discussed three major priority items during my testimony today – the creation of a regional bio-based product procurement system, the establishment of regional feedstock demonstration projects, and the importance of local economic development. We hope that these projects are only the beginning of our involvement with this Committee. Let me reiterate that although the Consortium is a regional project, we welcome the opportunity to collaborate with other regions, and hope that the lessons learned in our region are applicable around the country as our nation continues down the current path towards greater use of bio-energy to support energy independence, local economic development, and environmental protection. Thank you for your commitment to the health and vibrancy of agriculture in this country.

**ATTACHMENT 1:****RECOMMENDATIONS FOR THE ENERGY TITLE OF THE 2007 FARM BILL**  
**National Association of State Universities and Land Grant Colleges****SEC. \_\_1. PROCUREMENT OF BIOBASED PRODUCTS.**

Reauthorize and amend the current law program to (1) require the Secretary of Agriculture to establish regional centers to advise and assist producers of biobased products in accessing Federal agency markets, and (2) authorize the Secretary to provide assistance develop a model State biobased product procurement law and to encourage its adoption by the States.

**SEC. \_\_2. BIOENERGY DEVELOPMENT GRANTS.**

Reauthorize and expand the biorefinery development program to assist in the development of new technologies for the use of “biomaterials, and other sources of renewable energy”. Require the Secretary of Agriculture to carry out a study to determine which grants made under the program resulted in successful technologies or other outcomes, and why.

**SEC. \_\_3. BIODIESEL FUEL EDUCATION AND DEVELOPMENT GRANTS.**

Reauthorize the program and expand it beyond education to include assistance in the development of new technologies for biodiesel fuels production.

**SEC. \_\_4. ENERGY AUDIT AND RENEWABLE ENERGY DEVELOPMENT PROGRAM.**

Reauthorize the program and require the Secretary to carry out a program to improve the energy use practices of farmers to reduce the production cost of crops and livestock, and promote the increased use of all sources of renewable energy.

**SEC. \_\_5. RENEWABLE ENERGY SYSTEMS AND ENERGY EFFICIENCY IMPROVEMENTS.**

Amend the existing program to require the Secretary, directly or through one or more land grant colleges and universities, to carry out a study to determine which types of grants and loans made or guaranteed have resulted in successful outcomes, and why.

**SEC. \_\_6. BIOMASS RESEARCH AND DEVELOPMENT.**

Amend the program to require the Secretary of Agriculture to work to achieve better coordination between USDA biomass research and development programs and the Department of Energy’s renewable energy programs, and to use competitively selected research centers at land grant colleges and universities to assist in carrying out the program.

**SEC. \_\_7. COOPERATIVE RESEARCH AND EXTENSION PROJECTS;**

**CARBON CYCLE RESEARCH.**

Reauthorize the extension and related carbon sequestration projects under the carbon cycle research provisions of section 221(e) of the Agricultural Risk Protection Act of 2000.

**SEC. 8. ENHANCED RESEARCH ON BIOMASS AND ENERGY.**

Reauthorize the Biomass Research and Development Act of 2000 and increase the discretionary authorization level from \$200 million to \$300 million annually.



**Attachment 2:****National Association of State Departments of Agriculture  
2007 Farm Bill Highlights****Introduction**

Agriculture is an important force in the economic, social, and political fabric of America and is considered one of the protected "critical assets" of this Nation as outlined by the Department of Homeland Security (DHS). The commissioners, secretaries, and directors of the state departments of agriculture are keenly aware of the changing dynamics in food, fiber and fuel production around the world. As the chief agricultural officials in their states, they understand the importance of the entire food and agricultural sector, not only to their states but to the national economy as well. From this vantage point the National Association of State Departments of Agriculture's (NASDA) puts forward a comprehensive set of strategic policy initiatives designed to enhance U.S. agricultural competitiveness and profitability and to ensure the survivability of U.S. producers.

NASDA's purpose is to contribute to a wide-ranging and constructive debate on agricultural policy and the next farm bill. As representatives of the state departments of agriculture, NASDA members seek to outline what issues must be addressed in the next farm bill for the United States in order to allow the best avenue for protecting agriculture as a critical asset to the safety and security of this Nation and its people.

NASDA's recommendations offer a broad, opportunity-based agricultural policy focusing on expanding and improving the safety net for farmers and ranchers. NASDA's recommendations also outline bold, new ideas to address environmental and food safety challenges. For the first time, NASDA's recommendations emphasize development of renewable energy resources, nutrition initiatives, and an expanded invasive species program.

NASDA's Farm Bill recommendations encompass 209 specific recommendations

in nine general policy areas. The recommendations in this paper are the highlights of NASDA's full recommendations. For the full text of NASDA's recommendations, please go to [www.nasda.org/fb2007/](http://www.nasda.org/fb2007/).

#### **Economic Safety Net for Producers**

- Maintain marketing loans and counter-cyclical payments
- Expand crop insurance options with an emphasis on whole farm revenue insurance
- Enact a permanently authorized disaster assistance program
- Payment limits must be clearly established and enforceable; the "three-entity rule" needs to be revised.
- GAO needs to study and report on the impact of direct payments on land values to provide a baseline for future policy discussions.

#### **Access to International Markets for U.S. Agricultural Products**

- Support continuation of trade promotion authority
- Continue funding for Market Access Program (MAP) and Foreign Market Development Program
- Maintain and enhance FAS Agricultural Trade Offices overseas
- Market Access for US biotech crops is important

#### **Support for Specialty Crops**

- Block grants to states, including a base grant of \$2 million to each State
- Ensure that specialty crop producers have comparable access to USDA benefits

#### **Enhancing Environmental Quality through Partnerships with States**

- Expand scope and eligibility of Conservation Security Program (CSP)
- Enact stewardship partnership agreements with States
- Enhance the Farmland Protection Program
- Improve current USDA conservation programs

#### **Rural Development**

- Enact farm/ranch profitability grants
- USDA-Rural Development programs need to be available for rural areas in proximity to metropolitan areas

**Providing Safe, Healthy, and Nutritious Food**

- Expand the DoD Fresh and USDA Fruit and Vegetable pilot programs to all states
- Improve funding and delivery of nutrition programs
- Allow interstate sales of state-inspected meat and poultry
- Enact pre-harvest food quality assurance partnerships with States

**Support for Bio-industry Development with Emphasis on Energy Production**

- Implement the 25x25 agriculture energy initiative with emphasis on the development of alternative fuels from agriculture commodities and other biomass
- Make permanent the tax credits for ethanol and biodiesel
- Establish on-farm incentives to produce and utilize solar, wind, and biobased energy, including allowing use of CRP land for production of energy and biobased crops with commensurate payment reductions
- Develop a cellulosic/energy feedstock production base enrollment program using long term contracts

**Identification and Removal of Invasive Species**

- Enhance non-native pest and disease identification and eradication/control programs consistent with safeguarding principles, e.g. expand prevention and early detection and rapid response programs
- Expand funding sources through a streamlined, dedicated appropriation with block grants to states to expand programs
- Continue emphasis on sound-science and SPS harmonization in trade agreements
- Improve inspection of cargo arrivals

**All-Hazards Security Programs**

- Expand state emergency programs for food and agriculture consistent with federal emergency preparedness and response programs
- Enhance animal identification programs to assure state and federal animal health objectives are met

**Research and Information**

- Ensure data collection needs are met
- Increase funding in research, extension, and education programs

**Biotechnology**

- Create a federal office to assure communications, cooperation and coordination of information between federal and state agencies

**Other Critical Issues – Labor and Transportation**

- Availability of agricultural labor force through guest worker program
- Rivers, Rails and Roadways: Critical investments needed to maintain agriculture's competitiveness in world marketplace

**Role of States**

- State departments of agriculture should be full partners with USDA in program delivery to producers through partnership agreements, block grants, and pilot projects

**Attachment 3:****Bio-energy Projects in the North Central region by technology**

There are a variety of projects in the North Central region that already use cellulosic biomass, plan to do so, or could if they so choose. This is not an exhaustive list, but merely provides some examples of projects that could demonstrate biomass feedstocks at commercial scale:

**Pyrolysis and Gasification**

Pyrolysis applies heat and pressure to biomass in the absence of oxygen for a brief duration to produce liquid "bio-oil", char, and gases. Bio-oil is a mixture of hundreds of compounds that distilled into multiple high-value chemicals and fuels. The charcoal produced from pyrolysis can be used as a soil amendment. As one example of a high-value chemical product from bio-oil, the Red Arrow company in Wisconsin produces Liquid Smoke food flavoring. This process is currently commercial.

Gasification is similar to pyrolysis but by using higher temperatures and longer duration it breaks down biomass completely to hydrogen and carbon monoxide. This "producer gas" can be combusted or, using various processes, transformed into pipeline-quality natural gas, various liquid fuels such as alcohols and Fischer Tropsch Diesel, and other chemicals. There are numerous gasification projects at various scales around the region. Gasification is currently commercial for many applications; while other applications are still under development.

**Anaerobic Digestion**

Many places around the region demonstrate anaerobic digestion of manure, distiller dry grains, oils, proteins, and other materials into bio-gas and other products. This process, when used with manure, frequently involves the addition of some cellulosic biomass as part of the feedstock. It is usually partly a waste-disposal strategy in addition to an energy production strategy.

An example is a pilot plant for oil and protein conversion to electricity that Ohio State University is installing this summer with US Department of Energy and Ohio Third Frontier funding. The economically-driven program initiative involves conversion of animal and food processing waste into clean, renewable energy

(electricity) via biodigesters that turn the waste into biogas and fuel cells that turn biogas (also direct feedstocks such as soybean oil) into energy. This technology is important to rural communities and on-farm production of energy and fits the overall theme of NC-BEC (it also fits Ohio particularly well as we have an 11 million population but an \$80B ag sector of which food processors comprise \$30B; the technology should be adaptable to other states and their specific opportunities).

**Process heat:**

Gasification or combustion of biomass to provide process heat is a commercial process. One ethanol plant, Central Minnesota Ethanol Company in Little Falls, MN, already operates a gasifier in this way primarily using wood waste. This facility, and other ethanol facilities, could use perennial bioenergy crops as well, but this concept needs to be demonstrated.

Any other commercial or industrial facility with a process heat requirement could use bioenergy crops in the same way. The potential market for heat biomass is enormous in the North Central region.

Some ethanol plants with fluidized coal bed boilers may be able to use bioenergy crop in combination with, or to replace coal for process heat. This is a near-term application for biomass.

**Pellet Stoves:**

There are several companies around the North Central region that produce biomass pellets for use in home heating. This is a commercial application with a large market. It is possible to make biomass pellets from any type of biomass, including switchgrass, poplar and willow. There are currently pelletization projects in Minnesota, Missouri, Wisconsin, and other states.

**Coal-fired power plants:**

Virtually any coal-fired power plant could co-fire biomass with coal to produce electricity. The Chariton Valley Biomass Project in Chillicothe, Iowa demonstrated this concept. Additionally, Alliant Energy's 800 MW Ottumwa Generation Station has co-fired up to 2% switchgrass. Alliant believes its Nelson Dewey plant in Cassville, WI could also use switchgrass, wood or corn stover in

addition to coal and petroleum coke. Alliant has filed petitions with the Public Service Commission about this usage of the Nelson Dewey Plant and depending upon approval, could be operational by 2012-2015. This facility could scale-up this concept and in fact tried to do so at countless other pulverized coal plants around the North Central region.

**Direct Combustion:**

Many states have facilities that currently burn biomass to produce heat and electricity. These projects are primarily in states with existing wood products industries.

- Michigan currently burns wood chips and forest waste products in six commercial facilities to co-generate electricity. They have a combined capacity of 368,170 kW per year.
- Wisconsin and Minnesota also have several facilities burning wood and wood waste for energy.

**Cellulosic ethanol:**

On February 28, 2007 Department of Energy (DOE) Secretary Samuel W. Bodman announced that DOE will fund six biorefinery projects over the next four years with up to \$385 million in federal funds. The biorefineries are expected to produce more than 130 million gallons of cellulosic ethanol annually as well as biobased products, including: power, methanol, hydrogen, and ammonia. Each biorefinery will use more than 700 tons of feedstocks per day including agriculture residues such as corn stover, wheat and rice straw; wood residues, wood-based energy crops; landfill organic wastes; and switchgrass. Two of these facilities will be located in the North Central region (see below).

Not listed below is another project approved for a DOE grant. A technology to convert forest thinnings/woodchips to ethanol currently exists based on research conducted in Fayetteville, Arkansas by Bioengineering Resources, Inc. Commercial development is also underway in LaBelle, Florida by Alico, Inc. This technology could utilize another feedstock common in the North Central region.

**Abengoa Bioenergy, LLC of Chesterfield, Missouri, up to \$76 million.**

The proposed plant, located in the state of Kansas, will produce 11.4 million gallons of ethanol annually and enough energy to power the facility, with any excess energy used to power the adjacent corn dry grind mill. The plant will use 700 tons per day of corn stover, wheat straw, milo stubble, switchgrass, and other feedstocks.

**POET (formerly Broin) Companies of Sioux Falls, South Dakota, up to \$80 million.**

After expansion, the plant, located in Emmetsburg, Iowa, will produce 125 million gallons of ethanol per year, of which roughly 25 percent will be cellulosic ethanol. For feedstock in the production of cellulosic ethanol, the plant expects to use 842 tons per day of corn fiber, cobs, and stalks.

**Co-gasification with coal:**

Analysis by Bob Williams at Princeton University suggests that by co-gasifying coal and biomass, capturing and storing carbon dioxide, and producing electricity, liquid fuels and other products, that net carbon neutral or even carbon negative energy would be possible. The carbon produced and stored in the plant through photosynthesis is not re-emitted to the atmosphere through combustion, but captured in the gasification process. Perennial crops would be particularly advantageous because they sequester additional carbon in the soil.

At least one European gasification plant – a 250 MW facility operated by the Dutch utility Nuon in Buggenum, Netherlands – co-gasifies up to 30% biomass with coal to produce electric power. This technology, known as integrated gasification-combined cycle (IGCC), is fully commercial in Europe, and the Buggenum plant demonstrates the technical ability to co-gasify biomass at scale. Nuon is now planning biomass co-gasification with coal for diesel fuel production for a much larger 1,200 MW plant to be operational by 2012. The plant will have a 750 MW IGCC component.

There are IGCC and coal-to-liquid gasification plants under development in the North Central states of Illinois, Indiana, Minnesota, and North Dakota. Although all of them could co-gasify some amount of biomass, none of the plants have firm plans to do so at this time. However, the Great River Energy-Headwaters, Inc.



project team recently visited the Buggenum plant and met with gasifier vendors with biomass gasification experience. The team is developing a lignite gasification plant with carbon capture that will produce both electricity and liquid fuel plants in North Dakota. Follow-up discussions have occurred about the possibility of co-gasifying switchgrass, grass mixtures, or wheat straw with lignite.

Given that there will be commercial scale IGCC and coal-to-liquids facilities in the North Central region within five years, co-gasification of perennial bioenergy crops could be possible within that timeframe as well, assuming the availability of incentives to support demonstration of a biomass stream in one of the early commercial plants.

#### **NDSU/MBI Biomaterials Initiative**

Many research efforts are underway throughout the region to develop bio-based products – many of which could be produced from native perennial feedstocks.

The North Dakota State University/MBI team, with initial funding from USDA-CSREES, is working to develop and commercialize a bio-based nanocomposite material that could substitute for fiberglass and petroleum-based composites. Wheat straw will be the initial feedstock, although other local raw materials such as switchgrass and industrial hemp could qualify. This technology will be integrated as part of a multi-product biorefinery, which will produce ethanol and electricity as well as cellulose nanofibers for the nanocomposite material. The preliminary investigation phase of this project is complete with promising results.

## **Attachment 4:**

### **Biomass Feedstock Research in the North Central region by state**

#### **Illinois:**

- A research program on miscanthus at the University of Illinois – Urbana-Champaign led by Dr. Stephen Long
- Research on Molecular Bioengineering of Biomass Conversion being done with the Institute for Genomic Biology, for which Dr. Blaschek serves as theme leader.

#### **Indiana:**

At Purdue:

- DOE-funded research on poplar;
- NSF funded project on cell wall biosynthesis in grasses;
- Improved biomass production in switchgrass.
- These projects should result in outcomes that would bring them closer to commercial production in about 5 years.

#### **Iowa:**

- Research on switchgrass at Iowa State University, partly in support of Chariton Valley Biomass Project.

#### **Kansas:**

- Kansas Wheat is very aggressively pursuing research and demonstration of wheat straw as an ethanol feedstock, and that they have talked with Abengoa Energy, which has received a DOE grant to build a cellulosic ethanol plant (one of six grants announced at the end of February) here in Kansas. They have talked to many growers and are seriously working on issues of supply, storage and transportation.
- Kansas State University is investigating the production of ethanol from grain sorghum and millets, as well as cellulosic production from various types of straw and stover.
- Research is being done on the integrated systems involving prairie and grazing lands, our cattle feeding industry and our current ethanol production

- A green energy facility is under consideration for development in conjunction with a proposed new coal generation facility located at Holcomb, KS

#### **Michigan:**

The Michigan State University Office of Biobased Technologies (OBT) has several research projects on bioenergy feedstocks and conversion, including:

- Research to allow corn to produce its own cellulose enzymes,
- Research on ammonia fiber expansion to pre-treat biomass for conversion to biofuels
- Basic genetic research
- A research plot on various biofuel crops, including switchgrass

#### **Minnesota:**

- Conducted research showing that mixed prairie grasses on marginal land significantly increase biomass yields (as compared to monocultures such as switchgrass) and may be a significant source of biomass for "carbon-negative" biofuels.
- Studied the use of alfalfa, willow and other woody perennials as energy sources; developed and tested new hybrids of poplar to increase their genetic diversity, disease resistance, and yield, especially on marginal soils; studied land management practices that increase biomass yields while improving soil and water productivity, reducing runoff and erosion, protecting water quality, conserving fish and wildlife habitat, and sequestering carbon.
- Developed methods for densifying and pre-treating bulky biomass crops to facilitate their storage and transportation (liquefaction and microwave pyrolysis to produce liquid bio-oils, and syngas; pelletization of switchgrass and corn stover).
- Conducted tests of the gasification of corn stover and distillers grain for a Biomass Gasification System on the University of Minnesota Morris campus.
- Engineered bacteria that create fuel hydrocarbons in hours versus the millions of years required for fossil fuels.
- Developed novel autothermal reforming technologies to produce hydrogen from ethanol and other forms of renewable biomass.
- Expanded the focus of the Center for Diesel Research to include development of a biofuels and bioproducts research facility at the University of Minnesota; developed fuel delivery and nozzle-atomization

systems and modifications that improve the performance of ethanol and other biofuels in engines.

- Developed a scalable biorefining model for processing corn and other forms of biomass into ethanol and a variety of intermediate products (biodiesel, biopolyols, oil).
- Converted livestock waste to energy, fuels, and bio-based products.
- Developed a novel process for degrading the lignin in woody biomass with enzymes.
- Begun developing a metagenomics approach to isolate novel enzymes that have the ability to convert cellulosic biomass into sugars .
- Studied the economic and environmental impacts of biomass-fueled versus coal-powered ethanol plants.
- Research on bio-based products such as polyurethane foam, polyester, and biodegradable plastics.

#### **Missouri:**

- Forest management plans are being developed for public lands around the state – including the Mark Twain National Forest – for harvesting small diameter trees and trimmings.
- The potential energy output from forestry in Missouri is outlined in a draft study from the Agroforestry Center at the University of Missouri titled "Utilization of Missouri Ozark Small-diameter Trees and Their Waste Wood Residuals."

#### **Nebraska:**

- **USDA-ARS, Grain Forage and Bioenergy Research Unit** – Research on switchgrass, prairie grasses, and prairie legumes – focused on developing switchgrass and other perennial species as feedstocks for biofuels since 1990. ARS-Lincoln conducted a 5 year on-farm study in 10 farm location in NE, SD and ND and data shows that switchgrass can be grown, hayed and renewably harvested as a bioenergy feedstock over a five-year period – this study also demonstrated that producers can optimally manage switchgrass in monoculture to provide feedstock in a cost-efficient and environmentally sustainable manner. Other work is ongoing on developing sorghum and wheat suitable for the bioenergy sector

**North Dakota:**

- **The NDSU/MBI Biomaterials Initiative** is investigating the use of wheat straw and other cellulose materials to produce biobased composites that could substitute for fiberglass and petroleum-based composites. Although wheat straw is the initial focus, this process could utilize switchgrass and other biomass materials.
- **USDA-ARS North Great Plains Research Project:** Establishing 18 research/demonstration plots at 6 locations in North Dakota with perennial herbaceous crops to collect baseline soil quality data, evaluate different perennial crops, and evaluate harvest impacts, economics, soil carbon storage potential, and the impact of alfalfa on stand yield and maintenance.
- **EERC Center for Biomass Utilization:** The Energy and Environmental Research Center at University of North Dakota conducts research on biomass utilization. Currently nearly \$5 million of activities are funding in CBU through industry investment; local, state and federal government contracts; and industry-government joint ventures.
- **NDSU Agricultural Experiment Station:** A dedicated bioenergy crop study initiated by many government, research, NGO, and industry partners in the state.

**Ohio:**

- Census of feedstocks and feedstock opportunities assembled to provide framework for policymakers.
- Assessment of feedstock alternatives, especially in relation to carbon management/maintenance.
- Bioconversion technology (waste to energy).
- By-product utilization and product development.

**South Dakota:**

At South Dakota State University:

- Switchgrass breeding program,
- Research on grass based mixtures
- Impacts on soils, water and wildlife

**Wisconsin:**

- Agrecol Corporation of Madison and Evansville have been growing switchgrass for several years and already use a pelletization process to heat their commercial buildings. They are launching an expanded research project for switchgrass to energy use.
- Alliant Energy is already doing research for their proposed Nelson Dewey facility.
- Also, see above projects listed under working on commercialization.

**Testimony before the Senate Committee on  
Agriculture, Nutrition and Forestry, May 9, 2007  
Renewable Energy and Rural Development**

**Daniel G. De La Torre Ugarte, Burton C. English, and Kim Jensen**

Associate, Full, and Full Professors, respectively, Department of Agricultural Economics, The University of Tennessee

Chairman Harkin, members of the Senate Ag Committee on Energy and Rural Development, thank you for the opportunity to appear today to discuss the potential impacts to agriculture and the nation as we pursue increased renewable energy. I am Daniel De La Torre Ugarte, an Agricultural Economist located at the University of Tennessee. Both of my colleagues Burton C. English and Kim Jensen send their regrets for not attending this committee meeting.

We have been involved in a number of studies during the past several years that examine the impacts increased renewable energy might have on the agricultural sector and the nation's economy. Two recent studies have completed for the Governors Ethanol Coalition and for the 25X'25 economic workgroup. Both these studies have similar findings so we are going to focus on the 25X'25 study but bring some information learned from the Governor's Ethanol Study towards the end of the testimony. Both of these studies are available on the World Wide Web at: <http://beag.ag.utk.edu/>.

The 25X'25 study was designed to determine the feasibility of America's farms, forests and ranches providing 25 percent of U.S. total energy needs while continuing to produce safe, abundant and affordable food, feed and fiber. In addition, the analysis looks at the associated impacts of achieving the goal on the agricultural sector and the nation's overall economy. According to the U.S. Dept. of Energy (DOE), estimated energy use in 2005 was 100.5 quads. Based on DOE estimates and a recent RAND study, the nation will annually consume about 117.7 quads of energy by 2025. To put a quad in perspective, about 4.4 million households would consume a quad of energy through electricity and gasoline use in one year.

To meet the 25x'25 vision, 25 percent of the projected 117.7 quadrillion British Thermal Units (quad) or 29.42 quads are needed from renewable energy sources. At present, an estimated 1.87 quads are produced from biomass (agricultural/forestry) resources in the production of electricity and/or heat. Based on information from the RAND study, it is estimated that, by 2025, 12.10 quads will be annually produced from geothermal, solar photovoltaic, hydro, and wind generation. Therefore, to meet the 25x'25 goal of 29.42 quads, an additional 15.45 quads would need to come from agricultural and forestry lands.

***Key findings in this analysis:***

- **America's farms, forests and ranches can play a significant role in meeting the country's renewable energy needs.**

- **The 25x'25 goal is achievable.** Continued yield increases in major crops, strong contributions from the forestry sector, utilization of food processing wastes, as well as the use of over one hundred million acres of dedicated energy crops, like switchgrass, will all contribute toward meeting this goal. A combination of all of these new and existing sources can provide sufficient feedstock for the additional 15.45 quads of renewable energy needed.
- **The 25x'25 goal can be met while allowing** the ability of the agricultural sector to reliably produce food, feed and fiber at reasonable prices.
- **Reaching the goal would have an extremely favorable impact on rural America and the nation as a whole.** Including multiplier effects through the economy, the projected annual impact on the nation from producing and converting feedstocks into energy would be in excess of \$700 billion in economic activity and 5.1 million jobs in 2025, most of that in rural areas.
- **By reaching the 25X'25 energy goal, the total addition to net farm income could reach \$180 billion,** as the market rewards growers for producing alternative energy and enhancing our national security. In 2025 alone, net farm income would increase by \$37 billion compared with USDA baseline projections.
- **Reaching the goal would also have significant positive price impacts on crops.** In the year 2025, when compared with USDA baseline projections, national average per bushel crop prices are projected to be \$0.71 higher for corn, \$0.48 higher for wheat, and \$2.04 higher for soybeans.
- **With higher market prices, an estimated cumulative savings in government payments of \$15 billion could occur.** This does not include potential savings in fixed/direct or Conservation Reserve Program (CRP) payments.
- **In the near term, corn acres are projected to increase.** As cellulosic ethanol becomes commercially viable after 2012, the analysis predicts major increases in acreage for a dedicated energy crop like switchgrass.
- **The higher feed crop prices do not result in a one-to-one increase in feed expenses for the livestock industry.** Increases in ethanol and biodiesel production result in more distillers dried grains (DDG's) and soybean meal, which partially compensate for increased corn prices. Moreover, the integrated nature of the industry allows for the adjustment of animal inventories as a way to adjust to the environment and increase net returns. In addition, the production of energy from manure and tallow could provide additional value for the industry.
- **Contributions from America's fields, farms and forests could result in the production of 86 billion gallons of ethanol and 1.2 billion gallons of biodiesel,** which has the potential to decrease gasoline consumption by 59 billion gallons in 2025. **The production of 14.19 quads of energy from biomass and wind sources** could replace the growing demand for natural gas, diesel, and/or coal generated electricity. These renewable energy resources could significantly decrease the nation's reliance on foreign oil, fossil fuels, and enhance the national security of all Americans.



### Methodology:

This type of cutting-edge research on the economics of alternative energy required the UT to combine two computer models in order to provide a comprehensive outlook at both the agricultural sector and the national and state economic impacts. A computer simulation model, POLYSYS, and an input-output model, IMPLAN, were used for the study. POLYSYS has been used for a number of national agricultural studies that require projections on the impacts on agricultural acreages and production by U.S. Agricultural Statistical Districts as the result of federal farm policy changes. IMPLAN contains state level input-output models that provide an accounting of each state's economy.

The picture of agriculture that we present this day is but one of many pictures that could be painted. The methodology that we use is to determine the impacts that are likely given the scenario being evaluated and comparing those results to a baseline. In this case, we used the 2005 USDA baseline to the year 2015 and extended it out to the year 2025 or 2030 in the case of the Governors Ethanol Coalition project. Some major assumptions in these analyses include: the need to produce approximately 30 quads of energy from renewable sources (Figure 1), increase in yield trends (50% increase in the rate assumed by USDA from 2016 through 2025) above USDA projected increases, commodity programs remain as they are today, corn to ethanol average conversion efficiency increases to 3 gallons/bushel by 2025 and cellulosic ethanol increases to 89 gallons/ton.

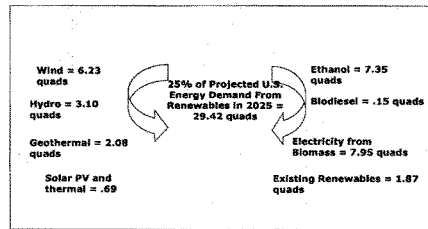


Figure 1. Estimated levels of renewable energy in the 25X'25 analysis

Land availability is also an important assumption, in the 25x'25 analysis, we assumed 15 million acres of CRP was available for conversion to switchgrass along with 61 million acres of cropland pasture and a portion of the 395 million acres of pastureland. No forestlands were incorporated into the analysis thought the workgroup is seeking to find additional funding so that these lands can be incorporated.

Renewable fuel feedstocks include a variety of agricultural residues, wastes, and dedicated energy crops. The feedstocks incorporated in this analysis are represented in Figure 2.

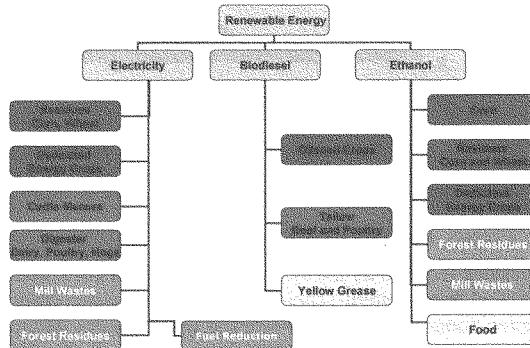


Figure 2. Energy Feedstocks from Agriculture

## Results

The remainder of this testimony will present some of the results and challenges that we see as we move toward a cellulosic future. Results discussed include projections on the feedstock converted to energy, land use shifts, changes in commodity prices, distribution of cellulosic materials and dedicated energy crops, impacts of the policy on net farm income and government payments, and finally economic impacts to the national economy.

### Feedstocks for Energy

Bioenergy production is derived from several feedstocks (Figure 3). Corn for grain, in the initial years of the scenario, provides the foundation of the bioenergy industry. By 2012, nearly 14 billion gallons of ethanol is projected to be produced from this nation's grains. Even after the introduction of the cellulosic-to-ethanol conversion technology (in 2012)<sup>1</sup>, corn is projected to continue to play a key role in the overall supply of feedstock. However, additional mill wastes, and forest residues enter in as feedstocks in 2012. Reaching the energy goal requires a significant use of cellulosic. Attaining the goal is also dependent on the successful introduction of bioenergy dedicated crops such as switchgrass and conversion of wood to ethanol. As production reaches the year 2025, the contribution of bioenergy dedicated crops is over 50 percent of the total

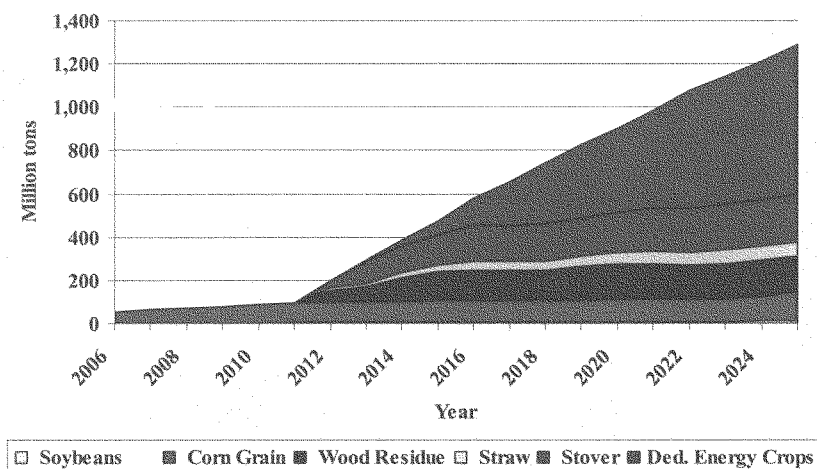


Figure 3. Feedstock composition over time

feedstock required by the bioenergy industry. In 2015, dedicated energy crops, are supplied from western Tennessee, eastern Texas, and other parts of the Southeastern United States, plus parts of North and South Dakota, Minnesota, Michigan, and northern New York, and the New England States (Figure 4). By 2025, many of the Agricultural

<sup>1</sup> Based on the National Renewable Energy Lab estimate, cellulosic ethanol is assumed to be commercial in 2012.

Statistical Districts in the Southern United States are producing in excess of a million tons of cellulosic material from dedicated energy crops. The regions in which dedicated energy crops will first expand are in the Southeast and Southern plains. After a few years, dedicated energy crops expand towards the north, but the Southeast and Southern Plains remain the areas with a higher density.

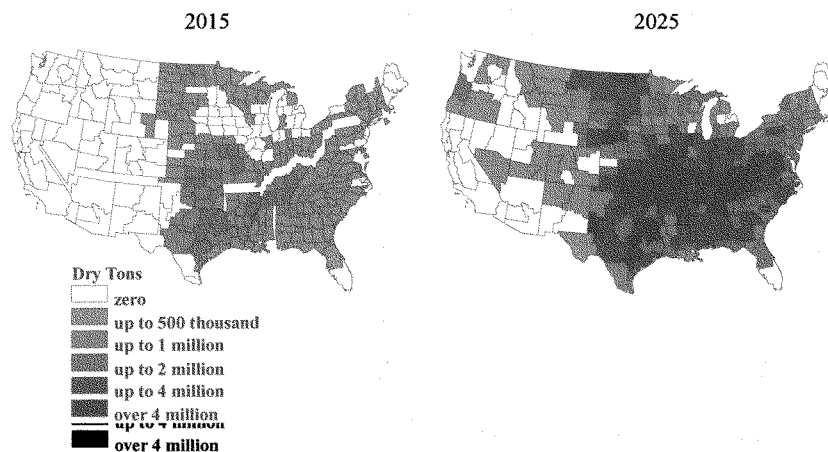


Figure 4. Distribution of the dedicated energy crops

Other cellulosic feedstocks (crop residues, wood residues, and wood thinning) are initially concentrated in the corn growing areas of the Midwest. Then, the production of feedstock expands towards the Southern Plains and the Southeast. Importantly, the sources of feedstock expand to nearly all 48 contiguous states.

The Midwest and Northern Plains would be the major sources of crop residues (corn and wheat), while the Southeast and Western states would be a major source of wood residues and forest thinning. It is important to reiterate that no forest is specifically harvested for energy purposes in these scenarios. However, the addition of forest resources could have substantial impacts on bioenergy markets and should be the subject of future research. By 2025, in both renewable energy scenarios, the Midwest portion of the country ranging from Texas to North Dakota and from Kansas/Nebraska to Kentucky/Tennessee is supplying the bulk of bioenergy materials.

### Land Use Shifts

To support the level of feedstock reported above, significant changes in land use were projected to be necessary. Use of agricultural cropland changes when compared to the baseline as agriculture attempts to meet the energy goal (Figure 5). Dedicated energy crops, such as switchgrass, will likely become major crops in U.S. agriculture, with 105.8 million acres planted. Significant shifts from current uses (2007) are projected. For instance, about 20 million acres of soybeans would slowly shift into dedicated energy

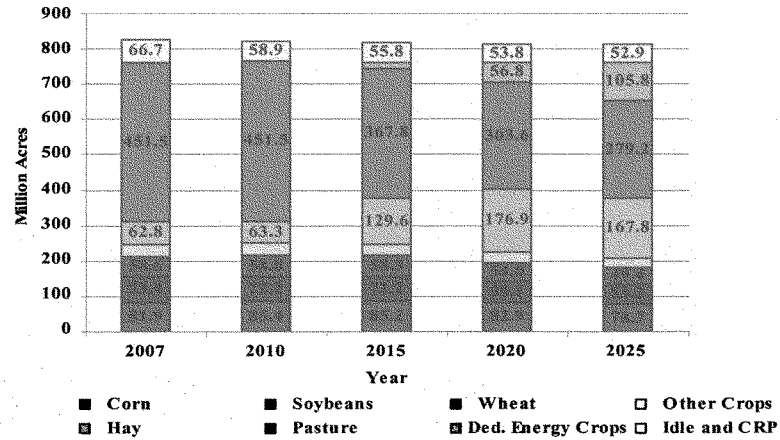


Figure 5. Projected land use changes, 2007-2025

crops, along with 9 million acres of wheat. In the case of corn, during the last five years of the analysis period, a shift of about 3 million acres would occur, as acreage becomes constrained and more energy per acre is required to achieve the target reflected in both scenarios.

Perhaps the most significant projected change is the shift of pastureland/rangeland and cropland in pasture, hereafter referred to as pastureland, towards the production of energy under the assumption that the feed value of the converted pastureland is replaced through hay production. A share of the shift of 172 million pasture acres<sup>2</sup> (100 million acres) was used to produce more intensive grasses for animal feed, and the remaining pasture in cropland and the grassland (not cropland) are projected to experience an increase in their management intensity, as it is well recognized that pasture and grassland are significantly under utilized. Consequently, this increase in management intensity is likely to occur at a very low additional cost, and while causing changes in the livestock industry, would not likely jeopardize the welfare of the livestock industry.

### Commodity Price and Net Returns Impacts

With a dramatic shift in land use toward energy crops, a corresponding change in average crop prices is anticipated. Therefore, as most major crops have some acreage shifted to energy dedicated crops, an overall increase in commodity prices is projected. Notably, when compared with the baseline prices, the crops that experience larger increases in price have the largest acreage decreases, as is the case of soybeans and wheat (Figure 6). However, the price increases within price ranges experienced in the last decade.

<sup>2</sup> While there is no recent literature on the use of cropland for pasture, a 2005 study of producers in Tennessee reported that at about \$55 per ton for switchgrass, producers would be willing to convert acreage equivalent to about 12 percent of the state's pastureland into energy dedicated crops (Jensen, et al, 2005).

Crop	\$/bu from baseline			
	2010	2015	2020	2025
Corn	0.16	0.02	0.16	0.71
Wheat	-0.12	-0.23	0.33	0.48
Soybeans	0.09	0.16	1.69	2.04
\$/dry ton				
Dedicated Energy Crops	0	46.85	60.9	81.85
\$/gallon				
Cost of Ethanol	1.57	1.38	1.44	1.60

Figure 6. Changes in prices from baseline

Yields for traditional crops, which increase at rates greater than baseline, are projected to dampen price increases as a result of acreage conversion to energy crops. The price impacts without the higher yields would be significantly higher, and even exceed market prices experienced in the past, especially for corn, wheat, and soybeans. Therefore, expansion of a biofuels industry has to be accompanied not only by investments in bioenergy related elements of the supply chain, but also investments in traditional crops. This will increase the likelihood of success of the bioenergy industry growth.

