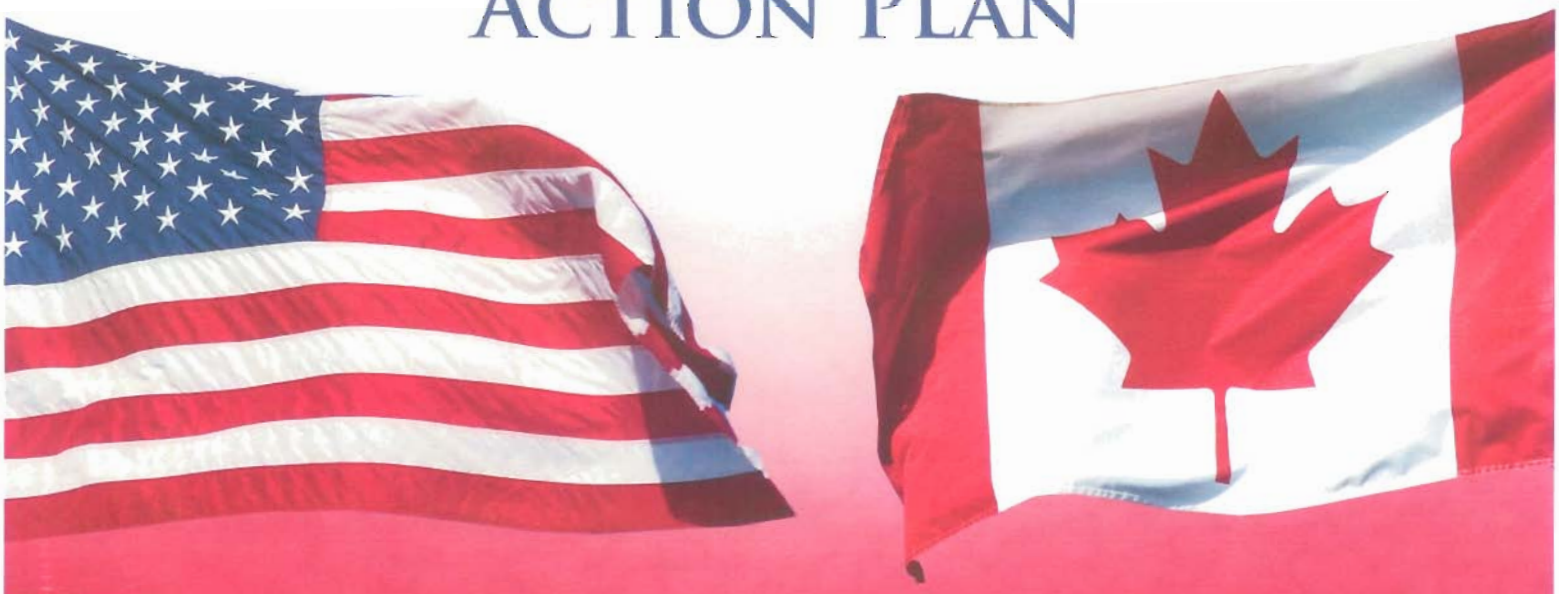
U.S. - CANADA
CLEAN ENERGY DIALOGUE
ACTION PLAN



FIRST REPORT OF THE WORKING GROUPS TO:

THE HONOURABLE JIM PRENTICE
MINISTER OF THE ENVIRONMENT
CANADA

THE HONORABLE STEVEN CHU
SECRETARY OF ENERGY
UNITED STATES OF AMERICA

SEPTEMBER 16, 2009

Environment Canada Environnement Canada

U.S. DEPARTMENT OF ENERGY

U.S. — Canada Clean Energy Dialogue Action Plan

Transitioning to a Low-Carbon Economy

> "*The President and the Prime Minister agreed that environmental protection and the development of clean energy are inextricably linked and announced plans to work together to build a new energy economy as a key element of broader economic recovery and reinvestment efforts.*"
>
> Clean Energy Dialogue Announcement, February 2009

Climate change is a pressing global policy challenge, and the United States and Canada are taking action to reduce greenhouse gas emissions and accelerate the transition to a low-carbon economy. Realizing these goals will require the advancement of clean energy technologies, which will in turn address the joint challenges of climate change mitigation, enhanced energy security, and the revitalization of the economy through the creation of clean energy jobs.

