Reducing GHG Emissions under EPA’s Section 111(d) Guidelines

Comments of the Canadian Electricity Association

I. Introduction
The Canadian Electricity Association (“CEA”) offers this proposal for the consideration of the Environmental Protection Agency (“EPA”), as EPA evaluates options for setting flexible, cost-effective guidelines to reduce greenhouse gas (“GHG”) emissions from existing power plants.

In this paper, CEA respectfully recommends that EPA develop and implement guidelines under section 111(d) of the U.S. Clean Air Act (“CAA”) in a manner that recognizes and leverages the integrated nature of the North American electricity grid, and promotes the continued two-way flow in cross-border electricity trade. Similarly, to the extent the guidelines may permit “outside the fence line” measures\(^1\) which credit GHG reductions from sources other than the regulated unit and which encompass non- and low-emitting sources of electric generation, then CEA believes that Canadian supply should be considered within this portfolio of solutions.

Such an approach can help to meet the criteria for the guidelines laid out in President Obama’s June 2013 memorandum and promote increased clean energy deployment in the U.S., while building on the legacy of successful cooperation between the U.S. and Canada in combating pollution together.

II. Description of CEA
CEA is the authoritative voice of the Canadian electricity industry, promoting electricity as a key social, economic and environmental enabler that is essential to North America’s prosperity. CEA members generate, transmit, distribute and market electric energy to industrial, commercial and residential customers across Canada and into the United States every day.

CEA is committed to pursuing opportunities for cooperation with government, industry and public interest partners in Canada and the U.S. on tackling shared challenges – in particular, the protection of our common air shed.

III. U.S.-Canada Electric Integration
Electricity plays an integral role within the vibrant U.S.-Canada energy relationship. There are more than 35 electric transmission interconnections between the Canadian and U.S. power systems, which together form a highly integrated North American grid (see Appendix 1).

\(^1\) In the context of discussions over flexible compliance mechanisms under 111(d), CEA is aware of proposals for “outside the fence line” GHG reduction measures such as demand-side energy efficiency programs; emissions averaging, trading or offsetting; renewable energy generation; and transmission upgrades.
These linkages between the U.S. and Canadian grids have enabled steady growth in a continent-wide electricity marketplace. Trade occurs and has occurred for decades – at a range of points across and beyond the border, with supply fulfilling demand in the most efficient, cost-effective manner possible (see Appendix 2). System integration and cross-border trade enables market participants to take advantage of supply diversity across the wider grid, reflected in the very different generation mixes in place in either country (see Appendix 3).

Among the various drivers underlying the expansion of U.S.-Canada electric integration over the years, the North American Free Trade Agreement (“NAFTA”) has featured prominently. As the common framework governing trade and investment across the continent, and with a specific segment devoted to environmental cooperation, NAFTA has been universally recognized as a great success in increasing cross-border energy trade, including in electricity. The shared benefits which have accrued to both U.S. and Canadian energy customers as a result of NAFTA have been significant. CEA therefore requests that the EPA develop and implement its 111(d) guidelines in a manner that respects the spirit and purpose of NAFTA.

IV. Leveraging Integration & Promoting Trade under the EPA 111(d) Guidelines
CEA applauds the EPA for committing to grant states broad flexibility in designing their respective programs for reducing GHG emissions from existing power plants. Consistent with these signals from the EPA, CEA strongly believes that the suite of regulatory flexibilities which will be extended should enable states to take advantage of cross-border integration and trade.

As detailed below, such an approach has the potential to facilitate substantial reductions in GHG emissions—to which numerous U.S. states and utilities can attest, having already reaped the benefits of a lower-emitting power supply through years of purchasing Canadian imports, or having already undertaken action to do so. Beyond reducing the emissions profile of the U.S. supply mix, this approach will also assist in fulfilling the other criteria for the EPA’s guidelines set forth in the President’s June 2013 memorandum.


Canada – A World Leader in Non- and Low-Emitting Generation
With abundant hydropower resources, a sizeable nuclear fleet and expanding renewable production, Canada boasts one of the cleanest supply mixes in the world, with approximately 80% non-emitting generation.