The impact of the increased demand for agricultural resources, as a result of expanding the role of agriculture as a source of bioenergy, can be observed in the changes in net farm income. A 16.5% increase in realized net returns occurs to the agricultural sector when meeting the energy goal. In the baseline, producers could expect over the entire 20 year period a realized net income of over \$900 billion. An increase in realized net farm income of \$180 billion is projected to occur over the period of analysis with larger gains in realized net farm income occurring in the latter years under the energy goal. In 2025, for instance, a gain of \$37 billion is projected (Figure 6).

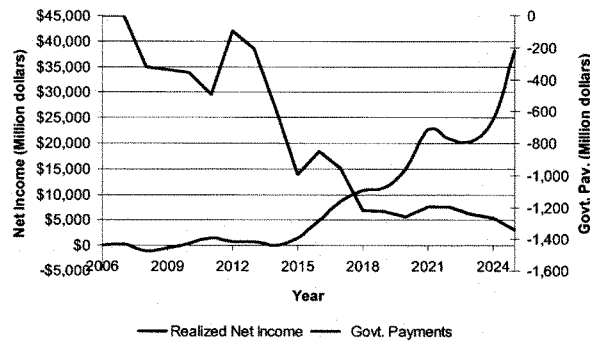
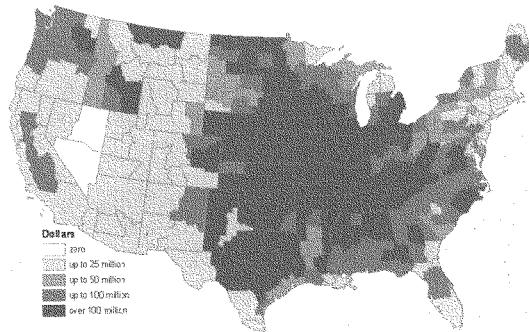


Figure 7. Changes in Realized Net farm Income and Government Payments

As prices of the major crops increase, a reduction in the level of government payments, such as loan deficiency payments and counter cyclical payments, both based on average market prices, would be anticipated. However, the projected payments under the baseline are already substantially lower than historical farm program spending, so the savings in these government payments are relatively small. Consequently, the savings in either type of payment are relatively minor. The majority of changes reflect the decrease in CRP payments that occur as contracts expire and landowners who are attracted by higher crop prices voluntarily move land into production (an aggregated \$28 billion over the 20 year analysis period).

Farmers and rural communities throughout the United States benefit from the renewable energy program, as increase in net returns from agriculture increase across the continental US. The gains first occur as a result of the expanded demand for corn, so they are initially concentrated in the Midwest, but as the use of cellulosic feedstock expands, the gains of net returns also expand to all areas of the country (Figures 8). By 2025, the areas with higher gains are located east of the Rockies, where agricultural lands are concentrated and areas to grow energy dedicated crops were identified.



**Figure 8. Distribution of Net Returns**

### **Impacts on the Livestock Sector**

The results of the analysis indicate that the livestock sector would face higher feed expenses. However, of the primary feed sources for livestock - hay, soybean meal and corn - only corn is expected to experience a significant increase in price. Hay price is determined at the regional level and is not determined in the POLYSYS model, but in order for cropland in pasture to come into crop production a portion of pasture must be converted to hay production to make up for the regional loss in pasture forage productivity. By 2025 national hay acreage is expected to rise from 62 million acres to more than 167 million acres, an increase of 100 million acres. This represents an

intensification of the management of the pasture land. While there could be a one time cost of shifting cropland in pasture to hay, it is not expected to be of any long term significance. As cropland in pasture is replaced with hay acreage, hay price is not expected to rise.

Although there is a large decline in soybean acreage, the soybean meal supply, a key feed ingredient, does not change significantly. This is due to two major reasons – decreased exports of soybeans and a large influx of soybean meal byproduct from biodiesel production. By 2025, soybean acreage drops quite significantly from 66.9 million acres to 53.3 million acres, a loss of 13.6 million acres resulting in a production drop of 437 million bushels. Increased soybean prices cause exports to decline from 1,099 million bushels to 481 million bushels, a drop of 618 million bushels. Biodiesel production demands 276 million bushels. Soybean crush demand (independent of biodiesel) drops by 138 million bushels. The soybean meal supply actually increases slightly due to 6,284 thousand tons of byproduct from biodiesel production. This causes soybean meal price to increase slightly from \$177 per ton to \$180 per ton. Note that as the use of soybeans for biodiesel increases, the driving product in the soybeans complex shifts from the meal value of the soybeans to the oil value of the soybeans.

The various components of the livestock industry react differently to the higher feed prices driven by the inclusion of corn in the feed ration, by the importance of the feed expenses in the overall cost of production, and by the ability to transfer the cost of the additional feed expenses to the consumer.

The cattle sector reacts to the cost increase by adjusting cattle inventories. The reduction in inventories leads to higher prices that offset the sector's increased production costs. Table 18 indicates that, by 2025, cash receipts from cattle increase \$532 million over baseline. Feed costs increase \$115 million over baseline and net returns increase by \$417 million, which is about a 3.9 percent gain in total net returns to cattle. It is important to note that increased costs incurred as a result of more intensive roughage management are not accounted for in the livestock analysis.

The hog and poultry industries experience decreases in net returns. In both industries, corn is a major component of feed ration, and consequently the cost of feed increases result in noticeable drop in net returns. The increase in feed expenses by 2025 in both industries is above a billion dollars, mostly in the poultry sector. The model results indicate that the production adjustment and increase in prices are not large enough to compensate for that increase in feed expenditures. However, it is very important to emphasize that the model is not fully capable to capture the high degree of vertical coordination in the poultry and hog industry.<sup>3</sup> Vertical coordination and associated production contracts make predicting market adjustments difficult. The model also reflects consumption of DDG's by the hog and poultry sectors of up to 10%. Given emerging technologies and genetic improvements, it could be possible that a greater portion of DDG's may become part of the feed ration for these species.

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<sup>3</sup> Vertical coordination in the poultry and hog industries involves processors coordinating successive stages of production and marketing. Coordination mechanisms include contract production and ownership of production.

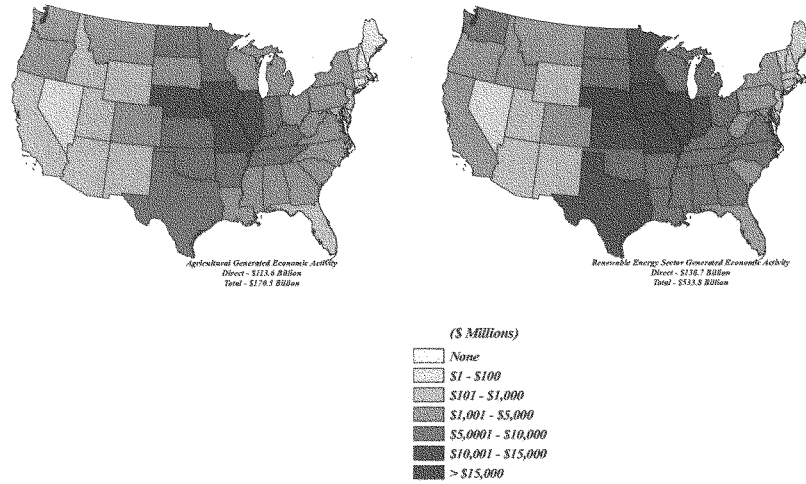
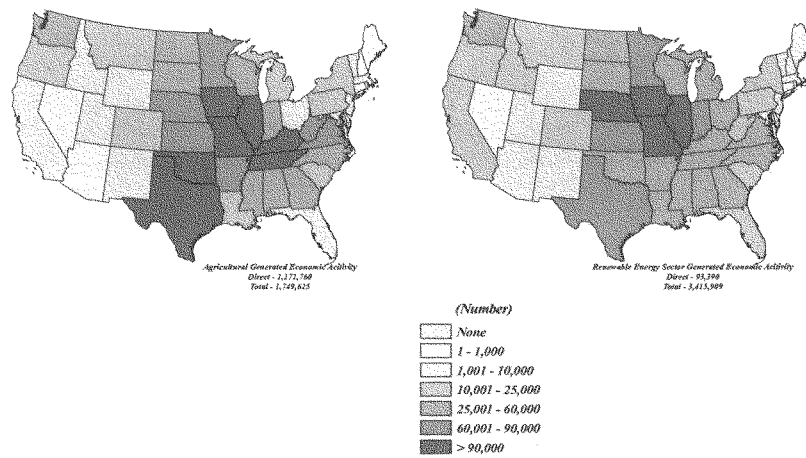
Other factors need to be mentioned which have not been accounted for in the quantitative analysis. First, as the production of forage increases as a result of the added management, there would be a long term change in the feed ration of cattle, in which corn and soybean meal would be partially replaced by increased pasture and forages. This would in turn contribute to reduce the price pressure for the feed in the poultry and hog industries. Second, the process of converting cellulosic material to ethanol through fermentation opens up the opportunity to produce byproducts with a high content of protein and energy suitable to replace corn and soybean meal in the livestock industry (Dale, 2006). This integration of the energy feedstock conversion and livestock production would result in gains for the livestock industry not quantified in this report. Finally, no changes in feeding efficiency are considered during the period of analysis.

### **Impacts on the Nation's Economy**

The impacts on the economy are spread throughout the United States. As a result of changes in the agricultural sector, Illinois, Iowa, Missouri, and Nebraska receive benefits in excess of \$10 billion per year (Figure 9). An estimated \$533.8 billion dollars is generated annually in the conversion of renewables to energy. Assuming the renewable energy sector is developed in close proximity to the feedstocks, the states that receive the greatest benefit include the same states Illinois, Iowa, Missouri, and Nebraska. However, states receiving over ten billion dollars in increased economic activity include in addition to these four states, Texas, Kansas, Minnesota, and Indiana. Interstate commerce associated with conversion that cannot be assigned to any individual state is nearly equal to impacts that are allocated. Including both allocated and unallocated economic activity, 5.2 million jobs are estimated to be created from the development of a renewable energy sector beyond what exists today.

In total, \$252 billion is directly generated in the economy purchasing inputs, adding value to those inputs and supplying the energy. These expenditures create additional impacts. The total impact to the nation's economy is estimated at slightly more than \$700 billion creating an estimated five million jobs. Since the 29 quads of energy created by the renewable energy sector would not impact current production levels, any reduction in economic activity resulting from current energy industry displacement is minimal and no adjustments were made to the current renewable energy sector. These benefits do not include the impacts of investing in 1000 new cellulosic ethanol facilities, the wind turbines, the additional corn ethanol facilities, etc. These one time impacts exceed \$1 trillion in impacts to the economy and will occur through out the analysis period.



**Total Industry Output****Employment**

**Figure 9. Estimated impacts to the national economy as a result of changes in agricultural production, prices, and government payments and as a result of establishing a larger renewable energy sector**

### Final Remarks

Pursuit of the 25x'25 vision will not be easy. It will require national commitment and an understanding of a complex system. In a way, it reducing the time it takes to create energy from millions of years to a few hours. The nation will face challenges along this path. These challenges include the following:

- Provide the funding and risk reduction necessary to ensure that the cellulose to ethanol path is commercially available by 2012. This will reduce the pressure on a single crop –corn- strategy.
- Continue investing in agricultural research in the traditional crops, and increase research activities in the agronomics of dedicated energy crops. Higher yields would reduce pressures over the land resource and on prices.
- Define public incentives ensuring environmental sustainability and enhanced benefits to rural communities.
- Support the expansion of dedicated energy crops, like switchgrass, to 100 million acres through significant increased extension efforts that disseminate best management practices to farmers.
- Examine and support the agribusiness sector and its role in gearing up in order to satisfy the input demand from energy dedicated crops in the areas of seed, chemical labeling, and machinery.
- Provide the means to solve key issues in the supply of feedstock to biorefineries including the pre-treatment of feedstocks as well as the transportation, storage, and handling of those feedstocks.
- Provide infrastructure and needed funding to construct between 700 and 1200 biorefineries.
- Develop an efficient and reliable system to distribute 86 billion gallons of ethanol from the biorefineries to the sales point.
- Create an ethanol infrastructure capable of delivering up to E85 to the public. This must be expanded in accordance with the growth of the industry.
- Define the role of trade.

Finally, members of the committee, it must be stated that while we do have several challenges ahead of us, rarely does one find a win-win-win-win-win situation. In developing this industry, we have a win for agriculture, a win for rural development, a win for nation security, and a win for the environment.

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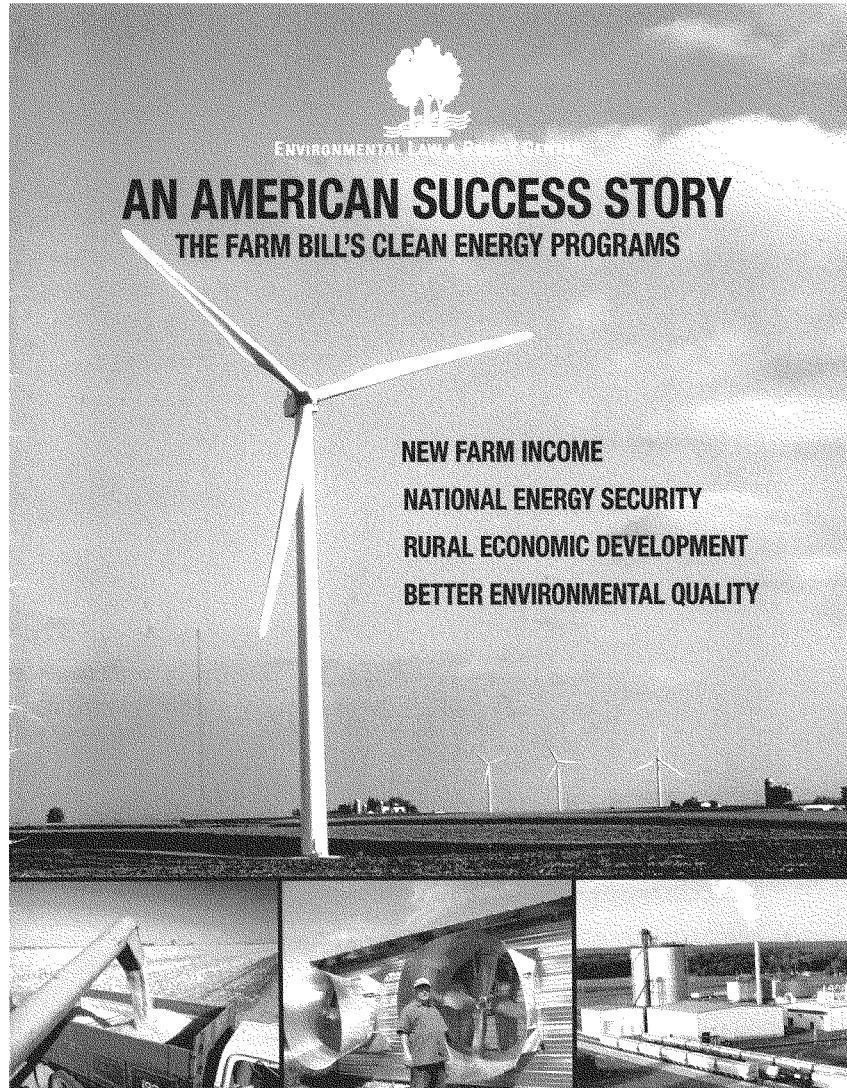
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**DOCUMENTS SUBMITTED FOR THE RECORD**

MAY 9, 2007

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## CONGRESSIONAL SUPPORT FOR THE FARM BILL'S CLEAN ENERGY PROGRAMS

"American farmers and rural businesses are successfully using the Section 9006 clean energy program to leverage hundreds of millions of dollars in private investment for successful new renewable energy and energy efficiency projects. These new energy projects are good for rural economies, good for the environment, and good for our national energy security."

-Senator Tom Harkin (D-Iowa)



"Our insatiable appetite for energy, particularly that from outside our borders, represents one of our gravest security threats. The Energy Title of the 2002 Farm Bill recognized our nation's agriculture and rural sectors' ability to confront these risks. Solutions, such as the Section 9006 program, not only improve our nation's energy equation, but also provide an economic stimulus to our rural economy."

-Senator Richard Lugar (R-Indiana)

"Rural America possesses the resources and the innovative spirit that can lead our nation away from dependence on foreign oil and non-renewable sources of energy. The 2002 Farm Bill took the first steps to help farmers, ranchers and small businesses with energy conservation and production, and I expect we will continue and expand on these efforts in the new Farm Bill. Programs like Section 9006 provide the resources that are helping rural America make practical ideas to save or produce energy a reality. This kind of common-sense, practical program will help transform rural America into an energy resource for the entire nation."

-Representative Collin Peterson (D-Minnesota)

## **AN AMERICAN SUCCESS STORY**

### **THE FARM BILL'S CLEAN ENERGY PROGRAMS**

**NEW FARM INCOME**

**NATIONAL ENERGY SECURITY**

**RURAL ECONOMIC DEVELOPMENT**

**BETTER ENVIRONMENTAL QUALITY**

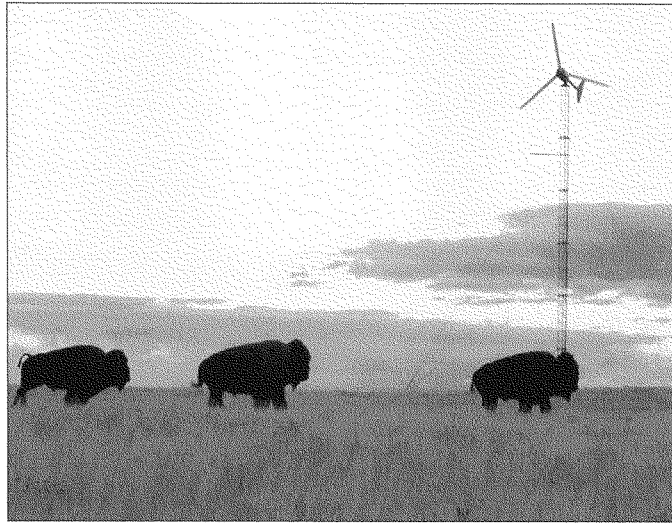


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# FARM BILL CLEAN ENERGY PROGRAMS

## A New Cleaner Energy Future



Agriculture can strengthen our nation's energy security. More clean renewable energy and energy efficiency in rural America helps to meet our nation's energy needs while boosting local economies, improving environmental quality and strengthening our energy infrastructure. Americans are looking for more clean energy choices, and agriculture can provide them.

The 2002 Farm Bill created programs to help farmers, ranchers and rural small businesses invest in proven clean wind power, biofuels, solar power and energy efficiency improvements. These programs offer substantial grants and loans to jumpstart clean energy projects. Agriculture producers and rural businesses are responding enthusiastically with applications now far exceeding available funds.

These new clean energy programs are a win-win-win for farmers and ranchers, national energy security, rural economic vitality and the environment:

- Family farmers and ranchers gain a potential new income stream.

- Energy security is strengthened with diverse, distributed and resilient energy systems. Renewable energy and energy efficiency reduce the risk from fuel supply disruptions, stabilize the power grid, reduce the need to import energy, and help respond to potential future restrictions on global warming pollution.

- Rural economic vitality is increased through new sources of farm and business income, investments in rural communities, and new jobs in the manufacturing and service sectors.

- Environmental quality is improved by reducing air pollution through less wasted energy with higher-efficiency systems and more clean renewable energy development. Many of these energy sources also help to protect our soil and water resources.

## Section 9006 – Cornerstone of the Energy Title

### The Farm Bill's Successful New Renewable Energy and Energy Efficiency Program

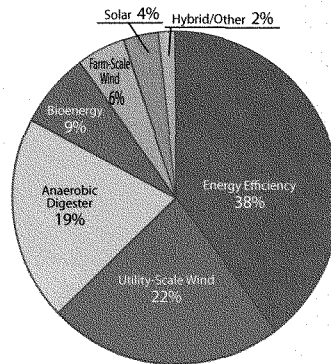
The cornerstone of the Farm Bill's programs is the Section 9006 Renewable Energy Systems and Energy Efficiency Improvements Program. Section 9006 authorizes the U.S. Department of Agriculture to award \$23 million in grants and loan guarantees each year to eligible farmers, ranchers and rural small businesses.

These competitive grants provide up to \$250,000 for energy efficiency improvements or \$500,000 for renewable energy systems (not exceeding 25% of total project cost). Loan guarantees can go up to \$10 million. Eligible technologies must be proven and commercially available.

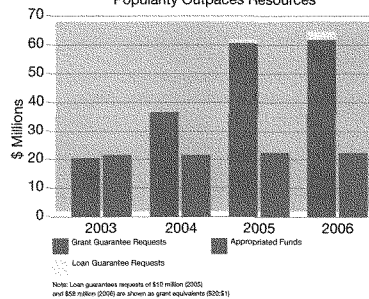
This popular new program already is producing strong results in its first three years. Between 2003 and 2005, the USDA has awarded more than \$66 million in grants and \$10 million in loan guarantees to 434 projects in 38 states. These federal funds will leverage almost \$800 million in capital investments in rural communities for a range of projects, including small and large wind turbines, anaerobic digesters turning livestock manure into energy, ethanol and biodiesel production facilities, solar electric systems, and energy efficiency improvements at farms and small businesses. The program continues to be very popular with more than 600 applications submitted in 2006.

When completed, these projects will boost economic activity in rural areas, create hundreds of new jobs and produce millions of gallons, BTUs and megawatt hours of clean energy production and efficiency savings for the benefit of all Americans.

2003 to 2005 Section 9006 Grants:  
Distribution of Projects by Technology



Section 9006  
Popularity Outpaces Resources



On the following pages, you will read about some of the successful projects supported by grants from the Section 9006 program. They represent the leading edge of a rapidly growing demand for new clean energy choices and opportunities across rural America for the benefit of the entire country.



### MinWind III-IX

Luverne, Minnesota

Utility-Scale Wind  
Section 9006 Grant: \$178,201  
Each project - 2003

The MinWind utility-scale wind projects on the wind-rich Buffalo Ridge in southwestern Minnesota are among the nation's most heralded examples of locally-owned "community" wind projects. The business model for MinWind III-IX is similar to that for the first two projects, which began producing power in 2002. Each of the seven projects is organized as a separate business, consisting of a single 1.75 megawatt (MW) wind turbine owned by 33 local investors.

Each project applied for and received a Section 9006 grant of \$178,201, roughly 10% of the installed project cost. The projects also

qualified for Minnesota's renewable energy production incentive.

These projects benefit from the economies of scale and professional management of a larger project. Yet their cooperative-type business structure brings the financial benefits of community wind ownership to a large number of local farmers and landowners.

Mark Willers, President of MinWind Energy, receives many visitors and fields phone calls from people wanting to replicate Minwind's success, and the small prairie town of Luverne is alive with happy wind farm owners.



### Neppel Energy

Armstrong, Iowa

Utility-Scale Wind  
Section 9006 Grant: \$400,000  
2003

Paul and Alice Neppel run a large, diversified grain and hog operation with their sons in western Iowa. Faced with an annual electric bill from their livestock buildings that exceeded \$200,000 per year, the Neppels began to notice the two wind turbines that the nearby Spirit Lake School district had installed several years earlier. They decided that they, too, could benefit from the strong winds that passed over their property and decided to put up their own turbine.

They learned about the Section 9006 grant program shortly after the program was announced and applied for a grant. They also received an interest-free loan from the Iowa Energy

Center and a loan for the balance from their local bank. The project went online in August 2004 and is now producing close to five million kilowatt-hours of electricity annually, enough

for 400 Iowa homes. The electricity is being purchased by Alliant Energy under a long-term contract.

This was the first farmer-owned wind project in Iowa and has been a tremendous catalyst for other locally-owned wind projects there. Since the Neppels received their grant, more than two dozen other small locally-owned wind projects have begun in Iowa, many with the help of Section 9006 grants.



## Last Mile Electric Cooperative

Pacific Northwest

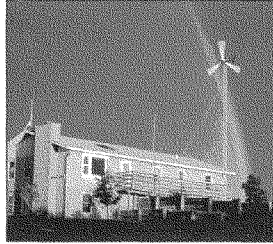
Farm-Scale and Utility-Scale Wind  
Section 9006 Grants: \$77,449 - 2003,  
\$307,000 - 2004

The Last Mile Electric Cooperative is an association of public utility districts and electric cooperatives in Washington. The co-op invests in both farm-scale and utility-scale wind turbines for farms, ranches and public and private facilities across the Northwest.

Northwest Sustainable Energy for Economic Development (Northwest SEED) and the Last Mile Electric Cooperative were awarded a Section 9006 grant in 2003 for \$77,449 to finance nine 10 kW turbines installed on farms and ranches. One of these turbines is on Montana rancher Jess Alger's land near Stanford. He expects wind to power most of his home and farming operation.

According to Alger, "the nation needs poli-

cy that is focused on renewable energy, and continuing to fund Section 9006 is a step in that direction. Funding more renewable energy projects, like wind sites, would reduce carbon dioxide emissions and I think that is very important."



Following up on the success of the small turbine program, Northwest SEED and the Last Mile Cooperative received a \$307,000 Section 9006 grant for a utility-scale project in 2004. The 660 kW turbine at Luna Point in Goldendale, Washington will be the first community wind project in the state of Washington. Profits from the sale of wind power will benefit Operation Warm Heart, a low-income energy assistance program.

## Illinois Rural Electric Cooperative

Pittsfield, Illinois

Utility-Scale Wind Turbine  
Section 9006 Grant: \$438,000  
2003

Illinois Rural Electric Cooperative (IREC), with 10,000 electric customers in central Illinois, recently installed a 1.65 MW wind turbine that will provide about 5% of the peak load for its members. IREC management was eager to build the turbine as a commitment to renewable energy and as a catalyst to encourage additional wind projects in Pike County. Since wind-generated power was more expensive than the co-op's power supply contract and the co-op did not want to pass this increased cost on to its members, it had to find additional sources of funding to support the investment. IREC was able to tap into three separate sources of funding that together covered 50% of the project's capital costs: in addition to



a grant from the Section 9006 program, IREC received grants from the Illinois Department of Commerce and Economic Opportunity and the

Illinois Clean Energy Community Foundation. The remaining project cost was financed through the Rural Utilities Service.

IREC received the 2005 Wind Cooperative of the Year award by the U.S. Department of Energy. Douglas Faulkner, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, said, "IREC has been honored for its innovation and commitment to wind power. They have demonstrated that wind power can contribute to a cleaner environment and a stronger local economy, and can act as a hedge against rising fuel costs."

## Lincoln Agri-Energy, LLC

Palestine, Illinois

Ethanol Production Facility  
Section 9006 Grant: \$300,000  
2003

Lincolnland Agri-Energy is a majority farmer-owned ethanol production facility located in Crawford County on the eastern edge of Illinois. The plant has an annual capacity of 40 million gallons of ethanol and 128,000 tons of dried distillers grains.

Lincolnland was formed as a new generation cooperative in 2001 with 453 farmer-investors. In addition to the Section 9006 grant, the cooperative found additional investors to help fund the proposed ethanol plant, which is organized as an LLC. Ethanol production

began in 2004. Lincolnland is one of two farmer-owned ethanol plants in Illinois.

The plant is a triple-win for area farmers, the community, and energy security. The plant is buying 17 million bushels of corn (from over 100,000 acres of area farmland) and providing a premium to farmers of 7-10 cents/bushel over market prices. Also, 33 local residents work there. The profits are being retained by local investors. Finally, the facility is producing 40 million gallons of renewable, domestically-sourced fuel.

## Liquid Resources of Ohio

Medina, Ohio

Ethanol Production Facility  
Section 9006 Grant: \$500,000  
2003

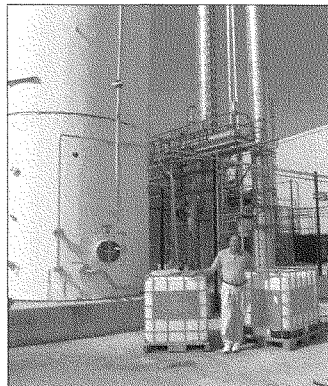
Liquid Resources of Ohio converts expired and spoiled soft drinks, juices and alcoholic beverages into ethanol. By contracting with beverage manufacturers and distributors to recycle spoiled and expired products, Liquid Resources helps to keep these products out of landfills and sewers and convert them into a renewable fuel. Liquid Resources also separates the beverage containers for recycling.

Liquid Resources is Ohio's first new ethanol production facility in 25 years. The privately-held firm is located in a rural area south of Cleveland

and has a capacity of 6 million gallons per year. Although this production is small compared to most corn-based ethanol plants, the plant's use of a waste stream makes it an innovative project. Liquid Resources employs 15 people at this facility and expects to add more as production increases.

**Every dollar of this Section 9006 grant is a dollar of equity we don't have to raise. We deeply value the support that USDA has provided to the launch of our company.**

**-Tim Curtiss  
CEO, Liquid Resources of Ohio**



In addition to the Section 9006 grant, Liquid Resources also received a loan guarantee from USDA's Business and Industry Loan Guarantee Program and a revenue bond from the Ohio Air Quality Development Authority. A commercial bank provided the remaining debt financing.

Tim Curtiss, CEO of Liquid Resources, said that "the 9006 program grant provided us with an important source of capital and credibility. Every dollar of this grant is a dollar of equity we don't have to raise. The loan guarantee provided valuable credit enhancement as we structured our initial financing. For an entrepreneur, that's incredibly valuable. We deeply value the support that USDA has provided to the launch of our company."

## Crete Food Mart

Crete, Nebraska

Energy Efficiency  
Section 9006 Grant: \$11,750  
2004

Crete Food Mart is a 14,000 square foot family-owned grocery store located in southeastern Nebraska. Peter Clark, the store's owner, learned about the Section 9006 grant program through a newsletter from his grocery distributor. He was interested in cutting his energy costs, especially because some of the store's produce coolers were over 35 years old, and much of the store's other equipment was old and inefficient.

An energy audit of the store provided by Nebraska Public Power District identified energy savings opportunities. Clark then applied for and used the grant to help invest

in new produce and milk coolers, a walk-in freezer, roof and insulation and high-efficiency T-8 lighting fixtures. The projected energy savings from this project are nearly 50% with a payback of less than 5 years.

Apart from the energy savings, the investment is yielding other benefits for the store and the town. Refrigeration maintenance costs are down because the equipment is new and reliable. The store also looks better, which is increasing sales. In sum, the project is helping the store's bottom line, protecting local jobs and helping to maintain a local grocer in Crete.



## Bonnie and Donald Vos

Oskaloosa, Iowa

Energy Efficiency/Grain Drying  
Section 9006 Grant: \$12,250  
2004

Bonnie and Donald Vos wanted to upgrade a 40 year-old grain drying facility on their Oskaloosa farm with more efficient equipment. They applied for and received a Section 9006 grant to help fund the replacement of their old and inefficient 3,000 bushel grain bins and 24-inch drying fan with a new grain drying facility that is twice as large.

Last fall, the Voses dried about 70,000 bushels of corn with their new grain-drying facility. They estimated that the upgraded equipment saved

their farm \$16,739 in propane costs, or about 21.7 cents per bushel, compared to their old system.

"It was a wonderful year for us to put in a new structure," Vos said. "It was an exceptionally good year for harvest, and our yields were up for both corn and beans. With propane costs at all-time highs, and with the large crop in Iowa, it would have been impossible to dry that many bushels through our old facility."

## Mississippi Poultry Growers

Various locations

Energy Efficiency  
Section 9006 Grants: \$1,503,947  
for 43 projects - 2003-04

The success of Mississippi poultry producers in using Section 9006 awards to improve the energy efficiency of their broiler houses is a great example of teamwork and the ability to replicate a project across many individual producers with similar energy efficiency opportunities.

Poultry and egg production is the largest agricultural sector in the state, with 2,800 producers generating \$2 billion in annual sales. Because most of the poultry producers are contract producers, one of their only controllable costs is energy—and propane costs for heating these poultry houses are high, even in Mississippi. Energy costs consume approximately 20% of broiler producers' gross revenue.

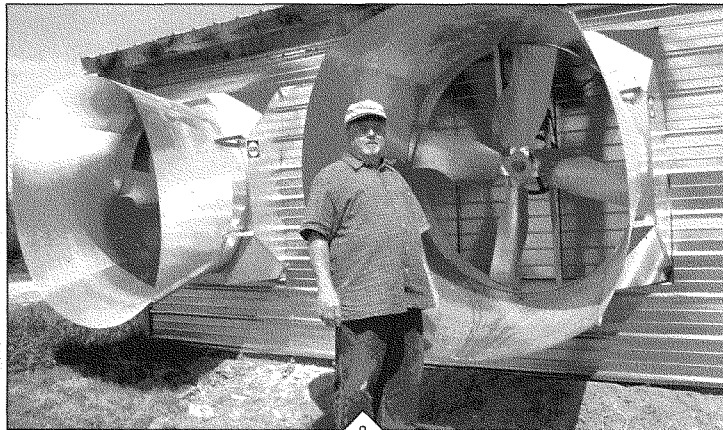
Mississippi State University's Poultry Science Department and the state poultry association

held workshops to educate producers about the opportunities to save energy in their operations. The workshops identified the Section 9006 program as a key source of funding to help pay for these improvements. The Southwest Resource Conservation and Development Council then helped to prepare dozens of successful Section 9006 applications during the last three years.

Bennie Hutchins of Southwest RC&D said, "The need to be more energy efficient is especially critical for poultry producers that have older production houses. Most poultry producers with these older houses were already considering making energy efficiency improvements to remain competitive. The potential to offset up to 25% of the cost through a 9006 grant encouraged many of them to make the move."

America is too dependent on foreign sources of energy. This dependency creates uneasiness in the energy markets and thus translates into higher energy prices. Programs such as those provided in Section 9006 of the Farm Bill assist and encourage producers to look at and implement strategies and technologies to reduce fossil fuel use and dependence.

-David Waide, President, Mississippi Farm Bureau Federation



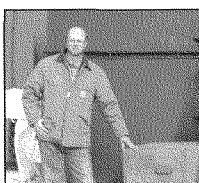
## Cozad Alfalfa

Cozad, Nebraska

Bioenergy  
Section 9006 Grant: \$37,500  
2004

Cozad, a southern Nebraska town of 4,000, is known as the "Alfalfa Capital of the World." The surrounding Dawson County grows and produces 25% of the dehydrated alfalfa in the United States, with Cozad producing half of the county's total. Cozad Alfalfa is one of two local producers of alfalfa pellets. Jon Montgomery, Cozad Alfalfa's owner, was searching for relief from the high cost of natural gas used in the mill's drying operations. That's when he learned about the Section 9006 grant program.

Cozad Alfalfa used its Section 9006 grant to help fund the purchase and installation of a new solid fuel burning system to replace its natural gas system. The project also received a grant from the Nebraska Litter Reduction and Recycling



The financial assistance provided by USDA was instrumental in making the decision to invest in the solid fuel burner.

-Jon Montgomery,  
Owner, Cozad Alfalfa

Grant Program administered by the state's Department of Environmental Quality.

The new system uses sawdust from a furniture manufacturer in Lincoln as the primary fuel. It became operational in May 2005 and now displaces over 90% of the natural gas requirements of the dehydration process. The project is expected to pay for itself in 5 years.

"We are a small family-owned ag business," Montgomery said. "The financial assistance provided by USDA was instrumental in making the decision to invest in the solid fuel burner. We also feel good about utilizing a waste fuel that otherwise would be placed in a landfill."

## Flick Seed Co./Missouri Bioenergy

Kingsville, Missouri

Bioenergy  
Section 9006 Grant: \$95,000  
2003

Flick Seed Company is a native grass seed processing and prairie restoration company in west-central Missouri that purchases seed crops from area contract growers. Each year, the company pays a hauler to landfill millions of pounds of grass residue from the seed extraction process. Steve Flick, the company's owner, determined that the grass residue had an unusually high energy value of about 10,000 BTUs/pound so he decided that he could make a renewable fuel from the waste material.

Flick formed a new company, Missouri Bioenergy, to transform the waste into a renewable fuel. The company built a facility to process up to 15 million pounds of seed residue annually into fuel pellets. These pellets will have a variety of fuel uses, including co-firing with coal in pulverized coal plants and as a fuel for industrial boilers and home heating units. The facility went online in June 2006.

USDA awarded a \$95,000 Section 9006 grant to the company to help fund this \$2.5 million project. The company also received a planning/feasibility grant from USDA's Value-Added Producer Program and state grants.

If we can put a man on the moon, surely we can grow kilowatts on the ground.

-Steve Flick, President,  
Missouri Bioenergy

The remainder of the project's financing comes from private sources, including an investment by Show Me Energy, the first biomass cooperative in the country.

Flick Seed Company is also working to develop a mix of seed-bearing grass crops that have an energy value of as much as 26,000 BTUs/pound, almost four times the equivalent energy value of a pound of coal. This would completely change the economics of growing energy crops for farmers. As Steve Flick explained, "if we can put a man on the moon, surely we can grow kilowatts on the ground."

## Five Star Dairy

Elk Mound, Wisconsin

Anaerobic Digester  
Section 9006 Grant: \$180,000  
2004

Five Star Dairy, an 800-head dairy farm owned by Lee Jensen, began operating its anaerobic digester in June 2005. The digester includes an engine generator set that will use the biogas to generate up to 775 kW of electricity, enough power to supply 600 homes. Microgy, Inc. constructed and will maintain Five Star's digester.

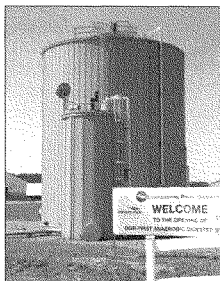
This project is appealing because it is a hands-free operation for Mr. Jensen. All that he needs to supply is the manure. Microgy will maintain the digester. Dairyland Power Cooperative, a large electrical cooperative based in western Wisconsin, is buying all of the biogas under a 30-year contract. Dairyland owns the on-site generator and will sell the power to its members.