To put our countries on a path to achieve low-carbon development, both the United States and Canadian Governments are currently working to establish comprehensive legislative and regulatory approaches to reducing greenhouse gas emissions and enhancing energy security. The United States and Canada have announced ambitious emissions reduction goals for 2050, and will work to institute flexible, market-based systems to bring about economically and environmentally effective mitigation.

The U.S.-Canada energy market is highly integrated and has led to a mutually beneficial trading relationship that allows us to achieve a more diversified generation resource mix. The United States and Canada are already undertaking investments in the next generation of energy technologies. In the United States, the economic stimulus bill signed by President Obama in February 2009 provides for significant investments in clean energy technologies, as will the President's ten-year funding proposals for energy research and development to transition to a clean energy economy. Canada – along with its provincial partners – has recently announced substantial funding for emerging technologies that will mitigate climate change.

In addition to the important steps we are taking domestically, our efforts will be further reinforced by working together, as evidenced by our history of success in addressing shared challenges. Through enhanced U.S.-Canada collaboration on clean energy, our countries have a great opportunity to accelerate our collective progress towards a clean energy future.

Clean Energy Dialogue Update

A key component of our countries' joint efforts to build a low-carbon economy is the **U.S.-Canada Clean Energy Dialogue** (CED), which was launched by the President and Prime Minister in February 2009, and is led by Secretary Steven Chu, United States Department of Energy, and the Honourable Jim Prentice, Minister of the Environment, Government of Canada.

The CED was created to enhance collaboration on the development of clean energy technologies to reduce greenhouse gas emissions and address climate change.

In order to realize the objectives of the CED, the United States and Canada established three bilateral government Working Groups to identify key opportunities for joint collaboration in each of the following priority areas:

1. Developing and deploying clean energy technologies;

2. Building a more efficient electric grid based on clean and renewable generation; and

3. Expanding clean energy research and development.

A key product of the Working Groups' efforts was the organization of a Roundtable that solicited input from clean energy experts in the private sector, academia, and non-governmental organizations. The Roundtable focused on the most productive activities to undertake to further U.S.-Canada collaboration in accelerating deployment of clean energy technologies into our shared marketplace.

Based on the collective expertise of working group members, and incorporating the suggestions generated by the Roundtable as well as priority project lists identified by both Governments, the CED Working Groups have developed a series of key recommendations for the Governments to consider. These recommendations are focused on four broad types of activities:

- Accelerate the **development and demonstration** of clean energy technologies;

- Strive to develop compatible key **regulatory standards**;

- Enhance collaborative **research and development**; and

- Increase **public awareness** and outreach.

The following sections provide an overview of these recommendations within each of the three CED focus areas, identify joint activities, and describe possible next steps for the Dialogue.

Carbon Capture and Storage

Strengthening bilateral collaboration on carbon capture and storage (CCS) will help shorten the timeframe for CCS deployment, and encourage consistent cross-border regulatory and policy approaches to CCS. CCS holds tremendous promise for North American climate and energy security, and is a critical technology for significantly reducing carbon dioxide (CO_2) emissions from large industrial point sources that use fossil fuels. Applications include strategic sectors of the economy such as coal-fired electricity, which currently accounts for one-third of total CO_2 emissions in the United States and 13 percent in Canada. The timely implementation of CCS

will enable both countries to develop and use their domestic fossil fuel resources in a way that mitigates climate change while enhancing energy security.

Canada and the United States already collaborate extensively on CCS technology, notably through one of the largest CO_2 geological sequestration projects in the world, at Weyburn-Midale, Saskatchewan. Our countries also collaborate in other bilateral and multilateral fora, such as the Plains CO_2 Reduction Partnership, the Carbon Sequestration Leadership Forum (CSLF), and the recently established Global Carbon Capture and Storage Institute (GCCSI).

