

**Highlights of
2014 Canadian Energy Summit**

**WORLD ENERGY COUNCIL
NORTH AMERICA REGION ENERGY FORUM**



Energy Council of Canada
Conseil canadien de l'énergie

Transformations Across the Energy Sector: Past Present and Future set the general theme for the combined 2014 Canadian Energy Summit (June 24 and June 25) and the World Energy Council North America Region Energy Forum (June 26).

Over 125 representatives attended the back-to-back events in Calgary Alberta, Canada's energy capital, from WEC member organizations and from non-member organizations in Canada, the United States and Mexico.

Energy Council of Canada
Attendees
2014 Canadian Energy Summit
WEC North America Region Energy Forum



Highlights of the Presentations and Sessions

Presentations and sessions described aspects of the transformations underway under four thematic tracks: Perspectives from governments, Energy Overview and Energy Policy, Oil and Gas, and Electricity¹.

Perspective from Government

The opening reception for the Summit featured a **welcome address by Diana McQueen, Alberta's Minister of Energy**. Ms. McQueen provided highlights on Alberta's Resource Management System for development of the oil sands, the importance of gaining access to new markets for Alberta's oil and gas production, and Alberta's leadership as the first jurisdiction to put GHG regulations in to effect. She underlined the importance

Thematic Tracks	Presentations, Sessions
Perspectives from Governments	<ul style="list-style-type: none"> - Honourable Diana McQueen, Minister of Energy, Alberta - Kelly Block, Parliamentary Secretary to Minister of Natural Resources Canada - Honourable Rich Coleman, Deputy Premier, Minister of Natural Gas, British Columbia - Gabriel Heller Green, Director General of Investments, Undersecretary of Hydrocarbons, Energy Secretariat of Mexico - "Energy Conversation – Officials from Canada, United States, Mexico"
Energy Sector Overview and Energy Policy	<ul style="list-style-type: none"> - An Evolving Energy Landscape, Perspectives from World Energy Council, Marie-José Nadeau, Chair, WEC - Transformation in North American Energy Sector: Past, Present and Future - Developing a Canadian Energy Strategy - Earning Public Support for Resource Development Projects
Oil and Gas	<ul style="list-style-type: none"> - Energy Infrastructure Developments and Implications - Race for LNG Exports - Dialogue on Oil and Gas Transformations
Electricity	<ul style="list-style-type: none"> - Technological Innovations in Electricity Sector - Electricity Market Evolution - Dialogue on Electricity Market Transformations

¹ The program details and brief information on each of the speakers and moderators is available on the Energy Council of Canada's website at http://www.energy.ca/sites/energy.ca/files/ecc-14_summitforum_prog_final_hq_2.pdf

of fostering cooperation between the provinces to reduce barriers and maximize the economic benefits for the country.

The Summit program on June 25 was opened by **Ms. Kelly Block, the Parliamentary Secretary to Mr. Greg Rickford, Minister of Natural Resources Canada**. The importance of accessing new market access for Canada's oil and gas, reliance on market forces, and NRCan's responsible resource development policy were highlighted in Ms. Block's remarks. Ms. Block underlined the Government of Canada's determination to ensure that no project will proceed unless it is safe for the environment and that the maximum benefit is obtained from Canada's energy resources through strengthening safety and environmental regulation, forging stronger relationships with Aboriginal peoples through trust, inclusion and reconciliation, investing innovation, and reinforcing economic fundamentals. The creation of the Major Projects Management Office West was highlighted, providing a single window for First Nations communities, industry, and provincial and federal governments to address issues related to west coast energy infrastructure developments. Ms. Block referenced the establishment of a new tripartite forum for energy dialogue between the Government of Canada, the Government of British Columbia, and British Columbia First Nations leaders. The concluding point was that Canada is positioned as a key contributor to North American and global energy security but that Canada needs to move quickly to seize the opportunities but without compromise to the commitment to responsible resource development.