The Five Star Dairy project demonstrates a replicable approach for a renewable energy technology that generates farm income while

also reducing livestock waste problems. The anaerobic digestion process kills harmful bacteria and decreases odors from the manure. An outside company maintains the system so

that the farmer can focus on what he knows best: raising and milking cattle. Finally, the local electric cooperative uses the biogas for electricity generation, lowering the project costs and complexity for the farmer.

Wisconsin, "The Dairy State," is a leader in promoting the use of anaerobic digesters. The state's Focus on Energy program and Biogas Development Group offer extensive outreach and technical assistance to the state's dairy farmers, and their work produces results: In the first three years of the Section 9006 program, USDA has awarded grants to 33 Wisconsin farmers to install anaerobic digesters.



## Harris Farm

Greenville, North Carolina

Anaerobic Digester  
Section 9006 Grant: \$130,000  
2003

Hog farming is a major industry in North Carolina, and managing hog waste has become a major environmental challenge for the state's farmers. Harris Farm, a 12,000 hog finishing operation under contract to Premium Standard Farms, decided to take a new approach and transform its hog waste into a renewable energy resource. With the assistance of AgriClean, a Tennessee-based waste engineering firm, Harris Farm built a new manure handling system and anaerobic digester to process the waste. This is one of the first digesters designed for a hog facility in

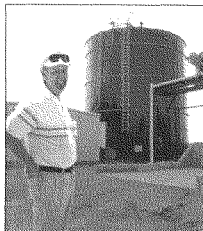
the U.S. and should serve as a model for the many thousands of hog farmers around the

state and the country in transforming a waste stream into an asset.

Harris Farm will use the biogas from the digester as fuel to replace natural gas for an existing on-site hot water boiler. The farm chose not to generate electricity with the biogas due to the utility's very low "avoided cost" buyback rate.

Scott Pogue of AgriClean commented, "If USDA were not out there to supplement the development of these systems, they simply wouldn't get built because it is too hard to gather the upfront capital. Traditional

sources of funding for these type projects are just not there yet."





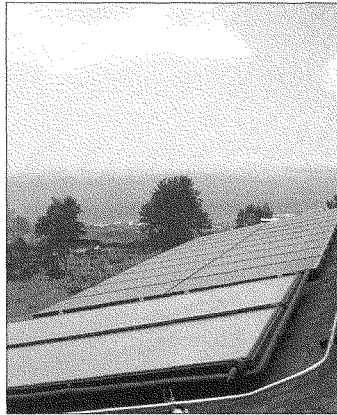
## Luana Farms

Holualua, Hawaii

Grid-Tied Solar Photovoltaic System  
Section 9006 Grant: \$14,105  
2003

Luana Farms is a small organic coffee and fruit farm on the Big Island. The combination of extraordinarily high electricity rates in Hawaii (24 cents/kW-hour) and abundant sunshine means that solar energy is an especially sound investment. Hawaii also offers a "net-metering" program so that any surplus electricity produced by a renewable energy system is purchased by the utility at the retail rate. Finally, the State offers a 35% tax credit against the cost of any installed solar energy system.

With these favorable economics in mind, Luana Farms applied for a Section 9006 grant from USDA to invest in a 5 kW solar photovoltaic system for the farm. Kyle Datta, the farm's owner, reports that since installing the system, the farm's monthly electric bill has dropped from \$300 to just \$15, despite an unusually cloudy year in 2005.



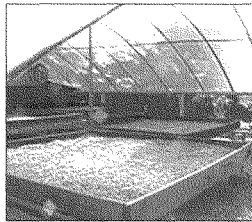
## Korina Farms

Tehama County, California

Solar Pecan Drying System  
Section 9006 Grant: \$25,250  
2003

Dried fruits and nuts are a multi-billion dollar industry for California growers. The drying process requires a lot of natural gas and propane and has exacting standards to meet processor quality requirements. With the abundant sunshine in California, solar drying would seem to be a perfect fit.

Garry Vance farms 62 acres of pecans at Korina Farms, and he dries nuts from his farm and from other growers. Seeking to reduce his high propane costs, he built a new drying facility and incorporated a 5,000 square foot SolarWall™ system into its roof. This system is essentially a roof-mounted metal box which captures the radiant heat of the sun to warm the ambient air in the box. The system then circulates the warm air through the nuts. On sunny days, the



system warms the outside air by 20 degrees, providing the optimal drying temperature of 80 degrees.

Korina Farms received a \$25,250 Section 9006 grant to help fund the project, which cost a total of \$200,000. Korina Farms also received support from the California Air Resources Board. At current propane prices, the project will save over \$10,000 in energy costs per year.

This is the first solar pecan-drying facility in the country and is one of several demonstration solar fruit and nut drying projects in California. The challenge in making this investment pay off is the short, but critical, drying season for these crops. By adapting it to other nut crops grown on neighboring farms, Korina Farms maximizes the system's use during the year and also generates more revenue for the farm.



## Funded Clean Energy Incentive Programs

In addition to the Section 9006 Renewable Energy and Energy Efficiency Program, the Farm Bill includes several other key programs to boost domestic clean energy production in the nation's farmland and rural areas. With sufficient funding, these programs will help to increase our nation's energy security, protect the environment, and improve rural economies by boosting farm income.



### Value-Added Producer Program (Section 6401)

This program offers grants for business planning activities and working capital for producing and marketing value-added agricultural products including renewable energy projects. The Section 6401 program has helped to fund dozens of feasibility studies for locally-owned wind projects and biofuels facilities.

Eligible applicants include independent producers, cooperatives and agricultural producer groups. Although the 2002 Farm Bill authorized this program at \$40 million per year, in 2006 it was funded at just \$15 million. [www.rurdev.usda.gov/rbs/coops/vadg.htm](http://www.rurdev.usda.gov/rbs/coops/vadg.htm)

### Biomass Research and Development Program (Section 9008)

This program helps to fund university and private-sector research projects focused on utilization of biomass resources for energy production. In 2003-05, the joint USDA/Department of Energy program funded 52 research projects. Our country has enormous biomass resources from agricultural and

forestry residues to dedicated energy crops. This program helps transform these resources into an important part of America's energy mix. USDA's share of this program was funded at \$12.6 million in 2005. [www.ars.usda.gov/bbcc](http://www.ars.usda.gov/bbcc)  
[www.bioproducts-bioenergy.gov](http://www.bioproducts-bioenergy.gov).

### Bioenergy Program (Section 9010)

This program encourages new biofuel production capacity by making cash payments to ethanol and biodiesel producers for a portion of commodity purchases—primarily corn and soybeans but also oilseeds and animal byproducts—as their production increases. The incentive is especially useful

for new farmer-owned ethanol facilities that carry high debt burdens in their first few years of operation. Although the 2002 Farm Bill authorized this program at \$150 million per year, it was funded at \$100 million in 2005 and was discontinued in 2006. [www.fsa.usda.gov/daco/bio\\_daco.htm](http://www.fsa.usda.gov/daco/bio_daco.htm).

## Unfunded Clean Energy Incentive Programs

Some programs in the Energy Title have languished because of lack of funding. Here are two key examples:

### Biorefinery Development Grants (Section 9003)

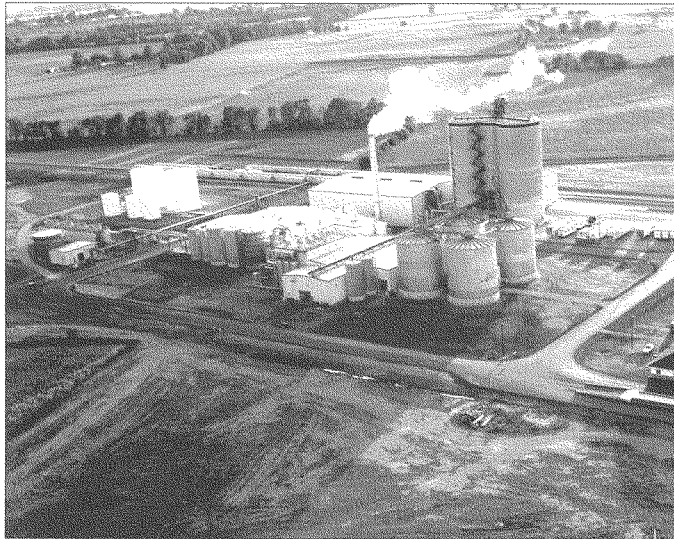
This program would help to commercialize technologies to convert biomass into a range of transportation and other fuels and chemicals. USDA grants could be made available to fund up to 30% of the development and construction

costs of new biorefinery projects. This program would especially help to jump-start cellulosic ethanol production, which is now on the edge of commercialization.

### Energy Efficiency Audit and Renewable Energy Development Program (Section 9005)

This program would help farmers and ranchers conduct audits and feasibility studies to determine their best energy efficiency and renewable energy options. This program would help to fill the gap left by states and utilities that

have cut back on their energy audit programs, and would maximize the wise investment of public and private dollars for clean energy improvements.



## Other Important Clean Energy Programs

### Federal Procurement of Biobased Products (Section 9002)

For all purchases of specified products that cost at least \$10,000, federal agencies must give preference to those containing the highest percentage of biobased ingredients. This program helps to build the market for these products, making them available and affordable to all customers and reducing the

use of their petroleum-based equivalents. USDA's final rules for this program identified 11 categories of relevant products including adhesives, construction materials, fibers, fuel additives, lubricants and solvents. Rules for six product categories have now been specified. [www.biobased.oce.usda.gov](http://www.biobased.oce.usda.gov).

### Biodiesel Fuel Education (Section 9004)

This program helps to educate the public, especially fleet operators, about the benefits of biodiesel fuel use. It is funded

at \$1 million a year. For more information: [www.biodiesel.org/usda](http://www.biodiesel.org/usda).

### Hydrogen and Fuel Cell Technology Development (Section 9007)

The 2002 Farm Bill directed USDA and the Department of Energy to cooperate in the development and promotion of hydrogen and fuel cell technology programs for rural

communities and agricultural producers. The two agencies are focusing primarily on existing programs as the basis for their work. [www.hydrogen.energy.gov](http://www.hydrogen.energy.gov).

### Conservation Security Program Renewable Energy Opportunities (Section 2001)

The Conservation Security Program provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on working farms and Tribal land. Starting in 2005, USDA's program rules for the Conservation Security Program included a renewable en-

ergy component. Eligible producers receive compensation for converting to renewable energy fuels such as biodiesel and ethanol, for recycling 100% of on-farm lubricants, for moving to low-tillage practices which save energy, and for renewable energy production. [www.nrcs.usda.gov/programs/csp](http://www.nrcs.usda.gov/programs/csp).

### Conservation Reserve Program — Biomass Harvesting and Wind Turbines (Section 2101)

This program encourages renewable energy development on Conservation Reserve Program (CRP) acreage by allowing landowners to harvest biomass energy crops

or install wind turbines while forfeiting only a portion of their CRP contract revenue. [www.fsa.usda.gov/dafp/cepd/crp.htm](http://www.fsa.usda.gov/dafp/cepd/crp.htm).

## Looking Ahead to the Next Farm Bill

Congress is now working on reauthorization of the Farm Bill. Even with budget pressures, several countervailing forces underscore the need for strong clean energy development programs in the next Farm Bill:

### Gasoline Price and Supply Security

Record petroleum prices, supply insecurity and pollution concerns provide impetus for the strong expansion of biofuels production. The current Energy Title offers some opportunities, but much more can be done to achieve the full potential of a robust and cost-effective biofuels industry.

Producing ethanol from cellulosic material like switchgrass, poplars, wheat straw and corn stover can revolutionize America's energy

supply. Similarly, biorefineries hold the key to producing a wide array of chemical and fuel products from renewable resources. But moving the first generation of these plants from the laboratory to commercial operation isn't easy. Consistent support for research and financing incentives would reduce the commercial risk and encourage private companies to invest the necessary capital to get the first generation these plants built.

### World Trade Organization Rulings

In 2004, the World Trade Organization ruled that certain subsidies for U.S. cotton farmers were unfair to Brazilian and other cotton producers. This ruling and other WTO decisions may jeopardize certain U.S. crop subsidy programs.

The Farm Bill's renewable energy and energy efficiency programs and the land conservation incentive programs are considered legal "green box" programs under WTO rules and trade agreements because they have clear environmental objectives and do not distort international trade through direct price supports. Therefore, increasing funding for programs

such as the Section 9006 Renewable Energy Systems and Energy Efficiency Improvement Program can help farmers, ranchers and rural businesses make investments that will lower their energy costs (increasing their profit) and provide a new source of income through the sale of renewable energy.

To download a copy of the Environmental Law & Policy Center's report, "WTO Legal Impacts on Commodity Subsidies: Green Box Opportunities in the Farm Bill for Farm Income Through the Conservation and Clean Energy Development Programs," visit [www.elpc.org/tools/publications.php](http://www.elpc.org/tools/publications.php).

### Rising Natural Gas Prices

Farmers have been hit hard by the sharp increase in fertilizer prices brought about by rising natural gas costs (natural gas is 90% of the cost of producing nitrogenous fertilizers). Farmers and rural businesses are also facing

record propane and natural gas costs for heating and grain drying. Investments in renewable energy and energy efficiency can ease pressure on natural gas and propane demand, reducing prices for all users.

## Acknowledgements

The Environmental Law & Policy Center appreciates the many organizations and individuals who assisted us in compiling these case studies, including USDA Rural Development field offices, the National Renewable Energy Laboratory, Windustry, Northwest SEED, Southwest Mississippi Resource Conservation and Development, and individual Section 9006 grant recipients.

Visit [www.farmenergy.org](http://www.farmenergy.org) for current information on the Farm Bill's Clean Energy programs, including application templates, program rules, latest news, previous award recipients and useful contacts.

## CONGRESSIONAL SUPPORT FOR THE FARM BILL'S CLEAN ENERGY PROGRAMS

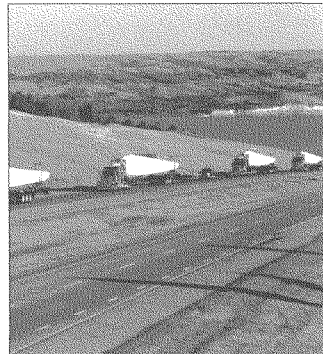


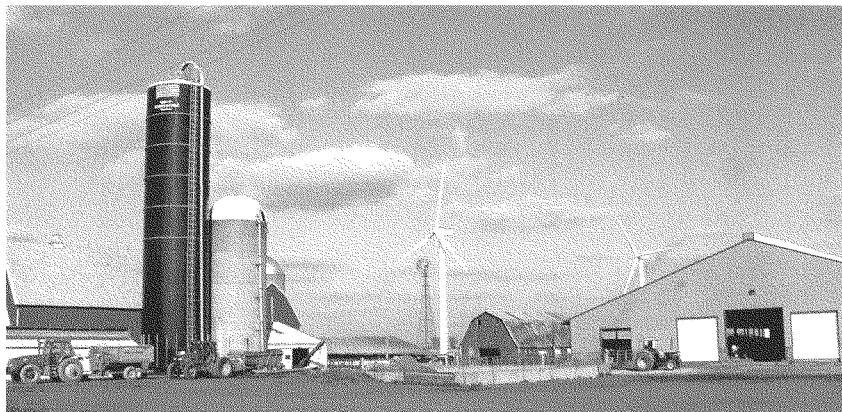
"Programs such as Section 9006, which leverage federal funds for private investment in renewable energy innovations, help to provide a more diverse energy base for our nation. The pinch of high energy costs is being felt nationwide and farming operations have been among those hit hardest. The Section 9006 program works to address this problem by rewarding proven clean energy technologies and contributing significantly toward the effort of developing on-farm energy sources. We need to continue to support these kinds of programs to ensure that our country's domestic energy supply remains plentiful and secure."

-Senator Mike Crapo (R-Idaho)

"I strongly support the Section 9006 renewable energy/energy efficiency program because it is one of the only federal programs that comprehensively transforms a clean energy development vision into "refueling pumps in the ground" across rural America. Farms and rural businesses want clean energy choices. Rural America also can supply clean energy to meet a substantial portion of our nation's energy needs while strengthening domestic energy security, boosting farmer income, and improving environmental quality. Section 9006 successfully achieves these objectives."

-Representative Marcy Kaptur (D-Ohio)





### ENVIRONMENTAL LAW & POLICY CENTER

The Environmental Law & Policy Center is the Midwest's leading public interest environmental legal advocacy and eco-business innovation organization. We develop and lead successful strategic advocacy campaigns to protect our natural resources and improve environmental quality. We are public interest environmental entrepreneurs who engage in creative business dealmaking with diverse interests to put into practice our belief that environmental progress and economic development can be achieved together. ELPC's multidisciplinary staff of talented and experienced public interest attorneys, environmental business specialists, public policy advocates, and communications specialists brings a strong and effective combination of skills to solve environmental problems.

ELPC's vision embraces both smart, persuasive advocacy and sustainable development principles to win the most important environmental cases and create positive solutions to protect the environment. ELPC's teamwork approach uses legal, economic and public policy analysis, and communications advocacy tools to produce successes. ELPC's strategic advocacy and business dealmaking involves proposing solutions when we oppose threats to the Midwest environment. We say "yes" to better solutions; we don't just say "no."

ELPC was founded in 1993 after a year-long strategic planning process sponsored by seven major foundations. We have achieved a strong track record of success on national and regional clean energy development and pollution reduction, transportation and land use reform, and natural resources protection issues. ELPC's creative public advocacy effectively links environmental progress and economic development and improves the quality of life in our Midwestern communities.



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## **USDA/FSA SOURCE WATER PROTECTION PLAN**

### **CITY OF MOULTRIE COLQUITT COUNTY**

**WATER SHEDS  
UPPER OCHLOCKONEE  
CU03120002  
WITHLACOOCHEE  
CU03110203  
LITTLE RIVER  
CU03110204**

**GROUND WATER SOURCES  
CITY OF MOULTRIE WSID # 0710004  
SPENCE FIELD WSID #0710021**



**DECEMBER, 2006**



## **Source Water Protection Plan**

For Public Drinking Water Sources  
In  
City of Moultrie, Georgia  
Colquitt Co.

December, 2006

Prepared by:  
The  
Colquitt County Source Water Protection Steering  
Committee

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### ***Review and Update Annual***

Date Reviewed




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Table 1 Summary of City of Moultrie, Colquitt County Source Assessment and BMP's

## **1. Introduction**

This Source Protection Plan (SPP) was prepared by the Colquitt County, City Moultrie Source Water Protection Committee and the Georgia Rural Water Association for public drinking water sources in City of Moultrie, Colquitt County, Georgia. There are seven drinking water sources (wells) covered in this plan although not all of public draw from the same source, they all draw their drinking water from local sources. In this respect, the Colquitt County Source Water Protection Committee has considered protection measures for all surface and ground water in the cities water shed area in order to achieve the greatest public health protection.

The purpose of this source water protection plan is to protect the quality of Colquitt Countys' drinking water by identifying and managing potential sources of contamination and threatening activities that occur within the source protection area. The plan identifies and outlines a structured approach to managing potential sources of contamination and threatening activities that occur within the source protection area. It is a working document that will be routinely reviewed and updated to remain current, active, and viable.

### **1.1 Source Protection Area**

The Source water assessment plan for the ground water systems in City of Moultrie have been completed in accordance with Georgia's Source Water Assessment and Protection Implementation Plan for Public Drinking Water Sources. The assessment is part of a larger effort called the Georgia Well Protection Plan and is compiled by the Water Resources Branch Drinking Water Program, Georgia Department of Natural Resources, Environmental Protection Division.

Source Water Protection Areas are the areas from which groundwater and surface water will flow to the intake source. As such, these land areas are the critical areas for source water protection. Also, it is likely that additional public water sources will be in the future. For this reason, the Colquitt County's Source Water Protection Committee determined that while certain protection measures are necessary within the water shed areas, other contaminant prevention measures are appropriate county-

wide to protect Colquitt County's water resources for future drinking water needs.

## **2. Potential Sources of Contamination**

This documents the potential sources of contamination within City of Moultrie, Colquitt County. The potential contamination sources that lie within the Source Water Protection Area pose a risk to public drinking water supplies.

## **3. Assessment of Threats**

The vulnerability of the City of Moultries' drinking water supplies contributed to a number of contaminant criteria. Certain potential contaminants or land uses are shared by most of Colquitt County and the City of Moultries' public drinking water sources ,Source Water Protection Areas (SWPAs). The following threatening land uses or potential contaminant sources are commonly received as high vulnerability ranking for the City of Moultries public water sources:

- 1.Known detects of contaminants in water supplies (most commonly microbiological contaminants, VOCs and SOCs.
- 2.Location and number of highways and roads within the SWPA.
3. Number and proximity of septic systems and sewer treatment systems and discharge permits within the SWPA.
4. Percentage of land cover with the SWPA.

These criteria for which the Upper Ochiokonee River Basin public drinking water source received low susceptibility rankings are discussed in the following pages.

### **1. Confirmed Contaminant Detects of Concern in Source Water.**

The routine monitoring samples required by Ga. EPD of public water systems has detected the presence of contaminants .

## **2. Agricultural Fields**

Nutrient Applications. Runoff or infiltration from croplands, pastures, rangelands, and nurseries utilizing fertilizer, manure, or sludges can contaminate surface waters or ground waters. These applications can contain excessive amounts of nutrients such as phosphorus, nitrogen, and potassium which are applied to enhance production. Excessive nutrients harm water supplies by prompting excessive algae growth which can lead to odor and taste problems in drinking water, thereby increasing treatment costs.

## **3. Irrigation Well**

Shallow Well Injection. Shallow injection wells, also known as agricultural drainage wells, have been used in some farming situations as a way to carry excess water from surface or subsurface drainage systems directly into deeper layers of the ground. These wells threaten groundwater quality because they allow agricultural runoff and any contained pollutants to feed directly into the groundwater. Normally, natural filtering of runoff takes place as water seeps slowly through several layers of fine- and medium-textured soil before it reaches the groundwater. This natural filtering is bypassed when injection wells are used. These drainage wells are typically used to receive water from potential crop land in areas where it is difficult to do using streams or ditches. Similar drainage wells have been used to accept water from roadways, septic systems, and urban land.

## **4. Auto Repair/Body/Salvage Washes**

Potential contaminants include Arsenic, Barium, Cadmium, Chlorobenzene, Copper, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, 1,4-Dichlorobenzene or p-Dichloromethane or Methylene Chloride, Tetrachloroethylene nor Perchloroethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers)

## **5. Electrical Substations**

Utility stations can potentially contribute Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Cyanide, 2,4-D, 1,4-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloromethane or Methylene Chloride, Lead, Mercury, Picloram, Toluene, 1,1,2,2-Tetrachloroethane, Tetrachloroethylene or Perchloroethylene (Perc, Trichloroethylene (TCE), Xylene (Mixed Isomers)

**5. Laundromats/Dry Cleaners**

Dry Cleaners can potentially contribute Tetrachloroethylene or Perchloroethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroethane.

**6. Above Ground Storage Tanks**

Storage tanks, both above and underground, are a potential source of contaminants that can pollute source water. Underground storage tanks include tanks and any connected underground piping that have at least (10) percent of their combined volume underground. All other tanks are considered above ground. Storage tanks typically contain either petroleum or hazardous substances as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), but may contain non-hazardous substances.

**7. UnderGround Storage Tanks**

Storage tanks, both above and underground, are a potential source of contaminants that can pollute source water. Underground storage tanks include tanks and any connected underground piping that have at least (10) percent of their combined volume underground. All other tanks are considered above ground. Storage tanks typically contain either petroleum or hazardous substances as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), but may contain non-hazardous substances.

**8. Electrical Transformers**

Electrical transformers can leak and release polychlorinated biphenyls(PCBs), a family of persistent organic chemicals with

known health effects, as well as other pollutants. Electrical transformers should be properly handled, stored and disposed of.

#### **9. Utility Poles**

Wooden utility poles have been linked with the release of pentachlorophenol and related chemicals used to preserve them. These chemicals have known health effects.

#### **10. Vehicle Parking Areas**

Vehicle Parking areas can potentially contaminate surface and ground water with a variety of pollutant such as gasoline, diesel fuel, lubricating oil and antifreeze, which may leak from the vehicles.

#### **11. Abandoned Wells**

Abandoned drinking water wells can serve as conduits for many types of pollution, including Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Diquat, Dalapon, Giardia Lambia, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Oxamyl (Vydate), Picloram, Simazine, Trichloroethylene (TCE), Turbidity, Vinyl Chloride, Viruses.

#### **12. Domestic Wells**

Domestic water wells are potential pathways for contaminants to enter groundwater, if the cover is not tight or the casing is leaky.

#### **13. Injection Wells**

Injection wells have been used by some industries as a method for disposal of process wastes streams and as a production method for certain mining petrochemical industries. The injection wells carry waste streams directly into deeper layers of the ground and threaten groundwater quality as they allow these streams and any contained pollutants to feed directly into the groundwater.

#### **14. Storm Water Runoff/Infiltration**

Impervious surfaces are any surfaces that water cannot readily pass through. Urban areas have an excessive amount of impervious



surfaces including pavement on roads, sidewalks, driveways and parking lots; rooftops of buildings and structures, and dirt parking lots and sports fields with compacted soils. Impervious surfaces can lead to increased source water pollution. During storms, rainwater flows across these impervious surfaces and mobilizes contaminants transporting them to water bodies. Potential Contaminants include oil, gasoline, automotive fluids, hydrocarbons, sediments, fertilizers, animals wastes, and litter.

#### **15. Sewer Lines**

Leaking sewer lines can potentially contribute Coliform, Cryptosporidium, Diquat, Dalapon, Giardia, Lambda, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses.

#### **16. Airports**

Airport maintenance and fueling areas can potentially contribute Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, cis 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Ethylbenzene, Lead, Mercury, Selenium, Tetrachloroethylene or Perchloroethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform. Trichloroethylene (TCE), Xylene (Mixed Isomers).

#### **17. Major Highways & Railroads**

Railroad yards with maintenance and fueling areas can potentially contribute Atrazine, Barium, Benzene, Cadmium, Dalapon, 1,4-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Mercury, Tetrachloroethylene or Perchloroethylene (Perc), Trichloroethylene (TCE).

#### **18. Transportation Corridors**

The use of transportation corridors can facilitate source water contamination. Transportation corridors include both the paved, impervious surfaces used for roadways and also any green space or rights-of-way around the roadways. Transportation activities and hazardous and non-hazardous material spills can disturb the land, right-of-ways, and roadways allowing runoff to carry

sediments, nutrients, and various chemicals to surface water bodies. Additionally, fertilizers are commonly used on right-of-ways and green spaces along transportation corridors. These herbicides and fertilizers can be washed away by runoff or infiltration into the ground and contaminate either surface or groundwaters with chemicals and nutrients.

#### **19. Dumps**

Dumps or landfills can be source of chemical and other potential contaminants, for both surface and groundwater.

### **3.1 Assessment of Poultry Industry**

#### **1. Layer Production**

Nutrients leaching from improperly handled layer manure or mortalities can contaminate ground water. Poorly managed lagoons and egg washing operations can also contaminate surface and ground water.

#### **2. Broiler Production**

Broilers are Georgia's largest single agricultural commodity and some of the nutrients in broiler litter, carcasses and dead bird compost may impact ground water.

#### **3. Composting Poultry Mortalities**

With a rapidly expanding poultry industry and equally rapid urban growth, it is becoming more difficult for farmers to safely dispose of poultry mortalities.

### **4. Management Plan**

The source protection area referred to in the plan is the area comprised by the wellhead protection plan of City of Moultries's public drinking water sources. In order to reduce the potential risk of contamination to the City of Moultries' drinking water sources, the City of

Moultries' Source Water Protection Committee will work with the community to implement the following management measures:

**1. Conduct an education and outreach campaign**

Public education and awareness is the cornerstone of the Source Protection Plan because everyone poses a risk to source water. Most homeowners and business owners will work to protect their local water supplies if they know how to minimize contamination risks. The City of Moultries' education and outreach campaign will include, but not necessarily be limited to, the following steps:

1. Provide educational information to residences and businesses. This educational information may be picked up at bill paying Locations, at festival booths or through school hand-outs.
2. Develop a media campaign to the public with educational information about local drinking water, and about the current Source Water Protection effort.
3. Hold an informational meeting with local residents about the Source Water Protection effort to increase local awareness Of the link between land use and drinking water quality and Involve the public in Source Water Protection activities. This could be structured as a meeting or as a more informal water fair/public event with drinking water displays and activities.

**2. Develop a BMP ( Best Management Practices) Survey Program**

Many of the pollution sources identified by GA EPD's Source Water Assessments are Petroleum products and regulated substances (greater than household quantities of hazardous materials). Therefore, the committee will develop a Best Management Practice (BMP) Inspection/Survey Program for businesses that use regulated substances. BMP's are guidelines for the storage and handling of hazardous materials.

BMP Survey programs can be either voluntary or mandatory. A voluntary program is in which the surveyor asks to visit the business to talk about Best Management Practices and may only do so if the

Business is willing. A mandatory program requires the business to allow a survey.

### **3. Drinking Water Source Protection Area Signs**

Post drinking water source signs at road accesses to City of Moultries SWPAs where appropriate, alerting travelers about the presence of the protection area and how to notify emergency personnel if a contamination event should occur.

### **4. Reduce the Contamination Risk from Used Motor Oil**

The City of Moultries Source water Protection Committee will work to inform Coulquitt County residents how to safely dispose of their motor oil and provide increased opportunities for motor oil collection. Possibilities for improved motor oil collection opportunities include:

- a. Sponsor a used motor oil collection program at the town dump.
- b. Work to better inform the public regarding facilities that **currently collect used motor oil.**
- c. Hold a household hazardous waste collection day, and possibly hold the event more frequently than once a year.

### **5. Form a Source Water Protection Steering Committee**

The Following persons comprise the City of Moultrie, Coulquitt County Source Protection Committee. This committee has developed this drinking water protection plan for their community, and has committed to implanting the contaminant prevention measures outlined above. Furthermore, this committee will meet at a minimum of once a year to review and update the plan to assess its progress.

#### **Source Water Protection Steering Committee**

Debbie Cannon	Regional Representative, U.S. Senator Saxby Chambliss, Georgia
Mark Mobley	Mobley Gin Co.

Joe Hester	Farm Services Administration
Jerry Usry	Usry Consulting Inc.
Doug Wilson	Georgia Water planning & Policy Center
Roger King	Director of Utilities City of Moultrie

## **5. Contingency Plan**

### **5.1 Emergency Response**

If an emergency such as a spill or other contamination occurs within the Source Protection Area the following people/agencies may then be notified:

1. City of Moultrie Utility Department
2. City of Moultrie Police and Fire Departments
3. Georgia Department of Natural Resources, Environmental Protection Division

### **5.2 Notification of System Users**

If The City of Moultries, Coulquitt Counties public drinking water sources should become contaminated, the drinking water system and /or the authority involved will notify the water system users by one or more of the following method:

1. Hand deliver a notice to each water system user
2. Post a notice at the Bill paying office
3. Place a notification Local newspaper
4. Broadcast an announcement the local radio station, Local TV station

and on the local cable access channel.

### **5.3 Short Term Contingency Options**

Short-term response to either a quality or quantity will require one or all of the following options depending on the specific nature of the outage:

1. Issue a boil water notice and/or recommend that bottled water be utilized for drinking water purposes.
2. Trucked and delivered water from an approved source.
3. Request that water system users conserve available water.
4. Source Treatment

Bottled water will be provided for potable (i.e. consumptive) use in the event of a water quality problem. Restrictions will be placed on the use of water for anything but consumptive use and personal hygiene.

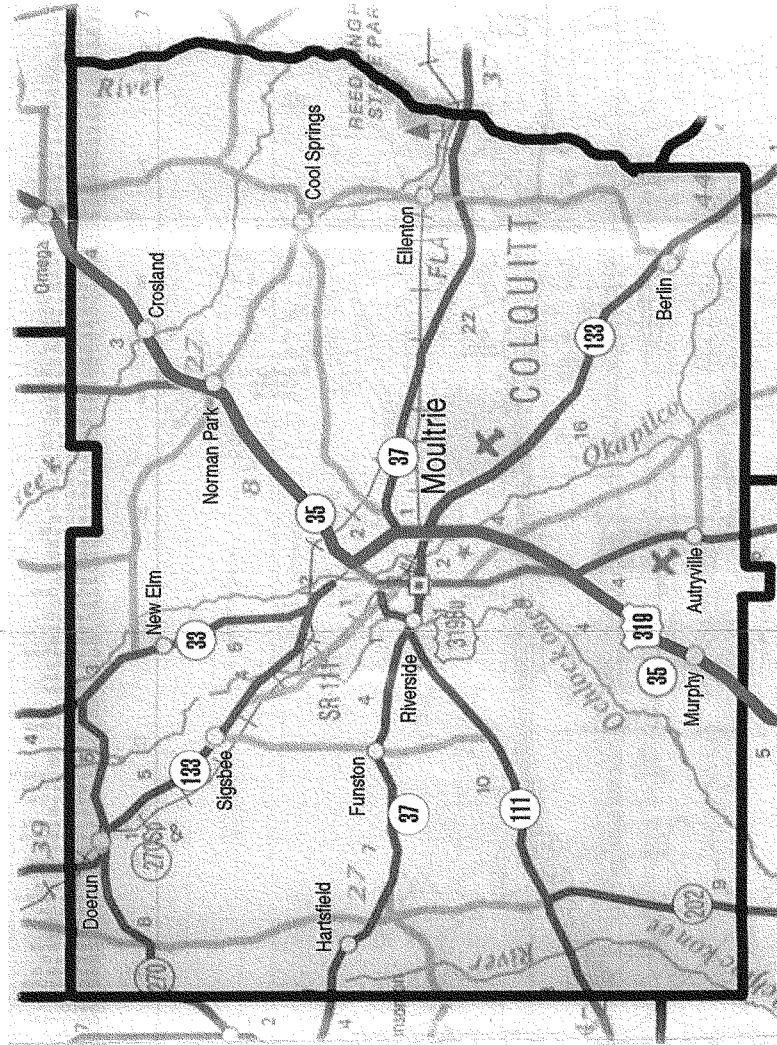
### **5.4 Long Term Contingency Options**

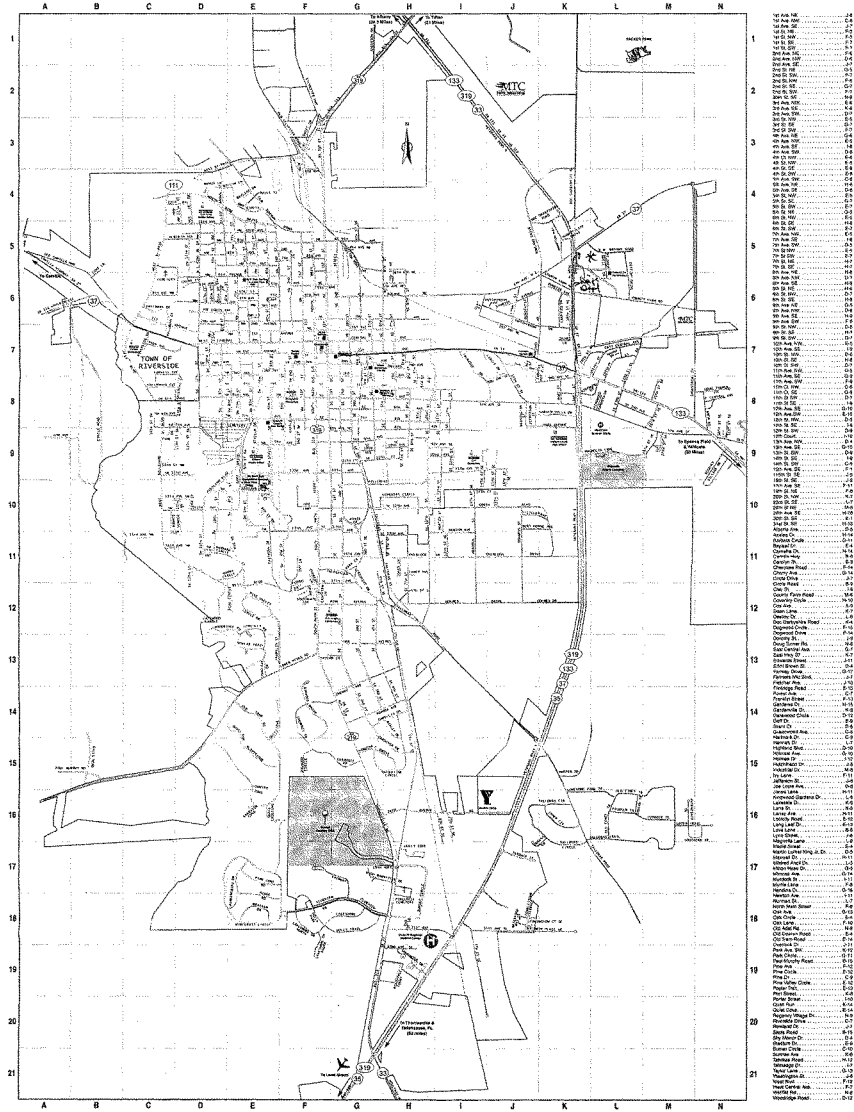
A back connection to an unaffected source maybe required.