Canada’s portfolio is set to shift even further towards a lower-carbon profile, as a result of new federal regulations prohibiting the construction of new coal-fired plants without carbon capture and storage (“CCS”) technology and requiring existing plants to shut down following a
maximum of 50 years of operation (again, unless CCS technology is applied). It should be noted that the performance standard for the intensity of carbon dioxide ("CO₂") emissions established in these regulations – 420 tonnes per gigawatt-hour – represents the most stringent regulation of GHGs from coal units anywhere in the world.

With Canada’s coal-fired regulations finalized in 2012 and scheduled to take effect in 2015, new regulations limiting CO₂ emissions from natural gas-fired generation are also pending and will likewise be based upon this rigorous standard of performance. Accordingly, as these rules help foster a gradual decline in the share of coal-fired production in Canada’s supply mix and a transition to higher-efficiency gas units, any generation from fossil fuels in Canada is set to meet a stricter carbon intensity limit than that which the EPA proposed in its New Source Performance Standards for future power plants in September 2013.

**A Robust Cross-Border Trading Regime**

Historically, electricity exports to the U.S. have represented 5-10% of total electric generation in Canada. The majority of these exports involve the sale of surplus output from provinces with major hydropower resources, such as British Columbia, Manitoba and Québec. Export volumes from Ontario have also risen more recently, making the province the second largest exporter for several years. In 2012, nuclear and hydropower comprised just under 80% of Ontario’s supply.³

Over the years, this dynamic cross-border electricity trading regime has yielded tangible benefits in terms of assisting U.S. customers in transitioning to a lower-carbon economy. For example, from 2006-2012, exports of hydropower from Manitoba to utilities in the U.S. helped to reduce GHG emissions in the U.S. Midwest by over 47 million tonnes. Likewise, in recent years, increased sales of hydropower from Québec to neighboring markets have resulted in the avoidance of 53 million metric tons of GHG emissions – roughly tantamount to removing 13 million vehicles from the road.⁴

And in many U.S. states and regions, the importation of low-carbon Canadian electricity remains an appealing option to diminish reliance on older or less efficient fossil-fuel based energy systems even further. In Massachusetts, for example, the state’s clean energy and climate plan calls for expanding clean energy imports from Canada, with expected economy-wide GHG reductions totalling 5.1 million metric tons (or 5.4% of overall state emissions) by 2020.⁵

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² This figure is equivalent to 926 lbs/MWh.
Similarly, there has been a recent trend of formal recognition of imported hydropower from Canada under state-level Renewable Portfolio Standards ("RPS") and other renewable energy policies:

- June 2010 – Vermont revised its statutory definition of "renewable energy" to include hydroelectric generation of any capacity, including imported hydropower from Québec.⁶
- March 2011 – The Minnesota Public Utilities Commission authorized a state utility to apply environmental attributes associated with a new purchase agreement for hydropower from Manitoba towards fulfillment of the utility’s state renewable energy requirements.⁷
- July 2011 – Wisconsin modified its RPS to grant recognition to specific large hydroelectric facilities in Manitoba.⁸
- June 2013 – Connecticut amended its RPS to include imported hydropower from Canada as a qualifying renewable energy resource under specified circumstances.⁹

Moreover, Massachusetts’ current administration is leading a joint effort with its New England neighbors to explore ways to increase imports from large hydropower resources into the region.¹⁰ In step with this initiative, the New England States Committee on Electricity ("NESCOE") released an analysis in November 2013 of the economic and environmental impacts associated with hypothetical incremental levels of hydroelectric imports from Québec and Newfoundland and Labrador ("NL").¹¹ Under different scenarios of increased imports during a 2014-2029 study period, the analysis concluded that average annual electric sector GHG emission reductions in New England would range from 1.3 million to 8.0 million tons, with cumulative reductions ranging from approximately 58 million to 97 million tons.