Mr. Rich Coleman, British Columbia's Deputy Premier and Minister of Natural Gas, described the implementation of **BC's aggressive strategy to encourage and support the development of the emerging LNG industry**. This includes consulting and working with First Nations people who are supporting the proposed developments. He indicated that the province recognizes that there is a window of opportunity to win a share of the natural gas export market and that British Columbia is acting now to implement efficient regulatory and decision-making process. He emphasized that a national strategy is needed in order to address the anticipated shortage of skilled labour. Master development agreements are being created to address the issues and remove barriers to investment.

Gabriel Heller Green, Assistant Secretary for Oil and Gas Councils and Committees, Energy Secretariat of Mexico, provided **an update on Mexico's extensive reforms of the electricity sector and oil and gas sector**. The reform package, passed in December 2013, starts with the principle that the state is the sole owner of resources found in Mexico's subsoil. The package will implement an open market environment promoting free competition between state enterprises and the private sector, strengthening of regulatory bodies and related agencies, transformation of PEMEX and CFE into state-owned productive enterprises, and provisions for sustainability and environmental protection. The reform involves Mexico's oil sector, natural gas sector and electricity sector. New investment opportunities will become available for exploration and production, refining, natural gas processing and transportation, storage, distribution and retail marketing of hydrocarbons, and for generation, transmission and distribution, retail and wholesale trading in the electricity sector. The secondary legislation needed to implement the reform package is being considered now. Expected benefits are lower bills for electricity and natural gas, significant increases in investments in the energy sector, additional jobs, and a steady increase in oil and natural gas production. Mexico's commitment to

sustainability and environmental protection will continue, as well working with communities to minimize impacts from exploration and production operations.

An overview of the latest energy developments in the United States was presented by Barry Worthington, Executive Director, United States Energy Association. Many transformations are underway across the energy sector in the United States. These include the many implications of abundant, low-cost natural gas with implications for higher-priced sources of generation, the introduction of wind and solar electricity into electricity grids, and security issues related to cyber attacks and physical attacks. The implications of the new rules issued by the EPA regarding GHG emissions are being explored. These include the issue of how the baseline is set as a reference point for calculating future emission reduction targets, the implications for US States, some of which have already taken actions to reduce their emissions, and the requirement for each US state to file GHG a reduction plan. The geopolitical energy picture is changing daily, with examples from the Russia-Ukraine confrontation, questions around the stability of oil supply from Iraq, implications of reduced US reliance on imported oil due to recent supply growth, and conflict in the Middle East.

A perspective on the **ingredients for successful energy developments and Canada's First Nations** was presented by Matthew Coon-Come, Grand Chief, Grand Council of the Cree. He explained that First Nations see the proper relationship with energy developments as being a pathway to nation building, a channel for implementing self-governance, a means to achieve remediation of the social and environmental impacts arising from energy projects, and an instrument for protecting Cree culture. The James Bay Agreement has brought positive results through creating a framework which allows the benefits of resource developments to flow, and at the same time, fostering healthy and stable communities. This Agreement sets a precedent for First Nations people to become participants in energy projects in a manner that demonstrates dignity, respect, cooperation and harmony. This exemplifies how Canada can develop better fundamental aboriginal relations, honour treaties and rights, implement aboriginal participation, all leading a win-win outcome.

“Energy Conversation” – Canada, United States, Mexico

Perspectives on energy transformations in Canada, the United States, and Mexico were offered during the “energy conversation” following the joint Summit and Forum dinner on June 25. Speakers were: Serge Dupont, Deputy Minister, Natural Resources Canada; Gabriel Heller Green, Assistant Secretary for Oil and Gas Councils and Committees, Energy Secretariat of Mexico; and, Barry Worthington, Executive Director, United States Energy Association.

Mr. Dupont noted the **profound transformations which are taking place in the energy sector in North America and globally**, and the historic opportunity available to Canada based on responsible development of natural resources. He indicated that the Government of Canada has refined its regulatory regime for tanker safety and emergency response, that the importance of closer dialogue with First Nations is recognized and being implemented, that good progress on innovation is being made by industry through initiatives such as the Canadian Oil Sands Innovation Alliance, and that significant progress has been made on the energy efficiency front. As an energy provider, Canada

requires sustained security of demand, underlining the importance of gaining access to a variety of markets for energy commodities.

