



Fostering Renewable Electricity Markets

in North America

Executive Summary



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Table of Contents

Acknowledgements	4
Introduction	5
Purpose of this Paper	5
Structure of the Markets	6
Electricity Generation in North America	6
Demand-Side Drivers	6
Supply-Side Drivers	10
Recommendations	12
Canada	12
Mexico	12
United States	13
References	15

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Introduction

Renewable electricity is derived from naturally regenerating energy resources such as the sun, wind, water, biomass and heat from the Earth's interior. Hereafter, the term “renewable electricity,” or simply “RE,” will be used to refer to all renewable energy technologies for the generation of electricity. Although all hydroelectricity is renewable, this paper is limited to low-impact hydro. While definitions of low-impact hydro vary by jurisdiction, they generally include hydro-power facilities that meet all regulatory licenses and adequately protect or mitigate impacts on river flows, water quality, fish passage and protection, watersheds, threatened and endangered species, cultural resources, and public access and recreation opportunities. Other renewable energy applications, such as thermal biomass and biogas applications, biofuels such as ethanol, solar thermal or geothermal heating and cooling, are outside the scope of this paper.

The paper provides an overview of the key market demand and supply-side drivers for renewable electricity in each of the three North American countries. It then identifies regulatory mandates, voluntary purchases, self-supply and financial incentives as the most important drivers of a renewable electricity market in North America today. The paper also explores the opportunities for growing the renewable electricity market in each of the three countries. It then concludes with a series of brief recommendations for the market overall and for the Parties of the North American Agreement on Environmental Cooperation (NAAEC) to help foster a North American renewable electricity future.

Purpose of this Paper

The purpose of this paper is to assist governments of the three North American countries in supporting renewable electricity development by addressing informational and transactional barriers that add to renewable electricity costs, and by more actively assisting with policy implementation.

There is tremendous opportunity for renewable electricity to meet an increasing proportion of the North American electricity market. Many states and provinces in the United States and Canada have adopted some type of target for the supply of renewable electricity. At the same time, there has been an upsurge in the growth of the voluntary market¹ from large corporate and other commercial purchasers, particularly in the United States. Rising prices for natural gas and other fossil fuels have allowed suppliers to position renewable electricity as a hedge against fuel market volatility—demonstrating the value of renewables beyond environmental benefits. In Mexico, two new pieces of legislation will address some of the legal and market constraints on renewables if they are enacted. These and other factors show great promise for a continued growth of a renewable electricity market in North America.

1. An energy market that allows consumers to voluntarily select whether their electricity is supplied by renewable sources or nonrenewable ones.

However, the North American renewable electricity market faces a number of obstacles to its continued growth. In some locations, RE is cost-competitive with traditional resources, though its cost is more typically higher. The local, state/provincial, and national governments of the Parties to the NAAEC have different RE procurement rules.

Structure of the Markets

Policy drivers for renewable electricity depend on existing policy frameworks and the structure of the electricity sectors within each of the three countries.

In Canada, provinces have jurisdiction over resource development, including electricity, and as a result most aspects of energy policy and regulation reside with them. Any regulatory initiatives to increase production or to set resource targets also originate with the provinces. The federal government has jurisdiction over nuclear energy and, through the National Energy Board, regulates electricity exports and international power lines.

In Mexico, since 1960, the generation, transmission and distribution of electricity is the responsibility of the federal state, accomplished through its two vertically integrated utilities, the *Comisión Federal de Electricidad* (Federal Electricity Commission, or CFE) and *Luz y Fuerza del Centro* (Central Light and Power, or LyFC).² Energy policy is determined by the federal government with virtually no state-level involvement. Following amendments introduced in 1992, the Public Electricity Service Act (LSPEE) allows private sector participation in the generation of electricity in the form of self-supply, co-generation (combined heat and power), independent production and small production (not exceeding 30 MW); as well as import and export of electricity under conditions established for each case (*Ley del Servicio Público de Energía Eléctrica*, Art. 36, 1993), regulated by the *Comisión Reguladora de Energía* (Energy Regulatory Commission, or CRE).