### **5.5 Water System Shut Down and Start Up Procedures**

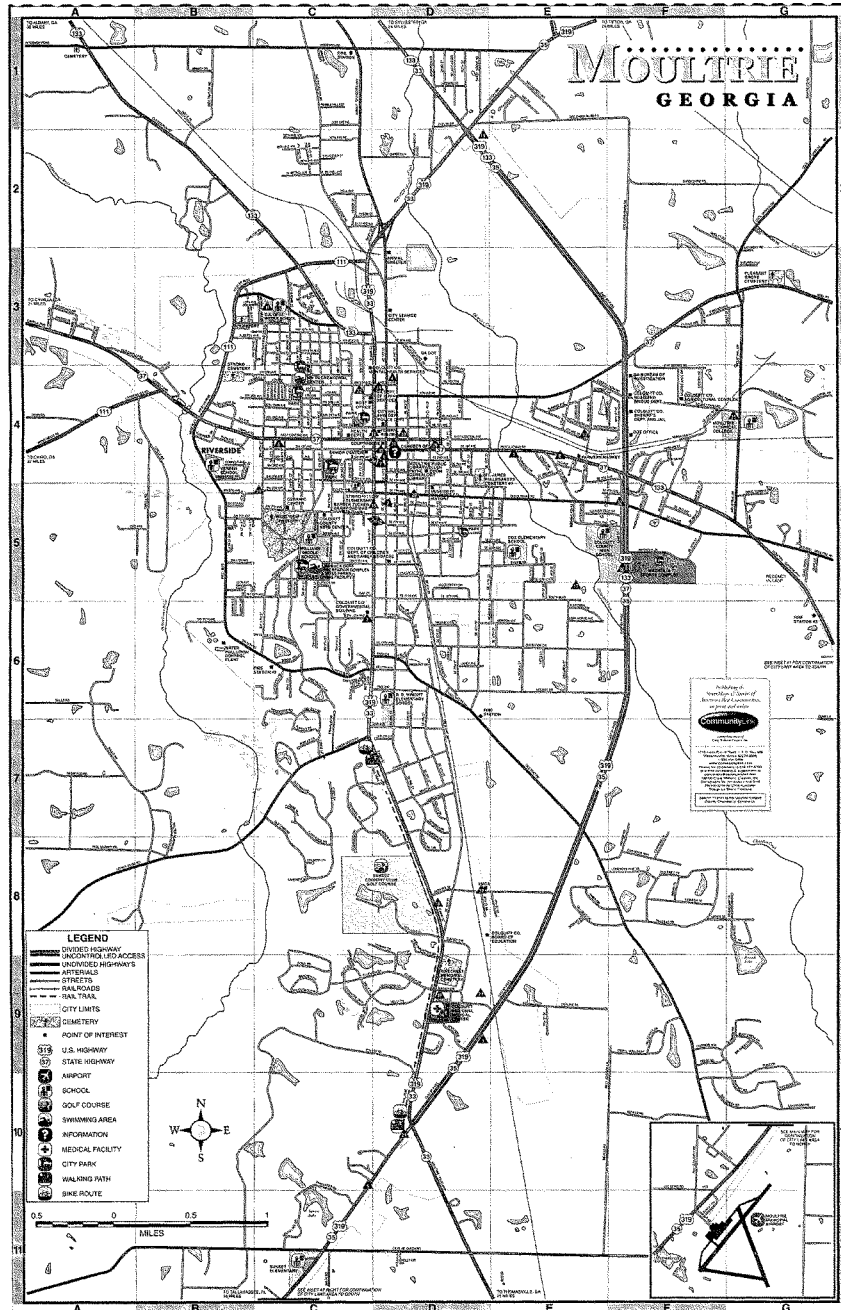
In the event that the City of Moultries public water systems must be shut down for an emergency situation, the system personnel should follow the systems procedures for shutting down the wells and water plants affected, and notify the Manager in charge.

## COLQUITT COUNTY, GEORGIA









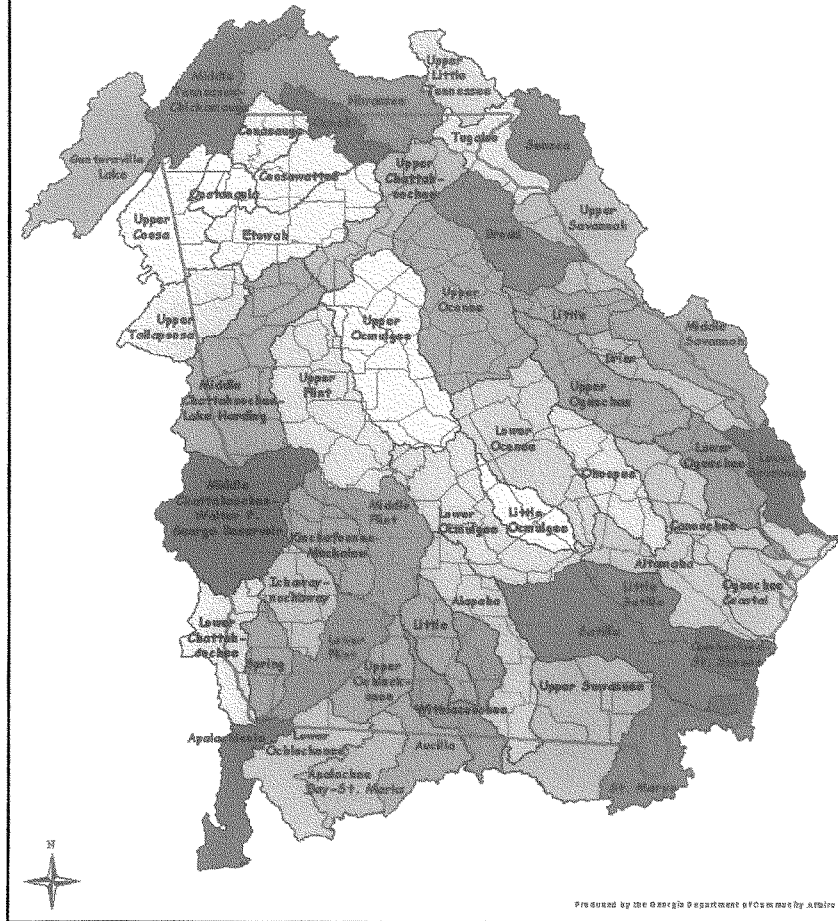
**GEORGIA'S 52 LARGE WATERSHEDS**

<b>EPA/USGS WATERSHED NAME</b>	<b>CU NUMBER</b>
Alapaha	03110202
Altamaha	03070106
Apalachee Bay-St. Marks	03120001
Apalachicola	03130011
Aucilla	03110103
Brier	03060108
Broad	03060104
Canoochee	03060203
Conasauga	03150101
Cossawattee	03150102
Cumberland-St. Simons	03070203
Etowah	03150104
Guntersville Lake	06030001
Hiwassee	06020002
Ichawaynochaway	03130009
Kinchafoonee-Muckalee	03130007
Little (in Georgia only)	03110204
Little (in Georgia-South Carolina)	03060105
Little Ocmulgee	03070105
Little Satilla	03070202
Lower Chattahoochee	03130004
Lower Flint	03130008
Lower Ochlockonee	03120003
Lower Ocmulgee	03070104
Lower Oconee	03070102
Lower Ogeechee	03060202
Lower Savannah	03060109
Middle Chattahoochee-Lake Harding	03130002
Middle Chattahoochee-Walter F. George Reservoir	03130003
Middle Flint	03130006
Middle Savannah	03060106
Middle Tennessee-Chickamauga	06020001
Ocoee	06020003
Ogeechee Coastal	03060204
Ohoopee	03070107
Oostanula	03150103
Saint Mary's	03070204
Satilla	03070201
Spring	03130010
Tugaloo	03060102
Upper Chattahoochee	03130001
Upper Coosa	03150105
Upper Flint	03130005
Upper Little Tennessee	06010202
Upper Ochlockonee	03120002
Upper Ocmulgee	03070103
Upper Oconee	03070101
Upper Ogeechee	03060201

Upper Savannah	03060103
Upper Suwanee	03110201
Upper Tallapoosa	03150108
Withlacoochee	03110203

EPA IS THE U.S. ENVIRONMENTAL PROTECTION AGENCY  
USGS IS THE U.S. GEOLOGICAL SURVEY  
CU IS THE USGS CATALOGING UNIT CODE

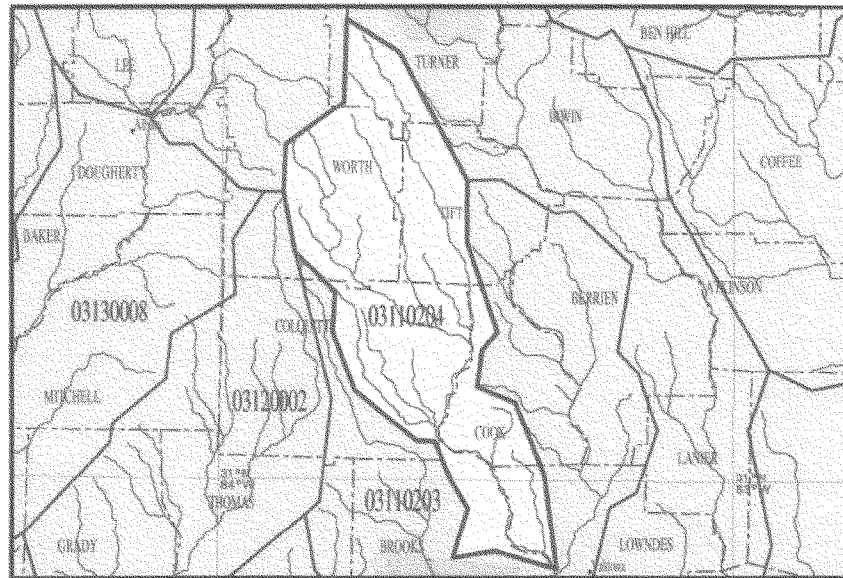
## Georgia's 52 Watersheds



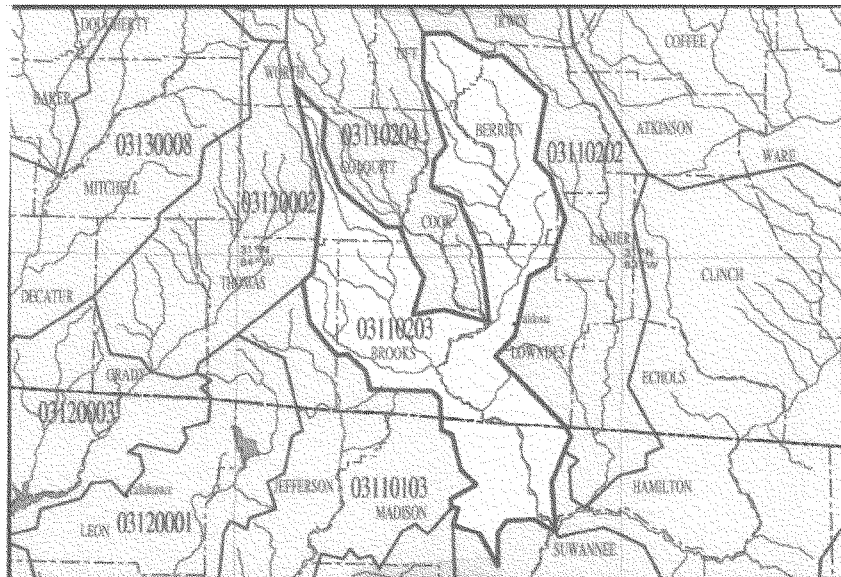
## SUWANNEE WATERSHED



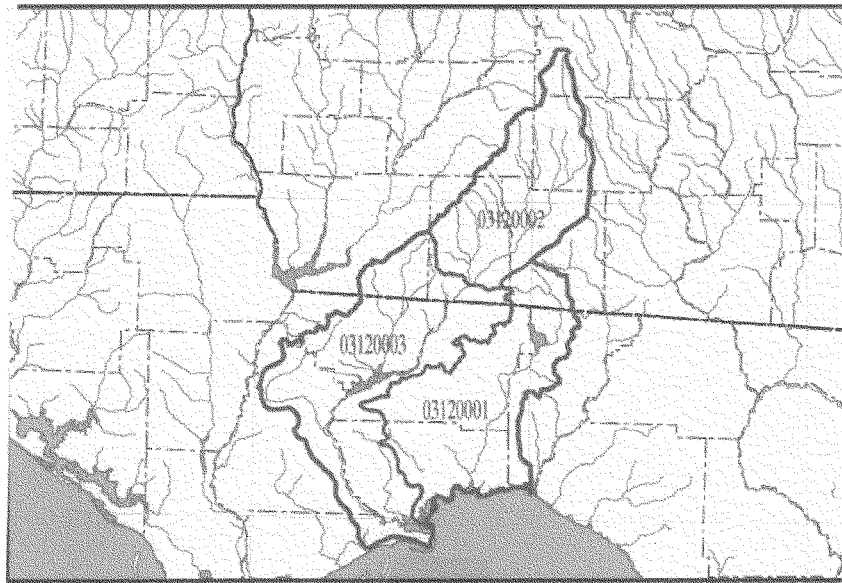
**LITTLE RIVER  
WATERSHED  
CUO3110204**



**WITHLACOOCHEE  
WATERSHED  
CU03110203**

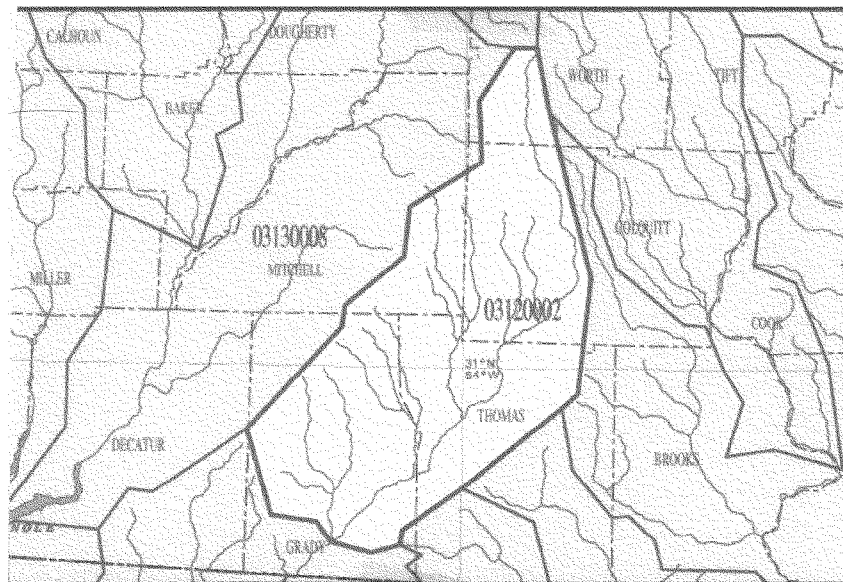


## **OCHLOCKNEE WATERSHED**



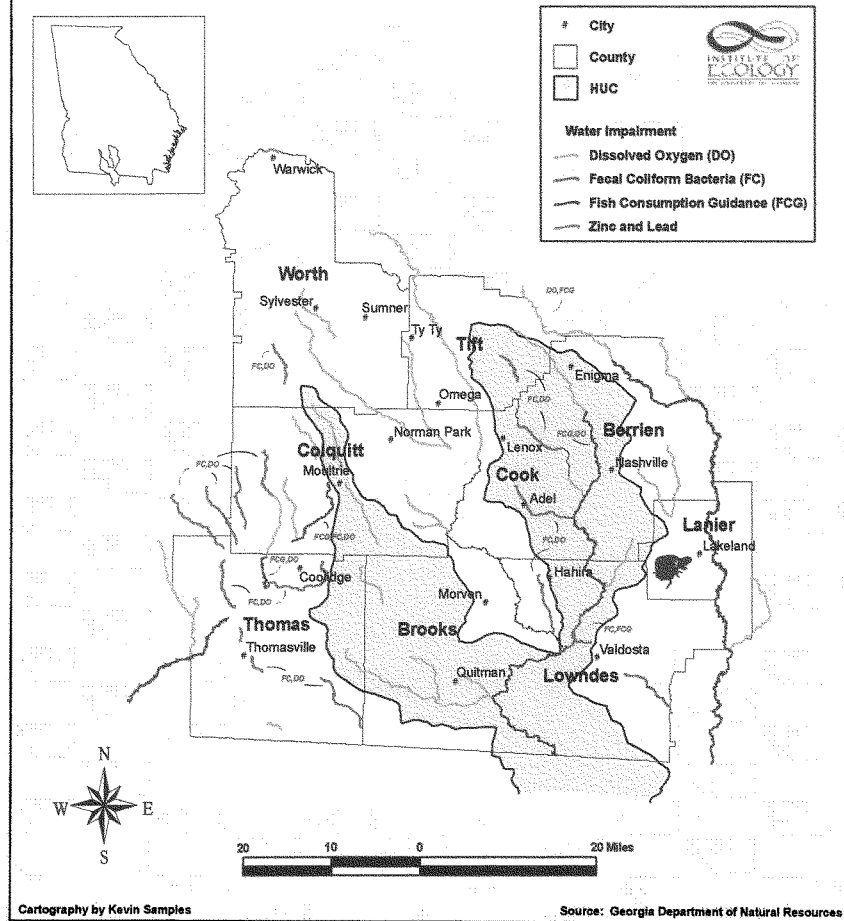


**UPPER OCHLOCKEE  
WATERSHED  
CUO3120002**



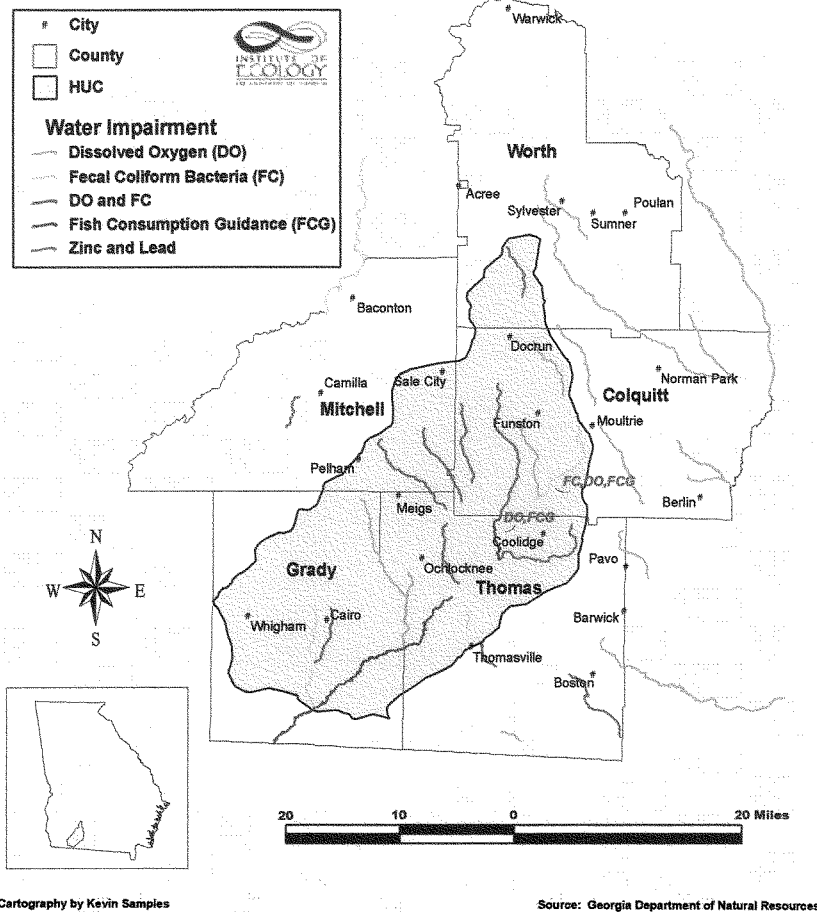
# Georgia Impaired Waters, 2000

## Withlacoochee River Watershed



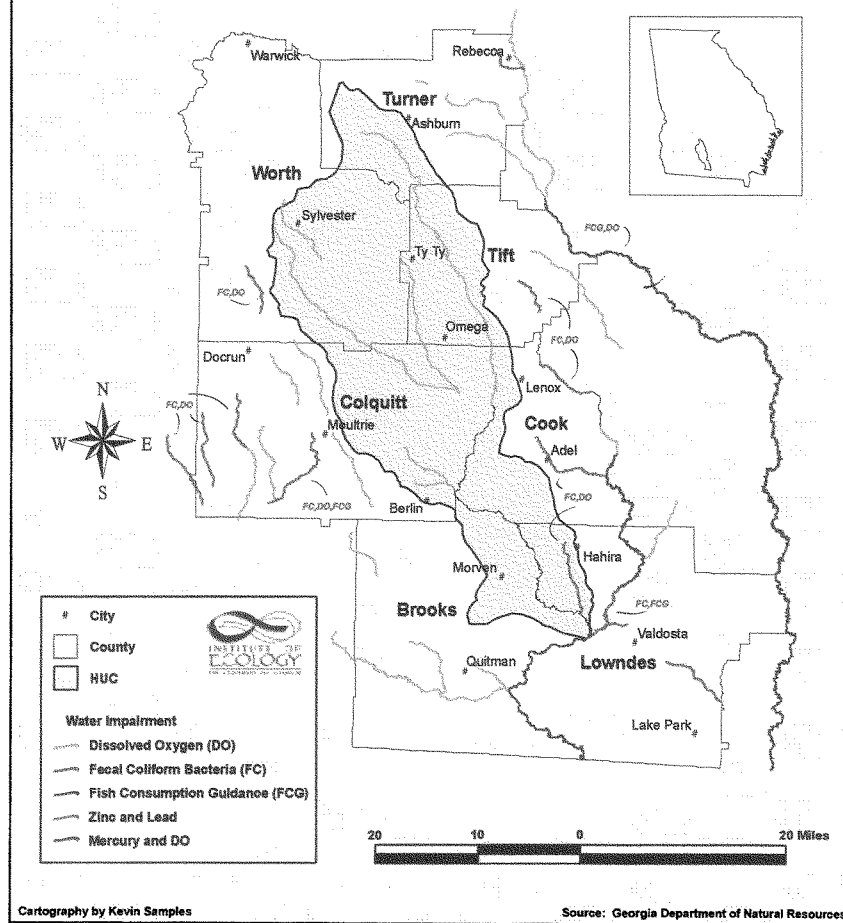
# Georgia Impaired Waters, 2000

## Upper Ochlockonee River Watershed



# Georgia Impaired Waters, 2000

## Little River Watershed



## AGRICULTURAL FIELDS

### CAUSE FOR CONCERN

**Nutrient Applications.** Runoff or infiltration from croplands, pastures, rangelands, and nurseries utilizing fertilizers, manure, or sludges can contaminate surface waters or ground waters. These applications can contain excessive amounts of nutrients such as phosphorus, nitrogen, and potassium which are applied to enhance production. Excessive nutrients harm water supplies by prompting excessive algae growth which can lead to odor and taste problems in drinking water, thereby increasing treatment costs.

**Chemical Applications.** Runoff or infiltration from croplands, pastures, rangelands, and nurseries utilizing pesticides or herbicides can contaminate surface waters or groundwaters with various chemicals. Pesticides and herbicides applied to crops can be washed off and transported to streams, rivers, and other surface water bodies. Once in the water body, the chemicals may settle on plants or other substrates, or may remain in the water column. These chemicals are eventually ingested by fish and other organisms and can work their way up the food chain to humans through bioaccumulation.

**Irrigation.** Irrigation water is applied to supplement natural precipitation or to protect crops against freezing or wilting. Inefficient irrigation can cause water quality problems. The major agricultural pollutants that result from these non-point source activities are sediments, nutrients, pathogens, pesticides, and salts. Excessive irrigation runoff can also damage habitat and stream channels.

Agricultural fields can potentially contribute Benzene, 2,4-D, Dalapon, Dinoseb, Diquat, Glyphosate, Lindane, Lead, Nitrate, Nitrite, Picloram, Simazine, Turbidity.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- Agriculture Statistics. <http://www.usda.gov/nass/>
- Potential Priority Watersheds for Protection of Water Quality from Agriculture Sources. <http://www.nrcs.usda.gov/technical/land/pubs/wqpost2.html>
- EPA Potential Contaminants Source Index (by contaminant and by source): <http://www.epa.gov/safewater/swp/intro4.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Zoning

Critical Area Zoning

**Buffer and Setbacks****BMPs**

Nutrient Loading Standards

Agricultural Management, Flushing and Dilution

**Pollution Prevention**

Source Management

Education

Reduction

**Health Regulations**

Contaminant Bans

Use Controls

**Zoning**

**Critical Area Zoning.** Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

**Buffer and Setback Zones.** Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

**BMPs**

**Nutrient Loading Standards:** Can establish the permissible amount and source of nutrients in runoff and the amount, source, placement, and timing of nutrient applications on the landscape. Nutrient loading standards are often implemented in nutrient management plans and include manure, organic wastes, chemical fertilizers, and crop residue sources.

**Pollution Prevention**

**Source Reduction.** Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat

of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

**Management of Contaminates.** Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

**Education.** Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Health Regulations**

**Contaminant Bans and Use Controls** Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

## IRRIGATION WELLS

### CAUSE FOR CONCERN

Shallow Well Injection. Shallow injection wells, also known as agricultural drainage wells, have been used in some farming situations as a way to carry excess water from surface or subsurface drainage systems directly into deeper layers of the ground. These wells threaten groundwater quality because they allow agricultural runoff and any contained pollutants to feed directly into the groundwater. Normally, natural filtering of runoff takes place as water seeps slowly through several layers of fine- and medium-textured soil before it reaches the groundwater. This natural filtering is bypassed when injection wells are used. These drainage wells are typically used to receive irrigation tailwaters, other field drainage, barnyard runoff or to remove excess water from potential crop land in areas where it is difficult to do so using streams or ditches. Similar drainage wells have been used to accept water from roadways, septic systems, and urban land.

Irrigation. Irrigation water is applied to supplement natural precipitation or to protect crops against freezing or wilting. Inefficient irrigation can cause water quality problems. The major agricultural pollutants that result from these non-point source activities are sediments, nutrients, pathogens, pesticides, and salts. Excessive irrigation runoff can also damage habitat and stream channels.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 1) Agriculture Statistics. <http://www.usda.gov/nass/>
- 2) Potential Priority Watersheds for Protection of Water Quality from Agriculture Sources. <http://www.nrcs.usda.gov/technical/land/pubs/wqpost2.html>

#### Health Regulations

Well Closure

#### Zoning

Critical Area Zoning

#### Pollution Prevention

Source Reduction

Management

Education

Disposal

#### BMPs

Agricultural Management, Flushing & Dilution



### Emergency Response Plan

#### **Health Regulations**

Well Closures. Protective well closure requirements may be adopted to ensure that abandoned wells do not become a potential source of ground water contamination.

#### **Zoning**

Critical Area Zoning. Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

#### **Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

**Emergency Response Planning**

Short Term Planning. The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
- Should you shut down the intake or well?
- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## **AUTO REPAIR/BODY SHOP/SALVAGE WASHES**

### **CAUSE FOR CONCERN**

Potential contaminants include Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Copper, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, 1,4-Dichlorobenzene or P-Dichlorobenzene, Lead, Fluoride, 1,1,1-Trichloroethane or Methyl Chloroform, Dichloromethane or Methylene Chloride, Tetrachloroethylene or Perchloroethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers)

### **ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS**

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 1 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>
- 2 EPA Potential Contaminant Source Inventory Tools:  
<http://www.epa.gov/safewater/protect/feddata/inventory.html>

### **LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS**

#### Zoning

Critical Area Zoning

Buffers and Setbacks

Floodplain Management

#### BMPs

Infiltration Basins

Runoff Pond

#### Pollution Prevention

Source Reduction

Management

Disposal

Education

Health Regulations

Contaminant Ban

Use Control

**Zoning**

**Critical Area Zoning.** Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

**Buffer and Setback Zones.** Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective

buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

### **BMPs**

**Infiltration Basins.** Infiltration basins are a system of shallow ponds connected by grass or vegetated drainage swales. The gradient of the swales and the elevation of the ponds are constructed to control the runoff flow velocity to permit continuous ponding along the length of the infiltration system. However, the ponding is intended to be for a temporary duration of about 24 hours so that runoff is absorbed into the soil along the length of the system. Because the infiltration system is designed to be non-erosive, to treat runoff contaminants, and to absorb the water, the swales and basins are effective at protecting source water from runoff?

**Runoff Ponds / Wetlands.** Runoff ponds and constructed wetlands are larger and deeper than shallow infiltration basins. They can act as a pretreatment system that allows the settling and filtration of runoff. These systems are particularly useful in controlling peak flows during large, rare storm events. In addition, they are also useful if the topography does not permit the vegetated swale and shallow ponding system. If the low velocity of the infiltration system cannot be met, numerous check dams of earth, wood, or stone can help slow runoff to storm water ponds and constructed wetlands and improve treatment performance.

### **Health Regulations**

**Contaminant Ban and Use Controls** Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- 3) restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- 4) establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

**Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

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Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

## **ELECTRICAL SUBSTATION**

### **CAUSE FOR CONCERN**

Utility stations can potentially contribute Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Cyanide, 2,4-D, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Mercury, Picloram, Toluene, 1,1,2,2- Tetrachloroethane, Tetrachloroethylene or Perchloroethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers)

### **ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS**

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 3 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>
- 4 EPA Potential Contaminant Source Inventory Tools:  
<http://www.epa.gov/safewater/protect/feddata/inventory.html>

## **LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS**

### Pollution Prevention

Source Reduction

Management

Education

### Utility Requirements

### Emergency Response Plan

### **Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include

education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

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#### **Emergency Response Planning**

Short Term Planning. The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- 5) Is the surface water intake or ground water well threatened?
- 6) Is there an emergency response mechanism in place sufficient to contain the spill?
- 7) Should you shut down the intake or well?
- 8) Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- 9) Do you have the funding to pay for water via a tank truck for a short period of time?
- 10) Is providing an alternative source of water an option?

Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?



## LAUNDROMATS/DRY CLEANERS

### CAUSE FOR CONCERN

Dry Cleaners can potentially contribute Tetrachloroethylene or Perchloroethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, 1,1,2-Trichloroethane.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 5 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>
- 6 EPA Potential Contaminant Source Inventory Tools:  
<http://www.epa.gov/safewater/protect/feddata/inventory.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Health Regulations

Contaminant Ban and Use Controls

#### Pollution Prevention

Source Reduction

Management

Disposal

Education

#### Conservation and Reuse

### **Health Regulations**

Contaminant Ban and Use Controls Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- 11) restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- 12) establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

### **Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine

maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Conservation and Reuse**

Wastewater Reuse. The reuse of highly treated wastewater as a water supply has been implemented successfully in many areas. Practicing wastewater reuse can create what some consider to be a new water supply. Rather than discharging treated effluent to surface waters, water can be reclaimed for a number of uses to help protect the quality and supply of the drinking water source.

*Direct Potable Reuse.* Direct potable reuse is reclaimed wastewater, treated at the highest level that is fed directly into the drinking water treatment systems.

*Indirect Potable Reuse.* Indirect potable reuse is reclaimed wastewater that is discharged to a surface water body or to an aquifer for subsequent withdrawal as a drinking water supply.

*Indirect Nonpotable Reuse.* Indirect nonpotable reuse is reclaimed wastewater used for agricultural irrigation, landscape irrigation, industrial processes, or for other nondrinking water uses.

## **ABOVE GROUND STORAGE TANKS**

### **CAUSE FOR CONCERN**

Storage tanks, both above ground and underground, are a potential source of contaminants that can pollute source water. Underground storage tanks include tanks and any connected underground piping that have at least ten (10) percent of their combined volume underground. All other tanks are considered above ground. Storage tanks typically contain either petroleum or hazardous substances as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), but may contain non-hazardous substances.

Over 95 percent of underground storage tanks contain petroleum. Many underground storage tanks are located at fueling stations for vehicles, but can also be found at airports, school bus barns, hospitals, automotive repair shops, military bases, industrial plants, residential areas, and other facilities.

Petroleum includes carcinogenic compounds such as benzene. Even at very low levels, fuel contaminants in water may not be detected by smell or taste, yet they can affect human health. Petroleum can also contain the additive methyl tertiary butyl ether (MTBE), which can make water smell and taste bad enough to be undrinkable. Even a few quarts of gasoline in the ground water can pollute a drinking water well.

Most releases from storage tanks are a result of the corrosion of parts, improper installation, failure of piping systems, poorly conducted fuel or supply deliveries – particularly spills and overfills, and improper operation and maintenance.

Releases can contaminate soil and drinking water supplies. Once in the soil, these releases can move rapidly and threaten drinking water supplies.<sup>3</sup>

Potential contaminants from storage tanks include Arsenic, Barium, Benzene, Cadmium, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Trichloroethylene (TCE), Tetrachloroethylene or Perchloroethylene (Perc)

**ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS**

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 7 Oil and Chemical Spills Compendium.  
<http://www.uscg.mil/hq/g%2Dm/nmc/response/stats/aa.htm>
- 13) EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>

**LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS**Zoning

Critical Area Zoning  
 Floodplain Management  
 Buffers and Setbacks

Health Regulations

Contaminant Ban and Use Control

Pollution Prevention

Source Reduction  
 Management  
 Disposal  
 Education

Restoration

Re-siting and Remediation

Emergency Response Plan**Zoning**

**Critical Area Zoning.** Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

**Buffer and Setback Zones.** Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for

it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

### **Health Regulations**

Contaminant Ban and Use Control Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

### **Pollution Prevention**

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information

campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Restoration**

**Re-siting and Remediation:** Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with re-siting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

### **Emergency Response Plan**

**Short Term Planning.** The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
- Should you shut down the intake or well?
- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

**Long Term Planning.** In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## UNDERGROUND STORAGE TANKS

### CAUSE FOR CONCERN

Storage tanks, both above ground and underground, are a potential source of contaminants that can pollute source water. Underground storage tanks include tanks and any connected underground piping that have at least ten (10) percent of their combined volume underground. All other tanks are considered above ground. Storage tanks typically contain either petroleum or hazardous substances as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), but may contain non-hazardous substances.

Over 95 percent of underground storage tanks contain petroleum. Many underground storage tanks are located at fueling stations for vehicles, but can also be found at airports, school bus barns, hospitals, automotive repair shops, military bases, industrial plants, residential areas, and other facilities.

Petroleum includes carcinogenic compounds such as benzene. Even at very low levels, fuel contaminants in water may not be detected by smell or taste, yet they can affect human health. Petroleum can also contain the additive methyl tertiary butyl ether (MTBE), which can make water smell and taste bad enough to be undrinkable. Even a few quarts of gasoline in the ground water can pollute a drinking water well.

Most releases from storage tanks are a result of the corrosion of parts, improper installation, failure of piping systems, poorly conducted fuel or supply deliveries – particularly spills and overfills, and improper operation and maintenance.

Releases can contaminate soil and drinking water supplies. Once in the soil, these releases can move rapidly and threaten drinking water supplies.<sup>3</sup>

Potential contaminants from underground storage tanks include Arsenic, Barium, Benzene, Cadmium, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Tetrachloroethylene or Perchloroethylene (Perc), Trichloroethylene (TCE).



### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 8 Oil and Chemical Spills Compendium.  
<http://www.uscg.mil/hq/g%2Dm/nmc/response/stats/aa.htm>
- 9 Underground Storage Tanks UST – Access.  
<http://www.epa.gov/swrust1/ustaccs/>
- 14) EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Zoning

- Critical Area Zoning
- Floodplain Management
- Buffers and Setbacks

#### Health Regulations

- Contaminant Ban and Use Control
- Underground Tank Requirements

#### Pollution Prevention

- Source Reduction
- Management
- Disposal
- Education

#### Restoration

- Re-siting and Remediation

#### Emergency Response Plan

#### Zoning

Critical Area Zoning. Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

Buffer and Setback Zones. Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of

surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

### **Health Regulations**

Contaminant Ban and Use Control Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.
- 

Local Underground Storage Tank Regulations. If authorized by state law, health regulations may set underground fuel storage requirements such as secondary tank containment and periodic testing and monitoring to minimize the risk of leaks and spills. The regulations may also completely prohibit the use of underground fuel storage tanks in source water protection areas.

### **Pollution Prevention**

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information

buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Restoration**

**Re-siting and Remediation:** Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with re-siting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

### **Emergency Response Plan**

**Short Term Planning.** The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool

of contamination in close proximity to the water intake?" The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
- Should you shut down the intake or well?
- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## ELECTRICAL TRANSFORMERS

### CAUSE FOR CONCERN

Electrical transformers can leak and release polychlorinated biphenyls (PCBs), a family of persistent organic chemicals with known health effects, as well as other pollutants. Electrical transformers should be properly handled, stored and disposed of.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 10 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Pollution Prevention

Management  
 Disposal  
 Education

#### Health Regulations

Contaminant Ban and Use Controls

### **Pollution Prevention**

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and

managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

**Health Regulations**

Contaminant Ban and Use Control Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- 15) restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- 16) establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

## UTILITY POLES

### CAUSE FOR CONCERN

Wooden utility poles have been linked with the release of pentachlorophenol and related chemicals used to preserve them. These chemical have known health effects.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 11 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Pollution Prevention

- Source Reduction
- Management
- Disposal
- Education

#### Zoning

- Buffers and Setbacks

### **Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that



allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

**Education.** Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Zoning**

**Buffer and Setback Zones.** Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

## VEHICLE PARKING AREAS

### CAUSE FOR CONCERN

Vehicle parking areas can potentially contaminate surface and groundwater with a variety of pollutants such as gasoline, diesel fuel, lubricating oil and antifreeze, which may leak from the vehicles.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 12 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Subdivision Requirements

Site Design

#### Building Codes

Impervious Surface Limits

Porous Paving

#### BMPs

Grass Swales

Infiltration Basins

#### Stormwater Management

Intergovernmental Coordination

Stormwater Infiltration Facilities

### Subdivision Requirements

In addition to identifying water supply and wastewater management options, traditional subdivision regulations often specify the following requirements.

- 17) Site design, engineering, and construction requirements establish standards for streets, curbs, gutters, and other drainage structures and for the use of impervious surfaces to protect water resources on- and off-site.
- 18) On-site wastewater and erosion and sedimentation control requirements can be stipulated in subdivision requirements.
- 19) Dedicated area requirements for ground water recharge or public amenities such as open space and parkland may also be established in subdivision requirements.

### Building Codes

Impervious Surface Limitations. Impervious surface building codes control the proportion of a building site that can be covered in nonporous roads, roofs, parking lots, driveways, sidewalks, and other pavements without capturing and/or treating the runoff. This code limits the generation of runoff and the pollutants it carries at the source, while allowing development of any type and intensity to occur.