In order to bolster our efforts to combat climate change, we recommend advancing CCS technologies by undertaking the following:

- Identifying shared priorities in Canada and the United States to advance CCS in the coal-fired electricity sector and other large industrial emitting sectors;

- Bolstering joint efforts to both demonstrate the viability of existing CCS technologies on a large-commercial scale in key sectors, as well as to develop the next generation of more efficient and cost-effective technologies;

- Developing and sharing best practices in order to enable the widespread deployment of CCS, including on the proper legal and regulatory frameworks, and to effectively engage the public; and

- Strengthening the U.S.-Canada partnership on CCS by engaging federal and state/provincial Governments, as well as industry, universities, and other non-government entities in collaboration activities.

To that end, under the U.S.-Canada Clean Energy Dialogue, the two countries have agreed to form a *U.S.-Canada CCS Collaboration* under the current Trilateral Energy Science and Technology Agreement (TESTA) which can support U.S.-Canada or U.S.-Canada-Mexico cooperation.

We recommend that this initiative build on existing U.S.-Canada collaboration to address climate change through the use of CCS, and focus on the following activities:

1. North American Carbon Atlas

The existing *Carbon Sequestration Atlas of the United States and Canada* will be updated and expanded based on integrated efforts by the United States and Canada to better analyze and map out CO_2 sources and geological storage opportunities.

2. Next Generation Technologies

Enhancing links between Canadian and U.S. CCS researchers will be facilitated in order to advance research on next generation CCS technologies. Research institutes (including the United States Department of Energy-supported National Laboratory programs and Energy

Frontier Research Centers, and Natural Resources Canada's CanmetENERGY laboratories) and universities will advance collaborative opportunities such as research exchanges, joint research projects, and other activities in order to promote excellence in science and complementary research and development activities.

3. CO_2 Injection and Storage Testing

Existing collaboration in testing the underground injection of CO_2 and monitoring its behavior in the storage reservoir – such as the Weyburn-Midale CO_2 Monitoring and Storage Project and the Fort Nelson project in north eastern British Columbia – will be expanded, and new opportunities explored.

4. Collaboration on Large-Scale Coal-Fired Power CCS Demonstration

A common 'forum' will be established to share and disseminate best practices and lessons learned from large-scale CCS demonstration projects at coal-fired power plants and at other sites of mutual interest.

5. Strategies for Public Engagement

Canada and the United States will share information and best practices, and, where appropriate, coordinate on strategies for engaging and communicating with the public on CCS.

6. Working Towards Compatible Rules, Standards, and Practices

In order to facilitate future cross-border CCS projects and minimize business barriers due to potential differences in regulatory requirements, Canada and the United States will work towards compatible CCS project rules, standards, and monitoring – as well as verification and accounting principles – across jurisdictions.

7. Bilateral National Conference

To further this dialogue and to facilitate these activities on an ongoing basis, an annual bilateral CCS conference will be instituted. The conference will bring together Canadian and U.S. CCS experts from the public and private sector to share best practices and provide updates on the activities above.

Schedule:

- By the end of 2009, the *U.S.-Canada CCS Collaboration* will be formalized through a CCS Implementation Agreement under TESTA, and details for the above activities, including timelines and mutual roles, will be developed.

- Where applicable, specific agreements will be developed for individual activities in early 2010.

Electricity Grid

As demand for electricity continues to grow, both countries require major investments to meet that demand, replace aging facilities and equipment, and realize efficiency gains. Renewal of the electricity sector thus represents a significant opportunity to reduce the sector's environmental footprint; failure to make the right investment decisions today could lock-in high emission levels for many years.

The North American electricity market is integrated across national borders through north-south interconnected grids, with electricity flows between Canadian provinces and interconnected United States regions exceeding Canadian interprovincial power transfers. These flows are important for balancing loads and managing reliability in both countries, as well as ensuring that each country minimizes the use of back-up generation capacity – which is often more polluting – during peak load periods. This interconnectedness has led to a trading relationship where both countries benefit from seasonal differences in electricity demand and achieve a more diversified generation resource mix than would be possible without trade.

In order to realize a reliable, adequate and secure North American electrical system – which will support a cleaner energy portfolio while providing cost effective energy solutions to consumers – the Working Group commits to regular joint public-private collaboration and dialogue, and recommends the following five priority areas on which to focus:

- Greening electricity supply by increasing cleaner generation and transmission technologies;
- Expanding and modernizing the grid by developing new grid capacity and deploying smart grid technologies;
- Matching supply and demand by improving system flexibility and by garnering a better understanding of existing and potential electrical storage capability, market issues and future opportunities;
- Investing in workforce development to create educational opportunities and provide incentives for career choice; and
- Engaging in public outreach in order to allow consumers to be a part of the solution.