The US electricity market is governed by the Federal Energy Regulatory Commission (FERC) and state public utility commissions. FERC is an independent government agency, officially organized as part of the Department of Energy. It is responsible for regulating the interstate transmission of electricity, wholesale electricity sales, licensing and inspecting hydroelectric projects, and monitoring energy markets and companies to protect customers from market manipulation. Individual state public utility commissions approve all utility resource plans and regulate retail sales of electricity and utility operations.

Electricity Generation in North America

Figure 1 depicts the current mix in electricity generation in Canada, Mexico and the United States. **Table 1** shows the installed electricity generation in each country.

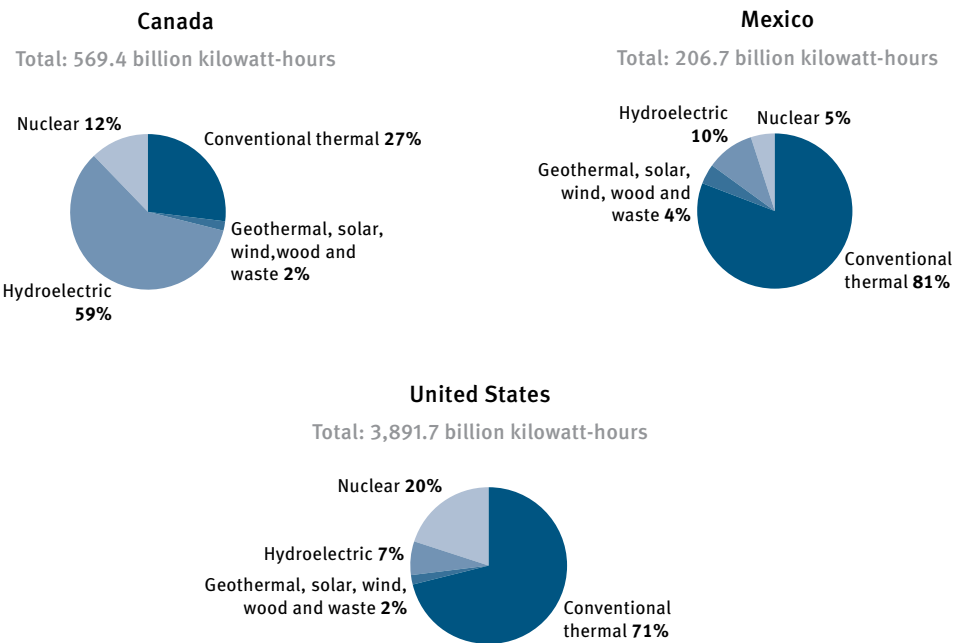
Demand-Side Drivers

Governmental mandates refer to various laws and regulations that require the use of renewable resources (such as the renewable portfolio standard (RPS) requiring or setting as a goal a certain proportion of the electricity production to come from environmentally preferable fuel sources) or policy imperatives for renewables. Each country has taken a different approach in this area, as discussed below.

The Canadian government has stated its interest in ensuring future generations enjoy clean air, clean water and clean energy. Canada is currently developing an environmental agenda

2. LyFC supplies the Federal District and the surrounding region in central Mexico, while CFE covers the rest of the country. CFE is in charge of 97% of the total generation capacity in Mexico (excluding self-supply) and provides electricity to meet most of the electricity needs of LyFC. Although in practice CFE is responsible for contracting virtually all new public sector capacity in Mexico (with the exception of a set of natural gas-based distributed generation plants that LyFC will soon install), any reference to CFE in this document applies in principle to LyFC as well.

Figure 1. Electricity Generation in North America (2003)



Source: Energy Information Administration, *International Energy Annual 2004*, <http://www.eia.doe.gov/iea/elec.html>.

that will address greenhouse gas and air pollutant emissions. It is anticipated that this agenda will help foster renewable electricity generation.