Porous Pavement. Porous pavement codes require the use of specific materials such as permeable asphalt, concrete, and crushed stone or gravel; open-celled pavers such as concrete or plastic grids with voids that are filled with topsoil and seeded or filled with porous aggregate; grass; paving stones; and wood mulch. These materials can be used for street pavements, driveways, parking lots, sidewalks, bike and footpaths, pedestrian plazas, and courts where appropriate to increase the capture, infiltration, and treatment of runoff through the underlying soil

#### **BMPs**

Grass Swales. Grass or vegetated drainage swales are open and non-erosive conveyance systems that replace gutters, drainage pipes, and paved channels to carry, treat, and facilitate infiltration of runoff from storm events or snowmelt. While runoff passes through the grass swales, the pollutants it carries have a chance to be removed by the vegetation?27

Infiltration Basins. Infiltration basins are a system of shallow ponds connected by grass or vegetated drainage swales. The gradient of the swales and the elevation of the ponds are constructed to control the runoff flow velocity to permit continuous ponding along the length of the infiltration system. However, the ponding is intended to be for a temporary duration of about 24 hours so that runoff is absorbed into the soil along the length of the system. Because the infiltration system is designed to be non-erosive, to treat runoff contaminants, and to absorb the water, the swales and basins are effective at protecting source water from runoff?

#### **Stormwater Management**

Storm water collection infrastructure and treatment facilities may be required by the new Phase II NPDES permits. Depending on the degree of urbanization within a watershed, at least one watershed government may need to install, operate, and maintain storm drainage infrastructure and facilities. It only makes sense to consider runoff inputs from the entire watershed when designing these facilities.

Consistency in local government land use measures, erosion and sedimentation ordinances, and enforcement efforts throughout the watershed will be critical in order to succeed in watershed- wide source water protection. As most ordinances attempt to achieve similar results, consistency between local government ordinances may be a larger concern for the legal counsel than for the public or elected officials.

## ABANDONED WELLS

### CAUSE FOR CONCERN

Abandoned drinking water wells can serve as conduits for many types of pollution, including Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Simazine, Trichloroethylene (TCE), Turbidity, Vinyl Chloride, Viruses.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 20) EPA Potential Contaminants Source Index (by contaminant and by source):

<http://www.epa.gov/safewater/swp/intro4.html>

- 21) University of Minnesota Extension Service Groundwater Contamination Bulletin:

<http://www.extension.umn.edu/distribution/naturalresources/DD5866.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Health Regulations

Well Closure

Sewage Discharge and Management

#### Restoration

Remediation

#### Stormwater Management

Intergovernmental Coordination and Consistency

Stormwater Infiltration Facilities

### Health Regulations

Well Closures. Protective well closure requirements may be adopted to ensure that abandoned wells do not become a potential source of ground water contamination.

Sewage System Permits. Sewage discharge permits often provide siting and design criteria and maintenance and monitoring requirements for small sewage treatment systems. Regulations may also prohibit the use of on-site sewage management systems in cases where existing contaminant concentrations, such as nitrogen, pose a health risk.

**Restoration**

Re-siting and Remediation: Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with re-siting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

**Stormwater Management**

Storm water collection infrastructure and treatment facilities may be required by the new Phase II NPDES permits. Depending on the degree of urbanization within a watershed, at least one watershed government may need to install, operate, and maintain storm drainage infrastructure and facilities. It only makes sense to consider runoff inputs from the entire watershed when designing these facilities.

Consistency in local government land use measures, erosion and sedimentation ordinances, and enforcement efforts throughout the watershed will be critical in order to succeed in watershed- wide source water protection. As most ordinances attempt to achieve similar results, consistency between local government ordinances may be a larger concern for the legal counsel than for the public or elected officials.

## DOMESTIC WELLS

### CAUSE FOR CONCERN

Domestic water wells are potential pathways for contaminants to enter groundwater, if the cover is not tight or the casing is leaky.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 22) EPA Potential Contaminants Source Index (by contaminant and by source):

<http://www.epa.gov/safewater/swp/intro4.html>

- 23) University of Minnesota Extension Service Groundwater Contamination Bulletin:

<http://www.extension.umn.edu/distribution/naturalresources/DD5866.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Health Regulations

- Design Standards
- Permit for Installation
- Contamination Ban and Use Control

#### Pollution Prevention

- Education

#### **Health Regulations**

Local Design Standards. Health regulations often establish design standards for potential contamination sources and require on-site inspection of construction and operation activities to ensure that they do not threaten water resources. Activities that are often subject to such requirements include: underground storage tanks, wells, septic tanks, and other on-site sewage disposal systems. In addition, ground water monitoring may be required for developments that include these activities or that involve the handling, storage, or generation of hazardous materials.

Well Permits. Health regulations often require a permit for the installation of wells to ensure their proper placement and construction. Regulations may apply to specific types of wells (e.g., shallow wells for private use) or to well installation procedures to prevent surface-level contamination from reaching ground water.

**Contaminant Ban and Use Control** Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

**Pollution Prevention**

**Education** Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

## INJECTION WELLS

### CAUSE FOR CONCERN

Injection wells have been used by some industries as a method for disposal of process wastes streams and as a production method for certain mining and petrochemical industries. The injection wells carry waste streams directly into deeper layers of the ground and threaten groundwater quality as they allow these waste streams and any contained pollutants to feed directly into the groundwater.

Industrial injection wells are used for a variety of purposes including disposal of industrial wastes - particularly from the petrochemical facilities, from solution mining of uranium and sulfur, and for brine production with wells in salt beds. Each of these activities carries with it the potential to contaminate groundwater supplies. Uranium solution mining has a significant potential for contaminating groundwater supplies by increasing levels of total dissolved solids and uranium.<sup>45</sup>

Industrial waste disposal wells can potentially contribute Acrylamide, Arsenic, Atrazine, Alachlor, Aluminum (Fume or Dust), Ammonia, Barium, Benzene, Cadmium, Carbofuran, Carbon Tetrachloride, Chlorobenzene, Copper, Cyanide, 2,4-D, 1,2-Dibromoethane or Ethylene Dibromide (EDB), 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or p-Dichlorobenzene, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2 Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) adipate, Di(2-ethylhexyl) phthalate, 1,2-Dichloroethane or Ethylene Dichloride, Dioxin, Endrin, Epichlorohydrin, Hexachlorobenzene, Hexachlorocyclopentadiene, Lead, Mercury, Methoxychlor, Oxamyl (Vydate), Polychlorinated Biphenyls, Selenium, Styrene, Sulfate, Tetrachloroethylene or Perchloroethylene (Perc), Toluene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust)

### On-Line Tools to Help Identify Potential Threats

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>



- EPA Potential Contaminant Source Inventory Tools:  
<http://www.epa.gov/safewater/protect/feddata/inventory.html>

#### **LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS**

##### **Zoning**

Critical Area Zoning  
Floodplain Management  
Buffers and Setbacks

##### **Health Regulations**

Contaminant Bans and Use Controls  
Well Requirements  
Well Closures

##### **Restoration**

Remediation

##### **Pollution Prevention**

Source Reduction  
Management  
Disposal  
Education

##### **Emergency Response Plan**

##### **Zoning**

**Critical Area Zoning.** Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

**Buffer and Setback Zones.** Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

### **Health Regulations**

**Contaminant Ban and Use Control** Because national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

**Well Permits.** Health regulations often require a permit for the installation of wells to ensure their proper placement and construction. Regulations may apply to specific types of wells (e.g., shallow wells for private use) or to well installation procedures to prevent surface-level contamination from reaching ground water.

**Well Closures.** Protective well closure requirements may be adopted to ensure that abandoned wells do not become a potential source of ground water contamination.

### **Restoration**

**Re-siting and Remediation:** Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with re-siting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

### **Pollution Prevention**

**Source Reduction.** Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Disposal Activities. Disposal activities are related to the long-term fate of solid and hazardous waste, including household hazardous waste. Inappropriate siting and operation of disposal facilities can have a significant impact on water sources. Local government activities may also include hazardous waste amnesty collection days that allow residents to bring hazardous materials to a central location for collection and subsequent controlled disposal.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

#### **Emergency Response Plan**

Short Term Planning. The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
- Should you shut down the intake or well?
- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## STORM WATER RUNOFF/INFILTRATION

### CAUSE FOR CONCERN

Impervious surfaces are any surfaces that water cannot readily pass through. Urban areas have an excessive amount of impervious surfaces including pavements on roads, sidewalks, driveways and parking lots; rooftops of buildings and other structures, and dirt parking lots and sports fields with compacted soils. Impervious surfaces can lead to increased source water pollution. During storms, rainwater flows across these impervious surfaces and mobilizes contaminants transporting them to water bodies. Potential contaminants include oil, gasoline, automotive fluids, hydrocarbons, sediments, fertilizers, animal wastes, and litter.

The runoff from impervious surfaces also poses a significant threat to drinking water wells pulling from groundwater aquifers. Hydrologists have determined that wells can induce infiltration from rivers, streams, and other surface water bodies up to 1000 feet away, especially in periods of below-average precipitation. The water infiltrated to the well from a surface water body can carry the runoff contaminants and also pollute the ground waters and the well. Therefore, although pollution-generating activities on land may contribute to a degradation of downstream water quality, it is also important to minimize or eliminate these degrading activities on lands upstream of streamside wells as well as surface water withdrawal points.

Residential/Commercial Construction. Non-point source pollution is widespread and can occur any time the land or water is disturbed. Nonpoint source pollution originates from sources that are difficult to identify and locate. Nonpoint sources of pollution are more diffuse.<sup>8</sup> Construction is a potential source of pollution. The most common pollutants from construction are sediment and nutrients. These wash into water bodies from construction sites and other areas of disturbance. During construction impervious surfaces are often added to sites and can lead to additional source water pollution. Impervious cover can include pavements on roads, sidewalks, driveways and parking lots; rooftops of buildings and other structures, and dirt parking lots and sports fields with

compacted soils. During storms, rainwater flows across these impervious surfaces and mobilizes contaminants transporting them to water bodies. Potential contaminants include oil, gasoline, automotive fluids, hydrocarbons, sediments, fertilizers, animal wastes, and litter.

Disposal Wells. Disposal wells used for storm water drainage and automotive service station disposal can potentially contaminate source waters. Disposal wells are used as a way to carry excess water from surface or subsurface drainage systems and other wastes directly into deeper layers of the ground. These wells threaten groundwater quality because they allow storm water runoff and other wastes and any contained pollutants to feed directly into the groundwater.

Storm water infiltration basins and injection into wells can potentially contribute Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Chlorine, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Nitrosamine, Oxamyl (Vydate), Phosphates, Picloram, Simazine, Trichloroethylene(TCE), Turbidity, Vinyl Chloride, Viruses and many other pollutants.

#### **ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS**

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 24) EPA Potential Contaminants Source Index (by contaminant and by source):

<http://www.epa.gov/safewater/swp/intro4.html>

- 25) EPA Potential Contaminant Source Inventory Tools:

<http://www.epa.gov/safewater/protect/feddata/inventory.html>

#### **LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS**

##### Zoning

- Critical Area Zoning
- Floodplain Management
- Buffers and Setbacks
- Overlay Districts
- Impact Fees
- Development Agreements

##### Subdivision Regulations

- Site Design
- Erosion and Sedimentation Control
- Building Codes
  - Porous Pavement
  - Impervious Surface Limitations
  - Excavation, Grading and Seeding
  - Phased Development
- BMPs
  - Grass Swales
  - Infiltration Basins
  - Runoff Ponds
- Pollution Prevention
  - Source Reduction
  - Management
  - Education
- Health Regulations
  - Design Standards
  - On-site Sewage Management Controls
- Stormwater Management
  - Intergovernmental Coordination
  - Stormwater Infiltration Facilities
- Emergency Response Plan

### **Zoning**

Overlay Districts. Overlay districts establish areas where additional zoning restrictions apply that are superimposed on top of the underlying type of zoning. Land uses in overlay districts must then conform to the restrictions set for both zones. This approach can be used to identify and set additional protective measures for water supply watersheds, wellhead protection areas, floodplains, wetlands, and significant ground water recharge areas.

Critical Area Zoning. Critical area zoning is similar to the use of overlay districts in that it imposes restrictions or prohibitions, or requires review standards for developments in water supply watersheds, areas with steep slopes, floodplains, wellhead protection zones, significant ground water recharge areas, and similar sensitive areas. It often allows for non-intensive uses such as some types of agriculture or recreation fields that preserve the water quality functions of the land (e.g., floodplains that filter water pollutants). Critical area zoning can be a powerful tool to protect highly vulnerable portions of the source water protection area.

Buffer and Setback Zones. Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that

transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.

**Impact Fees.** Impact fees allow for the collection of money from new development applicants based on a formula that calculates the impacts on the natural resources and local infrastructure caused by the new development. The fee structure is typically established in a local ordinance codified within the zoning ordinance. The local government can apply the assessed fees to offset the impacts on water quality by, for instance, installing storm water infrastructure or acquiring critical land in the source water protection area. This regulatory protection tool may require state enabling legislation that authorizes local governments to enact and assess impact fees.

**Development Agreements.** Development agreements are binding legal contracts, usually between a landowner/developer and the local government, that specify how the parties believe the development project should be accomplished. The parties to the agreement negotiate permit conditions in exchange for public benefits such as protection of source water resources. This tool may be most useful in large, lengthy developments in which it is beneficial for all concerned that stable and predictable development will occur. Nine states have chosen to establish criteria for the use of development agreements in state enabling legislation. On a less formalized basis, local governments frequently negotiate ad hoc agreements with developers, which identify development restrictions, public benefits, or amenities as conditions for permit approval.

### **Subdivision Regulations**

**Regulated Activities by Subdivision Requirements.** In addition to identifying water supply and wastewater management options, traditional subdivision regulations often specify the following requirements.

- Site design, engineering, and construction requirements establish standards for streets, curbs, gutters, and other drainage structures and for the use of impervious surfaces to protect water resources on- and off-site.
- On-site wastewater and erosion and sedimentation control requirements can be stipulated in subdivision requirements.
- Dedicated area requirements for ground water recharge or public amenities such as open space and parkland may also be established in subdivision requirements.

**Subdivision Requirements for Source Water Protection.** As with the alternatives to zoning tools, subdivision regulations are being adopted to protect natural resources. Many local governments are adopting subdivision ordinances to allow flexible

development designs that are based on the natural features of the site, enabling the developer to protect stream corridors, wetlands, and other sensitive areas.

### **Building Codes**

**Impervious Surface Limitations.** Impervious surface building codes control the proportion of a building site that can be covered in nonporous roads, roofs, parking lots, driveways, sidewalks, and other pavements without capturing and/or treating the runoff. This code limits the generation of runoff and the pollutants it carries at the source, while allowing development of any type and intensity to occur.

**Porous Pavement.** Porous pavement codes require the use of specific materials such as permeable asphalt, concrete, and crushed stone or gravel; open-celled pavers such as concrete or plastic grids with voids that are filled with topsoil and seeded or filled with porous aggregate; grass; paving stones; and wood mulch. These materials can be used for street pavements, driveways, parking lots, sidewalks, bike and footpaths, pedestrian plazas, and courts where appropriate to increase the capture, infiltration, and treatment of runoff through the underlying soil

**Excavation, Grading and Seeding.** Excavation, grading, and seeding codes can also affect the amount and quality of surface runoff that leaves a site during and after construction. Due the fact that grading can significantly alter the hydrologic responsiveness of a site, the limitation of the grading can serve to decrease the impact of development as well as preserve natural covers such as natural wooded areas.

**Phased Development.** Phased development codes can be adopted to affect the timing of land-disturbing activities on a building site. This protection measure requires that construction be completed to a stage where exposed land is stabilized before another section of the site is placed under construction. By minimizing the amount of exposed land to that under active construction, runoff can be diminished and controlled by vegetative cover.

### **BMPs**

**Grass Swales.** Grass or vegetated drainage swales are open and non-erosive conveyance systems that replace gutters, drainage pipes, and paved channels to carry, treat, and facilitate infiltration of runoff from storm events or snowmelt. While runoff passes through the grass swales, the pollutants it carries have a chance to be removed by the vegetation?

**Infiltration Basins.** Infiltration basins are a system of shallow ponds connected by grass or vegetated drainage swales. The gradient of the swales and the elevation of the ponds are constructed to control the runoff flow velocity to permit continuous ponding along the length of the infiltration system. However, the ponding is intended to be for a temporary duration of about 24 hours so that runoff is absorbed into the soil along the length of the system. Because the infiltration system is designed to be non-erosive, to treat runoff contaminants, and to absorb the water, the swales and basins are effective at protecting source water from runoff?



Runoff Ponds / Wetlands. Runoff ponds and constructed wetlands are larger and deeper than shallow infiltration basins. They can act as a pretreatment system that allows the settling and filtration of runoff. These systems are particularly useful in controlling peak flows during large, rare storm events. In addition, they are also useful if the topography does not permit the vegetated swale and shallow ponding system. If the low velocity of the infiltration system cannot be met, numerous check dams of earth, wood, or stone can help slow runoff to storm water ponds and constructed wetlands and improve treatment performance.

### **Pollution Prevention**

Source Reduction. Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

### **Health Regulations**

Local Design Standards. Health regulations often establish design standards for potential contamination sources and require on-site inspection of construction and operation activities to ensure that they do not threaten water resources. Activities that are often subject to such requirements include: underground storage tanks, wells, septic tanks, and other on-site sewage disposal systems. In addition, ground water monitoring may be required for developments that include these activities or that involve the handling, storage, or generation of hazardous materials.

Sewage System Permits. Sewage discharge permits often provide siting and design criteria and maintenance and monitoring requirements for small sewage treatment

systems. Regulations may also prohibit the use of on-site sewage management systems in cases where existing contaminant concentrations, such as nitrogen, pose a health risk.

**Septic Tank Regulations.** Septic tank regulations usually establish design and construction standards, require on-site inspection and percolation tests (to determine the absorption capacity of the soil at the site), establish density limitations on the number of septic tanks in an area, and set distance requirements between septic systems and wells and property lines. Local health regulations may also require that older septic systems be upgraded and that all systems be pumped regularly, such as every five years.

#### **Stormwater Management**

**Storm water collection infrastructure** and treatment facilities may be required by the new Phase II NPDES permits. Depending on the degree of urbanization within a watershed, at least one watershed government may need to install, operate, and maintain storm drainage infrastructure and facilities. It only makes sense to consider runoff inputs from the entire watershed when designing these facilities.

**Consistency in local government** land use measures, erosion and sedimentation ordinances, and enforcement efforts throughout the watershed will be critical in order to succeed in watershed- wide source water protection. As most ordinances attempt to achieve similar results, consistency between local government ordinances may be a larger concern for the legal counsel than for the public or elected officials.

#### **Emergency Response Plan**

**Short Term Planning.** The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
- Should you shut down the intake or well?
- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

**Long Term Planning.** In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## SEWER LINES

### CAUSE FOR CONCERN

Leaking sewer lines can potentially contribute Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses.

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

26) EPA Potential Contaminants Source Index (by contaminant and by source):

<http://www.epa.gov/safewater/swp/intro4.html>

27) EPA Potential Contaminant Source Inventory Tools:

<http://www.epa.gov/safewater/protect/feddata/inventory.html>

### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Health Regulations

Well Closures

Sewage Discharge and Management

#### Stormwater Management

Intergovernmental Coordination and Consistency

Stormwater Infiltration Facilities

#### Emergency Response Plan

#### Restoration

Remediation

### **Health Regulations**

Well Closures. Protective well closure requirements may be adopted to ensure that abandoned wells do not become a potential source of ground water contamination.

Sewage System Permits. Sewage discharge permits often provide siting and design criteria and maintenance and monitoring requirements for small sewage treatment systems. Regulations may also prohibit the use of on-site sewage management systems in cases where existing contaminant concentrations, such as nitrogen, pose a health risk.

Septic Tank Regulations. Septic tank regulations usually establish design and construction standards, require on-site inspection and percolation tests (to determine the absorption capacity of the soil at the site), establish density limitations on the number of

septic tanks in an area, and set distance requirements between septic systems and wells and property lines. Local health regulations may also require that older septic systems be upgraded and that all systems be pumped regularly, such as every five years.

#### **Stormwater Management**

Storm water collection infrastructure and treatment facilities may be required by the new Phase II NPDES permits. Depending on the degree of urbanization within a watershed, at least one watershed government may need to install, operate, and maintain storm drainage infrastructure and facilities. It only makes sense to consider runoff inputs from the entire watershed when designing these facilities.

Consistency in local government land use measures, erosion and sedimentation ordinances, and enforcement efforts throughout the watershed will be critical in order to succeed in watershed-wide source water protection. As most ordinances attempt to achieve similar results, consistency between local government ordinances may be a larger concern for the legal counsel than for the public or elected officials.

#### **Emergency Response Plan**

Short Term Planning. The emergency response plan should answer the “what if” type of questions that enable a water system to react thoughtfully to an emergency situation before it becomes a crisis. For example, the plan should outline responses to a series of questions related to emergency situations, such as, “What if a spill or leak caused a pool of contamination in close proximity to the water intake?” The following questions serve as a guide to developing proper emergency responses to that situation.

- Is the surface water intake or ground water well threatened?
- Is there an emergency response mechanism in place sufficient to contain the spill?
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- Can you provide an alternative and safe supply of water for a short period of time until the threat has passed?
- Do you have the funding to pay for water via a tank truck for a short period of time?
- Is providing an alternative source of water an option?

Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

#### **Restoration**

Re-siting and Remediation: Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside

critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with resiting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

## AIRPORTS

### CAUSE FOR CONCERN

Airport maintenance and fueling areas can potentially contribute Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, cis 1,2- Dichloroethylene, Dichloromethane or Methylene Chloride, Ethylbenzene, Lead, Mercury, Selenium, Tetrachloroethylene or Perchloroethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Xylene (Mixed Isomers).

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

- 1 EPA Potential Contaminants Source Index (by contaminant and by source):  
<http://www.epa.gov/safewater/swp/intro4.html>
- 2 EPA Potential Contaminant Source Inventory Tools:  
<http://www.epa.gov/safewater/protect/feddata/inventory.html>

### Local Tools to Help Address Potential Threats

#### Health Regulations

Contaminant Bans and Use Controls

#### Zoning

Critical Area Zoning

Overlay Districts

Floodplain Management

Siting of Highway and Road Locations

Buffers and Setbacks

#### Subdivision Regulations

Site Design

Sediment and Erosion Control

BMPs

Grass Swales

Infiltration Basin

Runoff Ponds and Wetlands

Building Codes

Excavation, Grading and Seeding

Stormwater Management

Intergovernmental Coordination and Agreements

Infiltration Facilities

Emergency Response Planning

**Health Regulations**

Contaminant Ban and Use Control Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- 1) restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
- 2) establish requirements for handling toxic and hazardous materials within source water protection areas to reduce the risk of spill-related contamination of water supplies.

**Zoning**

The zoning ordinance is the basic legal instrument traditionally used by local governments to address land use matters. A zoning ordinance divides land into districts, allowing compatible land uses to exist in each district but separating incompatible uses from each other. It consists of a map showing the various districts that permit residential, commercial, industrial, agricultural, and other uses. The ordinance also includes a written portion that establishes the conditions under which land may be developed and used for particular purposes, such as the allowable size and height of structures, building density, setback requirements, and other conditions for each district. These conditions often include restrictions on the siting of specific facilities or activities that are potential sources of contamination. Potential contaminate sources that may merit siting restrictions include landfills; wastewater treatment plants; business concerns that store, use, or process hazardous material or contaminants of concern; and large concentrated animal feeding operations.

Overlay Districts. Overlay districts establish areas where additional zoning restrictions apply that are superimposed on top of the underlying type of zoning. Land uses in overlay districts must then conform to the restrictions set for both zones. This approach can be used to identify and set additional protective measures for water supply watersheds, wellhead protection areas, floodplains, wetlands, and significant ground water recharge areas.

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Buffer and Setback Zones. Buffer and setback zones, a specific type of critical area zoning, designate linear or circular areas of land along the edge of a stream, river, or reservoir upstream of a community water supply intake. They are important protection mechanisms since land use restrictions in the zones can reduce the adverse impacts of surface water runoff on drinking water sources. Buffers and setbacks provide water quality protection by filtering the over ground sheet flow of rain or snowmelt that transports contaminants from land to water supplies and provides greater opportunity for it to soak into the soil. Buffers and setbacks can also provide other functions, such as minimizing flooding, preserving wildlife habitat and corridors, maintaining stream bank integrity, protecting aquatic habitat, and providing recreation areas. The most effective buffers and setbacks are naturally vegetated and undisturbed strips of land 50 to 400 feet in width. Exact determination of the width is flexible, based on such factors as topography and slope, classification of the stream or water body, current and future land uses in the watershed, costs, and political realities.



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- On-site wastewater and erosion and sedimentation control requirements can be stipulated in subdivision requirements.
- Dedicated area requirements for ground water recharge or public amenities such as open space and parkland may also be established in subdivision requirements.

Subdivision Requirements for Source Water Protection. As with the alternatives to zoning tools, subdivision regulations are being adopted to protect natural resources. Many local governments are adopting subdivision ordinances to allow flexible development designs that are based on the natural features of the site, enabling the developer to protect stream corridors, wetlands, and other sensitive areas.

### **BMPs**

Grass Swales. Grass or vegetated drainage swales are open and non-erosive conveyance systems that replace gutters, drainage pipes, and paved channels to carry, treat, and facilitate infiltration of runoff from storm events or snowmelt. While runoff passes through the grass swales, the pollutants it carries have a chance to be removed by the vegetation?

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Runoff Ponds / Wetlands. Runoff ponds and constructed wetlands are larger and deeper than shallow infiltration basins. They can act as a pretreatment system that allows the settling and filtration of runoff. These systems are particularly useful in controlling peak flows during large, rare storm events. In addition, they are also useful if the topography does not permit the vegetated swale and shallow ponding system. If the low velocity of the infiltration system cannot be met, numerous check dams of earth, wood, or stone can

help slow runoff to storm water ponds and constructed wetlands and improve treatment performance.

#### **Building Codes**

Excavation, Grading and Seeding. Excavation, grading, and seeding codes can also affect the amount and quality of surface runoff that leaves a site during and after construction. Due the fact that grading can significantly alter the hydrologic responsiveness of a site, the limitation of the grading can serve to decrease the impact of development as well as preserve natural covers such as natural wooded areas.

#### **Stormwater Management**

Storm water collection infrastructure and treatment facilities may be required by the new Phase II NPDES permits. Depending on the degree of urbanization within a watershed, at least one watershed government may need to install, operate, and maintain storm drainage infrastructure and facilities. It only makes sense to consider runoff inputs from the entire watershed when designing these facilities.

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- Do you have the funding to pay for water via a tank truck for a short period of time?
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Long Term Planning. In addition to planning for short-term emergencies, the emergency response plan should develop options to long-term or permanent contamination of the water supply source and disruption to the water supply service. In this case, where could a long-term alternative water supply source be located?

## MAJOR HIGHWAYS & RAILROADS

### CAUSE FOR CONCERN

Railroad yards with maintenance and fueling areas can potentially contribute Atrazine, Barium, Benzene, Cadmium, Dalapon, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Mercury, Tetrachloroethylene or Perchloroethylene (Perc), Trichloroethylene (TCE).

### ON-LINE TOOLS TO HELP IDENTIFY POTENTIAL THREATS

The location of potential contamination sources should be identified during the source water assessment process. However, communities may want to determine more specific source water threat information. The following tools can be utilized in addition to the section herein on Potential Source Water Threats:

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## LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

### Health Regulations

Contaminant Bans and Use Controls

### Zoning

Critical Area Zoning

Overlay Districts

Floodplain Management

Siting of Highway and Road Locations

Buffers and Setbacks

### Subdivision Regulations

Site Design

Sediment and Erosion Control

#### BMPs

Grass Swales

Infiltration Basin

Runoff Ponds and Wetlands

#### Building Codes

Excavation, Grading and Seeding

#### Stormwater Management

Intergovernmental Coordination and Agreements

Infiltration Facilities

#### Emergency Response Planning

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Contaminant Ban and Use Control Because the national standards for drinking water were established under the Safe Drinking Water Act, the role of local health organizations in establishing contaminant-specific requirements was greatly reduced. However, local health organizations have considerable leeway in addressing local health-related issues. If the local health officials determine that a threat to human health exists, they can take action. It is possible that contaminants for which an MCL has not been established could affect the local water supply. In such cases, the local government may adopt regulations specific to this source. For instance, if permitted by state law, health regulations could:

- 28) restrict the use of certain potential contamination sources in source water protection areas (e.g., storage tanks, stock piles, septic tank cleaners); and/or
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## **TRANSPORTATION CORRIDORS**

### **CAUSE FOR CONCERN**

The use of transportation corridors can facilitate source water contamination.

Transportation corridors include both the paved, impervious surfaces used for roadways and also any green space or rights-of-way around the roadways. Transportation activities and hazardous and non-hazardous material spills can disturb the land, rights-of-way, and roadways allowing runoff to carry sediments, nutrients, and various chemicals to surface water bodies. Additionally, herbicides and fertilizers are commonly used on rights-of-way and green spaces along transportation corridors. These herbicides and fertilizers can be washed away by runoff or infiltrate into the ground and contaminate either surface or groundwaters with chemicals and nutrients.

Transportation corridors (roads and railroads) can potentially contribute Dalapon, Picloram, Simazine, Sodium, Sodium Chloride, Turbidity

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Contaminant Bans and Use Controls

#### **Zoning**

Critical Area Zoning

Overlay Districts

Floodplain Management

Siting of Highway and Road Locations



Buffers and Setbacks

Subdivision Regulations

Site Design

Sediment and Erosion Control

BMPs

Grass Swales

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## DUMPS

### CAUSE FOR CONCERN

Dumps or landfills can be source of a wide variety of chemical and other potential contaminants, for both surface and groundwater. (See additional information under the Landfills section).

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### LOCAL TOOLS TO HELP ADDRESS POTENTIAL THREATS

#### Zoning

Siting

Buffers and Setbacks

#### Solid Waste Ordinance

#### BMPs

Grass Swales

Runoff Ponds and Wetlands

#### Pollution Prevention

Source Reduction

Management

Education

#### Restoration

Re-siting

Remediation

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#### **Pollution Prevention**

**Source Reduction.** Source reduction is the most effective pollution prevention measure because potential contaminants are either not used or used at a reduced level. The threat of contamination, therefore, is reduced. Examples of source reduction activities include education programs to help homeowners reduce the application of fertilizers and

pesticides, the modification of industrial practices to use less or reuse toxic materials, and integrated pesticide management programs used on golf courses and agricultural fields.

Management of Contaminates. Management of contaminants and polluting behaviors may include protocols and practices for wastewater treatment plants, septic systems, and storm water control; standards for storing hazardous substances, petroleum products, pesticides, and fertilizers; or programs to cap or plug abandoned wells.

Education. Education can stress pollution prevention as a part of source reduction, management, and disposal efforts. Education measures may involve a public information campaign focusing on storm drains, maintaining shoreline and stream-side vegetative buffers, appropriate use of fertilizers and pesticides, boat and lawn mower engine maintenance, and household hazardous materials handling and disposal. Education may be coupled with technical assistance focused on developing the technical, financial, and managerial capacity of the community water system to comply with drinking water standards. Such an approach includes training for water system operators under a certification program.

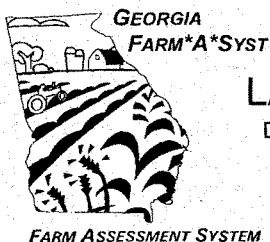
#### **Restoration**

Re-siting and Remediation: Regardless of the strategy, the first step in restoration is to stop the impact of the activity or condition that impairs or threatens to contaminate the source water quality. This may involve rehabilitation of sites through clean ups. Restoration may require the re-siting or moving of certain facilities or operations because the characteristics of the contaminants that are used or stored there simply pose too great a risk. While perhaps not the easiest option, re-siting some facilities or land uses outside critical areas in the source water protection area may be the cheapest and best option for protecting the water source. Although land acquisition costs may be associated with re-siting, the long-term cost of instituting the highly technical and engineered solutions involved in the active restoration approaches may make reclaiming a drinking water source infeasible.

**Other**

(Insert a description of any other source of potential pollution for this category)





## LAYER PRODUCTION

Dr. Larry Vest, Associate Professor,  
Poultry Science Department

*Cooperative Extension Service, The University of Georgia, College of Agricultural and Environmental Sciences, Athens*

### PRE-ASSESSMENT:

#### Why Should I Be Concerned?

Nutrients leaching from improperly handled layer manure or mortalities can contaminate ground water. Poorly managed lagoons and egg washing operations can also contaminate surface and ground water. Proper use of the nutrients in layer manure is to apply fresh manure from 1000 layers to 6 acres of cropland in two applications each year under normal cropping conditions. Exceeding that amount may result in nitrates leaching to ground water.

The manner in which manure is stored and land applied can make a big difference in its value as a fertilizer. Unprotected manure and dead bird carcasses improperly handled can pollute farm water sources and pose a health threat to humans and animals.

#### How Does This Assessment Help Protect Drinking Water and the Environment?

- This assessment allows you to evaluate the environmental soundness of your farm and operational practices relating to your layer management practices.
- You are encouraged to complete the entire document.
- The assessment evaluation uses your answers (rankings) to identify practices or structures at risk and should be modified to prevent pollution.
- The layer production facts give an overview of sound environmental practices that can be used to prevent pollution caused directly by well condition or location.
- You are encouraged to develop an action plan based on your needs as identified by the assessment. The layer production facts, reference and publication list provide alternatives to current practices as well as structural modifications to prevent pollution on your farm.
- If the birds on the farm are under contract involve the contracting company in this farm assessment. The contracting company may have recommendations on dead bird carcasses disposal and litter clean out which may be pertinent to this process.
- Farm\*A\*Syst is a voluntary program.
- The assessment should be conducted by you for your use. If needed, a professional from the Georgia Cooperative Extension Service or one of the other partnership organizations can provide assistance in completing the assessment or action plan.
- No information from this assessment needs to leave your farm.

*\*Words found in italics are defined in the glossary.*

**ASSESSMENT:****Assessing Your Layer Management Practices**

For each category listed on the left, read across to the right and circle the statement that best describes conditions on your farm. If a category does not apply, for example: if it asks about lagoon water and you don't have a lagoon, then skip the question. Once you have decided on the most appropriate answer, look above the description to find your rank number (4,3,2 or 1) and enter that number in the "RANK" column. The entire assessment should take less than 30 minutes. A glossary is on page 9 to clarify words found in italics throughout this assessment.

<b>LAYER PRODUCTION PRACTICES</b>					
	<b>LOW RISK (rank 4)</b>	<b>LOW-MOD RISK (rank 3)</b>	<b>MOD-HIGH RISK (rank 2)</b>	<b>HIGH RISK (rank 1)</b>	<b>RANK</b>
<b>STORAGE AND HANDLING OF LAYER OPERATIONS MANURE, DEAD BIRD CARCASSES, AND EGG WASH WATER</b>					
<b>Manure storage</b>	Manure stored under a roof on an impervious surface. (Slurry stored in a non-leaking pit). Manure is protected from rainwater. Surface water is diverted around the manure.	Manure temporarily stored on an impervious surface without a roof. At least 100 feet down slope from the well.	Manure routinely stored at least 100 feet down slope from a well but is exposed to either rain water or surface water.	Manure is stored less than 100 feet from the well and is exposed to either rainwater or surface water.	
<b>Lagoon water</b> <i>Lagoon water is usually contained in a closed system.</i>	Lagoon lined or on non-porous soil, located according to a site specific plan.	Lagoon lined or on non-porous soil at least 100 feet down slope from the well.	Unlined lagoon (soil type undefined) at least 100 feet down slope from the well.	Unlined lagoon (soil type undefined) less than 100 feet down slope from the well.	
<b>Egg wash water spray fields</b> <i>Egg wash water is managed by adding to manure, adding to lagoon water or treated in permitted spray fields, on a site-by-site basis.</i>	Spray field located at least 200 feet down slope from the well. Appropriate water treatment and adequate land capacity.	Spray field located at least 200 feet down slope from the well. Appropriate water treatment but less than adequate land capacity is available.	Spray field located at least 200 feet down slope from the well. Water is not treated and less than adequate land capacity is available.	Spray field located less than 200 feet down slope from the well. Water is not treated and less than adequate land capacity is available.	
<b>Mortalities (dead bird) disposal</b>	All dead birds are collected and treated in a well designed and functioning composter.	Dead birds are disposed of by an approved, non-compost method according to guidelines provided by the Georgia Department of Agriculture and Consumer Services.	Dead birds are disposed of in pits. Ground water may move in and out of the pit during rainy periods.	Dead birds are disposed of by a non-approved method.**	

**\*\* These conditions are in violation of state and/or federal law.**

LAYER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>Application rates</b>	Manure and <i>compost</i> are applied to fields at rates that meet crop nutrient requirements based on a <i>nutrient management plan</i> (NMP).	Manure and <i>compost</i> are applied to cropped fields at rates that do <u>not</u> exceed 3 tons/acre/ application, and do not exceed 6 tons/ acre/year. Soils in application areas are tested.	Manure and <i>compost</i> are applied to cropped fields at rates that do <u>not</u> exceed 3 tons/acre/ application, and do not exceed 6 tons/acre/ year. Soils in the application areas are not tested.	Manure and <i>compost</i> are applied to cropped lands at rates that exceed 3 tons/acre/application, or exceed 6 tons/acre/year; or these materials are applied to uncropped lands at any rate.	
<b>Soil testing of manure and compost application sites</b>	Yearly	Every 2 years.	Every 3 years.	Less frequently than every 3 years.	
<b>Nutrient (N, P, K) budgeting</b>	Based on waste analysis, soil test, and crop <i>nutrient</i> utilization information or done according to <i>nutrient management plan</i> (NMP).	Soil test used. No waste analysis. <i>Nutrient</i> value based on published estimates.	No waste analysis or soil test. <i>Nutrient</i> value based on published estimates alone.	No waste analysis or soil test or effort toward <i>nutrient</i> accounting.	
<b>Record keeping</b>	Complete records kept on farm applications and <i>nutrients</i> leaving farm through sales or giving away.	Partial records kept on farm applications and <i>nutrients</i> leaving farm through sales or giving away.	Partial records kept on farm applications but no records on <i>nutrients</i> leaving farm.	No records kept.	
<b>Application timing</b>	According to accurate <i>nutrient</i> accounting or NMP. Never apply in wet conditions.	Based on when crop is at growth stage that usually needs fertilizing. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses and compost is available. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses and compost is available. Often applied when soil is wet.	
<b>Application areas</b>	All areas are more than 25 feet from rock out-crops, 100 feet from surface water sources, wells, dwellings, or sinkholes and have slopes of 15% or less. Or all areas are approved by a NMP.	Most areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings, or sinkholes and have slopes of 15% or less. Or most areas are approved by a NMP.	Several areas are less than 25 feet from rock outcrops, or less than 100 feet from surface water sources, wells, dwellings, or sinkholes, or have slopes greater than 15%.	Manure nearly always spread over areas that are less than 25 feet from rock outcrops, or less than 100 feet from surface water sources, wells, dwellings, or sinkholes, or that have slopes greater than 15%.	

