



**Environmental Challenges  
and Opportunities of the Evolving  
North American Electricity Market**  
Secretariat Report to Council under Article 13 of the  
North American Agreement on Environmental Cooperation

**10**

**Appendix**

**Government Comments on  
*Environmental Challenges and  
Opportunities of the Evolving North  
American Electricity Market: Secretariat  
Report to Council under Article 13 of the  
North American Agreement on  
Environmental Cooperation***

- **Canada**
- **Mexico**
- **United States**

**Date:** June 2002



**Secretariat Report to Council under Article 13  
of the North American Agreement on Environmental Cooperation:**

**Environmental Challenges and Opportunities of the Evolving North American  
Electricity Market**

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**Canadian Government Comments**

This was a beneficial exercise on a complex issue related to integration of the North American electricity market. The report is the culmination of an inclusive and transparent process, and we commend the CEC Secretariat for developing a process, including creating an Electricity and Environment Advisory Board, which brought together diverse interests.

The result is a report which provides one perspective on future growth and integration of the electricity sector and its implications for the environment. This provides the rationale for the identification of possible opportunities for cooperation.

The perspective presented is based on specific sets of data, analyses and a number of assumptions. While data sets can always be enhanced and analyses and assumptions improved, the perspective, as presented, provides a starting point for a debate which could include the further improvement of information and analyses.

The opportunities for environmental cooperation fall under four headings, and map out a series of actions which the Secretariat believes would be beneficial in informing policy on this topic: transboundary airshed management, innovative economic instruments, energy efficiency and renewable energy, and information planning and transboundary cumulative impact assessment. Governments have also identified some of the same opportunities, and are already taking action in a number of the areas identified by the CEC Secretariat as opportunities for cooperation. For example, bilateral discussions are underway between Canada and the US to explore the concept of a Western Ozone Annex and a Particulate Matter Annex.

In the other cases identified, there may well be opportunities for collaboration in projects or evaluations to advance our understanding of the issues. These will be discussed by Ministers at the June meeting of the Council and a course of action determined.

The report is a useful starting point, and will contribute to a healthy discussion around energy and environmental issues .



**MEXICAN GOVERNMENT COMMENTS ON THE DOCUMENTS OF THE STUDY**  
**“ENVIRONMENTAL CHALLENGES AND OPPORTUNITIES OF THE EVOLVING**  
**NORTH AMERICAN ELECTRICITY MARKET”**  
**PREPARED BY THE CEC**

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### **General comment**

The documents presented by the Commission for Environmental Cooperation of North America, referring to the region’s electricity market, represent a broad analysis of the current situation and future perspectives of electricity generation in Canada, the United States and Mexico, with regard to environmental impact and an analysis of energy policies.

The main problem found is pollution in geographically shared but jurisdictionally divided regions. In particular, without referring specifically to Mexico, there is concern that differences in environmental rules will lead to preferences in the location of generation plants, and it is highly recommended that more compatible environmental policies be established among the three countries.

As an alternative not specifically relating to environmental policy, the study proposes the promotion of “cleaner generation sources.” However, the proposed policy approaches are far from what is being discussed within Mexico, such as the suggested “internalization of the environmental cost of electricity”<sup>1</sup> or the establishment of minimum percentages of electricity generation based on renewable energy.<sup>2</sup>

It is also considered necessary to broaden the references to the references to advances in energy efficiency, since they appear to be raised without a clear understanding of what is happening in the region.

### **Specific comments on the Secretariat Report**

1. The last paragraph on page 31 indicates that “If power developers locate in regions of lower compliance costs (i.e., lower environmental standards), the question often arises, are these regions ‘pollution havens’? .... a simple comparison of environmental ‘standards’ across borders in an attempt to identify a ‘pollution haven’ needs to take into account differing circumstances, such as the degree of the pollution problem....” In this regard, and in any of the three countries, we consider it important to take into account that if a power developer wishes to install an electricity generation facility in either of the three countries’ two border zones (Mexico-United States or United States-Canada) to exclusively export its energy, it should be required to comply with the emissions standards of both its own country and the country where it installs.
2. The last paragraph on page 32 states, “There is a heated debate currently underway in the United States over differences in emission standards applied to new power plants and existing

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<sup>1</sup> Page 40 of the Secretariat Report.

<sup>2</sup> Page 6 of the document “Assessing Barriers and Opportunities for Renewable Energy in North America.”