While the NESCOE study underscored in clear terms the excellent potential of increased imports from Canada to help New England states meet their GHG emission reduction goals, it also observed the need for a measurement and verification system to validate the emissions attributes of these imports. CEA fully acknowledges the importance of verification and supports efforts to ensure that the environmental benefits associated with Canadian imports can be verified and

⁹ http://www.eea.pr-2013/ne-hydro.html.
represented with confidence by U.S. purchasers. In fact, such verification systems already exist in many places across North America: the Midwest Renewable Energy Tracking System (or “M-RETS”), which tracks renewable energy in numerous U.S. Midwestern states and the province of Manitoba; the Western Renewable Energy Generation Information System (or “WREGIS”), which serves as the renewable energy registry and tracking system for the Western Interconnection, including the provinces of Alberta and British Columbia; or the North American Renewables Registry, which covers facilities and jurisdictions not represented in other regional systems. The development of new tracking systems or the expansion of existing systems can be pursued as well.

The above examples are merely a sampling of the many ways in which non- and low-emitting electricity resources in Canada have provided and will continue to provide opportunities for meaningful reductions in GHG emissions from the U.S. electric power sector. In turn, they underscore the value and importance of EPA granting states the flexibility to implement the 111(d) guidelines in a way in which cross-border trade can be leveraged and optimized.

2. Canada-U.S. Electricity Trade Provides Reliable Power to U.S. Customers.

In tasking the EPA with developing guidelines under section 111(d) of the CAA, President Obama’s June 2013 memorandum instructs the agency to develop and implement these guidelines in a manner that is consistent with the provision of a reliable power supply. An approach which seeks to recognize and enhance cross-border integration and trade is likewise ideally-suited to helping to fulfill this objective.

As noted above, the interconnected nature of the North American grid offers numerous reliability-related advantages to both countries: (1) higher level of dependable service for customers through enhanced system stability; (2) efficiencies in system operation; (3) efficiencies in fuel management; (4) opportunities to use power from nearby markets to address local contingencies; (5) opportunities presented by seasonal/time zone variations associated with diversified load; and (6) expanded access to low-carbon and competitively-priced resources.

The physical and market linkages between the U.S. and Canada are made possible by adherence to a common set of operational and commercial rules, especially the following: (1) electric reliability standards developed by the North American Electric Reliability Corporation (“NERC”), which are mandatory and enforceable in all provinces with a footprint in the larger North American bulk power system; and (2) the standard market practices and protocols utilized by Independent System Operators (“ISOs”), Regional Transmission Organizations and other U.S. market participants. Compliance with these terms ensures greater liquidity in markets, and a greater diversity of supply options for customers throughout North America.
While a relatively small share of U.S. power consumption is composed of imports from Canada, these sales are nevertheless critical to the U.S. supply mix in many areas in close proximity to the border. For example, in 2010 exports from Canada represented the following percentages of total retail sales in these jurisdictions: Vermont, 38%; Maine, 18%; Minnesota and North Dakota (combined), 12%; New England (all states), 10%; New York, 6%; and Michigan, 6%.\textsuperscript{12} Likewise, in 2012 California became the fourth largest importer of electricity from Canada, with its purchases having tripled since 2009.\textsuperscript{13}

Other illustrations of the reliability benefits associated with cross-border electricity trade include the complementarity in the operational characteristics of segments of the grid on either side of the border. Many regions in Canada have winter-peaking systems, thus enabling them to contribute available surplus to adjoining U.S. regions which experience peak demand season during the summer.

Similarly, Canada-U.S. trade can serve to increase the diversity of supply options available in certain regions confronting unique challenges. For example, importation of electricity from Canada in New England has helped to mitigate this region's growing reliance on constrained natural gas supply and delivery systems. Having flexible import resources to call upon from Canada is vital to the reliable operation of New England's electric system, as the region remains dependent on natural gas for approximately 50% of its power generation needs.

In a variety of ways, cross-border trade is critical to the reliability of the North American transmission network and to the energy security of several U.S. regions. Implementation of the EPA's forthcoming 111(d) guidelines should therefore be planned and executed with the aim of supporting and strengthening such linkages.

3. \textit{Canada-U.S. Electricity Trade Provides Affordable Power to U.S. Customers.}

CEA has observed an emphasis on the need for cost-effectiveness to feature as a hallmark of the 111(d) guidelines. For example, the President's June 2013 memorandum expressly directs the EPA to tailor the guidelines to reduce costs and to promote affordability in their development and implementation.

On the grounds of cost-effectiveness, the case for promoting cross-border trade under the EPA's guidelines is further bolstered. For years, electricity imports from Canada have served as a cost-

\textsuperscript{13} National Energy Board, \textit{Electricity Exports and Imports}, 2009-2012.
effective resource able to compete with a diverse set of supply options in both bilateral and wholesale power markets across the U.S.