Barry Worthington presented observations about **six transformations underway in the United States' energy sector**. Domestic production is ramping up rapidly due to use of new production techniques, resulting in lower trade deficits, reduced energy imports, and a promising future for domestic industries using energy commodities as feedstocks. Exports of energy commodities are increasing, particularly refined petroleum products and coal, and several LNG export projects are moving ahead. Technological innovation on many tracks, for example, technologies to produce oil and gas from shale reservoirs, the smart grid, demand management, and greater penetration of renewable technologies due to cheaper costs. The business model of the United States energy sector is changing, as major energy companies undergo restructuring, as the electric power industry becomes more competitive due to competition from natural gas and cheaper renewable technologies, and as utilities respond to changes in electricity markets. Consumers have greater choices, for example, options in personal transportation using biofuels, electricity of natural gas instead of gasoline. Lastly, the impact of fuel efficiency standards is becoming apparent in reduced gasoline sales and electricity sales.

Gabriel Heller sees significant benefits in the trilateral energy relationship since Mexico is both a net energy exporter in the form of crude oil and a net energy importer of refined petroleum products. **Mexico's aggressive reforms of both the electricity sector and the oil and gas sector** are underway, aiming for implementation in late July. Once the reforms have been implemented, Mexico hopes to increase natural gas production, and together with new pipeline infrastructure, to become a natural gas exporter. Mr. Heller indicated that the three countries should work towards sharing a vision around energy in North America, and that discussions should continue on whether there might be opportunities for examining information energy balances, looking at the future picture for energy infrastructure, and explore regulatory changes that would be of benefit to energy in North America.

Energy Overview

Three overview sessions provided a perspective on the evolving energy landscape from the perspective of the World Energy Council, a high-level summary of the transformations in the North American Energy Sector, past, present and future, and a pollster's assessment of public attitudes towards major energy projects.

The **opening keynote address for the World Energy Council North America Region Energy Forum** by Marie-José Nadeau set the stage for the sessions which followed. She started by observing that past experience tells us that the way energy is done in the future will certainly be different than today, and as a result, that transformations in the energy sector will be a prominent feature of the global energy scene well into the future. Ms. Nadeau emphasized the importance for Canada of more carefully managing the environmental impacts of energy developments, citing the World Energy Council's energy trilemma assessment of Canada's ranking in the areas of energy security and energy equity, two areas in which Canada ranks very highly, and environmental sustainability, the area where Canada's ranking is the weakest. This is due to the environmental impacts caused by a high reliance on energy-intensive resource development industries, and long transportation distances. Three challenging issues

for Canadian policy makers are: managing the environmental and climate impacts of energy resource developments; diversifying markets for Canada's energy commodity exports; and, ensuring an appropriate sharing of the benefits arising from resource developments, notably with First Nations in whose traditional territory most resource development projects and energy infrastructure projects are being considered. Ms. Nadeau ended by stating that what is needed now more than ever is transparent, stable and predictable policies within which all involved can work towards a sustainable energy future for all Canadians today and for future generations.

The session on **Transformations in the North American Energy Sector, past, present and future** looked at the changes that are taking place in Mexico, the United States, and in Canada.