To that end, we recommend for consideration the following activities:

1. Increasing Opportunities for Trade in Clean Electricity

The United States Department of Energy and Natural Resources Canada will work with industry and other levels of government to facilitate the identification of potential resources and markets for increased clean electricity and ancillary services trade between the United States and Canada. This assessment should include an evaluation of the adequacy (location and capacity) of the existing international interties to meet market needs. As part of this work, Canada and the United States will identify at least two universities to host research centers which would study

and promote cross-border electricity trade and the modernization of the North American electricity grid.

2. Advancing Smart Grid and Clean Power Technologies

Both Governments will ensure joint participation and open information exchange of government-sponsored electricity research, development, and deployment (RD&D), as well as government and industry sponsored reliability standards, cyber security, and interoperability guidelines development. For example, broader participation through the North American Synchrophasor Initiative (NASPI) will create a robust, widely available and secure synchronized data measurement infrastructure for the interconnected North American electric power system. This collaboration will enhance analysis and monitoring tools that allow for better planning and operation, as well as improved reliability.

3. Realizing the Potential of Power Storage

As a first step, the United States Department of Energy and Natural Resources Canada will engage industry and other levels of government to improve understanding of the existing storage potential, particularly existing live storage potential, across the Canada-U.S. grid and the role it may play in the expansion of emerging renewable energy capacity across the continent.

4. Building the Power Work Force of Tomorrow

Canada and the United States will work with industry and educational institutions to identify the additional skills necessary to meet future labor requirements associated with modernizing and building a more efficient electricity grid. Information and best practices for skills development programs will be shared and, where appropriate, strategies coordinated for engaging and enhancing these programs.

5. Keeping the Dialogue Going - the Canada-U.S. Electricity / Smart Grid Forum

In an effort to increase collaboration and cooperation, the United States Department of Energy and Natural Resources Canada, will host a regular Canada-U.S. Smart Grid Forum. This annual Forum would serve as a mechanism to assess progress toward the objectives outlined above and identify new priorities. The Forum will also provide an opportunity to engage key players from all levels of government, industry and stakeholders, and will serve as a venue to inform the public, obtain customer and industry input, and guide policy.

Schedule:

- These activities will be initiated in the fall of 2009.

Clean Energy R&D

Research and development (R&D) are the basis for new discoveries that can lead to improved lives, a cleaner environment, better jobs, and economic prosperity. President Obama and Prime

Minister Harper agreed in February 2009 that, with regard to expanding clean energy R&D, the Clean Energy Dialogue would focus on: (1) advanced biofuels, (2) clean engines, and (3) energy efficiency. These focus areas correspond well with shared national priorities around low-emission power systems, low-emission transportation systems, and net-zero energy buildings and communities. Pursuing joint R&D and demonstration (RD&D) in these and other areas will enable significant greenhouse gas (GHG) reductions while strengthening North American economic performance and creating green employment.

Although Canada and the United States have similar clean energy RD&D interests and numerous existing joint initiatives, there are many areas in which we could enhance and expand this relationship. Working together will facilitate much-needed technology breakthroughs and leverage resources, acting as a force multiplier and allowing us to significantly accelerate the development and deployment of clean energy technologies.

We recommend the following objectives to assist us in achieving these goals:

- Developing a framework for Canada-U.S. clean energy RD&D collaboration, to provide mechanisms and resources for expanded joint initiatives;

- Identifying and describing, through a joint roadmapping initiative, the technology and associated R&D policy pathways that will allow Canada and the United States to meet our respective 2050 GHG emissions reduction goals; and

- Launching several collaborative projects immediately.