Several Canadian provinces have initiated aggressive measures, such as mandatory or voluntary renewable electricity targets, request-for-proposals, government procurement, and standard-offer contracts for renewable electricity. The levels of provincial/territorial mandates and targets are shown in [Figure 2](#). Quebec and Ontario have used quite aggressive requests for proposals as a means of increasing the electricity generation from renewable energy sources. The estimated amount of renewables expected from provincial and territorial RPS programs and targets is 9,140 MW by 2017.

Table 1. Installed Electricity Generating Capacity in North America by Type (1 January 2004)
(million kilowatts)

	Canada	Mexico	United States
Conventional Thermal	34.863	37.559	745.446
Geothermal, Solar, Wind, and Wood and Waste	2.419	0.979	19.462
Hydroelectric	70.197	9.650	77.641
Nuclear	10.615	1.365	99.628
Totals	118.094	49.553	942.178

Source: Energy Information Administration, *International Energy Annual 2004*, <http://www.eia.doe.gov/iea/elec.html>.

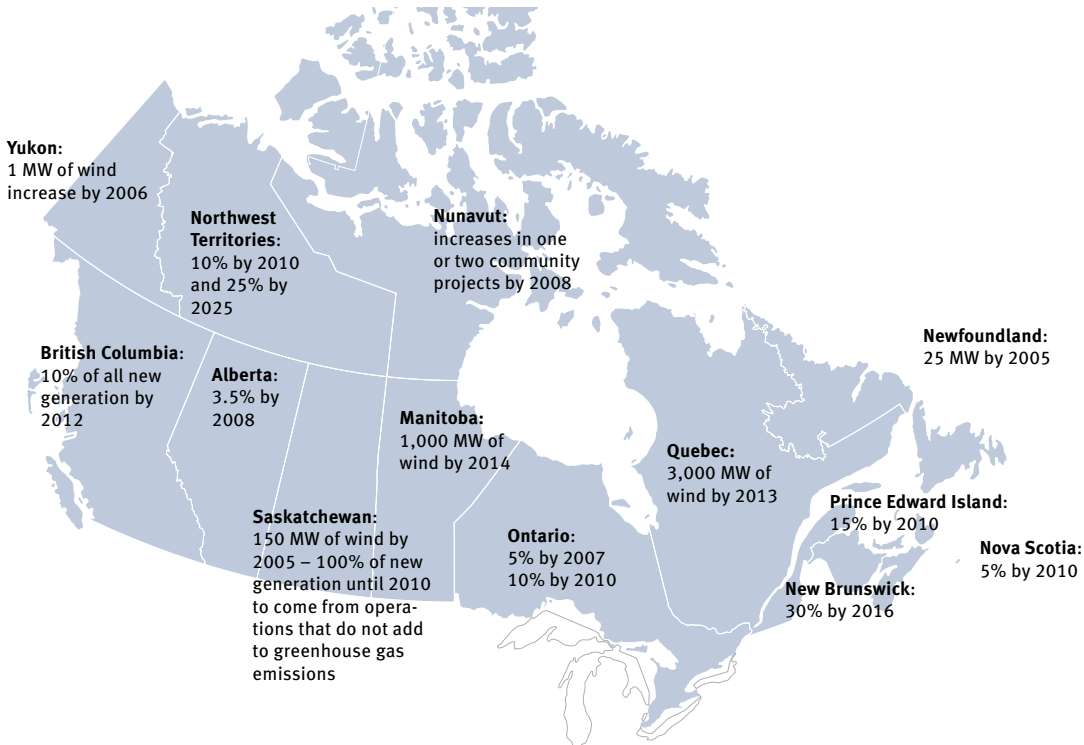
In Mexico, current planning calls for the installation of an additional capacity of 642 MW in wind and geothermal projects between 2006 and 2014. Expansion of capacity beyond that point has not yet been planned.

Of the three countries, the United States has the most governmental mandates, with twenty-one states that have enacted an RPS (see [Figure 3](#)). The state RPSs are currently the only significant regulatory drivers for new renewable development. The estimated demand for both new and existing renewable electricity is estimated to be 37,175 MW by 2017. Of this amount, approximately 32,000 MW is estimated to come from new renewable electricity.