‘grandfathered’ power plants.” Unlike the United States, Mexico has only one standard regulating emissions sources, depending on the boiler capacity, fuel type and the zone where the emissions source is located (metropolitan zone, critical zone or the rest of the country). Thus, wherever the electricity generation facility is located, as long as the emissions standard is met, the national environmental laws are also fulfilled. For this reason, the feasibility and practicality of a standard agreed upon by the three countries, permitting the installation of new electricity generation projects meeting the emissions standards in all three countries, should be analyzed. In Mexico’s case, it should be considered that, due to national circumstances, fuel-oil is produced with a high sulfur content that does not easily sold and thus must be used locally in conventional thermoelectric plants.

3. We consider that the topic “*Technological Innovation*” on page 33 should include energy generation based on geothermoelectric plants, as Mexico has advanced considerably in this field.
4. We find that the references to energy efficiency topics beginning on page 35 are made without a clear understanding of what is happening in the region. For example, the first paragraph on page 37 says that “*The greatest potential for energy efficiency improvements lies in changing residential and commercial building codes.*” This may be true for Canada and parts of the United States, but it is not the case in Mexico.
5. In this context, reference should be made to the problem arising from the flow of tens of thousands of second-hand equipment units, principally from the United States into northern Mexico, and the fact that they represent a serious energy inefficiency problem in the region.

### **Specific comments on the document “Environmental Challenges and Opportunities of the Evolving North American Electricity Market”**

1. The article is slanted toward the electricity market in the United States and its opportunities in Mexico and Canada, while the data presentation and analysis for these two countries is very limited.
2. In terms of per-capita energy use, Mexico and Canada are approximately 30% more intensive than the United States (1999 data). However, in terms of total CO<sub>2</sub> emissions, the United States pollutes 19 times more than Canada and 26 times more than Mexico. In terms of SO<sub>2</sub> emissions, the United States pollutes 7.3 times more than Mexico and 19 times more than Canada. As for NO<sub>x</sub> emissions, the United States pollutes 21 times more than Mexico and 20 times more than Canada. In Hg emissions, the United States releases 19 times more mercury than Canada and nearly 39 times more than Mexico. If we analyze per-capita emissions intensity, the United States releases almost nine times more CO<sub>2</sub> than Mexico and more than twice Canada’s emissions. Regarding SO<sub>2</sub> figures, the United States releases almost three times Mexico’s emissions and more than double that of Canada’s. In terms of emissions per Km<sup>2</sup>, the United States releases more than five times Mexico’s CO<sub>2</sub> releases and 1.5 times more than our SO<sub>2</sub> emissions. As for emissions per GWh produced, the United States has 1.22 times more CO<sub>2</sub> emissions than Mexico and three times more emissions than Canada (1998 data).

3. Nearly 50% of U.S. electricity generation is based on coal burning, which is the most polluting fuel that exists; only 14% is natural gas-based and 5% is based on fuel-oil. By comparison, Mexico uses coal in only two plants, and more than 60% of its electricity is generated from the burning of fuel-oil. Further, Canada derives around 60% of its generation from large hydroelectric plants.
4. The increased use of natural gas in the next seven years, in both the United States and Mexico, will contribute to a major reduction in the intensity of pollutant emissions (emissions per GWh), provided that the supply of natural gas is ensured for both countries in the coming years. However, if the economic outlooks show major increases in gas prices, the United States would resume using coal and Mexico would return to fuel-oil. Under this scenario, and considering that the United States would increase its capacity by more than 400,000 MW compared to an approximately 25 MW increased capacity in Mexico, the United States would remain as North America's biggest polluter.
5. One of the solutions proposed in this article to abate pollutant emissions in the three countries is to establish a baseline of emissions for a common year for the three countries and track reductions in subsequent years. The article identifies the main obstacle as the technical and resource differences in each country to reliably inventory pollutant releases and establish the baselines. However, the main problem may lie in the fact that the each country's emissions standards are disparate from each other because they correspond to the economic reality of each.
6. U.S. environmental programs for the construction of new electricity plants are strict, although the so-called grandfathered plants (which are the most polluting) are exempt from compliance. By contrast, Mexico intends not only to install new combined cycle plants with emissions-abatement equipment, but also plans to technologically reconvert its older plants. The disparity in standards, environmental programs and economic resources requires a policy and regulatory design congruent with each country's reality. Economic estimates show that to attain the electricity supply goals in the 2000-2010 period, Mexico's required investment as a function of gross domestic product (required investment/GDP = 0.029) is three times greater than that of the United States (required investment/GDP = 0.010). This means that Mexico must undertake an effort three times as large as the United States' to increase its electricity supply.
7. The environmental repercussions of a possible electricity trade in the three countries arise principally from the fact that the electricity-exporting country would, in principle, assume the environmental impact generated by the electrical energy to be ultimately used by the importing country. That is, energy importation results in the export of environmental impact, and vice versa. This would lead to the installation of electricity generation plants in the country or countries with the most lax environmental rules and regulations and the cheapest labor and materials. This would put Mexico at a disadvantage vis-à-vis its partners, from an environmental standpoint. In this sense, it would be convenient to internalize the environmental cost in the price of energy exports. This is not necessary only for nonrenewable sources, as the energy generated by large hydroelectric plants has an environmental cost (especially harm to biodiversity), which should be quantified and reflected in the price of energy generated using this source and exported to another country.