- Mexico is in the midst of a major restructuring of its electricity and oil and gas sectors with the goals of reducing monopolistic control and an opening up of the sectors to companies across North America. At present, the enabling laws are being debated. One issue which needs close attention is to provide information about the reforms, and the benefits and costs to society as a whole. Looking ahead, Mexico will soon become a more active player in the North American energy sector. (Javier Estrada, Assistant Secretary for Energy Planning, Mexico Energy secretariat)
- The United States is witnessing a closer integration of the electricity sector and the natural gas sector as a result of new gas-fired generation coming on line due to new abundant supply and low natural gas prices. The distribution system which was built to transmit power from centralized generation facilities is undergoing a rapid transformation towards a fully integrated combination of centralized and distributed generation, and real-time monitoring and control. Recent periods of exceptionally high demand due to severe winter weather conditions have revealed weaknesses in the United States' electricity and natural gas supply systems. (Dean Oskvig, President and CEO, Black & Veatch; Vice Chair, WEC North America)
- Innovation was described as a primary driver and an essential ingredient in the energy transformations underway across North America. It was identified as a key source of leading-edge solutions to address important energy issues such as conservation of water in energy operations, safe operation of existing and new pipeline systems, integration of electricity from renewables into the modern electricity grid, and the use of alternative "fuels" in the transportation sector, such as electric vehicles for personal and fleet use, and natural gas for freight vehicles. In the eyes of some, there is the appearance of the energy sector as "coming from behind" with respect to innovation. An extra effort is needed to communicate the achievements to date by conventional and non-conventional companies across the energy sector. (Ross Hornby, Vice President Government Affairs, GE Canada)
- Traditional utilities face considerable challenges as the energy sector undergoes the process of transformation. Shareholders will always expect a fair return on their investment, in a market which features many new forms of generation, some of which are subsidized, and in a market which is characterized by short term contracts rather than long-term contracts matched to the life-time of centralized generation plants. Simultaneously, the generation paradigm is evolving away from centralized generation to a more diversified supply mix. Utilities have been successful in bringing on new generation in the midst of rapid market changes. It was noted

that the timeline for project approvals was considerably shorter in other jurisdictions than in Canada; a gas pipeline project in Australia was cited as an example. (Dawn Farrell, President and CEO, TransAlta Corporation).

- Even though the public debate about new pipeline infrastructure is attracting public attention, there is an aggressive program underway to increase take-away capacity on existing pipeline systems. Additional capacity is being added, the flow of certain lines is being reversed, and new facilities are being added to existing systems to increase throughput. One important issue which remains for the pipeline sector is that there is a poor public understanding of the safe and reliable services being provided daily by the extensive network of existing pipeline systems which span North America. While the pipeline industry can bring this component of energy infrastructure to public attention, the message can also be effectively delivered by other respected spokesmen, such as those representing petrochemical operators and unions. (Vern Yu, Senior Vice President, Business and Market Development, Enbridge Pipelines)

An insightful presentation was given on **public attitudes regarding resource development projects** by Greg Lyle, Innovative Research Group. Mr. Lyle pointed out several features of how public opinion develops around energy projects: it is dynamic and can change quickly; there is no blank slate since people typically have entrenched opinions on the local implications; the public needs to be reminded constantly about the need for the project and its value to the community; and, that the public will be more willing to accept a project if the leading executives are closely and genuinely associated with the project from the beginning. Many people are supportive of resource development projects in general, but the support falls dramatically if the project will directly affect the community or local environment where they live. Since the public tends to make up their minds about a project well before it is announced, it is essential to initiate dialogue with affected communities well before a major project is announced around the general features of resource development, and the positive impacts such developments may have,

Transformations in Energy Policy – Developing a Canadian Energy Strategy, Earning Public Support for Energy Development Projects

Two initiatives in the development of energy policy were discussed: an update on the creation of a Canadian energy strategy, and the latest thinking on finding ways to earn public support for energy development projects.

The Moderator opened the session on **developing an energy strategy for Canada by** underlining the importance of creating an energy strategy which fits Canada's energy circumstances and needs. He illustrated this with the quotation: *"If you don't know where you are going, any path will do"*.

Presentations addressed the work underway by Canada's provinces and territories, the views of corporate Canada, and observations about the recommended makings of an energy strategy for Canada.