\*\* These conditions are in violation of state and/or federal law.

LAYER MANAGEMENT PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>Calibration</b>	<i>Nutrient</i> application equipment calibrated to proper application rate before each application and checked at least once during the application period. Uniform application over the area is assured.	<i>Nutrient</i> equipment calibrated before each application but not rechecked during the application period. No effort to assure uniform <i>nutrient</i> application over the area.	Use custom <i>nutrient</i> hauler and applicator and assume equipment is calibrated, or calibrate equipment only once a year.	Never calibrate <i>nutrient</i> application equipment or ask custom applicator about calibration procedure.	
AREAS AROUND POULTRY HOUSES					
<b>Drainage and areas around layer houses</b>	All areas without vehicle traffic have more than 90% vegetative cover. High traffic areas are paved or graveled. No visible soil erosion or surface drainage problems.	More than 50% of the area has established vegetative cover. Traffic areas are graveled. Few erosion or drainage problems.	Less than 50% of the area has established vegetative cover. Erosion and drainage problems are evident in traffic areas.	Area around layer house has less than 25% vegetative cover. Erosion gullies are evident in many areas.	

**\*\* These conditions are in violation of state and/or federal law.**

**Number of Areas Ranked** \_\_\_\_\_  
(Number of questions answered. There are a total of 12 questions.)

**Ranking Total** \_\_\_\_\_  
(Sum of all numbers in the "Rank" Column)

**NOTES:**

**ASSESSMENT EVALUATION:****What Do I Do with These Rankings?****STEP 1: Identify Areas That Have Been Determined to be at Risk**

Low risk practices (4s) are ideal and should be your goal. Low to moderate risk practices (3s) provide reasonable protection. Moderate to high risk practices (2s) provide inadequate protection in many circumstances. High risk practices (1s) are inadequate and pose a high risk for causing environmental, health, economic, or regulatory problems.

High risk practices, rankings of "1" require immediate attention. Some may only require little effort to correct, while others could be major time commitments or costly to modify. These may require planning or prioritizing before you take action. All activities identified as "high risk" or "1s" should be listed in the recommended action plan. Rankings of "2s" should be examined in greater detail to determine the exact level of risk and attention given accordingly.

**STEP 2: Determine Your Layer Risk Ranking**

The Layer Risk Ranking provides a general idea of how your layer management practices might be affecting your ground and surface water or contaminating your soil.

Use the rankings total and the total number of areas ranked on page 4 to determine the Layer Risk Ranking.

$$\text{RANKINGS TOTAL} \div \text{TOTAL NUMBER OF AREAS RANKED} = \text{LAYER RISK RANKING}$$

$$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

**LAYER RISK RANKING .....LEVEL OF RISK**

3.6 to 4 .....	Low Risk
2.6 to 3.5 .....	Low to Moderate Risk
1.6 to 2.5 .....	Moderate Risk
1.0 to 1.5 .....	High Risk

This ranking gives you an idea of how your layer production practices might be affecting soil, surface and ground water. This ranking should serve only as a very general guide, and not as a precise diagnosis since it represents the average of many individual rankings.

**STEP 3: Read the Information/Fact Section on Improving Your Layer Production Practices**

While reading, think how you could modify your practices to address some of your moderate and high risk areas. If you have any questions that are not addressed in the layer management practices facts portion of this assessment, consult the references on page 14 or contact your county Extension agent for more information.

**STEP 4: Transfer Information to the Total Farm Assessment**

If you are completing this assessment as part of a "Total Farm Assessment," also transfer your layer risk ranking and your identified high risk practices to the overall farm assessment.

**LAYER MANAGEMENT FACTS:**

Reducing the Risk of Pollution by Managing Manure, Mortalities, Lagoon and Egg Water from Layer Operations

Poultry manure, compost from *mortalities* (dead birds), and lagoon and egg wash water are *nutrient-rich*. Most of these materials benefit the farm if adequately collected, stored and applied to land. However, improper storage/management or treatment of dead bird carcasses and manure, and improper land application can threaten farm water sources.

**Manure Management for Layers Consists of Three Major Regimes:**

- Fresh manure either scraped or slurried with water and then spread.
- Manure allowed to build up under high-rise poultry houses and periodically cleaned out (the house serves as a storage facility).
- Self-contained lagoon systems where manure is flushed into the lagoon from which sludge is occasionally removed and land spread. If handled properly (in those operations that regularly spread manure), maximum fertilizer value can be maintained while reducing the risk of water contamination.

A *nutrient management plan* (NMP) effectively uses layer waste in an environmentally safe manner. Any situation where the waste is not effectively managed gives rise to potential pollution from animal waste. Layer waste can be a source of fecal bacteria. Nitrogen in layer manures can also be converted into nitrate-nitrogen. Runoff of phosphorus can cause excessive aquatic growth in surface water.

A sound *nutrient management plan* begins with the kind and number of animals in the farm operation and every aspect of waste handling. It includes how the waste will be gathered and stored and how large the storage facilities need to be. It

also specifies areas to be used for manure application, crops to be grown, the area of land needed to utilize available nutrients and the method and timing of application.

For more information and assistance in developing your *nutrient management plan*, contact your local Natural Resources Conservation Service, agricultural consultant or county extension office.

**STORAGE AND HANDLING OF LAYER OPERATIONS MANURE, DEAD BIRD CARCASSES AND EGG WASH WATER**

**Manure Storage and Composter Facilities**

Those operations in which manure builds up are cleaned one to two times per year. The house serve as the storage structure. Likewise, for those operations with lagoon management, the lagoon is a self-contained system that does not allow *nutrients* to leave. Layer houses where fresh manure is handled require regular clean-out and manure movement several times per week. Those systems usually have a loading and/or storage area at the end of the house into which manure and/or slurry are loaded and/or stored.

Manure should be stored under a roof. Slurry should be collected and stored in a non-leaking pit. Lagoons should be constructed according to a site-specific plan, but should generally be lined and/or located on nonporous soil. If done on-farm, *composting* dead bird carcasses can occur on the ground level of high-rise houses. If not, *composting* dead bird carcasses should be done in a roofed structure with a concrete floor to protect *compost nutrients* from getting into ground water. Cost sharing may be available through state and federal agencies.

### Composition of Manure, Composted Dead Bird Carcasses, Lagoon and Egg Wash Water

Replacement pullet operations, egg-type breeder facilities and nearly all egg operations manage birds in cages or on wire floors. In these operations, manure accumulates without added litter or bedding. In Georgia, an average laying hen produces an estimated .375 pounds of manure (75% moisture) per day. The average range of nitrogen - N, phosphorus and potassium in fresh manure, composted dead bird carcasses, lagoon and egg wash water appear in Table 1. Other nutrients, i.e. calcium and zinc, may be determined by analysis.

**Table 1: Average Nutrient Values in Layer Waste**

%	Manure & Composted Birds	Lagoon Water	Egg Wash Water
Nitrogen	1.5	0.15	0.25
Phosphorus	1.0	Trace	Trace
Potassium	0.5	Trace	Trace

### Egg Wash Water

Egg wash water may be held in storage tanks or actually mixed with manure and moved out with the manure for land spreading. Spray fields for egg wash water may be permitted on a site-by-site evaluation basis.

### Mortalities Disposal

The Georgia Department of Agriculture (GDA), which regulates the disposal of dead animal carcasses, currently approves the following disposal methods:

- *Composting*
- In-ground pits
- Incineration
- Burial/Landfill
- Digestion/Fermentation
- Rendering

All disposal methods require permits from the Georgia Department of Agriculture (GDA), 404-656-3671. Some disposal methods require a special application form.

*Composting* of poultry carcasses has proven to be an effective. There are several different versions of composters available.

All must:

- Be practically odorless.
- Operate at a temperature high enough to destroy pathogenic bacteria (>125° F).
- Provide for complete *decomposition* of carcasses (only feathers and bones remaining).
- Be adequately protected from flies so that larvae are not a problem.
- Protect the *compost* area from vermin.

Some Georgia farmers use a storage and treatment shed that has primary and secondary *composting* bins and ample room for temporary storage of broiler litter. These facilities allow ready access to the storage and *compost* bins. Materials can be added or removed as often as necessary for their effective treatment and land application.

## LAND APPLICATION

### Poultry Litter Application

At this writing, there are no state regulations governing the land application of poultry litter. Some counties have regulations. Contact your county Extension office to see if such regulations exist. A farm *nutrient management plan (NMP)* should be developed with Natural Resources Conservation Service (NRCS) or your county Extension office assistance.

The *nutrient management* plan should identify the locations, acreage, and types of crops or pasture to which any wastes are to be applied. An owner may have plenty of land for application of animal wastes, but some of it may be located a great distance from the poultry houses. The practice of spreading animal manures only on the nearest fields can result in excessive *nutrient* loading rates to the soil and possibly cause water quality problems.

### Dead Bird Compost Application

Application rates, calibration and timing, and record keeping should be handled manure. The Georgia Cooperative Extension Service, NRCS county offices and GDA can provide information on *composting* as well as other disposal methods.

### Application Rates

The best application rate depends on the crop being produced, the soil's *nutrient* content and the *nutrient* content of the applied material. Soil testing and manure *nutrient* analyses are recommended for determining poultry manure application amounts. Calibrate application equipment for accuracy and even distribution.

Evenly distribute poultry manure and *compost* at a rate not to exceed 6 tons per acre per year, or according to a site-specific land management plan, with no more than 3 tons/acre in each application.

Vehicles hauling non-liquid manure should be covered or tarped for transporting poultry manure on state or federally maintained roads or any public road for more than one mile. Slurry must not drip or spill out of spray tubes or loading spouts.

Your county Extension office can provide more information on soil testing, manure analyses, equipment calibration, record keeping and other areas related to land application.

### Soil Testing of Waste Application Sites

Stored or slurried manure or *compost* residue materials from dead bird carcasses can be sampled and tested to determine their nitrogen, phosphorus and potassium content. These *nutrient* values combined with manure or compost and applied per acre allow the determine the amount of commercial fertilizer required for crop production.

### Record Keeping

Growers who use waste materials as fertilizer or a soil amendment should maintain records of the analytical results, application rates, and soil test for each application site. Record keeping is a vital part of animal waste management. Recommendations for the land application of poultry litter should be based on actual laboratory analysis form a sample of your litter or manure.

An amount of record keeping is needed to keep up with the management of the waste application system. The record keeping forms provided in this publication will help you document site specific data. These forms will allow you to easily track your waste applications and provide you with an easy resource to ensure that you do not exceed waste applications in any fields.

Keeping accurate records, along with the implementation of proper management procedures evidence that you are managing your animal waste at a low risk to the environment and that your practices will not cause a negative environmental impact. Assistance with record keeping can be obtained



from your local county Extension agent, USDA-Natural Resource Conservation Service (NRCS) or an agricultural consultant.

**The following items should be recorded and maintained for a period of five years at the individual farm.**

- Waste application locations and rates.
- Map of farm fields including waste application fields and acreage.
- Nutrient Management Plan
- Waste sample analysis
- Annual soil analysis for each field receiving waste applications.

**It may be beneficial for you to maintain the additional records for verification of the conditions on your farm.**

- Daily farm rainfall records
- Plant analysis
- Animal Population
- Crop yields
- Surface water and ground water quality records.

Forms are included after the Action Plan that can be used to maintain these records.

#### **Application Timing**

Do not apply poultry manure and *compost* to land when it is saturated, during rainy weather or when rain is in the immediate forecast.

#### **Application Areas**

Do not apply poultry manure to land surface and subsurface within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies and dwellings. Apply according to a site-specific land management plan.

#### **Calibrating**

Calibration of waste application equipment, such as irrigation systems, tank wagons and manure spreaders is needed to ensure proper distribution of waste materials. Equipment should be calibrated and rechecked at least once during the application period since the consistency of manure can vary greatly. For more information about calibration of waste-spreading equipment, contact your county Extension office.

### **ENVIRONMENTAL CONTROL AND YARDS**

#### **Air Quality**

Air quality affects the health and well being of animals and their caretakers. Odor concerns are drawing increased attention as the urban/suburban areas expand into traditional agricultural areas. Measures to reduce or minimize odors in broiler houses include maintaining a low moisture content and chemical treatment of litter. Soil injection or incorporation of manure into the soil reduces odor problems associated with land application. Odor suppressants, counteractants, masking agents and numerous chemicals have also been used in animal production to reduce odors.

**GLOSSARY:**  
**Layer Management**

**Compost:** Organic residues that have been collected and allowed to *decompose*.

**Composting:** A controlled process of decomposing organic matter by microorganisms.

**Cost Sharing:** A program in which Consolidated Farm Service Agency (formerly the Agricultural Stabilization and Conservation Service) pays a percentage of the costs of a project, facility or effort.

**Decompose:** The breakdown of organic materials.

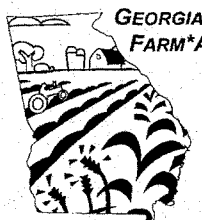
**Leaching:** The removal of soluble substances from soils or other material by water.

**Mobile:** Has the ability to move or be moved.

**Mortality:** Birds that died during production.

**Nutrient:** Usually referring to those elements necessary for plant growth  
– *nitrogen (N), phosphorus (P) and potassium (K)*.

**Nutrient Management Plan:** A specific plan designed to manage animal manures and *mortalities* so that the most benefit is obtained and the environment is protected.



GEORGIA  
FARM\*A\*SYST

## BROILER PRODUCTION

Dr. Mike Lacy, Associate Professor,  
Dr. Larry Vest, Associate Professor,  
Poultry Science Department

FARM ASSESSMENT SYSTEM

*Cooperative Extension Service, The University of Georgia, College of Agricultural and Environmental Sciences, Athens*

### PRE-ASSESSMENT:

#### Why Should I Be Concerned?

Farmers are concerned about soil and water quality and want to ensure that their land is protected for future generations. Broilers are Georgia's largest single agricultural commodity and some of the nutrients in broiler litter, carcasses and dead bird compost may impact ground water. To maintain soil and water quality, it is essential to properly utilize waste materials.

On the average, manure from a typical broiler house should be applied to no less than 35 to 40 acres of crop or pasture land in two applications per year. Exceeding that amount can increase the risk of nitrates affecting the ground water. The manner in which litter is stored and applied to land can make a difference in the litter's value as a fertilizer and whether farm water sources are threatened or not.

#### How Does This Assessment Help Protect Drinking Water and the Environment?

- This assessment allows you to evaluate the environmental soundness of your farm and operational practices relating to your broiler production practices.
  - The assessment uses your answers (rankings) to identify practices at risk that may need to be modified to prevent pollution.
  - The broiler production facts provide an overview of sound environmental practices that may be used to prevent pollution caused directly by broiler production practices.
  - You are encouraged to develop an action plan based on your needs as identified by the assessment.
  - Farm\*A\*Syst is a voluntary program.
  - It is recommended that you involve your broiler company in this farm assessment.
- Your company has recommendations on dead bird disposal and litter clean out pertinent to this process.
- Do not make any management changes based on this assessment that may affect your birds without consulting your flock supervisor.
  - You are encouraged to work through the entire document and use all eight areas when completing the assessment.
  - The assessment should be conducted by you for your use. If needed, a professional from the Georgia Cooperative Extension Service or one of the other partnership organizations can provide assistance in completing the assessment.
  - No information from this assessment needs to leave your farm.

*\*Words found in italics are defined in the glossary.*

**ASSESSMENT:**

## Assessing Your Broiler Production Practices

For each category listed on the left, read across to the right and circle the statement that best describes conditions on your farm. If a category does not apply, for example: if you always spread litter immediately after cleaning out and thus never store litter on your farm, then skip the question. Once you have decided on the most appropriate answer look above that description to find your rank number (4,3,2 or 1) and enter that number under the "RANK" column. The entire assessment should take less than 30 minutes. A glossary on page 11 clarifies terms found in italics throughout this assessment.

BROILER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>LITTER STORAGE AND DEAD BIRD CARCASS DISPOSAL</b>					
<b>Litter storage</b>	Litter is stored in a non-leaking <i>stacking shed</i> with a concrete floor.	Litter is temporarily stacked on a restrictive surface (concrete, 6-mil plastic, clay etc.) never within 100 feet of a well or surface water. Stacks are protected from rain-water by a 6-mil plastic cover. Surface water is diverted around the stacks.	Litter is routinely stacked at least 100 feet from a well, but is less than 100 feet from surface water and is exposed to rain.	Litter is stacked less than 100 feet from a well and surface water and is exposed to rain.	
<b>Dead Bird Carcasses disposal (mortalities)</b>	All dead bird carcasses are collected and treated in a well designed and functioning composter.  <i>See Dead Bird Carcasses Composting Assessment</i>	Dead bird carcasses are disposed of by an approved method other than composting according to guidelines provided by the Georgia Department of Agriculture.	Dead bird carcasses are disposed of in burial pits. Ground water may move in and out of the pit during rainy periods	<i>Dead bird carcasses are disposed of by a non-approved method.**</i>	
<b>LAND APPLICATION OF LITTER OR COMPOST</b>					
<b>Application rates</b>	Litter and <i>compost</i> applied to fields at rates that meet crop <i>nutrient</i> requirements based on a <i>nutrient management plan</i> (NMP). Litter and soils are tested.	Litter and <i>compost</i> applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in application areas tested.	Litter and <i>compost</i> applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in the application areas are not tested.	Litter and <i>compost</i> applied to cropped lands at rates that exceed 2.5 tons/acre/application, or exceed 5 tons/acre/year or materials applied to uncropped lands at any rate.	

**\*\* These conditions are in violation of state and/or federal law.**

BROILER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
Soil testing of litter and compost application sites	Yearly	Every 2 years.	Every 3 years.	Less frequently than every 3 years.	
Nutrient (N, P, K) budgeting	Based on waste analysis, soil test, and crop <i>nutrient</i> utilization information or done according to NMP.	Soil test used. No waste analysis. <i>Nutrient</i> value based on published estimates.	No waste analysis or soil test. <i>Nutrient</i> value based on published estimates alone.	No waste analysis or soil test or effort toward <i>nutrient</i> accounting.	
Record keeping	Complete records kept on farm applications and <i>nutrients</i> leaving farm through sales or giveaways.	Partial records kept on farm applications and <i>nutrients</i> leaving farm through sales or giveaways.	Partial records kept on farm applications but no records on <i>nutrients</i> leaving farm.	No records kept.	
Application timing	According to accurate <i>nutrient</i> accounting or NMP. Never applied in wet conditions.	Based on when crop is at growth stage that usually needs fertilizing. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses and compost is available. Try to avoid applying in wet conditions.	Based on convenience. When litter cleaned out of houses and compost is available. Often applied when soil is wet.	
Application areas	All areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings or sinkholes and have slopes of 15% or less. Or all areas are approved by NMP.	Most areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings or sinkholes and have slopes of 15% or less. Or most areas are approved by a NMP.	Litter is occasionally spread over areas that are less than 25 feet from rock outcrops or less than 100 feet from surface water sources, wells, dwellings or sinkholes, or have slopes greater than 15%.	Litter is routinely spread over areas that are less than 25 feet from rock outcrops or less than 100 feet from surface water sources, wells, dwellings, or sinkholes, or that have slopes greater than 15%.	
Calibration	<i>Nutrient</i> application equipment calibrated to proper application rate before each application and checked at least once during the application period. Uniform application over the area is assured.	<i>Nutrient</i> equipment calibrated before each application but not rechecked during the application period. No effort to assure uniform <i>nutrient</i> application over the area.	Use custom <i>nutrient</i> hauler and applicator and assume equipment is calibrated, or calibrate equipment only once a year.	Never calibrate <i>nutrient</i> application equipment or ask custom applicator about calibration procedure.	

BROILER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
AREAS AROUND POULTRY HOUSES					
Drainage and areas around broiler houses	All areas without vehicle traffic have more than 90% vegetative cover. High traffic areas are paved or graveled. No visible soil erosion or surface drainage problems.	More than 50% of the area has established vegetative cover. Traffic areas are graveled. Few erosion or drainage problems.	Less than 50% of the area has established vegetative cover. Erosion and drainage problems are evident in traffic areas.	Area around broiler house has less than 25% vegetative cover. Erosion gullies are evident in many areas.	

Number of Areas Ranked \_\_\_\_\_  
(Number of questions answered. There are a total of 10 questions.)

Ranking Total \_\_\_\_\_  
(Sum of all numbers in the "Rank" Column)

**NOTES:**

**ASSESSMENT EVALUATION:**

What Do I Do with These Rankings?

**STEP 1: Identify Areas That Have Been Determined to be at Risk**

Low risk practices (4s) are ideal and should be your goal. Low to moderate risk practices (3s) provide reasonable protection. Moderate to high risk practices (2s) provide inadequate protection in many circumstances. High risk practices (1s) are inadequate and pose a high risk for causing environmental, health, economic, or regulatory problems.

**High risk practices, rankings of "1" require immediate attention.** Some may only require little effort to correct, while others could be major time commitments or costly to modify. These may require planning or prioritizing before you take action. All activities identified as "high risk" or "1s" should be listed in the recommended action plan. Rankings of "2s" should be examined in greater detail to determine the exact level of risk and attention given accordingly.

**STEP 2: Determine Your Broiler Risk Ranking**

The Broiler Risk Ranking provides a general idea of how your broiler production practices might be affecting your ground and surface water or contaminating your soil.

Use the rankings total and the total number of areas ranked on page 4 to determine the Broiler Risk Ranking.

RANKINGS TOTAL ÷ TOTAL NUMBER OF AREAS RANKED = BROILER RISK RANKING

\_\_\_\_\_ ÷ \_\_\_\_\_ = \_\_\_\_\_

**BROILER RISK RANKING .....LEVEL OF RISK**

3.6 to 4 . . . . .	Low Risk
2.6 to 3.5 . . . . .	Low to Moderate Risk
1.6 to 2.5 . . . . .	Moderate Risk
1.0 to 1.5 . . . . .	High Risk

This ranking gives you an idea of how your broiler production practices might be affecting soil, surface and ground water. This ranking should serve only as a very general guide and not as a precise diagnosis since it represents the average of many individual rankings.

**STEP 3: Read the Information/Fact Section on Improving Your Broiler Production Practices**

While reading, think how you could modify your practices to address some of your moderate and high risk areas. If you have any questions that are not addressed in the broiler production practices facts portion of this assessment, consult the references on page 13 or contact your county Extension agent for more information.

**STEP 4: Transfer Information to the Total Farm Assessment**

If you are completing this assessment as part of a "Total Farm Assessment," also transfer your average broiler risk ranking and your identified high risk practices to the overall farm assessment.

**BROILER PRODUCTION FACTS:**

Reducing the Risk of Pollution by Improving Broiler Litter Management

Broiler litter and compost from *mortalities* (dead bird carcasses) are *nutrient-rich* and can benefit the farm if they are protected adequately and land applied correctly following storage or treatment. However, storage, disposal or application of these *nutrient-rich* materials can be a threat to farm water sources if not done properly.

Litter storage and land application are important management concerns for poultry producers. Sound management maximizes fertilizer value and reduces the risk of water contamination. Stored litter and *compost* residue materials should be sampled and tested to determine their nitrogen, phosphorus and potassium content.

Several dead bird disposal options are available. Specific requirements and guidelines for these disposal methods can be obtained from your broiler company or the Georgia Department of Agriculture (GDA), call 404-656-3671.

A *nutrient management plan* (NMP) assists you in effectively using broiler waste in an environmentally safe manner. Any situation where waste is not effectively managed gives rise to potential pollution problems. Broiler waste can be a source of fecal bacteria. Nitrogen in broiler manures can also be converted into nitrate-nitrogen. Runoff of phosphorus can cause excessive aquatic growth in surface water.

A sound *nutrient management plan* begins with the kind and number of animals in the farm operation and includes every aspect of waste handling. It includes how the waste will be gathered and stored and how large the storage facilities need to be. It also specifies areas to be used for manure application, crops to be grown, the area of land needed to utilize available *nutrients* and the method and timing of application.

For more information and assistance in developing your *nutrient management plan*, contact your local Natural Resources Conservation Service, agricultural consultant or county Extension office.

**LITTER STORAGE AND DISPOSAL OF DEAD BIRD CARCASSES****Poultry Litter Composition**

Nearly all broiler, pullet and breeder operations manage birds on earthen floors. Place a 2-6 inch base of wood shavings, peanut hulls or other bedding on the earthen floor before the birds arrive. Remove manure and bedding mixture, commonly called litter, and replace periodically. Most broiler operations produce 1.2 to 1.7 tons of litter per 1,000 birds. For a flock of 18,000 to 20,000 birds, this amounts to between 22 and 34 tons of litter per flock. The total nitrogen content of fresh poultry litter is usually 3 percent or more by weight on a moist-weight basis (20 to 30 percent water). Nitrogen contained in fresh litter can be fairly *mobile* and may be subject to *leaching* if not stored and applied properly.

**Litter Storage**

Not all nitrogen from a temporary litter stack would be expected to leach from exposure to rain, but surface or ground water contamination from an unprotected litter stack is possible. Stacking unprotected litter in fields, particularly during periods of wet weather, is not recommended.

If you cannot avoid temporary field storage, then protect the litter. Stack the litter on some type of restrictive surface, such as concrete, plastic, a compacted clay or other materials that limit *leaching*. The stack should be covered with 6-mil plastic that is securely anchored against the wind. An upslope surface water diversion (ditch, dike, grassed waterway, etc.) should be provided to keep runoff water from reaching the stack. Locate the stack at least 100 feet from any water source and downslope if possible. Any downslope surface water source with-



in 100 feet of the stack should be protected by a grass filter area between the source and the stack.

A *stacking shed*, a roofed structure with a concrete floor, is the safest and most effective way to temporarily store litter. Large quantities of litter can be stored and kept dry in stacking sheds, allowing easy handling and distribution.

*Cost sharing* for *stacking sheds* may be available from the Consolidated Farm Service Agency (CFSA, formerly the Agricultural Stabilization and Conservation Service). These funds are for farms that have an approved *nutrient management plan*. These plans are developed through the NRCS and include application acreage, crop *nutrient* requirements, litter application rates and application times. These factors are considered together with the size of the operation to arrive at the storage volume requirement and other design considerations for a planned stacking-shed. The stacking-shed design must be approved by the NRCS before CFSA acceptance.

### Mortalities Disposal

The Georgia Department of Agriculture (GDA), which regulates the disposal of dead animal carcasses, currently approves the following disposal methods:

- *Composting*
- In-ground pits
- Incineration
- Rendering

All disposal methods require permits from the Georgia Department of Agriculture (GDA), 404-656-3671. Some disposal methods require a special application form.

*Composting* of poultry carcasses has proven to be an effective on-farm disposal method. There are several different designs for composters available. All must:

- Be practically odorless.
- Operate at a temperature high enough to destroy pathogenic bacteria (>125° F).
- Provide for complete *decomposition* of carcasses (only feathers and bones remaining).
- Be adequately protected from flies so that larvae are not a problem.
- Protect the *compost* area from vermin.

Some Georgia farmers use a storage and treatment shed that has primary and secondary *composting* bins and ample room for temporary storage of broiler litter. These facilities allow ready access to the storage and *compost* bins. Materials can be added or removed as often as necessary for their effective treatment and land application.

### LAND APPLICATION

#### Poultry Litter Application

At this writing, there are no state of Georgia regulations governing the land application of poultry litter. Some counties, however, have regulations. Contact your county Extension office to determine if such regulations exist. A farm *nutrient management plan* should be developed with Natural Resources Conservation Service (NRCS) or your county Extension office assistance.

The *nutrient management plan* (NMP) should identify the locations, acreage, and types of crops or pasture to which any wastes are to be applied. An owner may have plenty of land to apply animal wastes, but some of it may be located a great distance from the poultry houses. Spreading animal manures only on the nearest fields can result in excessive *nutrient* loading rates to the soil and possibly cause water quality problems.

### Dead Bird Compost Application

Application rates, calibration, timing and record keeping should be handled in the same manner as manure. The Georgia Cooperative Extension Service, NRCS county offices and GDA can provide information on *composting* as well as other disposal methods.

### Application Rates

The best application rate depends on the crop being produced, the soil's *nutrient* content and the *nutrient* content of the applied material. Soil testing and litter nutrient analysis are recommended for best determining litter application amounts. Application equipment should be calibrated for accurate and even distribution.

Poultry litter should be evenly distributed over application sites at a rate not to exceed 5 tons per acre per year, with no more than 2.5 tons per/acre in each application or according to a site-specific nutrient management plan. As a rule of thumb annual litter production from one standard 20,000 square foot house (40 X 500) feet should be spread over no less than 35-40 acres.

Vehicles must be covered or tarped prior to transporting poultry litter on state or federally maintained roads or any public road. Your county Extension office can provide more information on soil testing, litter analysis, equipment calibration, record keeping and other areas related to poultry litter land application.

### Soil Testing of Waste Application Sites

Stored manure or *compost* residue materials from dead bird carcasses can be sampled and tested to determine their nitrogen, phosphorus and potassium content. These *nutrient* values combined with amount of manure or compost produced and applied per acre help determine whether more commercial fertilizer should be added for desired crop production.

### Record Keeping

Growers who use waste materials as fertilize or as a soil amendment should maintain records of the analytical results, application rates, and soil test for each application site. Record keeping is a vital part of animal waste management. Recommendations for the land application of poultry litter should be based on actual laboratory analysis from a sample of your litter or manure.

Record keeping is necessary to document your management of the waste application system. The record keeping forms provided in this publication will help you collect site specific data. These forms will allow you to easily track your waste applications and provide you with an easy resource to ensure that you do not exceed proper waste application rates in any fields.

Keeping accurate records, along with the implementation of proper management procedures provide evidence that you are managing your animal waste at a low risk to the environment and that your practices will not cause a negative environmental impact. Assistance with record keeping can be obtained from your local county Extension agent, USDA-Natural Resource Conservation Service (NRCS) or an agricultural consultant.

**The following items should be recorded and maintained for a period of five years on each individual farm.**

- Waste application locations and rates.
- Map of farm fields including waste application fields and acreage.
- Nutrient Management Plan.
- Waste sample analysis.
- Annual soil analysis for each field receiving waste applications.

**It may be beneficial for you to maintain these additional records for verification of the conditions on your farm.**

- Daily farm rainfall records.
- Plant analysis.
- Animal population.
- Crop yields.
- Surface water and ground water quality records.

Forms are included with this publication that can be used to maintain these records.

### **Application Timing**

Surface land application of poultry manure and *compost* should not be undertaken when soil is saturated, during rainy weather or when rain is in the immediate forecast.

### **Application Areas**

Consider unique features of the farm and make your management plan specific for these features. Do not apply poultry litter to the surface and subsurface of your land within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies and dwellings. Grass, vegetative and/or forest buffer strips along stream, pond or lake banks help prevent *nutrient* runoff from adjacent fields and pastures.

*Nutrients* should not be applied on slopes with a grade of more than 15 percent or in any manner that allows *nutrients* to enter the waters of the state.

### **Calibrating**

Calibration of waste application equipment, such as irrigation systems, tank wagons and manure spreaders, is needed to ensure safe and efficient distribution of waste materials. Equipment should be calibrated and rechecked at least once during the

application period since the consistency of the manure can vary greatly. For more information about calibration of waste-spreading equipment, contact your county Extension office.

## **ENVIRONMENTAL CONTROL**

### **Air Quality**

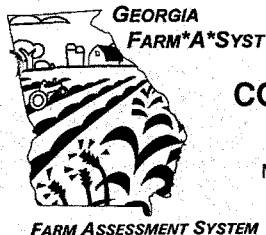
Air quality affects the health and well being of animals and their caretakers. Odor concerns are drawing increasing attention as the urban/suburban areas expand into traditional agricultural areas.

Management measures to reduce or minimize odors in broiler houses include maintaining a low moisture content in litter and chemical treatment of litter. Soil injection or incorporation of manure reduces odor problems associated with land application. Odor suppressants, counteractants, masking agents and numerous chemicals have also been used to reduce odors.

### **ABANDONED SITES**

Under certain circumstances abandoned chicken houses or old earthen chicken house foundations can be threats to the environment and farm water sources. Any abandoned structure should be completely emptied and the litter properly land applied or stored.

In the case of earthen floor facilities where floor soil is high in *nutrients*, remove soil to a depth of 1 foot and spread with the litter. The remaining hole should be filled and leveled. Litter packs remaining from moved or demolished poultry houses should also be removed and properly land applied or stored. The soil area under the litter pack should be cored and tested for nitrogen, phosphorus, potassium, sodium chlorides, nitrates and sulfates. If any of these compounds and elements are high, you should contact your county Extension agent or NRCS for guidance in dealing with the soil.



## COMPOSTING POULTRY MORTALITIES

Frank Henning & William Segars, Crop & Soil Sciences  
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Cooperative Extension Service, The University of Georgia, College of Agricultural and Environmental Sciences, Athens

### PRE-ASSESSMENT:

#### Why Should I Be Concerned?

Farmers are concerned with soil and water quality. With a rapidly expanding poultry industry and equally rapid urban growth, it is becoming more difficult for farmers to safely dispose of poultry *mortalities*\*.

An acceptable system for the disposal of dead birds is essential to any well run poultry operation. Current practices include incineration, burial pits, land filling, digestion/fermentation, rendering and *composting*. *Composting* of dead birds is a more recent disposal alternative that is environmentally sound. This process converts dead birds into a humus-like material that can be spread on land for crop utilization and/or soil improvement. This relatively inexpensive method of dead bird disposal is rapidly gaining acceptance in the poultry industry.

#### Assessment Objective

Unlike the other Farm\*A\*Syst assessments that focus on farmer stewardship and the environmental soundness of facilities and management practices, this assessment focuses on your *composting* facilities and procedures to ensure that the process prevents health risk or soil and water contamination. This assessment should be used in conjunction with the Broiler or Layer Production Farm\*A\*Syst assessments that address other environmental concerns pertaining to your operation.

#### How Does This Assessment Improve the Composting Facility On My Farm?

- This assessment is designed to ensure that your *composting* facilities, tools and techniques are part of a sound waste management plan.
- If you are a contract farmer, it is recommended that you involve your integrator in this farm assessment. Your company has recommendations on carcass disposal and *litter* clean-out pertinent to this process.
- Do not make any management changes based on this assessment that may affect your animals without consulting your integrator.
- You are encouraged to complete the entire document.
- The assessment should be conducted by you for your use. If needed, a professional from the Georgia Cooperative Extension Service or one of the other partnership organizations can provide assistance in completing the assessment.
- You are encouraged to develop an action plan.
- Farm\*A\*Syst is a voluntary program.
- No information from this assessment needs to leave your farm.

\*Words found in *italics* are defined in the glossary.

## ASSESSMENT:

### Assessing Your Poultry Mortality Composting Practices

For each category listed on the left, read across to the right and circle the statement that best describes conditions on your farm. If a category does not apply, for example: if you always spread *litter* immediately after cleaning out and thus never store *litter* on your farm, skip the question. Once you have decided on the most appropriate answer, look above that description to find your rank number (4,3,2 or 1) and enter that number under the "RANK" column. The entire assessment should take less than 30 minutes. A glossary is on page 14 to clarify words found in *italics* throughout this assessment.

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>PERMITTING FOR POULTRY MORTALITY COMPOSTING FACILITIES</b>					
Permitting for composting facilities	Producer has a permit from the state veterinarian that accurately describes <i>composting</i> procedures and type of facility being used.	Producer has a permit, but facilities and/or procedures have changed slightly since permit was issued.	Producer has a permit, but facilities and/or procedures have changed significantly since permit was issued.	Producer does not have a <i>composting</i> permit from the state veterinarian.	
<b>SIZING COMPOSTER</b>					
This applies if composting is your <u>only</u> means of dead bird disposal. If another method is used to dispose of dead birds, this amount could vary.					
Compost bin capacity  (See page 7 for capacity)	Capacity of both primary and secondary composters meet or exceed peak disposal requirements.	Composters can handle 75% of peak disposal requirements.	Composters can handle 50% of peak disposal requirements.	Composters cannot handle 50% of peak disposal requirements.	
<b>COMPOST FACILITY DESIGN AND CONSTRUCTION</b>					
Roof and floor design	<i>Compost</i> bins have a roof with an overhang to prevent rain from reaching <i>compost</i> and an <i>impervious</i> floor.	<i>Compost</i> bins have a roof without sufficient overhang to prevent rain from reaching <i>compost</i> and an <i>impervious</i> floor.	<i>Compost</i> bins have some covering but do not have an <i>impervious</i> floor.	<i>Compost</i> bins are not covered and sit directly on the ground.	
Fire Safety	<i>Compost</i> facility has fire protection equipment on site and water access to water.	Producer has access to nearby fire protection equipment.	Producer has a water supply on site but no plans for fire protection.	Producer has no plans for fire protection, equipment or access to water.	