### **Specific comments on the document “Estimating Future Air Pollution From New Electric Power Generation”**

1. According to estimates from the Federal Electricity Commission (*Comisión Federal de Electricidad*—CFE), CO<sub>2</sub> and SO<sub>2</sub> emissions tend to decline through 2006 due to the increased usage of natural gas (clean fuel) and the latest technology with better electrical energy efficiency (combined cycle).
2. According to the same CFE estimates, between 2004 and 2006 NO<sub>x</sub> emissions will tend to stabilize.
3. To understand the behavior of mercury emissions, the CFE will issue estimates for 1995 through 2006. This information will be submitted to the Energy Secretariat in the near future.

### **Specific comments on the document “Design and Legal Considerations for North American Emissions Trading”**

1. It is important to note that under the North American Free Trade Agreement, there is an asymmetrical relationship between policies, regulatory mechanisms and costs as they regard environmental matters. We thus suggest that the following circumstances be taken into account:
  - The possibility that countries such as the United States and Canada provide opportunities for innovation or technology transfer to Mexico.
  - The cost difference in avoiding greenhouse gas emissions varies among the three countries, which will lead to difficulties at the time an emissions trade system is established.
  - The fact that the United States does not intend to ratify the Kyoto Protocol may endanger the international recognition of any emissions trade system established in the region, especially since Mexico has already ratified it. It will be necessary to ensure that the greenhouse gas emissions avoided in Mexico may be traded worldwide.
2. The overview section on the North American emissions trade mentions the achievements and programs in Canada and the United States in regard of reduced emissions of SO<sub>2</sub>, NO<sub>x</sub> and greenhouse gases, as well as the elimination of lead in gasoline. However, we consider that the document presented by the CEC does not take account of Mexico's programs, efforts and investments to reduce NO<sub>x</sub>, SO<sub>2</sub>, greenhouse gases and lead in gasoline. The inclusion of this information could enrich the analysis and give the region a better outlook.

### **Specific comments on the document “NAFTA Provisions and the Electricity Sector”**

1. This document establishes that under Chapter 6, Article 602, energy distribution is reserved exclusively to the Mexican State. For this reason, the document “A

Retrospective Review of FERC's Environmental Impact Statement on Open Transmission Access" does not apply to Mexico.

**Specific comments on the document "A Retrospective Review of FERC's Environmental Impact Statement on Open Transmission Access"**

1. While the document provides relevant information for modeling environmental impact scenarios for different fuels and generation processes, this chapter as it stands clearly does not apply to Mexico, as the transmission and distribution of electric power are reserved to the State under NAFTA.

**Specific comments on the document "Assessing Barriers and Opportunities for Renewable Energy in North America"**

1. Given the economic and technological differences among the three NAFTA countries, Mexico does not have an infrastructure allowing for the use of technologies to use renewable energy sources, either for population centers or a particular industry. However, it does recognize that large-scale renewable energies may bring economic opportunities such as the creation of jobs for the implementation, installation and maintenance of electrical energy plants using unconventional technology.
2. The equitable development of these technologies should consider that each country has different energy policies. In the case of Mexico, 33% of electrical energy production uses unconventional technology, while Canada and the United States have 54% and 55%, respectively. This is due to each country's energy resource availability and the region's geographical conditions, making any attempt at an integrated policy complex. Furthermore, it is necessary to consider that the costs of both generation and installation per Kwh are unprofitable for Mexico and an elimination of the electrical energy subsidy for this type of technology could lead to a halt in the development of renewable energies.





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460**

**OFFICE OF  
INTERNATIONAL AFFAIRS**

Ms. Janine Ferretti  
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Dear Ms. Ferretti,

The United States Government appreciates the opportunity to comment on the CEC Secretariat's report entitled "Environmental Challenges and Opportunities of the Evolving North American Electricity Market." We would like to thank the Secretariat, the members of the CEC Electricity and Environment Advisory Board, and everyone who contributed to the development of the report, the supporting documents, and the associated symposium and workshops. The Secretariat's efforts have laid the foundation for a productive dialogue within and between Canada, Mexico, and the United States about the future structure of the electricity generation sector and associated environmental impacts in North America.