Figure 4 summarizes the cumulative renewable electricity demand in North America from regulatory mandates.

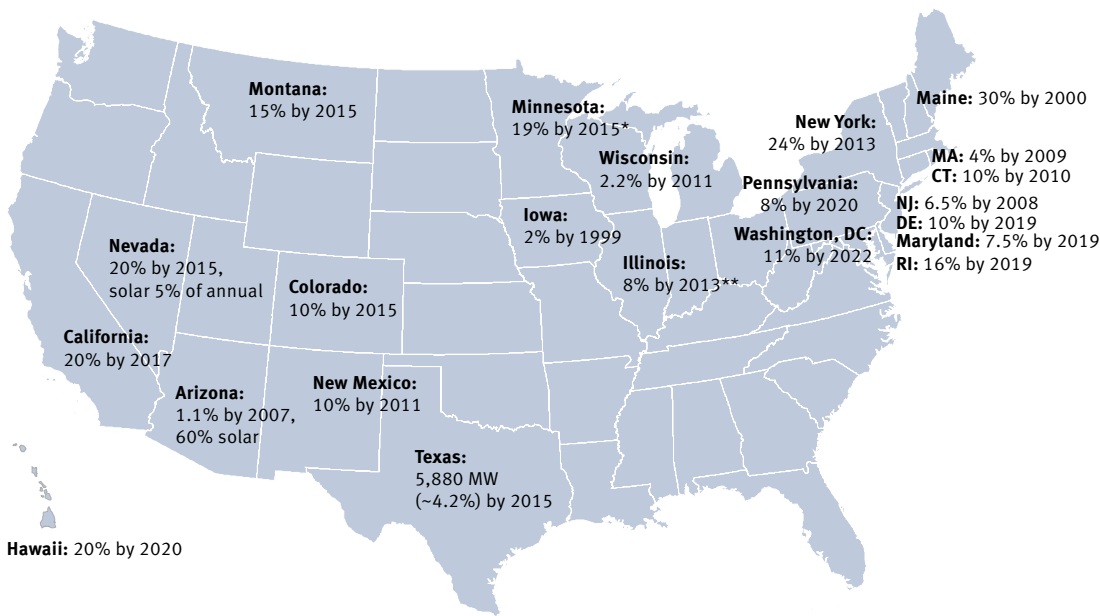
In addition, existing and proposed carbon regulations do provide incentives for renewables. Twenty-three US states have enacted programs and policies to monitor and or reduce greenhouse gas emissions that may impact the demand for renewable electricity. Policies to limit greenhouse gas emissions that may impact the demand for renewable electricity include setting limits for greenhouse gas emissions from power plants, introducing “carbon adders” to utility resource planning processes, and setting targets for statewide CO₂/greenhouse gas emissions. (A carbon adder is a sum of money that is added to the procurement costs of fossil fuel generation during a utility’s resource planning process to explicitly take into account the social costs of carbon emissions from electricity generation facilities.) Other actions may include states establishing working groups or commissions to develop climate change plans and policies. Some

Figure 2. Canadian Renewable Electricity Standards and Targets as of September 2005



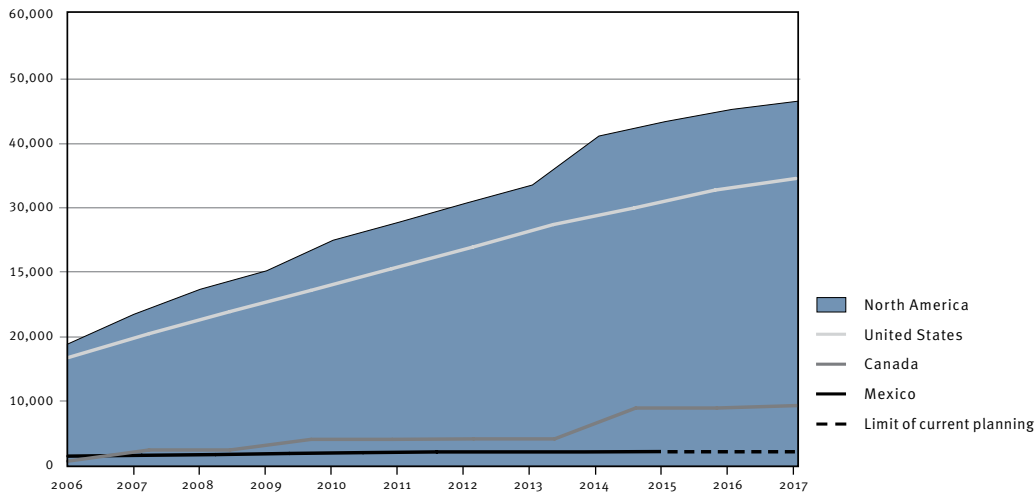
Source: Pollution Probe 2005.