- The Council of the Federation, made up of the energy ministers from the provinces and territories has undertaken a project to develop a Canadian Energy Strategy. Three themes have been developed to frame the project: sustainability and conservation, technology and innovation, and delivering energy to people. Work in each area is led by a team of provincial officials. Recognizing that the responsibilities for energy cross several departmental mandates, the teams are taking a “whole of government” approach which integrates the various departmental interests into the development of the strategy. The document will be considered by the premiers and territorial heads at the upcoming Charlottetown meeting of the Council of the Federation in late August. (Nevin French, Manager, Canadian Energy Strategy Secretariat, Council of the Federation)
- Corporate Canada strongly supports the development of an energy strategy for Canada since energy plays a central and essential role in all aspects of doing business in Canada. Rather than aiming to develop a formal energy strategy per se, an alternative target would be to develop an energy framework which would provide an underpinning that encourages investment and the deployment of new technologies that improve environmental and economic performance. Three key ingredients were identified which should be part of a future energy framework: engaging with aboriginal communities and groups in the spirit of partnership; addressing the challenges of meeting the requirements of industry for human resources, and, coming up with a climate policy that provides for carbon pricing, engagement with Canadians, and which is integrated closely with other federal and provincial initiatives. (John Dillon, Vice President, Policy and General Counsel, Canadian Council of Chief Executives)
- An observer of the ongoing prolonged dialogue towards creating an energy strategy for Canada pointed out that a proper process is essential. The key ingredients are: the requirement for a broad engagement with the public which involves the aggregation of interests; identification of the opportunities and trade-offs; and, an openness to dialogue and willingness to change positions on issues on the part of all parties. Too often the dialogue has been taking place in silos; what’s needed is a broad cross-sectoral dialogue which takes a “whole of country view”. A recommended approach to developing an energy strategy is start by building trust, followed by an open debate on the issues, opportunities and implications, then to develop a limited number of priorities, and then to take action on the priority areas. (Graham Fox, President and CEO, Institute for Research on Public Policy)

The speakers in the session on **earning public support for resource development**, also termed securing social licence, discussed the issues from three perspectives.

- There is a high level of media interest in the reaction of aboriginal groups, communities and the public around large-scale energy infrastructure projects. Concerns arise due to the impact on traditional uses of the land, on local and regional environmental impacts, and the implications for changes to the social fabric of affected communities. The use of the term “social licence” should be abandoned since it suggests a formalized licensing process that includes a list of requirements, and some sort of an approval process by an issuer. (Juan Eibenschutz, Director General, Mexico National Commission on Nuclear Safety and Safeguards; Honourary Vice Chairman, World Energy Council)
- A more appropriate phrase is “earning public support for resource development projects” which conveys the key requirement for the proponent before proceeding with a project. Although the

public recognizes the value of resource development, there is a low level of confidence that projects will be done in a manner that takes account of local and regional interests. Concerns arise around health and safety, impacts on the local and regional environment, and impact on communities. As a result, local resistance causes delays, heightened confrontation, and a loss of public support and confidence. Of the three main players, industry, government and local communities, the dialogue needs to be started by the project proponent, by parsing the issues and focusing attention on four key pillars: the implications and benefits for the local economy, maintaining community integrity, dealing with the impacts on the local and regional environment, and fostering genuine engagement with the people and governments affected by the proposed project. (Mike Cleland, Nexen Executive in Residence, Canada West Foundation; Member of the Board of Directors, QUEST)

- Shale gas development in the Appalachian Basin has resulted in environmental impacts of concern to the local residents. To address the issues and to foster a dialogue with the affected communities, the natural gas industry has taken the lead to develop guidelines for sound operating practices. A key feature of the guidelines is regular verification of compliance with the operating requirements by an independent third-party organization. The guidelines and the ongoing engagement with the community and NGOs is an example of how the natural gas developers have been successful in earning public support for shale gas production in the Appalachian region. (Andrew G. Place, Corporate Director, Energy & Environmental Policy, EQT; President, Centre for Sustainable Shale Development)
- The third speaker in this session strongly underlined the importance of opening up dialogue with communities affected by resource development projects well ahead of consideration of a particular project; this was underlined as an essential first step. In more detail, the first stage of dialogue should be focused on building a respectful relationship, developing an understanding of the community, and listening carefully to their aspirations and expectations as a society. In this context, First Nations should be seen as a government. In the second stage, dialogue could commence on the nature of the proposed project, and the potential opportunities and implications for the community. As dialogue proceeds around a specific project, the proponent should be prepared to share a portion of the jobs, economic benefits and long-term revenues with the community, for example through Industrial Benefit Agreements, and also to modify the configuration and timing of the project in order to align the interests of the community and the project proponent. A key requirement on the part of the proponent is a willingness to be patient and take the time necessary to work things out with the community. These are the recommended steps towards working together in partnership with the communities to earn their interest, engagement and support. (Richard Grant, Partner, Gowling Lafleur Henderson LLP)

Oil and Gas – Energy Infrastructure, Race for LNG Exports, Dialogue Session

Three sessions on **oil and gas** covered topics in energy infrastructure, the opportunities and market situation for development of LNG facilities and export markets, and the perspective on oil and gas developments in Canada, the United States and Mexico.