We recognize that this report is a Secretariat work product prepared under Article 13 of the North American Agreement on Environmental Cooperation and that it is not intended to reflect the views of the Parties. However, we believe that there are some important issues that warrant further qualification, analysis, and/or discussion. Most importantly, the report overestimates the future growth, continental-scale integration, and environmental impacts associated with the electricity sector. Furthermore, the discussion of future needs and opportunities would benefit from more comprehensive comparisons across the three countries. Our comments are discussed further in the attachment and are intended to supplement the initial editorial comments we submitted to the Secretariat on April 25.

We appreciate the Secretariat's work to illuminate the environmental and trade challenges that may arise as the electricity sector continues to evolve. We now look forward to addressing these challenges together with our neighbors in Canada and Mexico through the CEC and other cooperative relationships.

Sincerely,

Judith E. Ayres  
Assistant Administrator

Enclosure



## **U.S. Government Comments on**

### **“Environmental Challenges and Opportunities of the Evolving North American Electricity Market,” Secretariat Report to Council under Article 13 of the North American Agreement on Environmental Cooperation, April 2002**

- Table 2 would be more useful if it showed electricity trade among all the Parties separately and in total. Actual trade figures should be distinguished from projections.
- In the section entitled “Long-range and Cross-border Environmental Impacts,” the maps would be more useful if they combined the information from the 3 countries and, perhaps, if they overlaid the information on wind patterns with the information on generation and fuel type. While the title of the sub-section mentions environmental impacts, the sub-section does not present information on the extent of environmental impacts of cross-border emissions or the impacts of such emissions.
- The methodology used to estimate the future growth in air pollutant emissions from new electricity generation capacity (see pp. 23-27) is unlikely to provide reliable results for several reasons. First, the estimates are based on announcements by utilities, private developers, and energy planners of plans to build new generating capacity. The “High Boundary” estimates are based on the unlikely assumption that all of the announced capacity will actually be built, despite the acknowledgement in the corresponding background paper that “only a fraction of these projects will likely go forward.” Self-reported schedules for capacity additions are also less reliable as the time horizon is extended. For example, under the report’s “Low Boundary” scenario, very little planned capacity is self-reported to come on-line from 2004 to 2007. Second, future emissions are a function of several variables, including socioeconomic factors, fuel prices, and advances in generation and emission control costs. Electricity generation or demand is a more salient indicator of future emissions than future capacity. Overall capacity is significantly higher than generation levels for reliability reasons. Third, and more importantly, the Secretariat’s projections do not take into account the offsetting reductions in emissions from existing sources that will result from existing and planned regulatory programs, emissions controls, and improved technology. All three of these reasons lead to an overestimation of the future emissions that will result from the electricity sector.
- To assess the cumulative impacts of future changes in the electricity sector on air quality, it is necessary to understand how emissions from existing sources will change in the future and how new sources will be regulated and controlled. With respect to the U.S., the report fails to discuss the implications of existing and proposed cap and trade programs for electric utilities, which will almost certainly accommodate new sources under the caps. If so, new sources would (by definition of the “cap”) not lead to increased overall emissions within the “emissions capped” country. The more salient discussion would be to discuss the

potential for (and possible remedies to) generating plants locating outside of a region covered by an emissions cap, but selling power back to that region.

- Building on the discussion paper “Estimating Future Air Pollution from New Electric Power Generation,” the report would benefit from a discussion of the key areas where better, more comparable data might be needed for the assessment of environmental impacts.
- On page 26 paragraph 2, the report mistakenly implies a contrast between certain regulatory tools such as ambient air quality standards and others such as cap and trade programs. In fact, these two tools are fundamentally complementary and should not be contrasted. Alternatively, one could compare a regulatory program based on plant-specific emissions standards contrasted with a cap and trade program. The US Government strongly supports the use of, and has extensive experience in implementing, cap and trade programs.
- The use of the term “National” in the title of Table 4 is confusing, despite the explanation in the footnote, since “National” is often synonymous with “Total.” The report should use a phrase such as “in each country” instead. The time frame applicable to the Table should be reflected in the title, and the table should make it clear that the “reference inventory” for each country is based on data (some estimated) from various years between 1995 and 1998. The last sentence of the footnote omits mention of several other types of activities that could reduce emissions, such as conservation and energy efficiency measures.
- It is an overstatement to say that the BC Hydro project signals “the emergence of a true North American market (p. 28, para 1).” The phrase “far from completely integrated” elsewhere in the paragraph is more apt. Note that the Advisory Board cites the BC Hydro project and related developments only as evidence of “growing regional connectivity (p. 42, paragraph 1).”
- More importantly, the report does not distinguish between North American integration and what may be the more likely dominant scenario – more localized regional integration.
- On page 28, paragraph 4, a more thorough discussion of transmission constraints and the potential for addressing these through 2007 would help provide a better picture of how rapidly market integration might take place (especially between the US and Mexico), and thus of the timing of the potential regional environmental impacts.
- The discussion of “Standards and Regulations (pp. 31-32)” suggests that the issue of pollution havens is more complex than depicted in the section entitled “Pollution Havens, Halos and Generation Clusters (p. 28).” Environmental considerations are just one component of a complex mix of factors, including