Figure 3. United States Renewable Electricity Standards as of January 2006



*Includes requirements adopted in 1994 and 2003 for one utility, Xcel Energy. **No specific enforcement measures, but utility regulatory intent and authority appears.
Source: Union of Concerned Scientists 2005a.

Figure 4. Cumulative Renewable Electricity Demand in North America from Regulatory Mandates



Sources: Canadian Wind Energy Association 2005, Pollution Probe 2005, Union of Concerned Scientists 2005b. Current planning in Mexico does not extend beyond 2014.

states are also mandating the reporting of greenhouse gas emissions and several have established greenhouse gas registries for voluntary action.

At this time, the voluntary market for renewable electricity is a demand driver in the United States and Canada only (in Mexico, consumers can opt for the self-supply scheme discussed below). In the United States, the voluntary market has experienced exponential growth since the mid-1990s. This has been a result of the development of new products, the decreasing price of renewables, and the increased awareness of the benefits of renewable electricity. In 2004, 6.2 million MWh were sold in the voluntary market, of which almost half were to commercial, industrial and non-federal governmental customers. Altogether, voluntary purchases represented more than 2,000 MW of installed capacity. It is estimated that the voluntary market will support more than 7,000 MW of capacity by 2010.

The voluntary market in Canada is extremely small and immature. Although a handful of provinces have utility green pricing programs or green marketing programs, there is little demand right now for such products. In general, most voluntary renewable purchases in Canada will be counted toward provincial and territorial targets, and therefore, the authors estimate little additional demand from voluntary markets.

The combined total of Canadian and US federal government procurement of RE is estimated to be 2,850,000 MWh/year. This will create a demand for roughly 1084 MW of capacity.³ The authors do not include provincial or state or local government procurements in the summary total because it is assumed that these purchases are not incremental to the demand estimated from provincial targets in the case of Canada, and voluntary purchases, in the case of the United States.

Mexico does not currently have a federal renewable electricity procurement program. All three countries may be able to engage the North American Green Purchasing Initiative (NAGPI) to advance their efforts to promote renewable electricity.

Supply-Side Drivers

In Canada, there is an attractive array of incentive programs for new low-impact hydro renewable projects at both the federal and provincial level. These include: accelerated tax depreciation; direct production incentives; research, development and demonstration programs and funds; requests for proposals; standard offer contracts; and several provincial investment funds.

Similarly, the United States has a number of federal programs to support renewable electricity development, the most significant being the federal Production Tax Credit, the Energy Policy Act of 2005, the Farm Bill (Title IX), and presidential Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management." Furthermore, at the state level there are the Clean Energy Funds. In Mexico, the most significant supply drivers for renewable electricity are the accelerated depreciation allowance for renewable energy investments, and the Clean Development Mechanism.

The authors found that the major supply-side drivers for on-site generation are net-metering, standardized interconnection rules and financial incentives. Most policies and programs to encourage on-site distributed generation in Canada are at the provincial level. They include

3. The vast majority of the 2,850,000 MWh are from the United States, and they do not create demand for new installed generating capacity, as there is no new source requirement with US federal procurement. The majority of this is wind, and an optimistic capacity factor for wind is 30%. It should be noted, however, that in Canada, out of 147,000 MWh/year of federal purchases of electricity from renewable sources, 90,000 MWh/year come from small, low-environmental impact hydro with a capacity factor around 50%, the remaining production being from wind with an average of 30%. Furthermore, the Canadian federal program, Purchase of Electricity from Renewable Resources (PERR), has a clear eligibility requirement for new, incremental generating capacity.

eliminating the sales tax on small renewable energy equipment, net metering laws, and streamlined interconnection standards. Likewise, in the United States, net-metering laws and federal efforts to develop universal interconnection standards have been important to the growth of on-site distributed generation. In the US, state funds have played a critical role in helping to bring down the costs of installed distributed generation.