The **importance of energy infrastructure** to the Canadian energy economy is an essential feature of Canada's energy system. However, infrastructure is typically overlooked since pipeline networks and electricity transmission networks, operate efficiently and almost invisibly providing the energy services people take for granted. (David McFadden, Partner, Gowling, Lafleur Henderson LLP)

- The opening presentation reported **on public opinion surveys concerning attitudes and views regarding energy projects**. The results lead to several observations: the fact that the public has already formed an opinion about an energy project prior to the commencement of the regulatory approval process; that the public generally holds a negative perception of new major infrastructure projects, particularly if in the vicinity of their communities; that it is essential requirement to work with the people in communities who are likely to be directly affected by any new project; and that it is necessary to do more than just meet the minimum requirements set by the government or the regulator, in order to gain public support and permission for the project. (Greg Lyle, President, Innovative Research Group)
- The Canadian Energy Pipeline Association represents companies in the pipeline industry, and sees an important role in providing objective, reliable information about the sector's safety culture, systems for monitoring, managing and operating pipelines, and how innovation and technology are being implemented to ensure enhanced safety in the future. CEPA is working to foster: a safety culture with the goal of zero incidents; going beyond compliance to an open communication of the nature and learnings from incidents when they occur; developing an environment of collaboration across the sector and with First Nations; diligent continuous monitoring of construction and operation of energy infrastructure; and, the need to learn from incidents and follow-up with improvements to further enhance ongoing safety performance. (Brenda Kenny, President and CEO, Canadian Energy Pipelines Association)
- The third speaker in this session described experiences from the electricity sector arising from dealing with how infrastructure issues, such as replacing aging infrastructure, connecting new generation sources, increasing interconnection capacity, building connections with neighbouring jurisdictions, and reducing congestion, are being managed in the electricity sector in Ontario. Lessons learned included the importance of developing an understanding and an appreciation of the culture and expectations of communities affected by the proposed project; understanding the environmental impacts and how they can be mitigated; recognizing that each community has different levels of knowledge about energy projects and expectations regarding social and economic benefits and being flexible in responding to the particular expectations; realizing that the time required for proper engagement with the affected communities and the amount of time needed for thorough consultation is unpredictable in advance and cannot be rushed; and engaging early with community leaders, First Nations chiefs, and people who influence local opinion; and, be prepared to demonstrate flexibility and adapt routes, designs and construction practices in order to respond to local concerns. (Mike Penstone, Vice President, Network Development & Regional Planning, HydroOne)

In the session on the **Race to Develop LNG Exports**, the session Moderator, Gordon Nettleton, Partner, McCarthy Tétrault, posed questions to the four panellists: Mary Hemmingsen, Global LNG Lead, Canadian Power & Utilities Lead, KPMG; Cameron Gingrich, Director, Gas Services, Ziff Energy; Paul

Jeakins, Commissioner and CEO, BC Oil and Gas Commission, Don I. Althoff, President and CEO, Veresen Inc. British Columbia's is providing aggressive support for development of the gas supply, pipelines and compression facilities to develop LNG export capacity on the west coast of Canada.

During the session, the panellists described the challenging market conditions for BC's projects due, in part, to international competition including the possibility of rapid expansions to facilities already operating in other countries, and the intense price competition that will exist in a market characterized by many potential LNG suppliers chasing limited export markets. The regulatory process for consideration of new supply, transportation and compression facilities has been streamlined, and is ready to respond promptly as proposed projects mature. Supply from BC's shale gas plays is being aggressively developed already through application of the latest production technologies. Two to three new projects are expected to move ahead by 2020, creating an entirely new industry to reach previously-inaccessible export markets for Canadian natural gas.

Speakers from Mexico, the United States and Canada led off **the oil and gas dialogue session** with brief remarks designed to frame the discussion to follow.