production costs, relocation costs, tariffs, and taxes, that may affect the location of investments.

- Given that the FERC Open Access EIS was one of the first attempts to analyze the environmental impacts of electricity sector restructuring, it is appropriate that a “retrospective review” was included in a discussion paper, even though it only applied to the United States. While the report appropriately highlights the conclusions of the discussion paper, it should also note that Woolf et al. found the FERC EIS to be accurate in many respects.
- On page 31, the report claims that “[t]he experience gathered in the United States suggests that the introduction of competition favored coal over other fuels.” While the “competition favors coal” scenario in FERC’s EIS for Order 888 may have come closest to forecasting year 2000 volumes of emissions, this does not necessarily imply that owner/operators of power plants chose coal over other fuels in response to the introduction of competition. The discussion paper on the “retrospective review” by Woolfe et al. notes that 1) the “competition favors coal” scenario underestimated generation in all three major fuel categories, and the error in forecasting coal-fired generation was the smallest and 2) many different factors may have contributed to changes in electricity-related emissions patterns subsequent to the issuance of Order 888, some not directly attributable to increased competition, including overall economic growth.
- On page 31 paragraph 2, the report suggests that an increase in natural gas prices by 2007 (the time horizon for analysis in the report) could lead to widespread decisions to switch from investment in gas-fired generation facilities to facilities using “dirtier” fuels. This overemphasizes the level of natural gas prices as a decision factor to the exclusion of other factors. Note that other factors (e.g., gas-fired facilities are generally less expensive to construct than other fossil-fired facilities, are easier to site, take less time to construct, and emit fewer pollutants) are equal if not greater factors in investment decisions regarding fuel type.
- On page 31 paragraph 2, the assertion that near term health and environmental impacts “will largely be determined by whether and where ‘cleaner’ electricity generation fuels can compete favorably with ‘dirtier’ ones” is debatable. Environmental policy—including which pollutants are regulated, how stringently they are regulated, how well environmental regulations are enforced, and the geographic areas where they apply—would seem to be an even more important factor.
- The CEC’s 1999 report *Assessing Environmental Effects of the North American Free Trade Agreement* (Volume 6, pp.351-352) identified four scenarios for the potential environmental impacts of an increased integration of North American electricity markets: 1) “inconsistent emission standards and regulatory uncertainty could lead to increased pollution;” 2) “open grids—combined with NAFTA guarantees for assured, open, region-wide trade and investment—could

improve environmental quality by accelerating capital turnover;” 3) “trade liberalization could open markets for cleaner generation technology and fuels;” and 4) “incentives and regulations could benefit end-use efficiencies and renewables.” The current report does not present a compelling argument as to why the first of these four scenarios was highlighted and the other four downplayed.

- As noted in the section entitled “Standards and Regulations,” there are major differences between the three countries. The report would benefit from a country-by-country discussion of basic air quality management programs and tools, including air quality standards, existing programs for the energy sector, transmission access, enforcement and compliance. It is necessary to perform such a fundamental comparative analysis before one can meaningfully explore the challenges associated with transboundary air quality management (p. 34) and cross-border emissions trading (p. 35).
- On page 32, the report would benefit from a discussion of the notification, consultation, and assessment of transboundary air pollution impacts of proposed and ongoing activities currently being carried out under the US/Canada Air Quality Agreement.
- On page 33, the report would benefit from a discussion of the increased potential for the coordinated development and marketing of technological innovations that may result from integrated North American electricity markets.
- On page 34, the report suggests that U.S. state renewable energy programs may be viewed as possible barriers to international trade. The report would benefit from an examination of similar relevant issues in all three countries. While the paper “NAFTA Provisions and the Electricity Sector” provides a very useful discussion, the potential for trade challenges may be more theoretical than real. A number of U.S. states already have renewables portfolio requirements. We have not encountered any trade disputes related to differing renewable energy standards or definitions, and we see no indication of any trade barrier arising from differing definitions.