In Mexico, on-site or off-site self-supply is an important component of Mexico's renewable portfolio. Future large-scale grid-connected self-supply is expected to contribute 1,000 MW of new installed capacity in coming years and is benefiting from a new interconnection agreement developed by the Energy Regulatory Commission (CRE). Small-scale grid connected self-supply has good future potential in Mexico, but more work needs to be done to enable interconnection with the grid.

Notwithstanding these achievements and positive trends, there is room for improvement. Effective public policies supporting renewables need to be more widely implemented and lessons learned about programs or combinations of programs that worked or didn't work need to be more widely disseminated. Renewable electricity generation needs to be brought more on par with non-renewable generators, in terms of subsidies, tax incentives and other favorable government financing policies. Consumer understanding of the value of renewable electricity and the available green pricing options is low, and despite their large recent growth, voluntary markets for renewable electricity are still in their infancy in all three countries.

In Mexico, the legal framework of the energy sector is one of the greatest barriers to more renewable development. However, a growing consensus has emerged among a range of stakeholders about the need to foster renewable electricity. Consequently, a renewable energy bill and other bills have been proposed in Congress that would create a Renewable Energy Fund, require an increased amount of renewable electricity in the utilities' portfolio, pave the way for a voluntary green power market, and institute other measures to facilitate more renewable development by the State-owned utilities, independent power producers and self-suppliers. The passage and subsequent appropriation needed to implement these proposed laws is still pending.

To foster the continued growth of a North American renewable electricity market, the authors identify a number of opportunities where advancements would help achieve growth.

Recommendations

Canada

The overall recommendation for Canada is the development of a comprehensive renewable electricity vision and strategy through federal-provincial-territorial cooperation and stakeholder participation. The specific recommendations for Canada include:

Financial incentives

- Develop innovative financing mechanisms, to be tested through pilot projects.
- Capitalize on opportunities for renewable electricity projects with provincial and territorial governments that have policies to encourage the generation of electricity from renewable energy sources.
- Adjustment of tax policies for development expense write-offs and depreciation of project assets.

Address regulatory issues/institutional barriers

- Initiate a process for analysis and recommendations concerning the funding of transmission line extensions and upgrades.
- Support the development of national interconnection standards and/or refine net metering programs and interconnection standards where they exist.

Develop capacities/engage Canadians

- Create a national coordinating body or network with representatives from provincial, territorial, and federal government officials as well as key stakeholders.
- Establish centers of excellence to address technology and policy development.
- Develop Technology Road Maps that will help the private sector select and develop the best technology options to meet technical, environmental and market needs.
- Develop a comprehensive public education and outreach strategy to inform all segments of Canadian society about provincial/territorial and municipal renewable electricity targets as well as renewable electricity benefits and available options.
- Identify information gaps and lay the foundation for future plans and actions to address human resources and skills issues.

Mexico

The country-specific recommendations for Mexico, which should largely be achieved through the passage of the LAFRE bill, include:

Opportunities in CFE's expansion planning process

- Give an explicit mandate to the State-owned utilities to include renewable electricity in its expansion planning, as well as quantitative targets.
- Provide financial incentives for projects that deliver renewable electricity to the utilities, thereby compensating the positive externalities.
- Recognize the capacity contribution of intermittent renewable electricity sources—notably wind.
- Favor small-producer (under 30 MW) projects in two ways: (i) by giving the State-owned utilities the mandate to include some small projects in their expansion planning; (ii) by providing incentives to projects not included in the utilities' planning (thereby offering a supply driver for these projects).
- Review the methodology for determining the fossil fuel price forecasts.