This fact has been acknowledged in numerous ways by U.S. customers purchasing Canadian power and those entrusted with safeguarding their interests. Within the expansive community of U.S. voices attesting to the cost-effectiveness of transactions with Canadian market participants, CEA wishes to commend the following examples for the EPA’s consideration:

- In its most recent assessment of competitive performance of the ISO New England electricity markets, the External Market Monitor concluded that the importation of electricity from Québec and New Brunswick “reduces wholesale power costs for electricity consumers in New England.”\textsuperscript{14}

- The aforementioned NESCOE study of incremental hydroelectric imports from Québec and NL found average annual economic benefits associated with reduced electricity prices in New England ranging from US$103 million to US$471 million, with cumulative reductions in customer costs during the study period ranging from US$3.325 billion to US$5.652 billion.\textsuperscript{15}

- The Market Monitoring Unit (“MMU”) for the New York ISO has consistently observed a correlation between availability of electricity imports from adjacent Canadian jurisdictions and reduced market prices. For example, after a 20% increase in the market price from 2009-2010, the MMU identified a diminished level of imports from Québec as a key factor contributing to increased energy prices.\textsuperscript{16}

- A 2012 independent analysis of the economic impacts of the proposed Champlain Hudson Power Express transmission line in New York – a 330-mile underwater and underground line that will deliver hydropower from Québec into New York City – projected annual savings to consumers of more than US$650 million in the form of reduced electricity costs.\textsuperscript{17}

- In late 2013, the Midcontinent Independent System Operator (“MISO”) released a study examining whether the costs associated with enhanced transmission capacity between


\textsuperscript{15} NESCOE, \textit{supra}.


\textsuperscript{17} \url{http://www.chpexpress.com/docs/Analysis-of-the-Macroeconomic-Impacts-of-the-Proposed-CHPE-Project.pdf}, p. 4.
Manitoba and MISO would enable greater penetration of wind resources across the organized market. The study concluded that significant benefits would be derived from adding new capacity, including weighted average load cost savings of US$430 million annually through 2027.18

It is clear, then, that the marketing of electricity across the border has a proven track record of helping to maintain the affordability of power supplies in many U.S. regions. In addition, because the cost of generating non-emitting electricity is not dependent on fossil fuels, imports of electricity from non-emitting sources can assist with stabilizing electricity prices in regions subject to the price volatility inherent in fuel markets.

Cognizant that the EPA takes seriously its charge to develop and implement the 111(d) guidelines in the most cost-effective manner possible, CEA therefore strongly recommends that the agency extend states the flexibility to leverage access to competitively-priced resources from Canada and refrain from erecting any barriers – whether deliberate or otherwise – to doing so.

4. Canada-U.S. Electricity Trade Enables Development of Clean Energy in the U.S.

CEA notes with interest that the June 2013 presidential memorandum calls for the EPA to promote the continued development of cleaner technologies through the 111(d) guidelines. A fourth and final way in which U.S.-Canada electric integration can assist the EPA in meeting this and other objectives relates to the ability of energy deliveries from Canada to support the development of non- and low-emitting resources in the U.S.

In this regard, a compelling example is the marriage of wind and water which occurs in many cross-border contexts across North America. Often the storage capability of hydropower capacity in Canadian provinces can be used to firm-up the development of wind and other intermittent renewables in adjacent U.S. states.

The recent establishment of a long-term power purchase agreement between Manitoba Hydro and Minnesota Power for this exact purpose is an excellent illustration of this common synergy between the Canadian and U.S. grids. This agreement includes a “wind storage” provision, entitling Minnesota Power to deliver generation from its North Dakota wind farms into Manitoba, where the energy can be absorbed into the province’s hydroelectric system.19 In multiple public forums, Minnesota Power has repeatedly underscored how this agreement is vital

to its plans to maximize the operational efficiency of its existing wind resources and to further expand its wind development in the Midwest.\textsuperscript{20}

Elsewhere, this wind-water synergy is yielding or is set to yield similar sets of benefits in ways which are specific to the needs and interests of the local jurisdictions involved. In New York, for example, a long-standing plank of the current state administration’s energy policy platform has been the addition of new transmission capacity to enable the purchase of competitively-priced, renewable hydropower from Canadian provinces to complement the sale of surplus energy from upstate wind resources.\textsuperscript{21}

Accordingly, in view of the material advantages cross-border integration can offer to the development of non- and low-emitting power generation projects in the U.S., CEA believes that such opportunities should be fully promoted and enabled under the EPA’s 111(d) guidelines.