- The reforms in Mexico are designed to address current issues in the oil and gas sector. Production of oil and natural gas is declining in spite of significant levels of investment. The goals are to attract foreign companies to help increase production from new fields by using their latest production techniques, for conventional fields and also for shale reservoirs. The experience with joint ventures with Canadian companies has been positive and they hope to build on this track record. (Luis Vasquez, President, WEC Mexico Committee)
- In the United States, the rapid recent growth in oil and gas production has "energized America. The earlier concerns about limited supply seem comical now that production has increased so dramatically. This growth will continue, for example, based on new supply from the oil sands and from Mexico's expected deep water exploration in the Gulf of Mexico. Pennsylvania, the first state to have an oil pipeline, has seen aggressive growth in Shale gas production. This dramatic change in the oil and gas supply picture is influencing policy thinking already. (John Felmy, Chief Economist, American Petroleum Institute)
- From the Canadian perspective, the supply picture has changed scarcity of supply and abundance of fossil fuels. It has profound implications in North America as well as globally. This creates a significant opportunity for Canada. With Most of the new production additions comes from the oil sands. Canada now needs infrastructure to reach new export markets such as the Keystone XL pipeline and also new pipelines to ship bitumen both east and west to capture the huge export potential. Absent new pipeline capacity, the market is going to be tight between take-away capacity and growing levels of production. A similar situation is emerging for natural gas. Absent the potential new LNG export facilities, there is too much production. In parallel, a concerted effort is needed to reduce the environmental impacts and maintain social licence. Elements include better environmental performance, good communication with the public and communities, ensuring the social and economic benefits are achieved, and maintaining a solid regulatory system (legitimacy). New infrastructure provides an important opportunity as well to make good use of the latest technology. Canada should focus on developing infrastructure which provides access to

markets in the east and west in addition to US markets to the south. (Dave Collyer, President, Canadian Association of Petroleum Producers)

- A representative from one of Canada's leading pipeline companies described the tremendous opportunities available now in Mexico due to the changing landscape. Growth opportunities exist due to expectations for increased natural gas and oil production, and a transition to a cleaner energy mix. Responsible development will allow Mexico to meet its energy requirements and over time and increase exports to foreign markets. Building on Mexico's strong energy regulatory system and a very detailed environmental regulations, Mexico's reforms are designed to attract capital, connect new production, bring in the latest technologies, investment and infrastructure. Canadian pipeline companies offer technical experience, experience with pipeline construction and operation, the ability to line up financing, and new technologies such as tunnelling equipment. (Brandon Anderson, Senior Vice President, Mexico Gas Pipelines and Power, TransCanada Pipelines)

Transformations in the Electricity Sector – Technological Developments, Evolution of Market Practices

The transformations underway in the electricity sector were covered under two main headings – **technological transformations** and **changes in the electricity market** in response to new technological developments and more competitive markets.

Exciting **technological developments in the electricity sector** have taken root already to various degrees across the jurisdictions. The speakers highlighted:

- The challenges of dispatching generation in an electricity system made up of a diversified mix of supply. Ontario was cited as an example where market requirements are met by nuclear base-load generation, hydro, and a mix of wind and solar power. Although the technological operations of each source are well-managed, the dispatching of base-load and intermittent source in times of excess supply requires careful management by the system operator. (Paul Murphy, Chair, Advanced Energy Centre, MARS Discovery District)
- Electricity storage is a missing component in electricity systems. Storage capacity is being encouraged under Ontario's Long Term Energy Plan, with a call by the system operator to create 50 MW of new storage capacity into the operation of the electricity system. New projects are being developed for implementation in the near future, based on a variety of storage technologies, including flywheels, batteries, compressed air, and pumped water reservoirs. (Annette Verschuren, Chair and CEO, NRStor, Inc.)
- New nuclear technologies are being developed, highlighted by development of Small Modular Reactors with under 50 MW capacity. SMR systems are ideal for potential deployment in remote off-grid communities and in large energy-intensive resource development projects in Northern Canada. (Peter Lang, Dunedin Energy Systems LTD)
- Integrated grids which combine centralized and distributed generation and a variety of loads were described as the pathway to realizing the full value of centralized and distributed energy resources. The foundation of an integrated grid has four pillars – grid modernization as new distributed supplies come on line, communications standards and interconnection rules for prudently handling the large volumes of sensitive information provided by smart meters, integrated planning an

operations in order to take full advantage of the benefits provided by an integrated electricity system, and with the support of informed policy and regulation in order to address safety issues and in order to arrange for appropriate pricing of the enhanced services provided by modern grids. (Henry Courtright, Senior Vice President, Global Strategy and External Relations, Electric Power Research Institute)