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>COMPOSTER OPERATION</b>					
<b>Employee training in dead bird composting methods</b>	All employees associated with <i>composting</i> are thoroughly trained in dead bird <i>composting</i> procedures.	Employees who regularly compost are thoroughly trained in dead bird <i>composting</i> procedures.	Employees associated with <i>composting</i> receive limited training on dead bird <i>composting</i> .	Employees associated with <i>composting</i> receive no training on dead bird <i>composting</i> .	
<b>Composting procedures</b>	Are outlined in an easy-to-follow recipe, available to all composters, which describes amount, order, placement and treatment of all ingredients being composted.	Recipe is used, but does not contain all needed information.	Operator has a quality recipe for <i>compost</i> , but recipe is seldom used.	Operator either does not have a <i>compost</i> recipe or never uses a recipe for <i>composting</i> .	
<b>Microorganisms responsible for composting are supplied by</b>	A double layer of fresh active (warm) <i>litter/litter cake</i> with 40-60% moisture, reactivated <i>litter</i> or active <i>compost</i> .	A double layer of <i>dry litter/dry litter cake</i> , or less than a double layer of active <i>litter/litter cake</i> .	Less than a double layer of <i>dry litter</i> or <i>dry litter cake</i> used as starter.	No starter used.	
<b>Carcass placement</b>	Carcasses are never placed closer than 6 inches from side-walls or top of bins.	Carcasses are never placed closer than 6 inches from bin sidewalls, but are sometimes left uncapped overnight.	Carcasses are sometimes placed within 6 inches of bin side walls.	No attempt is made to keep carcasses away from top or sides of bins.	
<b>Filling birds</b>	Birds are covered daily with at least a double layer of <i>litter cake</i> or 1.5 parts by weight of <i>litter</i> for each volume/weight of birds. When full, bins are capped off with a double layer of <i>litter</i> .	Birds are sometimes left uncovered overnight.	Less than two volumes of <i>litter cake</i> are added for each volume of birds or less than 1.5 parts by weight of <i>litter</i> per bird weight.	When <i>compost</i> bin is filled to a height of 4 to 4½ feet, <i>compost</i> is either left uncapped, or is capped with less than a double layer of <i>litter</i> .	
<b>How is the moisture content of <i>compost</i> determined?</b>	Moisture meter.	Estimated by hand.	Estimated visually.	No attempt made to monitor or adjust moisture.	

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>Compost temperature and measurement</b>	Probe type thermometer is used daily to measure and plot temperature 8-10 inches into the center of <i>compost</i> pile. Temperature rises to 130-150°F within 2-4 days after the bin is capped off.	Temperature is measured daily but takes a week or more to reach 130-150°F.	Temperature is measured, but not daily, and never reaches 140°F.	Temperature is not measured or never reaches 130°F or sometimes exceeds 160°F.	
<b>When <i>compost</i> is turned</b>	<i>Compost</i> in the first bin has undergone at least 7-10 days of <i>composting</i> after being capped off, and the temperature has peaked (130-150°F) and begun to fall.	Temperature in the first bin has peaked and begun to fall, but <i>compost</i> is turned less than 7 days after <i>compost</i> was capped off.	Temperature in the first bin has not peaked and begun to fall.	Producer either has only one primary bin, and therefore has no way to dispose of birds once this bin is capped off, or producer does not measure temperature.	
<b>Compost stack height</b>	Compost (primary or secondary) never stacked higher than 5 feet.			Height of either primary or secondary <i>compost</i> sometimes exceeds 5 feet.	
<b>Aerating <i>compost</i></b>	In a timely manner, <i>compost</i> is cascaded using loader bucket or otherwise reaerated while being loaded into secondary bin.	<i>Compost</i> is moved to secondary bins, in a timely manner, but no attempt is made to reaerate <i>compost</i> .	<i>Compost</i> is moved, and reaerated, but only after odors and fly breeding are obvious.	<i>Compost</i> is never moved from primary to secondary bin(s).	
<b>Presence of flies, vermin or foul odors associated with <i>composting</i> activities</b>	Never	Occasionally	Usually	Always	
COMPOST DISPOSAL/LAND APPLICATION					
<b>Soil testing of <i>compost</i> application site</b>	Yearly	Every 2 years.	Every 3-5 years.	Less frequently than every 5 years.	
<b>Phosphorus level of soil <i>compost</i> application site</b>	Low	Medium	High	Very High	

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
<b>Application rates</b>	Compost applied to fields at rates that meet crop <i>nutrient</i> requirements based on a <i>nutrient management plan</i> (NMP). Litter and soils are tested.	Compost applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in application areas tested.	Compost applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in the application areas are not tested.	Compost applied to cropped lands at rates that exceed 2.5 tons/acre/application, or exceed 5 tons/acre/year or materials applied to uncropped lands at any rate.	
<b>Application timing</b>	According to accurate <i>nutrient</i> accounting or NMP. Never applied in wet conditions.	Based on when crop is at growth stage that usually needs fertilizing. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses, and <i>compost</i> are available. Try to avoid applying in wet conditions.	Based on convenience. When <i>litter</i> cleaned out of houses and <i>compost</i> are available. Often applied when soil is wet.	
<b>Application areas</b>	All areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings or sinkholes and have slopes of 15% or less. Or all areas are approved by an NMP.	Most areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings or sinkholes and have slopes of 15% or less. Or most areas are approved by an NMP.	<i>Litter</i> is occasionally spread over areas that are less than 25 feet from rock outcrops or less than 100 feet from surface water sources, wells, dwellings or sinkholes or have slopes greater than 15%.	<i>Litter</i> is routinely spread over areas that are less than 25 feet from rock outcrops or less than 100 feet from surface water sources, wells, dwellings, or sinkholes or that have slopes greater than 15%.	
<b>Record keeping</b>	Complete records kept on farm applications and <i>nutrients</i> leaving farm through sales or giveaways.	Partial records kept on farm applications and <i>nutrients</i> leaving farm through sales or giveaways.	Partial records kept on farm applications but no records on <i>nutrients</i> leaving farm.	No records kept.	
<b>Calibration</b>	<i>Nutrient</i> application equipment calibrated to proper application rate before each application. Uniform application over the area is assured.	<i>Nutrient</i> equipment calibrated annually. No effort to assure uniform <i>nutrient</i> application over the area.	Use custom <i>nutrient</i> hauler and applicator that does not calibrate equipment, or calibrates equipment less than once a year.	Never calibrate <i>nutrient</i> application equipment or ask custom applicator about calibration procedure.	

Number of Areas Ranked \_\_\_\_\_  
 (Number of questions answered. There are a total of 22 questions.)

Ranking Total \_\_\_\_\_  
 (Sum of all numbers in the "Rank" Column)



**ASSESSMENT EVALUATION:****What Do I Do with These Rankings?****STEP 1: Identify Areas Determined to Be at Risk**

Low risk practices (4s) are the best composting practices and should be your goal. Low to moderate risk practices (3s) provide reasonable management practices. Moderate to high risk practices (2s) often provide inadequate protection in a specific area. High risk practices (1s) are inadequate and are the least desired composting practices. High risk may indicate potential risk in disease transmission, fire hazards and/or threats to water resources.

High risk practices, rankings of "1" require immediate attention. Some may only require little effort to correct, while others could be major time commitments or costly to modify. These may require planning or prioritizing before you take action. List all activities identified as "high risk" or "1s" in the recommended action plan. Rankings of "2s" should be examined in greater detail to determine the exact level of risk and attention needed or "level of risk" and give attention accordingly.

**STEP 2: Determine Your Composting Risk Ranking**

The Composting Risk Ranking evaluates your composting practices for safe environmentally sound disposal of dead birds. It ranks a producer's composting facilities, tools and techniques and identifies areas that may be a risk to a sound waste management plan.

Use the rankings total and the total number of areas ranked on page 5 for your *Composting Risk Ranking*.

<b>RANKINGS TOTAL</b>	<b>÷</b>	<b>TOTAL NUMBER OF AREAS RANKED</b>	<b>=</b>	<b>COMPOSTING RISK RANKING</b>
_____	÷	_____	=	_____

**COMPOSTING RISK RANKING . . . . .LEVEL OF RISK**

3.6 to 4 . . . . .	Low Risk
2.6 to 3.5 . . . . .	Low to Moderate Risk
1.6 to 2.5 . . . . .	Moderate Risk
1.0 to 1.5 . . . . .	High Risk

This ranking gives you an idea of how your *compost* practices might be affecting disease transmission, fire hazards and threats to water resources, as well as the soundness of your waste management plan. This ranking should serve only as a very general guide, and not as a precise diagnosis since it represents the average of many individual rankings.

**STEP 3: Read the Composting Facts Portion of this Assessment**

While reading, think about how you could modify your practices to address some of your moderate and high risk areas. If you have any questions that are not addressed in the composting facts section of this assessment, consult the references in the back of this publication or contact your county extension agent for more information. **This assessment should be used in conjunction with the Broiler or Layer Production Farm\*Assessment.**

### COMPOSTING FACTS:

*Composting* is a natural, biological process by which organic material is broken down and *decomposed* because of the bacteria and fungi that digest the organic material and reduce it to a stable humus. The principles of *composting* are quite simple: just provide the microorganisms with an environment conducive to their growth—a balanced diet, water and oxygen.

**In order for composting to be successful as a method of dead bird disposal, the following must take place:**

- All birds must be decomposed beyond recognition.
- Risk from disease transmission must be eliminated.
- Fire hazards must be minimized.
- Any threats to water resources must be prevented.

### Permitting for Poultry Mortality Composting Facilities

All methods for the disposal of dead animal carcasses require permits from the Georgia Department of Agriculture (GDA). Growers must submit a written request to the state veterinarian at the following address:

**Georgia Department of Agriculture  
Animal Industry**  
19 M.L. King Jr. Drive  
Room 106  
Atlanta, GA 30334  
404-656-3671

The letter requesting the permit should state the name that the producer wants to appear on the certificate of compliance and describe the *composting* procedures and the type of facility to be used. It must also include the producer's pit number, if he or she has one. If this is a new farm, this should be stated at the time of request.

If the producer plans to have a *composting* facility inside the poultry house, approval from the poultry contracting company is required. A form is avail-

able from the Georgia Poultry Federation.

Interested growers should first contact their local Natural Resources Conservation Service (NRCS) to obtain information on *composting* and *compost* facilities.

*Composting* procedures (or recipes) developed by the Cooperative Extension Service (CES), NRCS, Farm Service Agency (FSA), or the Resource Conservation Development Council (RC&D) must be used.

### COMPOSTER CAPACITY

In order to meet peak disposal requirements, *compost* facilities must be properly sized.

#### Primary Bin Capacity:

The total minimum volume of the primary bins of composters can be calculated from the expression below:

$$V = B \times (M/T) \times W_b \times 2.5$$

- **V** is the total minimum volume in the primary bin in cubic feet
- **B** is the total number of birds on the farm
- **T** is the days of flock life
- **W<sub>b</sub>** is the average market weight of the birds in pounds
- **M** is the percent mortality expressed as a decimal (example 5% = 0.05)
- The factor of 2.5 in this equation represents 2.5 cubic feet of composter volume required per pound of dead birds.

#### Secondary Bin Capacity:

The total volume of the secondary bins should be the same as the primary composter capacity.

### COMPOST FACILITY DESIGN AND CONSTRUCTION

#### Roof Design

Some materials are composted outside. However, this is not recommended for dead bird composters. A roof ensures all-weather operation and helps control rain, snow, runoff and percolation which can be major concerns. In order to prevent excessive moisture in *compost*, the roof over *compost* bins must

extend sufficiently to protect the *compost* from blowing rains.

### Floor

An *impervious* (waterproof) floor with a weight bearing foundation (able to withstand the weight and force exerted by farm machinery used in operating the *compost* facility) is recommended to ensure all-weather operation and to secure the composter against rodents, dogs and other nuisances. An *impervious* floor also will help dispel questions about contamination of the groundwater and other surrounding areas. A concrete apron, sloped away from the primary bins is recommended. This provides an all-weather surface for equipment and operation.

### Fire Safety

Temperatures of 140-150°F are often reached in composters within a few days after a bin is capped off with *litter*. Excessive height and compaction increase the chance that the temperature in the composter will exceed 160°F. Temperatures this high are conducive to spontaneous combustion.

One *stacking house* in Georgia and at least one other in Virginia burned from spontaneous combustion. Temperatures should be monitored daily and fire extinguishers and water should be readily available to guard against this hazard. If smoldering begins to occur, compost should be removed immediately.

## COMPOSTER MANAGEMENT AND OPERATION

The requirements for proper and complete *decomposition* of dead carcasses are reasonably simple, but proper management is essential. *Decomposition* of the dead carcasses and *litter* depends upon microbial activity. The greater the microbial growth, the faster the carcasses decompose. Anything that slows down microbial growth lowers the temperature of the *composting* material and slows the *composting* process. The more rapid the microbial growth, the greater the heat output and temperature of the *composting* mass and the more rapidly the mass breaks down.

### Employee Training

All farm workers involved with *composting* poultry mortalities should be trained in *composting* procedures. Workers lacking training should not be involved in *composting* dead birds.

### Recipe for Ingredients That Go Into Compost

The essential elements for the microorganisms involved in *composting* are carbon (C), nitrogen (N), oxygen (O<sub>2</sub>) and moisture (H<sub>2</sub>O). If any of these elements are lacking, or if they are not provided in the proper proportion to one another, the microorganisms will not flourish and will not provide adequate heat.

**Table 1. Original Recipe for Composting Poultry Mortalities**

Material	Parts by Weight (lbs)
Dead Birds	1
Chicken Litter	1.5
Straw (wheat preferred)	0.1
Water	0 - 0.5

**Table 2. Litter Cake Recipe for Composting Poultry Mortalities**

Material	Parts by Volume
Dead Birds	1
Litter Cake	2.0 - 3.0
Water	0 - 0.5

### Procedures for Composting Poultry Mortalities

- Start by placing a double layer (usually 8 to 12 inches) of active *litter* or *litter cake*, with 40 - 60 percent moisture on the composter floor.
- This *litter* will supply bacteria and heat to start the process. This layer will also help in absorbing moisture if excess water is added to the com-

poster. (The base layer should not be placed more than a few days prior to use for *composting* birds or it will cool as bacterial numbers reduce when moisture or oxygen becomes limited.)

- Unless *litter cake* is used which is bulky with much air-holding ability, a thin layer of peanut hulls, coarse shavings or straw is added next.
- A layer of dead bird carcasses is then added. The carcasses should be arranged in a single layer side by side, touching each other. Carcasses should be placed no closer than 6 inches from the walls of the compost. Carcasses placed too near the walls will not compost as rapidly, since the temperature is cooler near the walls.
- A layer of *litter cake* (40 to 60 percent moisture content) twice as thick as the layer of carcasses underneath or litter (1.5 parts by weight) is added next. This layer should be twice as thick as the layer of carcasses underneath.
- If only a partial layer is needed for a day's mortality, the portion should be covered with *litter*. The rest of that layer can be used with subsequent mortality.
- A small amount of water may be needed after each layer. If much water is required, the *litter* is too dry and probably low in live bacteria.
- After completing the initial layer, subsequent layers of either *litter cake* and carcasses or *litter*, bulking ingredient and carcasses follow. Keep adding layers until compost height approaches 4 to 4½ feet.
- Cap off with a double layer of litter, so that the height of compost in the bin does not exceed 5 feet. Excessive height increases the chance that the compost temperature will exceed 160°F which increases the risk of spontaneous combustion.

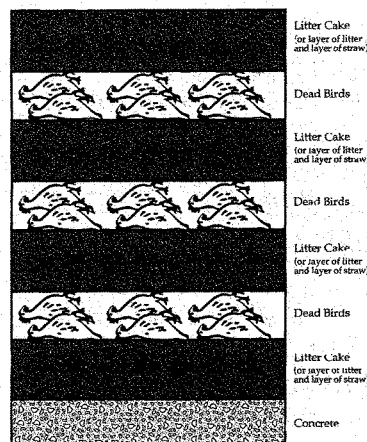


Figure 1. Composter Bin

Table 3. C:N Ratio

Ingredient	C:N Ratio
Birds	5:1
Litter	7:1 to 25:1
Straw	80:1
Peanut hulls	50:1
Shavings	300-700:1

If 2 parts by volume of *litter*, 1 volume of dead birds, and adequate bulking agent is either contained in the *litter*, or added prior to the carcasses, the C:N ratio should be adequate. If moisture and aeration are adequate, materials with lower C:N ratios usually compost at higher temperatures.

### Microorganisms

#### Starter:

The microorganisms responsible for *composting* are initially supplied by active *litter* or *litter cake*. The microbes in the *litter* used in the *composting* process need to be kept alive and in sufficient numbers so that *composting* can begin immediately to break down the carcasses and the *litter*. *Litter* that is

too dry and too long removed from the house will contain very low numbers of microorganisms. Old dry *litter* which contains low numbers of the necessary microorganisms slows the process of carcass *decomposition*.

#### Re-activating Litter:

*Litter* that is too dry or old should be activated before it is used in the composting process. A quantity of *litter* to be used in the next week, can be re-activated by raising the moisture content up to 40-60 percent. Excessive moisture displaces the oxygen, which reduces the heating and causes seepage.

Moisture is critical. If the moisture level is correct, the microorganisms in the pile will again begin multiplying, raising the temperature of the *litter*. When hot (130°-150°F), the *litter* is ready for use in decomposing carcasses.

#### Moisture Content:

Water is essential to the growth of any living organism. *Composting* microorganisms thrive in moist but not soggy conditions. Desirable moisture content in the *composting* materials is between 40 and 60 percent. Excessive moisture displaces the oxygen, which reduces the heating and causes seepage. Too little will prevent microorganisms from reproducing to adequately high numbers.

*Compost* moisture can be accurately measured with a moisture meter. However, moisture content can be estimated by hand. The moisture content of *litter* used for starter or *compost* is about right, if when it is squeezed with the hand, it breaks into two to three large pieces when the hand is opened. If a water can be squeezed from the material, the moisture content is too high.

#### Temperature

*Composting* begins as soon as the loading begins. Depending on the size of the primary cell and the number and size of carcasses, the loading time will vary. With active *litter*, a week's loading time may allow the lower levels to rise to 150°F by the time the cell is capped. A probe type thermometer is used daily to measure and plot temperature 8 to 10 inches into the center of the *compost* pile.

#### Destroying Pathogens:

While three consecutive days at 130°F or more in the composter is adequate to destroy pathogens harmful to man and poultry, *composting* in the primary bin normally occurs over a 10 to 21 day period.

#### Monitoring Temperatures:

Measure and record temperatures in each bin daily to ensure that dead birds have been pasteurized, to minimize the risk of spontaneous combustion and to determine when to turn *compost*.

When oxygen becomes limited, the temperature of the *compost* begins falling. By the time it drops to 130°F (about 7 to 21 days after capping), the *compost* can be moved to a secondary cell. At a temperature of 150°F, the birds decompose about twice as fast as at 130°F. If the temperature of the *compost* reaches only 130°F, birds nearer the walls where it is cooler will decompose very slowly.

#### Bulking Agents:

The *composting* product can be sustained at higher temperatures by using a bulking agent which makes the *compost* pile more porous and thus supplies more oxygen to the *composting* process. A coarse material, such as wood shavings, straw or peanut hulls will ensure more oxygen, allowing higher *composting* temperatures. Also, adding more *litter* or *litter cake* increases heating. If *litter cake* is used, little or no bulking agents are needed.

#### Compaction and Stack Height:

Do not compact *litter* in deep layers and do not stack your *compost* higher than 5 feet. Temperatures of 140-150°F are often reached in composters within a few days after a bin is capped off with *litter*. Excessive height and compaction increase the chance that the temperature in the composter will exceed 160°F. Temperatures this high are conducive to spontaneous combustion.

#### Aeration and Moving Compost to Second Cell

The purpose of moving the product is to remix and aerate it so that a faster, more complete breakdown of the *compost* occurs. Allow material to "case"

cade" from the loader bucket to provide good turning and re-aeration as it is deposited in the secondary treatment area. The movement to a second cell will probably be necessary to get adequate *decomposition* if the birds exceed 4 to 5 pounds or if material is removed from below and added above (see package composters on next page).

The product temperature should again rise to 150°F within days. Delayed movement, poor aeration, poor mixing or moisture above 60 percent or below 40 percent will cause the mass not to heat properly.

Once the temperature (determined by daily monitoring) drops from 150° to 130°F (7 to 21 days), the product is ready to be used as a fertilizer.

### Flies and Odor

Flies and odor are not a problem where composters are operating properly. The heat destroys the habitat for flies and since the process is *aerobic* (in the presence of oxygen) very little odor is produced. Improved management is usually the best solution to odor and fly problems.

### Composter Types and Layouts

Composters presently used for dead birds consist of four types.

- **Package Composters:** These composters are commercially available. The composted by-products fall to the bottom of the composter down to the concrete slab where they are then shoveled by hand back to the top to *compost* new dead birds. A 5-gallon bucket of new *litter* material is normally added to each *composter* each week. A few operators will add a small amount of bulking agent such as peanut hulls or cotton seed hulls to trap oxygen and promote heating.
- **Delmarva (small bin):** The front wall of these bins consists of 2-inch thick boards which are mobile to help with filling and removing the material to be composted. The material in the composters is moved with some type of end loader or skid steer loader. Therefore, the width of the small bin composter must allow the loader bucket to get into the bin. Normally these small

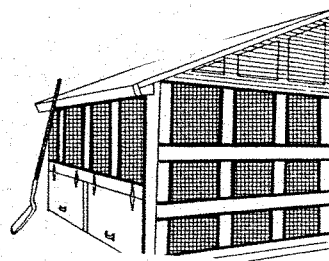


Figure 2. Package Composter

bin composters are 8 to 10 feet wide by 5 feet high and 5 feet deep. The depth is limited to 5 feet due to the reach required to drop the composted material into the secondary bin which is immediately behind the primary or small bin. Moving the material from the primary bin to the secondary bin after 10 to 21 days is common for Delmarva type composters to mix in oxygen in the mass to promote heating. The oxygen is added as the mixture is dropped or moved from the primary bin to the secondary bin.

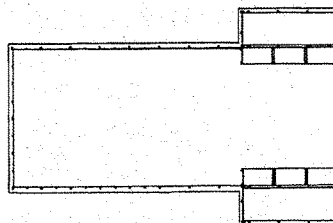


Figure 3. Small Bin Composter—Plan View

- **Big Bin (adaptation of the Delmarva):** The big bin uses a primary bin which does not have a removable front. In fact, the front is totally open and the *compost* material slopes back slightly with the front face of the composted material

standing at an angle of about 70 to 75 degrees. The front face of the pile must slope back slightly because the material will not stand on a vertical angle since no front wall is present for support. Many larger growers prefer the big bin composters. The big bin type composter is normally 10 to 12 feet wide and 20 to 50 feet or more in length. The primary and secondary bin are usually side by side or parallel to each other and built like a bunker silo. The big bin composter, like the small bin type, is filled to a height of 5 feet.

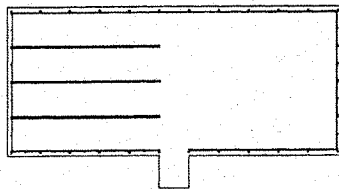


Figure 4. Big Bin Composter-Plan View

- **Minicomposter:** The minicomposter is a type of composter which can be used inside the broiler house for the disposal of birds up to about 5 to 6 pounds. These may be as simple as four pallets tied together at the corners and lined with wire mesh to make a cubicle.

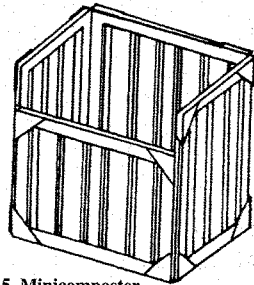


Figure 5. Minicomposter

## LAND APPLICATION

Poultry mortality compost is a *nutrient*-rich material. This material can benefit the farm if it is adequately protected and correctly land-applied. However, storage and application of this *nutrient*-rich material can be a threat to farm water sources if not done properly.

Stored *compost* should be sampled and tested to determine its nitrogen, phosphorus and potassium content. These *nutrient* values, combined with the amount of *litter* or residue applied per acre, allow for determination of whether more commercial fertilizer should be added to meet realistic crop production goals.

A *nutrient management plan* (NMP) assists you in effectively using poultry mortality *compost* in an environmentally safe manner. Any situation where *compost* or animal waste is not effectively managed gives rise to potential pollution. Nitrogen in poultry mortality *compost* can be converted into the nitrate form which can cause "methemoglobinemia" (blue baby syndrome) in infant humans and livestock. The phosphorus contained in *compost* can cause algal blooms and increase the rate of *eutrophication* in surface waters.

A sound *nutrient management plan* begins with the kind and number of animals in the farm operation and includes every aspect of waste handling. It includes how the waste will be gathered and stored including how large the storage facilities need to be. It also specifies areas to be used for manure application, crops to be grown, the area of land needed to utilize available *nutrients* and the method and timing of application.

For more information and assistance in developing your *nutrient management plan*, contact your local county Extension office, local Natural Resources Conservation Service or agricultural consultant.

The *nutrient management plan* (NMP) should identify the locations, acreage and types of crops or pasture to which any wastes are to be applied. An owner may have plenty of land for application of animal wastes, but some of it may be located a great distance from the poultry houses. The practice of spreading dead animal *compost* only on the nearest fields can result in excessive *nutrient* loading rates to the soil and possibly cause water quality problems.

At this writing, there are no state of Georgia regulations governing the land application of poultry *litter*. However, some counties do have regulations. Contact your county extension office to determine if such regulations exist.

#### **Dead Bird Compost Application**

Application rates, calibration and timing, and record keeping should be handled like manure. The Georgia Cooperative Extension Service, NRCS county offices and Georgia Department of Agriculture (GDA) can provide information on *composting* as well as other disposal methods. *Compost* should go through at least two decomposing cycles (primary and secondary treatment) before being land applied.

#### **Soil Testing of Application Sites**

*Compost* can be sampled and tested to determine their nitrogen, phosphorus and potassium content. These *nutrient* values combined with values for manures, crop residues and starter fertilizer help determine whether more commercial fertilizer should be added for desired crop production.

All land applications of poultry *mortality* *compost* should be based on soil test, *compost* analysis, and realistic crop yield goals.

#### **Record Keeping**

Keep records of the dates, quantity and specific application sites. If you sell the *litter*, keep a record of buyers, dates, amounts and the farm sites where buyers apply or use the *litter*. These records can assist you with management and protect you from liability.

#### **Application Rates**

The best application rate depends on the crop being produced, the soil's *nutrient* content and the *nutrient* content of the applied material. Soil testing and *litter nutrient* analyses are recommended procedures for best determining *litter* application amounts. Application equipment should be calibrated for accurate and even distribution.

Poultry *compost* should be evenly distributed over application sites at a rate not to exceed 5 tons per acre per year, with no more than 2.5 tons/acre in

each application or according to a site-specific *nutrient* management plan.

Vehicles must be covered or tarped for transporting poultry *compost* on state or federally maintained roads or any public road.

Your county extension office can provide more information on soil testing, *litter* analyses, equipment calibration, record keeping and other areas related to poultry *compost* land application.

#### **Application Timing**

Surface land application of poultry manure and *compost* residue should not be undertaken when soil is saturated, during rainy weather or when rain is in the immediate forecast.

#### **Application Areas**

Consider unique features of the farm and make your management plan specific for these features. Do not apply poultry *compost* to the surface and subsurface within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies and dwellings. Grass, vegetative and/or forest buffer strips along stream, pond or lake banks are helpful in preventing *nutrient* runoff from adjacent fields and pastures.

Do not apply *nutrients* on slopes with a grade of more than 15 percent or in any manner that will allow *nutrients* to enter the waters of the state.

#### **Calibrating**

Calibration of waste application equipment, such as irrigation systems, tank wagons and manure spreaders is needed to ensure safe and efficient distribution of waste materials. Equipment should be calibrated and rechecked at least once during the application period since the consistency of the *compost* can vary greatly. For more information about calibration of waste-spreading equipment, contact your county extension office.



**GLOSSARY:**

**Aerobic:** In the presence of oxygen or air.

**Cake Litter:** Clumps or larger pieces of poultry manure and bedding that are removed from the litter surface using a de-caking machine. Cake usually results from the presence of excessive moisture.

**Compost:** Organic residues that have been collected and allowed to decompose.

**Composting:** A controlled process of decomposing organic matter by microorganisms.

**Cost Sharing:** A program in which Consolidated Farm Service Agency (formerly the Agricultural Stabilization and Conservation Service) pays a percentage of the costs of a project, facility or effort.

**Decomposition:** The breakdown of organic materials.

**Eutrophication:** The process by which increasing nutrients in a waterbody promotes plant over animal life, often creating conditions with very low oxygen in the water.

**Impervious:** Incapable of being penetrated by water or other liquids.

**Leaching:** The removal of soluble substances from soils or other material by water.

**Litter:** A mixture of poultry manure and bedding material.

**Mortality:** Birds that died during production.

**Nutrients:** Elements necessary for plant growth, such as *nitrogen (N)*, *phosphorus (P)* and *potassium (K)*.

**Nutrient Management Plan:** A specific plan designed to manage animal manures and mortalities so that the most benefit is obtained and the environment is protected.

**Stack House (Shed):** A structure designed and built for the storage of poultry manure or compost.

## Drinking Water Protection

begins at



**S**afe drinking water is everyone's responsibility. Routine activities such as pesticide use may cause individuals to unwittingly pollute drinking water drawn from wells, lakes, or rivers. By the same token, individuals can take positive actions to safeguard drinking water. **Home\*A\*Syst** helps individuals identify pollution risks posed by activities in and around the home, while **Farm\*A\*Syst** helps pinpoint risks related to farms and ranches. Both programs enable individuals to take actions that prevent pollution of drinking water.

### Drinking water is only as safe as its source

Many people depend on water suppliers to deliver clean and safe water to their neighborhoods and homes, but they may not appreciate what is needed to protect their drinking water. The Safe Drinking Water Act requires public suppliers to test for over 80 different contaminants before they deliver water to individual homes. Contaminants can come from a variety of sources including household and farm activities. They may come from sources within several miles of a public well or reservoir, or much further away.

Since October 1999, water utility customers started receiving a *Consumer Confidence Report* to notify them about contaminants found in their drinking water. Those who do not receive water bills can contact their water supplier for a copy of the report. These reports should help people think about the need to protect drinking water sources and the steps they can take to prevent pollution.

### Source water protection is the first line of defense

While water suppliers can treat water to remove many contaminants, everyone is better off if we prevent the contaminants from entering the water. Sometimes water suppliers cannot discover problems before people become sick. Certain problems may not be easily fixed. Customers may be forced to boil water or drink bottled water. Fixing the problems may be costly. In cases of extensive contamination, communities may have to find alternative drinking water supplies.

Source water protection involves the use of different measures to prevent pollution from entering public sources of drinking water. Prevention saves communities money because it is cheaper than treatment.



### Why should people with private wells care?

Private well owners are responsible for protecting the safety of their drinking water. Private wells should be tested annually for nitrates and bacteria. Taking action to prevent pollution enables private well owners to protect their drinking water source – the groundwater – that may serve as a public supply for nearby communities.



## Taking Action

### Individuals can help prevent contamination of drinking water

**W**ater suppliers cannot protect public drinking water sources without everyone's help. Individual action is needed to prevent pollution from septic systems, soil erosion, pesticide and fertilizer runoff, leaky petroleum storage tanks, and other activities. Farmers can make important contributions through improved management of livestock operations and manure. They can also learn to safely handle and use farm chemicals.

When individuals pursue efforts to protect a community resource, they also can take advantage of opportunities to uncover health problems inside their homes. For example, a water test may reveal high levels of lead from indoor pipes.

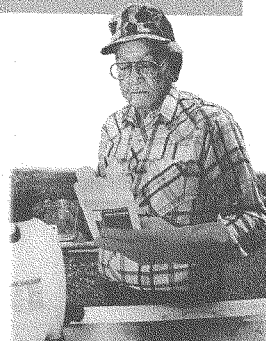
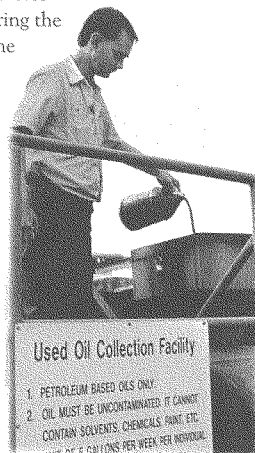
#### Taking action to protect drinking water

Whether you live in the city or country, or drink from a public water supply or a private well, the checklist on the facing page can help you protect drinking water. Start by answering the questions in the checklist on the facing page, skipping those questions that do not apply to you.



#### Taking action outside the home

Are you involved with a school, factory, office building, motel, campground, restaurant, or other public facility that serves people from its own drinking water well? These facilities need to provide safe and clean water to those who drink it. By answering questions on the facing page, you can see if you are keeping contaminants out of the water served to the public.



Pet waste, used oil and pesticides are among the potential sources of drinking water contamination.

**Checklist:** If you answer "yes" to a question, then use **Farm\*A\*Syst/Home\*A\*Syst** and other resources listed on the back of this brochure to take actions to prevent problems.

#### In and around the home

- ✓ Is there a potential source of contamination – such as pesticide or fertilizer storage, a petroleum storage tank, or septic system drain field – on your property located within 100 feet of a well or a waterway?
- ✓ Do you have unused or abandoned wells on your property that are not properly closed?
- ✓ Does your property have bare or sparsely planted areas of soil, particularly on slopes, where soil can run off?
- ✓ Do you leave pet waste on the ground where rain can wash the contaminants into surface water?
- ✓ Do you ever pour antifreeze, oil, solvents or other chemicals down a sink drain or toilet, in a storm drain or on the ground?
- ✓ Has it been more than three years since your septic tank was pumped or inspected?
- ✓ Do you have any signs of a failing septic system, such as slow-flowing drains, odors, or soggy ground over the drain field?
- ✓ Do you store fuel or heating oil in an underground fuel tank older than 15 years or an above-ground fuel tank without protection against spills or leaks?

#### Chemical use (home and farm)

- ✓ Do you store, mix, or apply pesticides or fertilizers without reading label instructions?
- ✓ Do you store, mix or apply pesticides within 100 feet of a well or other water supply?
- ✓ Do you mix water with pesticides without protecting against back flow of pesticides into your water supply?
- ✓ Do you apply pesticides routinely regardless of whether you have found pest problems?
- ✓ Do you apply pesticides without considering pest management options including the selection of resistant plants, removal of habitat for insect pests and use of natural predators?
- ✓ If you use fertilizer, has it been longer than three years since you had your soil tested for nutrients?

#### Chemical use (farm)

- ✓ Do you rinse out your sprayer tank within 100 feet of your water supply system (well, cistern, etc.) or a water body?
- ✓ Is your emergency plan incomplete because it doesn't list chemicals stored in different facilities, the average quantities stored, a floor plan for each storage facility and procedures for responding to a spill?

#### Livestock management

- ✓ Is your well or a water body within 100 feet of these pollution sources: livestock or poultry facilities, manure storage facilities, land that has received manure applications?
- ✓ Are animal facilities left unscrapped for more than a day, unless they are designed to require less frequent cleaning?
- ✓ Does runoff flow from livestock or poultry facilities without being contained or filtered?
- ✓ Do you store manure without routinely inspecting and maintaining the facility to prevent failures or leaks?
- ✓ Has it been longer than one year since you reviewed your nutrient management plan?
- ✓ Do you apply manure without analyzing nutrients in manure or crediting nutrients in the soil?
- ✓ Do you allow grazing animals to freely enter streams or other waterways?



## Resources

Drinking Water Protection  
begins at Home

### Worksheets and other assistance

#### Farm\*A\*Syst/Home\*A\*Syst

Nearly every state has a *Farm\*A\*Syst/Home\*A\*Syst* program to help you identify environmental and health risks to drinking water. *Home\*A\*Syst* can help every homeowner with worksheets on private drinking water wells, stormwater management, septic systems, hazardous product management, lead, lawn and garden care, and fuel storage. *Farm\*A\*Syst* worksheets cover farm activities including the management of livestock facilities and manure, pesticide and fertilizer storage, cropland nutrient and pest management, pasture, and woodlots. Specialized worksheets have been developed for commodities such as cotton, grapes, and potatoes.

For information about *Home\*A\*Syst* or *Farm\*A\*Syst* programs in your state, you can locate a local program coordinator by visiting either of these web sites: *Home\*A\*Syst* (<http://www.uwex.edu/homeasyst/>) or *Farm\*A\*Syst* (<http://www.uwex.edu/farmasyst/>). You may also contact the national *Farm\*A\*Syst/Home\*A\*Syst* office at 303 Hiram Smith Hall, 1545 Observatory Drive, Madison, WI 53706, Madison, WI 53706-1293, 608-262-0024, email:

[farmasyst@mac.wisc.edu](mailto:farmasyst@mac.wisc.edu) or [homeasyst@mac.wisc.edu](mailto:homeasyst@mac.wisc.edu).

These groups also may have program information: local county Extension office, Soil and Water Conservation District, Natural Resource Conservationist or state water quality agency.



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recycled paper



#### For safe, clean water at home

The resources on this page will help you protect your community's drinking water.

All photos by Margaret Frey, Louisiana State University AgCenter

#### Other national resources

EPA's Office of Ground Water and Drinking Water  
[www.epa.gov/ogwdw/protect.html](http://www.epa.gov/ogwdw/protect.html), and EPA's Safe Drinking Water Hotline at 1-800-426-4791 – for information about drinking water safety and protection

National Small Flows Clearinghouse  
800-624-8301 – for information on septic system design and maintenance

Water Environment Federation  
800-666-0206 – for information on disposal of hazardous products

National Lead Information Center  
800-LEAD-FYI – for information packets; 800-424-LEAD for personal assistance

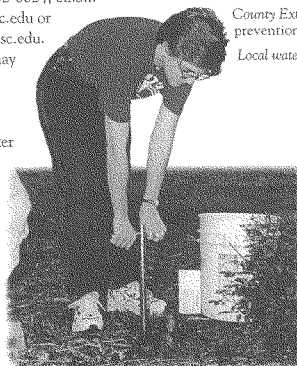
#### State and local resources

State environmental agencies – for information on petroleum storage tanks, recycling, small business incentives, waste management, and water quality generally

State and county health departments – for information on water testing, contaminants in drinking water, water quality standards, and sanitary codes for septic systems

County Extension agents – for information on farm and home pollution prevention, including University Extension Publications

Local water utility – for information on water conservation



Sampling soil to determine fertilizer needs.