Pursuit of a two-pronged approach consisting of an RD&D framework and roadmap, at the same time as launching immediate collaborative projects and initiatives, will provide the building blocks for robust collaboration. Accordingly, we recommend for action the following initiatives:

1. Clean Energy RD&D Collaboration Framework

In order to expand collaboration, the United States and Canada will develop a Clean Energy RD&D Collaboration Framework. The Framework will identify resources and offer mechanisms to enable: increased levels of collaborative research, development, and demonstration among technical laboratories, industry and academia; significant sharing of information and frequent exchanges of personnel; creation of virtual labs; establishment of formal linkages between institutions and projects; and increased shared-use of unique facilities and scientific infrastructure.

2. Clean Energy RD&D Roadmap

In order to identify and describe the technology and associated R&D pathways that would yield significant GHG reductions by 2050, Canada and the United States will undertake collaborative development of a RD&D roadmap. The roadmap will examine, in detail, select scenarios for achieving our goals, and identify near-term steps Canada and the United States could take under the auspices of the RD&D collaboration framework—and indeed under the Clean Energy

Dialogue at large—to ensure our RD&D and deployment portfolios are positioned to deliver the required transformational technologies in time. An important objective would be to support the move toward a single North American market for clean energy technologies, achieved through harmonized codes, standards and incentives where possible.

In order to ensure the development of successful technology and associated RD&D pathways, the roadmap would need to consider all current and future technology options for all GHG emission sources. Covering the three areas of the CED will address approximately two-thirds of projected GHG emissions; by adding additional sectors of industry, agriculture and forestry, all sources of emissions could be addressed in the roadmap. As such, this roadmap could conceivably be a flagship product of the Clean Energy Dialogue, setting the stage for our longer-term bilateral cooperation around clean energy.

3. Immediate Collaborative Projects and Initiatives

While the framework and roadmap will be essential to delivering RD&D collaboration initiatives, some specific projects and initiatives are ready to be launched immediately. These include joint work in sustainable bioenergy lifecycle analysis, production of biofuels using algae and mountain-pine-beetle-killed trees, development of lightweight materials for vehicles, and advancement of tools to optimize building energy performance.

The following collaborative projects and initiatives will be launched this fall under the three R&D focus areas of the CED:

- **ENERGY STAR criteria and programs** will be expanded through the development of new and revised specifications for product categories in a number of areas.

- A new **Implementing Arrangement in the Area of Bioenergy** will be signed, establishing a Joint Coordinating Committee for Bioenergy consisting of designated representatives from the United States and Canada.

- In order to **harvest value from mountain-pine-beetle-killed trees**, the United States and Canada will undertake analysis of the economic feasibility of converting mountain-pine-beetle-killed trees to biofuels through both thermochemical and biochemical processes, and will explore optimal conversion pathways.

- Canada and the United States will conduct research to improve productivity and harvesting methods in the use of **algal biomass**, a renewable biological resource which can be grown using sunlight and does not require land-mass, potable water, or the use of land which could otherwise be used for agricultural plants.

- In order to improve energy efficiency in the transportation sector, partnering agreements will be identified and secured to engage in coordinated R&D in the area of **lightweight materials development**.

- A Demand Response Quick Assessment Tool will be developed for the use of utilities, aggregators, and building owners to evaluate the **demand response potential of buildings**, which will facilitate the establishment of buildings as integral components of the smart grid.

Schedule:

- The RD&D Collaboration Framework will be developed in the fall of 2009, for implementation in 2010;

- The RD&D Roadmap will be initiated in the fall of 2009, for completion in 2010; and

- The projects identified above, along with other projects identified through the collaborative framework, will be initiated in 2009/2010 and are of varying lengths.

Next Steps

Going forward, the three Working Groups will continue to ensure joint collaboration in their respective areas of focus, while remaining open to expanding work into other priority areas as deemed appropriate by both Governments. The Working Groups will continue their work in order to realize the objectives of the CED. The Working Groups will also continue to provide updates on their progress, with the following reporting schedule:

- September 2009: Report to Leaders
- March 2010: Interim report to Ministers
- September 2010: Second report to Ministers
- March 2011: Final report to Leaders

In conclusion, the CED will capitalize on existing efforts in both countries, representing a coordinated effort to bring about a prosperous clean energy economy while addressing the challenge of climate change. Through the initiatives described above, the United States and Canada possess an important opportunity to work together in accelerating the development and deployment of clean energy technologies – all towards a clean energy future.