In parallel with the technological changes, the **practices in electricity markets are evolving and undergoing transformations** as well.

- The government of Mexico is engaged in a major structural reform of its electricity and oil and gas sectors. For electricity, this involves the transformation from a monopolistic arrangement for generation, transmission and distribution, to a phased-in opening of each of sector to competition. An example of the features of Mexico's re-structured electricity market is the creation of a new organization (CENACE) to control, dispatch and operate the electricity market. Obligations are being imposed which require new clean energy sources. (Francisco Barnes, Commissioner, Mexico National Energy Commission)
- The challenges of providing new supply to meet very rapidly growing demand from customers in rapidly growing urban centres were described for the City of Toronto, Ontario. Extraordinary efforts are required to locate power distribution equipment in compliance with urban development by-laws, within space limitations in areas with very high building density, and without causing large increases in electricity prices. Energy conservation initiatives are the key policy initiatives which are to limit maximum total demand and to provide the municipal utility with the ability to selectively reduce demand in peak periods. (Anthony Haines, President and CEO, Toronto Hydro)
- The United States is witnessing major changes in the electricity market as natural gas displaces coal-fired generation due to current low market prices for natural gas, as the older fossil plants are retired and as new forms of distributed generation come on line, supported by government incentives. Electricity demand is moderating due to the fall-out from the economic recession, due to restructuring of the goods and services mix across the economy, and due to policy measures such as the prohibition of incandescent light bulbs. Security of the electricity system is emerging as a key issue to address, aided yet made more complex as the electricity system transforms from a centralized grid to a combination of centralized and distributed generation and grid management. (Barry Worthington, Executive Director, United States Energy Association)

The **dialogue session on developments in the electricity sector** was shared by speakers from Canada, the United States and Mexico.

- Mexico is aggressively introducing solar and wind generation into the generation mix. The lessons learned are familiar to jurisdictions making the transformation from fossil-based or nuclear centralized systems to a more diverse supply mix. To meet these challenges Mexico will need to implement improved control technologies, new operating practices, better trained operators, more flexible power plants, a more flexible and robust transmission grid, and improved forecasts for variable energy resources. (Jose Luis Aburto, Deputy Director for Planning National Electric Utility, Mexico)

- The State of Minnesota is making the transformation to cleaner electricity by reducing the share of generation from coal-fired generators from 65% to 45%. Nuclear and renewable technologies will make up the bulk difference, with expected growth in the share of generation from natural gas fired facilities and from imports of hydropower from the neighbouring province of Manitoba. The State has implemented leading-edge arrangements for managing and pricing new intermittent sources of supply including net metering and pricing for ancillary services such as energy storage. An interesting comment was that the market is not providing pricing signals for new generation sources. This situation is being monitored closely as plants in the current coal-fired fleet start to come off line. (David C Boyd, Vice Chair, Minnesota Public Utilities Commission, NARUC Electricity Committee)
- An initiative by the Canadian Electricity Association aims to explain the value proposition of the electricity sector as a means to improve understanding of the services provided by the sector and the implications for future price trends. The communication emphasizes four points: the low cost of electricity services in comparison to other household expenditures; the services provided by a complex electricity system which spans generation, transmission, distribution to the household and overall monitoring and control to ensure reliability; the need to re-invest in the system to replace aging infrastructure and to implement modern approaches to cleaner generation and better grid management; and, to underline the importance of investing now to ensure a clean and reliable system for future generations. (Jim Burpee, President, Canadian Electricity Association)

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Please refer any questions regarding the presentations or the discussions to the Energy Council using the coordinates shown below.

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