\textbf{V. Conclusion}

The United States and Canada enjoy a legacy of exemplary cooperation in environmental protection. From combatting acid rain to maintaining the health of the Great Lakes region, a long history exists of confronting challenges to shared air and water resources in a creative, effective fashion. Environmental collaboration is also a mainstay of the broader backdrop for shared economic prosperity which NAFTA has helped to propel forward.

CEA strongly believes that there is an excellent opportunity to build upon this foundation of success as the EPA develops guidelines under the CAA to reduce GHGs from existing power plants in the U.S. In this spirit, and with the aim of seeking to support the EPA’s efforts to establish flexible, cost-effective guidelines which will achieve meaningful emission reductions, CEA has offered the recommendations set forth in this proposal.

As described above, guidelines that recognize the overall value and potential of U.S.-Canada electric integration and trade – including through any “outside the fence line” measures which the EPA may permit – will help the U.S. achieve a cleaner emissions profile, enhance reliability, reduce electricity prices and encourage more development of U.S.-based renewables.

CEA sincerely appreciates the EPA’s consideration on this matter and looks forward to remaining engaged with the agency on this important initiative.

\textsuperscript{20} For example, see Minnesota Power’s May 2012 comments to the U.S. Senate Energy and Natural Resources Committee on the \textit{Clean Energy Standard Act of 2012}: \url{http://www.gpo.gov/fdsys/pkg/CHRG-112shrg74903/pdf/CHRG-112shrg74903.pdf}.

APPENDIX 1

The Integrated North American Transmission Grid

Map copyright Canadian Electricity Association. Lines shown are 345 kilovolts ("kV") and above. There are numerous interconnections between Canada and the U.S. under 345 kV that do not appear on this map.
APPENDIX 2

Electricity Exports and Imports Between Canada and the U.S. (2012)

Map copyright Canadian Electricity Association.

U.S.-Canada Electricity Trade Volume (1990-2012)

Graph copyright Canadian Electricity Association.
APPENDIX 3

Canadian Electricity Exports as a Percentage of Total Retail Sales in U.S. States/Regions (2010)

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Vermont</td>
<td>38%</td>
</tr>
<tr>
<td>Maine</td>
<td>18%</td>
</tr>
<tr>
<td>Minnesota &amp; North Dakota</td>
<td>12%</td>
</tr>
<tr>
<td>New England</td>
<td>10%</td>
</tr>
<tr>
<td>New York</td>
<td>6%</td>
</tr>
<tr>
<td>Michigan</td>
<td>6%</td>
</tr>
<tr>
<td>Montana</td>
<td>2%</td>
</tr>
<tr>
<td>Washington</td>
<td>2%</td>
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</tbody>
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While Canadian power exports may constitute only a small percentage of electricity consumption in the United States nation-wide, they are critical to the energy security of numerous states and regions. The adjoining table shows the share of total retail electricity sales in various U.S. jurisdictions represented by exports of Canadian electricity into those areas in 2010.


Electricity Generation in the U.S. and Canada by Fuel Type (2012)

UNITED STATES
Total Electricity Generation in 2012 = 4054 TWh
- Coal 37.4%
- Natural Gas 30.4%
- Nuclear 19.0%
- Hydro 8.7%
- Petroleum 0.6%
- Other Renewables 0.4%
- Other Gas 0.3%
- Other 0.3%

CANADA
Total Electricity Generation in 2012 = 595 TWh
- Hydro 49%
- Nuclear 18%
- Conventional Steam (e.g. coal) 15%
- Combined Turbine (e.g. natural gas) 9%
- Wind 2%
- Other 2%

Numbers may not sum to 100 percent due to rounding.
Retrieved June 21, 2013

Chart copyright Canadian Electricity Association.