Opportunities in green pricing schemes

- Create green tariffs with a long-term stability guarantee.

Supply-side opportunities to increase grid-connected renewable electricity in Mexico

- Consider redirecting any electricity premiums paid by the federal government toward the purchase of renewable electricity.
- Provide financial support for the assessment of the potential of renewable energy sources nationwide, thereby overcoming the lack-of-information barrier for all renewable electricity projects.
- Address public awareness, public participation and social responsibility, thereby contributing to foster social acceptance of renewable electricity projects.
- Promote administrative simplification and coordination by the federal, state and municipal authorities, in order to facilitate the procurement of the required licenses for new projects.
- Undertake awareness-raising activities in resource-rich areas.

Opportunities to increase on-grid self-supply of renewable electricity in Mexico

- Strengthen the role of development banks in the provision of guarantees for municipalities in self-supply agreements.
- Follow-up and replicate the experience of the Integrated Energy Services for Small Communities in Rural Mexico project.

United States

For the United States, the country-specific recommendations include:

Advancing industrial, commercial, and institutional procurement

- Help advance the creation of a national certificate-tracking network across the United States so that large buyers can feel confident of the renewable certificate purchases.
- Explore how the CEC's North American Green Purchasing Initiative may help expand the deployment of renewable electricity technologies and purchases of electricity or renewable certificates.
- Increase federal and state support for and involvement in renewable electricity outreach activities.

Financial incentives

- Explore the creation of a federal program to allow use of tax-exempt bonds for private developers of renewable electricity projects.
- Explore broadening existing incentive options or creating new ones at the state and federal level for renewable distributed generation and supporting renewable industry and infrastructure development.

Maintaining effective state RPS programs

- Encourage states to explore options for encouraging renewables through their air policy, including design of cap-and-trade programs.

Expanding public understanding of renewable electricity beyond the environment

- Develop materials that promote the benefits of renewables beyond their environmental value.
- Encourage the use of renewables as a financial hedge against volatile fuel prices.

The NAAEC Parties should be commended for their commitment to reduce the impacts of electricity generation and trade on the environment by supporting the increased deployment of renewable electricity technologies. The paper offers several recommendations for cooperation among all three NAAEC Parties for follow-up activities that may support a North American renewable electricity market and the deployment of more renewable electricity across North America.

1. Compile best practices for power system dispatch and integration of intermittent and distributed resources. Foster trilateral information sharing on best practices in a form that is most likely to be effective and useful.
2. Prepare a report that quantifies the financial value and public benefit of renewables as a hedge against fuel costs, a mechanism to increase portfolio diversity. The findings of the report would be tailored to two main audiences: utility integrated resource planners and large-volume electricity users that may not fully appreciate the price stability of renewables.
3. Help advance programs that will provide recognition to commercial, industrial and institutional purchasers of renewable electricity, such as the EPA Green Power Partnership, or “Made with Renewables” or similar product labeling initiatives. Support trilateral information-sharing on how to best develop a buyers’ recognition program.
4. Develop case studies of the most successful programs for encouraging companies to buy renewable electricity, install on-site renewable generation, or become equity owners in utility-scale generation projects. Identify the most compelling motivational factors for these electricity users. Investigate opportunities for enhancing, expanding or replicating such programs in relevant markets.
5. Help advance the development and expansion of a North American market for RECs. Assist the development of compatible standards for REC integrity and initiatives to prevent double counting of RECs used in voluntary and mandatory markets.
6. Help advance federal government renewable electricity procurement initiatives in each of the three countries.
7. Develop a compendium of policies, examples, best-practices, and “how-to guides” for off-grid, distributed renewable generation that would provide practical guidance for small groups, e.g., indigenous populations, to select, finance, and install renewable distributed generation.
8. Help advance work to update and expand user functionality of the North American Renewable Energy Directory.
9. Prepare a report focusing on the development, deployment and market drivers for renewable energy technologies.
10. Increase cross-border trading of renewables between the three countries on short- and long-term markets.

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