#### Farm\*A\*Syst Home\*A\*Syst

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Environmental Resources Center.

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## Source Water Protection: Plain and Simple

Source Water Awareness

### What is Source Water Protection

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, springs and ground water that serve as sources of drinking water. It is part of the growing effort to protect drinking water sources before they become contaminated. Wellhead protection, for example, seeks to prevent the contamination of ground water that supplies public drinking water wells. Many States have successful wellhead protection programs in operation. Local governments promote source water protection of surface water through sound land management around a reservoir, using local land use planning and zoning authority as the key. Most source water protection programs address both surface water and ground water issues.

Particularly in rural areas, ground water protection is essential to preserve health and safety and to sustain the local economy. Half of all Americans, and more than 95 percent of the country's rural population, depend on underground sources for their household water supplies. Ground water provides about half of all agricultural irrigation and a third of the water needs for industry. The other half of the population gets its drinking water from surface water supplies. This includes most of the larger metropolitan areas of the United States.

For generations, water quality was taken for granted. The passage of the Clean Water Act of 1972 initiated the first concerted federal effort to recognize and address water quality issues. Since then, the nation has made much progress and learned a lot about where pollution comes from and how it may be controlled.

The Safe Drinking Water Act (SDWA) amendments of 1996 extended our understanding of drinking water issues once again, with their focus on preventing contamination, rather than simply removing it when detected.

### Source Water Protection Process

But moving from treatment to prevention will be a real challenge for local governments. Except when contamination occurs, drinking water has largely been out of sight and out of mind. The SDWA, however, initiated a two-stage process to develop a coordinated, national Source Water Protection initiative.

*First*, all public water systems (PWS) will receive a *source water assessment* of potential contaminant problems. These reports will be provided under each State's Source Water Assessment Program (SWAP). (Many States will provide public water systems or communities in which they are located with the opportunity to conduct parts of the assessment or to enhance the State's assessment by supplying more detailed local information.)

*Second*, public water systems will be strongly encouraged to develop appropriate *source water protection plans* based on the assessment results. These plans may be drawn up either individually, or in partnership with neighboring systems in the water-



## Source Water Awareness

shed. EPA has set a goal that by the year 2005, 50 percent of all community water system (CWS) customers will be served by systems with source water protection in place.

The risk of possible drinking water contamination, however, remains high almost thirty years after the passage of the original Clean Water Act. The U.S. Environmental Protection Agency reports that, "more than 80 percent of all drinking water systems report having at least one potential source of contamination within two miles of their water intake or well."

An overwhelming number of the SWAPs propose to pay for all or a substantial portion of the cost for local assessments with the funding available through the 1997 Drinking Water State Revolving Fund (DWSRF) allocation. The source water protection, or problem-solving stage, however, will depend largely on local leadership and local dollars. While the 1997 DWSRF allocation was targeted only for assessments, clearly Congress intended for these assessments to lead to action.

Here are the six basic steps that lead to source water assessment and protection:

- delineating source water protection areas;
- identifying sources of contamination within those delineated areas that may impact the public water system;
- determining susceptibility to the contaminants or the contaminant sources identified;
- making the results of the assessments available to the public;
- implementing measures to manage the identified sources; and
- establishing a contingency plan for responding to contamination incidents and planning for the future.

Source water protection clearly helps safeguard community water supplies and may save money in treatment costs. Despite obvious health and economic benefits, EPA reports that just over five percent of the nation's public water systems have instituted protection measures. Unquestionably, the private and public sectors and individual citizens are the key stakeholders in source water protection. It is the people living and working in communities across the country who have the most to gain or lose from the quality of their drinking water.

Many public drinking water systems are operated on a private, non-profit or special district basis. Yet local governments that are not directly involved in providing drinking water must still take the lead in preventing contamination. Towns, townships, small cities and counties may possess or share the legal authority for enacting and enforcing protection measures that include:

- zoning and other land use controls;
- point source pollution restrictions, requirements or controls for fixed sources, such as waste processing plants;
- health regulations (including sanitary setbacks for septic tanks or sewer lines from drinking water wells);

- land acquisition authority that provides protective zones around water sources;
- best management practices (ensuring that municipal operations, for example, do not impact drinking water supplies through such activities as pesticide application, dispensing fuel, etc.); and
- public education and outreach campaigns.

The list above includes mandatory and voluntary measures that must be carried out by individuals, local government, agriculture, business and citizen organizations. Therefore, these efforts will only succeed when local elected leaders enlist the broadest possible range of community support.

### Benefits of Source Water Protection

Since source water protection is a new approach, there is little data on its long-term financial benefits. Benefits can be measured in terms of what the costs might be, if this protection was not provided. Some of the areas for which costs can be estimated are: increased treatment; remediation; consulting services; and staff time. There also may be significant costs to satisfy public and media interest and concern, if source water contamination does occur. The most dramatic costs involve locating a new water supply and the legal costs of litigating those responsible for contamination of an existing well or reservoir. Even if only a part of a town's water supply is lost, diminishing the reserves from other sources and installing new lines all have their costs.

Communities with effective source water protection programs may also enjoy substantial savings in complying with SDWA regulations. Source water protection programs, for instance, could help water suppliers avoid costs related to the Disinfection Byproducts Rule: cleaner source water simply requires less disinfection, thereby reducing the costs for removing byproducts related to disinfection. Water suppliers with source water protection programs in place may also be eligible for waivers from periodic monitoring requirements. Such waivers have already saved water systems in Massachusetts over \$75 million in three years. Under the Surface Water Treatment Rule's filtration waiver program, huge savings are potentially available to surface water systems with good source water quality and a working source water protection program. In Maine, 15 systems saved an average of \$7 million each in capital costs by avoiding filtration.

Safe drinking water is essential to community quality of life and to continued economic growth. Source water protection helps maintain real estate values in areas served by protected water supplies. When water supplies are not safe, towns may have to calculate the revenues lost in foregone tax revenues and new jobs because businesses refuse to locate or remain in communities with known or suspected problems.

### Public Water Systems

Let's look briefly at the universe of public water systems that are affected by the source water protection measures in the SDWA. Each of these systems can benefit when the whole community joins in a concerted protection effort.

Most people receive their drinking water from the nation's nearly 175,000 public water systems (PWS). These systems range in size from regional utilities that serve millions of customers

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to privately constructed operations that may supply a single trailer park. By definition, these systems must serve a minimum of 25 customers or have at least 15 service connections. Within this grand total, are nearly 55,000 community water systems (CWS) that provide year round service to about 80 percent of all public water consumers. Local governments may own and operate a CWS or may be served by a CWS that is operated on a private or non-profit basis. In some States, water is supplied either through special districts that may be created by local government, or through independent authorities serving more than one jurisdiction.

The remaining 20 percent of public water consumers are served by either *non-transient, non-community water systems* (NTNCWS) that provide water to a relatively unchanging clientele at locations such as businesses and schools, or by *transient, non-community water systems* (TNCWS) that serve the travelling public at camp grounds, motels and restaurants. Federal requirements apply only to those non-community systems that operate at least six months out of the year. In 1996, there were approximately 20,000 NTNCWS and 96,000 TNCWS. Many of these systems are small, with limited financial and management capacity, and may have difficulty meeting the full range of federal requirements. Local leaders should be in contact with these systems, if there are any plans for consolidation or regional approaches to water supply and protection.

### Conclusion

Since the beginning of time, a safe and dependable source of water has been a major factor in where people settled. Currently, we depend on wells, springs, reservoirs, lakes, streams and rivers for our ever-expanding need for water. Once a water source is located, we usually do not question its safety and dependability. If the drinking water looks good, tastes good and smells good, we assume it is safe to drink. Progress, however, has not left water in its natural state.

In the last century, both population and business activity have exploded. Yet there is no more fresh water today than there was a million years ago. While 70 percent of the earth is covered with water, 97 percent is salt water. Of the three percent that is fresh water, two thirds is frozen. Industry, agriculture and the growth of cities have all contributed to greater use and greater contamination of water sources. Many places in this country face a critical water shortage, at the same time that the quality of their water is at risk. Until recently, public water systems have relied on testing and treatment to provide safe drinking water. The passage of the SDWA brings a new focus on prevention and protection. Source water protection is the first line in preventing drinking water contamination and the cornerstone of efforts to save future costs in treatment and possible replacement of local water supplies.



This material has been drawn from *A Small Town Source Water Primer* published by the National Center for Small Communities. It may be downloaded from: <http://natat.org/ncsc/Action%20Guide/WebBlurb.htm>

The guide explains how source water protection can help local elected leaders and other decision-makers maintain a safe, affordable water supply for home, business, agriculture and recreation.

For more information, contact the National Center for Small Communities at (202) 624-3552 or the International City/County





## *Promotional Materials for Drinking Water Protection and Awareness*

### **Camera -Ready Logo**

An electronic campaign logo is provided in this media kit. The logo is a full-color, full size printable image. The source water awareness logo can be used on newsletters, brochures, or stationary used in your campaign.

### **Source Water Protection: Plain and Simple**

This is an introductory document that describes the basic components of a State Source Water Assessment Program (SWAP) as mandated by the Safe Drinking Water Act (SDWA) of 1996. This information is useful for local water utilities and state water quality departments. It is also useful for citizens trying to gain a general understanding of SWAPs.

### **Sample Radio PSA**

Make a copy of the radio Public Service Announcements (PSA) and mail or fax it (with a copy of the news release) to local radio stations in your community. Follow up with a telephone call or personal visit to ask station managers or program directors if you can count on them to give the PSAs as much air time as possible.

### **Sample News Release**

This provides a way to inform local media about your drinking water awareness campaign. Fill in the bracketed areas of the news release with information about your company/organization/utility and then mail or fax it to local newspapers, radio and television stations in your area. You may also use the news release as a template for providing the media with specific information about activities being conducted in your community to increase drinking water awareness.

### **Sample Poster**

This two-color sample poster design can be blown up to a desired size for distribution. Display the drinking water awareness poster in your community center, the windows of supermarkets or retail stores, in shopping malls, public libraries, health clubs, schools, utility customer service centers, or any other place where lots of people will see it.

### **Q&A Fact Sheet**

This can be used as utility bill stuffers to get the word out in the community.

### **Informational Flyer and Community Checklist**

Use these at community gatherings, public meetings, and distribute at information centers like libraries and supermarkets all over the community.



## Public Service Announcement for Radio

Hi, my name is [Name], with a few words on protecting your drinking water.

### Consider the source!

Get to know the source of your drinking water, and get involved in activities to protect it. Drinking water source protection is a low-cost means to preserving the safety of a vital resource. Here are a few simple things you can do to help keep pollution out of the river, lake, stream, or aquifer that is your drinking water source:

- Take used motor oil to a recycling center. If you let it drain into a storm sewer or bury it in the trash, it can leak into lakes, rivers, and wells. Just one pint of used motor oil can expand over great distances, and potentially harm human health and the environment.
- Properly dispose of toxic household trash. For example, batteries contain lead and mercury. Some household cleaners also contain substances that contaminate water. Many communities have special collection sites for these items.
- Do not dispose of chemicals such as paints, cleaning products, and pesticides into septic systems, dry wells, stormwater drainage wells, or other shallow disposal systems that discharge to groundwater.
- Properly install and maintain septic systems. Be sure to inspect them regularly and pump them out when necessary.
- Find out what your community is doing to protect your water source and get involved. Work with schools, civic groups, and others to start a protection program.

### Safe drinking water is everyone's responsibility.

For more information, contact your local water utility at [Contact information] or your state health or environmental department at [Contact information]. Together, we can all make a difference.

This is a public service announcement brought to you by [Name of sponsoring organization].

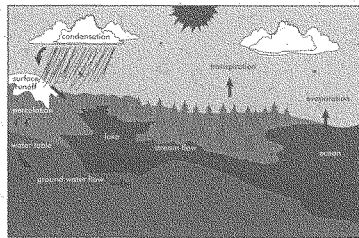
Source Water Awareness



# Source Water Awareness

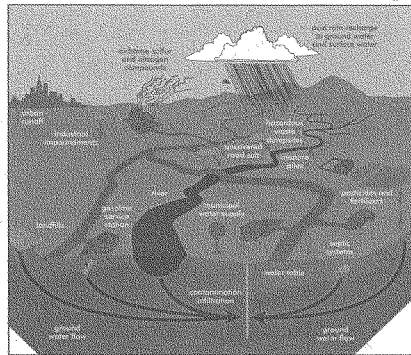
Funded by the U.S. Environmental Protection Agency's  
Office of Source Water and Drinking Water  
**ICMA**  
International  
Civic and  
Management  
Association

## Where Does the Water that We Drink Come From?



Our drinking water comes from water flowing on the earth's surface in rivers, lakes, and streams; and also from water beneath the earth's surface, in underground aquifers. Our drinking water is constantly moving between the air, the earth's surface and beneath the earth's surface. Water beneath the earth's surface moves at a much slower rate.

## Sources of Contamination to Our Water Supply



Some of the things we do on land can pose threats to our water supply and make it unsafe to drink.

## Simple Steps to Help Protect Our Water Supply

- Dispose of household and other chemicals properly. That is, don't pour chemicals on the ground or down the sink drain, toilet, or storm drain.
- Take used motor oil to the recycling center.
- Use only recommended amounts of fertilizers and pesticides.
- Have our unused wells properly closed.
- Pump and inspect our septic tank regularly.
- Plant vegetation on bare spots of the soil, particularly on slopes, to prevent erosion and excessive runoff of sediments into nearby water bodies.
- Become involved in drinking water protection activities in our community.



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Statement of

Lynn Youmans  
Farmer

On behalf of the South Carolina Farm Bureau

For the

United States Senate  
Committee on Agriculture, Nutrition and Forestry

Rural Energy Issues and Rural Development in the Farm Bill

May 8, 2007

I appreciate the opportunity to offer a statement on a very serious issue concerning agriculture today.

I attend a lot of agricultural meetings within our state and never has energy been such a common subject of discussion as it has this year. Corn prices are currently above \$4.00 for both old crop and December new crop when delivered to end users. The impact that this has on our agricultural (rural) communities is encouraging. The creation of alternative energy sources through agricultural products will reverse the downward economic trend that is prevalent in rural South Carolina and the rest of our nation.

South Carolinians spent nearly \$18 billion on energy in 2006. Last year our citizens and visitors consumed nearly 90 million barrels of oil at a cost of almost \$9 billion. Much of this money found its way to unstable parts of the world. Our country is blessed with an abundance of agricultural and forest-based materials that can be developed into available and sustainable industry that will help diversify our energy resources, provide a cleaner environment, promote energy security and lead to economic development in our rural areas.

An aggressive energy title should be initiated within the 2007 Farm Bill. Many states, including South Carolina, are taking action by creating legislation that will offer tax incentives for product development, property and sales tax exemptions, and tax credits. A collaborative effort with both state and federal governments will be necessary if we are to be successful in our efforts to lessen our dependence on foreign oil supplies.

It is important that Congress support the production and use of agricultural-based energy products and promotion of bio-blended fuels. The benefits from this support are numerous. Our citizens will live in a cleaner environment, the nation's overall economy will benefit from the development of a new industry, our agricultural economy will become more stable causing less strain on federal commodity support programs, rural America will see an economic turn-around and the ultimate goal is to gain energy independence. Now is the appointed time to do something that will truly benefit all the citizens of our great country.

By prioritizing and funding research, offering true incentives for development and use of Bio-based products, providing competitive grants and educational programs to encourage use, we all can win in this effort.

Thank you for this opportunity to express my thoughts.

Respectfully submitted,

Lynn Youmans

**Statement of  
Walter B. McCormick, Jr.  
President and CEO, U.S. Telecom Association  
to the  
Senate Committee on Agriculture, Nutrition and Forestry  
May 9, 2007**

Chairman Harkin, Ranking Member Chambliss, members of the committee: Thank you for this opportunity to present our views on the future of the Rural Utilities Service (RUS) broadband program. I am Walter McCormick, president and CEO of the United States Telecom Association. This committee has been at the forefront of helping advance the development of rural America, from bringing electricity and safe, running water to communities that never had it before, to connecting the country via the telephone and now, we all hope, via the high-speed Internet. USTelecom and its member companies are proud of the role we play connecting the country, and we wholeheartedly support the objective of ubiquitous, nationwide broadband. This should be a bipartisan objective, and we believe that RUS has a critical role to play in helping bring broadband to rural areas currently not served.

USTelecom represents innovative companies ranging from the smallest rural telecoms in the nation to some of the largest corporations in the U.S. economy. Our member companies offer a wide range of services across the communications landscape, including voice, video and data over local exchange, long distance, Internet and cable networks. USTelecom is the nation's oldest – and largest – association representing rural telecom providers. The vast majority of our member companies are rural providers. They are small businesses serving small communities. They are proud members of these communities and deeply committed to their future development. What unites our diverse membership is our shared determination to deliver innovative voice, video and data services to the consumer—a commitment we know is shared by this committee. So we appreciate the opportunity to share our recommended changes.

**Regulatory Changes Have Spurred Broadband Deployment**

The Federal Communication Commission's decisions that oriented the communications marketplace away from government-managed to market-based competition have resulted in an explosion of broadband coverage across the nation. In March 2002, the FCC clarified that high-speed cable-modem service is an information service not subject to unbundling and other Title II regulations of the Communications Act. In August 2003, the FCC exempted wireline fiber facilities from the Commission's unbundling requirements. In September 2005, the FCC clarified that wireline broadband Internet access service is also an information service not subject to unbundling and other Title II regulations of the Communications Act. These actions have accelerated broadband deployment in the United States from just over 4 million broadband lines in 2000 to just under 16 million broadband lines in 2002 to approximately 32 million lines in 2004 to almost 65 million lines in 2006. This demonstrates a direct correlation between the FCC's market-based policies and the explosion of broadband subscribers in

the United States. The lack of regulation on wireless services also has permitted wireless broadband services to explode as well. In June of 2005, there were almost 380,000 wireless broadband subscribers; in June of 2006, there were more than 11 million.

Internet access is available through DSL, or cable modem, or wireless, or satellite – and, increasingly, over power lines and municipal wi-fi systems. In fact, there are more than 1,270 broadband service providers in the U.S. today.

Against this competitive backdrop, North American telecommunications companies are projected to spend \$70 billion on new infrastructure this year. The next wave of broadband innovation holds the promise of significant, life-enhancing advances from health care to the environment to education and to our economy. It is critical, as you know, that these opportunities be accessible in rural America, as well. Mr. Chairman, much has been made recently of new international broadband penetration rankings from the Organization of Economic Cooperation and Development (OECD). We have some issues of our own with our country's current ranking of 15<sup>th</sup> in the world. We feel it significantly undercounts, for example, connections in the U.S. business market. It certainly also under-values the markedly more intense facilities-based competition we have here in the U.S. But the most striking dissimilarity is that 10 of the 11 countries allegedly in front of us are significantly smaller than the U.S.—as diminutive as Norway, which is comparable in geographic size to New Mexico. A majority also have much smaller *populations*, including Iceland, an entire country that is comparable to the metro area of Naples, Florida. The exception is Canada, which is a country of vast geographic expanse. However, 80% of the population is clustered along the U.S. border. So the true broadband challenge before our country is precisely the challenge we are here today to discuss. How can we most efficiently work together to connect parts of the country where the marketplace alone is incapable of attracting the significant investment necessary to truly build a broadband nation?

#### **The RUS Broadband Program -- Modest Changes Could Produce Dramatic Results**

Our member companies want to work with the committee to completely close the gap in broadband coverage. In its relatively brief history, the RUS broadband loan program has achieved some successes. But we believe with modest changes, largely based on the successful RUS telephone program, the program could accomplish even more.

As the committee begins to write the rural development title of the Farm Bill, USTelecom would make the following recommendations to advance our collective goal of helping the nation achieve universal broadband penetration:

- 1) Better target areas currently not served;
- 2) Enhance incentives for investment in the areas not served;
- 3) Expand program eligibility;
- 4) Improve processing at USDA, and
- 5) Explore public-private partnerships.

#### **Revise the eligibility rules to better target areas not served**

We believe the primary weakness of the current program is that it does too little for areas with no access to broadband. Although the nation is dotted with areas currently not served, the USDA Inspector General concluded the program's focus has shifted away from rural communities that would not, without government assistance, have access to broadband technology.

In revising eligibility rules, we believe the committee need look no further than the RUS telephone program. This program has a 60-year record of success, and we believe it holds important lessons for broadband. In the telephone program, initial loans to areas with adequate, existing service are discouraged. In fact, the RUS administrator must issue a non-duplication finding prior to making a loan. In the broadband program, such a requirement would help direct funds to where they are most needed – those areas with no existing broadband service. Making loans for duplicative facilities and service, when other citizens in rural America reside in areas with no service at all, is a waste of scarce government resources. In addition, the telephony program requires that service be extended to the widest practical number of users in the service area, avoiding a problem that has sometimes arisen in the broadband program, where service is only provided within town limits, but not to the surrounding county.

#### **Enhance incentives for investment in areas not served**

Providing broadband service in rural and remote areas is a challenging proposition. While the current practice of offering cost-of-money loans makes projects financially viable in some areas, other higher cost areas will require below-cost loans or a combination of loans and grants to make a costly infrastructure build feasible. This will become increasingly important as the program narrows to focus on areas with truly no access. Congress should encourage RUS to look at the unique needs of these areas and to enhance incentives for the private sector to act. Taxpayers will reap the benefits through loan repayments and tax revenues generated by broadband-driven economic development. We believe that taking these basic steps would increase the number of loan applications to areas with no service facing significant economic barriers to investment, such as low population densities or difficult terrain.

#### **Expand eligibility to more applicants**

We also believe steps should be taken to expand the number of companies eligible for broadband loans. When the broadband program was established, a provision was adopted prohibiting loans to telephone companies with more than 2% of the nation's access lines. This is counterproductive. Some USTelecom members serve rural areas that would otherwise qualify for broadband loans. For example, the FCC classifies Embarq as a rural carrier in 17 of the 18 states it serves, yet it is prohibited from applying for RUS broadband funds. Meanwhile, RUS is searching for more applications from carriers seeking to serve untouched areas. Again, if I might refer you to the successful, 60-year-old telephony program – it has never had a 2% restriction, and it has never suffered as a result. The emphasis in our view should be on the infrastructure needs of a community, not on the company willing to serve it.



### **Improve processing at USDA**

USTelecom also advocates that steps be taken to improve processing of loan applications at USDA. At present, the broadband and telephony programs have access to a small number of attorneys in the Agriculture Department's general counsel office. This has created a bottleneck when legal decisions are needed and caused delays in processing loan applications—delays that too often put broadband deployment on hold in communities with no service.

### **Explore public-private partnerships**

Finally, I direct the committee's attention to the successful public-private partnership in Kentucky, driven by a non-profit organization called Connect Kentucky. Connect Kentucky has worked with the RUS broadband program, but has gone much farther than would have been possible with RUS alone. Its first objective was to map broadband availability in the whole state, something that no other state has done. Then it created technology teams in each community that lacked broadband. These teams looked at computer ownership, technological literacy, and other factors to increase demand for broadband. At the same time, the teams worked with broadband providers to match up new demand with new broadband deployments. By the end of 2007, Kentucky will go from having one of the lowest broadband subscription rates in the country to having broadband available to 100% of its households. That's impressive progress, and we think Congress might look to Connect Kentucky as a model for what works. In fact, we understand that Senator Durbin has recently introduced legislation that would create a national program based on the Connect Kentucky model.

Mr. Chairman, in closing, let me reiterate that it is critically important that rural areas be included in the nationwide drive for greater bandwidth capacity. This modernization of the nation's communications infrastructure will seed economic growth and expand opportunities ranging from telecommuting to distance learning to telemedicine. Mr. Chairman, nowhere in the nation do these advances hold more potential than in rural America.

After 60 years of success, the RUS loan programs remain an essential public-private partnership conceived with the best of intentions—spreading opportunity throughout the country—helping the private sector overcome the often significant economic barriers associated with our nation's vast geography. The results have been impressive: RUS generates more revenue than it costs. It provides incentives where the market does not so private companies can invest in infrastructure that promotes rural economic development. And, it expands our citizens' access to services that can vastly enhance their quality of life and the economic opportunities available to them in their own communities. I'd also like to add that RUS has never lost a dime of taxpayer money because of a telecom carrier default.

We thank you for your attention to our recommendations. USTelecom and its member companies look forward to working with the committee and this Congress to achieve our shared objective of making broadband as ubiquitous today as electricity, water and

telephone service. Broadband is an essential building block of every modern American community. We look forward to working with you to make its many opportunities accessible to all Americans. Thank you.

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**QUESTIONS AND ANSWERS**

MAY 9, 2007

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**Senator Harkin**

**Questions for Glenn English**

1) It has long been the standard practice that rural electric cooperatives whose service area has become clearly urban are still allowed to continue to borrow funds from the Rural Utilities Service (RUS).

**Why is it justified that this practice of RUS lending to REC's serving urban areas continue?**

2) An article in the Washington Post dated April 30, 2007, reports on the financial condition of the National Rural Utilities Cooperative Finance Corporation, which is commonly referred to as CFC. The article suggests CFC is having financial difficulties and indicates its equity has dropped – by some 23 percent in the six months preceding November 30, 2006. Three bond rating agencies continue to rate CFC highly, but one, Egan-Jones Ratings, has sharply downgraded CFC bonds.

**To what degree have you examined this matter, and if so, is there is any merit to the Egan-Jones analysis?**

**What are the principal facts and arguments you would make to counter the Egan-Jones analysis on the merits?**

**What has been the effect of the article on the capital markets?**

3) CFC pays a small premium when it borrows from the Federal Financing Bank, part of which goes into an account to fund USDA's Rural Economic Development Loan and Grant program – also referred to as the REDL&G (red leg) program.

The REDL&G program is a great success, but USDA is not allowing money to be released from that account in the form of grants to help rural America grow. In other words, rural electric and telephone cooperatives contribute funds to the REDL&G program as they borrow funds, but those funds are not going back out to support rural development as intended and written into the 2002 farm bill.

**First, how would you modify the law with respect to funding the REDL&G program through premiums on loans guaranteed by RUS?**

**Second, how should existing law be changed to push USDA to send the funds in the REDL&G account out in grants to help rural communities?**

4) OMB has been trying to limit the ability of RECs to receive RUS assistance for generating plants for some time.

**Given the structure of the financial markets, why is it logical for that assistance to continue?**

**What is the expected volume of electric generating loan requests to the RUS over the coming 5 years and to the extent you are now aware of likely applications, please provide the committee with a list of the likely applications.**

Questions for Hearing  
Senator Charles Grassley

(Question for Glen English)

You are here testifying on behalf of cooperatives, but anaerobic digestion occurs at the farm and that is where the benefits are realized. Why are COOPs advancing this idea?

(Question for Jimmy Matthews)

Where do all the small towns go for help in compliance and for best practices with water and sewer operations, maintenance, and help obtaining funding?

(Question for Glenn English)

How can current programs or proposed programs be structured to promote/encourage local ownership of ethanol/renewable energy production facilities?

(Question for Lee Lynd)

How can current programs or proposed programs be structured to encourage the development of local entrepreneurial activities or the development of clusters of businesses complimentary to renewable energy production within a region?

(Question for Neil Rich)

What other types of rural development programs or rural development initiatives could be adopted to encourage entrepreneurship or business development complimentary to renewable energy production in rural communities?

Dear Senator Grassley,

In response to the question from the Senate Agriculture Committee Meeting –

**What other types of rural development programs or rural development initiatives could be adopted to encourage entrepreneurship or business development complimentary to renewable energy production in rural communities?**

I believe right now the number one thing Rural Development could do for rural America, would be the development of power plants running from renewable energy. Whether using wood pellets, biodiesel, biomass, syngas or wind there is enough electricity used throughout the Midwest and other rural areas of the country, we could truly make ourselves energy independent.

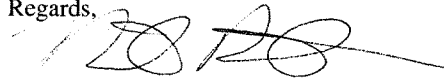
Right now our company has the opportunity to purchase our power either from renewable energy or from tradition coal power plants, the interesting thing is renewable energy in Iowa is nearly 40% more expensive to the consumer. For a Biodiesel plant or a homeowner, that is just simply unjustifiable. As a producer of renewable energy I would love to use renewable energy in my plant.

I believe if there were the correct programs in place such as interest free loans, loan guarantees or grants available there would be more interest in this area of energy production. Right now the program works, with the exception being the projects are generally completed before funding is granted. Therefore the money for the project is accruing interest which puts strains on many of the local lenders who would otherwise fund these projects.

There would also need to be a series of rules in place to allow the energy producer to get full price for the energy created. For instance on our family farm in Washington County we have 4 - 20KW wind generators to provide electricity to our farm plus it generates above our usage. The catch is we only get paid approximately 25-30% of what is charged to us for power purchased from the electricity provider. Granted there are expenses tied to running a power grid, but not 8 to 9 cents per kw.

Thank you for your continued support of Rural Development and Renewable Energy.

Regards,

A handwritten signature in black ink, appearing to read 'Neil Rich', with a long horizontal flourish extending to the right.

Neil Rich  
Riksch BioFuels LLC



### **Questions for Glenn English**

It has long been standard practice that rural electric cooperatives whose service area has clearly become urban are still allowed to continue to borrow funds from the RUS.

Why is it justified that this practice of RUS lending to REC's serving urban areas continue?

The Rural Electric Loan Program costs roughly \$25 million a year. For \$25 million dollars Electric Co-ops maintain 43% of the distribution lines and little less 5% of the generating capacity of the US. We feel that this is a very good deal for U.S. Taxpayers. Also, unlike other rural development type programs, Electric Co-ops are obligated to serve everyone in their service territory regardless population density or income. Presently, electric co-ops serve 75% of the land mass in the US.

Some electric co-ops have seen a tremendous amount of growth in their service territory. However, even these high growth systems remain predominately non-urban. The irony is that if these systems were served by municipal systems they would be eligible for tax exempt financing which equates to a much higher subsidy level than any electric co-op could possibly receive through the RUS electric loan program. Our most densely populated co-ops serve less than a third of the number of consumers per mile of line and receive one-fifth the revenue per mile of line as compared to municipal systems which receive much more in the way of federal assistance.

An article in the Washington Post dated April 30, 2007, reports on the financial condition of the National Rural Utilities Cooperative Finance Corporation, which is commonly referred to as CFC. The article suggests CFC is having financial difficulties and indicates its equity has dropped – by some 23 percent in the six months preceding November 30, 2006. Three bond rating agencies continue to rate CFC highly, but one, Egan-Jones Ratings, has sharply downgraded CFC bonds.

To what degree have you examined this matter, and if so, is there any merit to the Egan-Jones analysis?

What are the principal facts and arguments you would make to counter the Egan-Jones analysis on the merits?

What has been the effect of the article on the capital markets?

Answer:

I appreciate the question Mr. Chairman. Let me say upfront, I am not an accountant. I can only attest to what recognized experts and those who put their money on the line think of CFC. CFC is in the best position to answer questions about their financial strength and is willing to directly answer any questions that you may have.

Having said that, the three Securities and Exchange Commission (SEC) recognized rating agencies – Moody's Investor Service; Fitch Ratings and Standard & Poor's (S&P) -- all rate CFC as an A+ credit, and Fitch recently upgraded its outlook to positive from stable. Just as a point of reference, the typical Investor-Owned Utility (IOU) is rated BBB.

CFC's financial strength is closely connected to the financial strength of the electric co-ops. Consistently, rating agencies look at the electric cooperative industry and they see low-risk businesses that are focused on serving their members and not on taking big risks and chasing speculative profits. Wall Street likes the electric co-ops because we have shown that we generally will not take the same risks that got some IOUs into trouble.

CFC files quarterly reports with the SEC and is in full compliance with all SEC requirements. CFC is audited each year by a top tier accounting firm, currently Deloitte and Touche, and has received an unqualified audit in every year of its existence. As for the investors, every time CFC goes to the market to sell bonds, it consistently has more buyers than it has bonds to sell and it is able to obtain funds at very attractive rates. This seems to indicate that the markets – those investors who put their money on the line -- see minimal risk in CFC.

#### Washington Post

Unfortunately, the Washington Post story on CFC seems to fall in the same vein as other recent Post articles on electric cooperatives, as well as United States Department of Agriculture (USDA) farm and rural development programs. There appears to be some selective reporting of the facts. I am attaching for the record a copy of the letter to the editor of the Washington Post that CFC submitted in response to the story.

I can't possibly address all the misrepresentations contained in the article here, but I will touch on a couple of most egregious ones. Based on CFC's public filings to the SEC, the article states that CFC reported an operating loss of \$40 million in the nine months ending February 28, 2007. In fact, CFC actually reported an adjusted net income of \$84 million for that period. Again, I don't necessarily have the expertise to debate the myriad accounting rules applicable to financial statements, but I just don't see how anyone could confuse the facts so badly.

Further, the article's assertion that CFC's equity has dropped by "23 percent in the six month preceding November 30, 2006" at best demonstrates a lack of understanding of the cooperative business model. As a not-for-profit cooperative, CFC returns patronage capital to its members on an annual basis. Equity levels will be higher immediately before a patronage capital distribution and likewise lower immediately after. That is exactly the time period that the article chooses to compare. Any fair analysis of cooperative equity will compare equity levels on a year-to-year basis, not before and after a patronage capital return to members. When CFC's equity is compared for the same date each year it has been very stable.

#### Eagan-Jones

As for the Eagan-Jones report, I frankly had never heard of them before reading the article. I do know that Eagan-Jones is not an SEC recognized rating agency and I have been told that Eagan-Jones made no attempts to communicate with CFC before issuing their report. In fact, CFC was first made aware of the Eagan-Jones report when they read about it in the Virgin Islands Daily News—a newspaper owned by a telecommunications borrower that is involved in a bankruptcy and engaged in litigation adverse to CFC.

Again, I am not an accountant, so I do not want to dissect the report here. But its conclusions are clearly at odds with those of recognized experts and at odds with the conclusion of investors who put their money on the line by buying CFC bonds. To be fair, if Eagan-Jones expects their analysis of CFC to be taken seriously, they need to disclose who requested it, and who paid for it.

#### Market Reaction

Since the Washington Post reported on the Eagan-Jones analysis, there has been no impact on CFC from a capital market perspective. The spread on CFC securities has not been impacted, nor has the willingness of investors to buy CFC securities. This is a strong demonstration that investors understand CFC and are not swayed by press articles that lack merit.

3) CFC pays a small premium when it borrows from the Federal Financing Bank, part of which goes into an account to fund USDA's Rural Economic Development Loan and Grant program – also referred to as the REDL&G (red leg) program.

The REDL&G program is a great success, but USDA is not allowing money to be released from that account in the form of grants to help rural America grow. In other words, rural electric and telephone cooperatives contribute funds to the REDL&G program as they borrow funds, but those funds are not going back out to support rural development as intended and written into the 2002 farm bill.

**First, how would you modify the law with respect to funding the REDL&G program through premiums on loans guaranteed by RUS?**

**Second, how should existing law be changed to push USDA to send the funds in the REDL&G account out in grants to help rural communities?**

CFC and our rural electric cooperative members have a long history of working with the USDA to improve the quality of life in rural America and together have played an essential role in building our nation's rural utility infrastructure. The 2002 Farm Bill strengthened this partnership by authorizing the USDA Guaranteed Underwriter program.

This program provides private funding for REDL&G through fees paid by not-for-profit cooperative lenders like CFC – at no cost to the taxpayers. In these days of limited federal resources and a renewed commitment to fiscal discipline, I believe that this type of creative public-private partnership needs to be strengthened and extended. And I compliment the Chairman and the Committee for their support for this initiative.

The private sector fees generated by this program have become increasingly important in recent years because funds for REDL&G – over \$244 million in the last two years – have been redirected to other USDA programs. I propose that (1) Congress stop this redirection of REDL&G funds away from community and economic development projects, and (2) reauthorize the Guaranteed Underwriter Program to ensure that eligible private lenders are able to continue to utilize the program and thus continue to pay fees to REDL&G.

In addition, I recommend that the REDL&G program be authorized to play a key role in advancing our nation's energy security and climate change goals. Electric cooperatives already have biomass projects on line, producing renewable power and providing a positive solution to our farmers' environmental and water quality issues.

However, these projects are costly and difficult to finance. Whereas the REDLG program has been used in the past to help finance both ethanol and soy-diesel projects, biomass projects owned by electric cooperatives are presently not eligible for funding. We ask the Committee to authorize USDA to provide REDLG financing for these biomass projects owned by not-for-profit electric cooperatives.

OMB has been trying to limit the ability of REC's to receive RUS assistance for generating plants for some time.

Given the structure of the financial markets, why is it logical for that assistance to continue?

What is the expected volume of electric generating loan requests to the RUS over the coming 5 years and to the extent you are now aware of likely applications, please provide the committee with a list of the likely applications.

Electric Co-ops generate less than half our power supply needs. The rest of our electric power needs must be purchased from other sources. Electric coop consumers on average are therefore much more susceptible to market fluctuations than other traditional utilities which generate all their power supply needs. Maintaining a viable electric generating program is essential to protecting consumers in times of market fluctuations, like we saw in California during the deregulation fiasco.

Unfortunately, we don't have access to which co-ops currently have loan applications at RUS. RUS should have this type of information.

Questions for Hearing  
Senator Charles Grassley

You are here testifying on behalf of cooperatives, but anaerobic digestion occurs at the farm and that is where the benefits are realized. Why are COOPs advancing this idea?

Actually, electric co-ops are working with farmers at their behest to build and maintain manure digesters. While these facilities are not going to generate large amounts of power, it does help to alleviate the need for additional waste removal on the farm. Since the price to build and maintain manure digesters is relatively high for the average farmer to bear alone, there is very little market incentive to build these types of facilities.