Canada's Energy Future Conference: Building a Sustainable Energy Future Summary

12 March 2010

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Introduction

On 12 March 2010, the National Energy Board (NEB or Board) hosted a one-day, conference in Ottawa as a follow up to the successful Energy Futures workshop held in 2008. The theme of the conference was Building a Sustainable Energy Future. Twenty-three experts presented to conference participants on their area of expertise, and commented on the relevant issues concerning Canada's sustainability. Conference topics focused on energy market trends (i.e., energy supply, demand and prices) and associated factors that influence these trends (e.g., environmental policies, economic conditions, etc.).

The conference provided a forum for interested energy stakeholders in Canada to discuss long-term energy issues. The benefit of a conference is that it can expose participants to diverse energy views; allow for real-time communication, discussion and networking and finally, provide an opportunity to discuss timely issues. This year, these issues included volatile energy markets and economic conditions, announced government policies and impending government legislation.

It is the NEB's intent that information gathered at the conference be used to guide our future energy analysis. It will also be useful for work that our stakeholders may undertake. To this end, the NEB has prepared this high-level summary of the conference proceedings and has posted all of the conference presentations on our external website. To view these presentations and related material to the *Energy Futures* report please visit www.neb-one.gc.ca Please note that the views contained in this document and the presentations reflect speaker opinions and are not necessarily views of the Board.

Key Messages

The conference provided an opportunity for Canadians to discuss relevant energy topics. In each of the sessions, a balanced perspective was provided by incorporating a wide variety of speakers representing views from industry, consultants, environmental organizations, and government. A key concern expressed in all the sessions was the need for a consensus on policy and regulation that would create more certainty in terms of investments into new technology and in long-term projects. Speakers noted that with the increased production from oil sands and shale gas in Canada, it would be beneficial to invest in new infrastructure to ensure transportation into domestic and international markets.

The relationship between the global economy and energy markets was very apparent as the world went into a recession. Energy demand decreased in North America resulting in softer market prices. Understanding the correlation between the economy and energy markets is critical to making informed assessments on future energy trends. The energy sector in Canada is constantly evolving with innovation as new unconventional sources are supplying the void left by the decline of conventional production. Oil sands and shale gas, dubbed as the next main energy sources for Canada, have become prime focal points for industry participants. It is important to develop these unconventional sources in a manner where regulatory processes are efficient, policy is implemented and economic growth is not hindered. The Major Projects Management Office (MPMO) is one organization that was implemented to handle energy projects north of 60 to ensure that investment opportunities are not lost due to lengthy regulatory processes. Organizations such as QUEST and programs such as Ontario's Feed in Tariff (FIT) are expected to assist in creating a greener Canada. This is important to Canadians as Canada relies on its energy development for employment, growth and as an economic driver.

Shale gas is becoming increasingly economic to drill, as the advancements in drilling have cut both costs and time. For producers, it is important that their gas can access potential markets. Consequently, investments in critical infrastructure need to be considered and executed in a timely manner. The Kitimat liquefied natural gas (LNG) project could aid in connecting supply to a larger market by enabling Canadian producers to export into international markets that were previously unavailable to them and thereby making Canada a global gas player.

Canada possesses a significant quantity of unconventional oil both onshore and offshore. The investments made in offshore drilling have benefitted Newfoundland financially as producers have successfully drilled crude oil. Further projects off the coast of Newfoundland are in development and current projects are being expanded. In Northern Alberta, the oil sands have been faced with economic and environmental challenges. Canada is a net crude oil exporter and addressing the oil sands challenges should be a strong incentive for the Canadian oil industry and government for the benefit of the economy. Speakers noted that it was imperative to consider policies that reflect the need

for the development of the oil sands and to proceed with minimum costs. By striving for improved technology, infrastructure and advancements in climate policy, Canadian oil can be a strong competitor in global markets.

There continues to be advancement in climate change policies at various levels of government. The most advanced are those that are occurring at the sub national level. It is likely that these programs and policies will likely influence national and international targets and agreements. The impact of these developments will have far-reaching impacts for Canadian energy consumption and production.

Session Summaries

Keynote Address: Building a Sustainable Energy Future - What does this mean for Canada?

The keynote session included two speakers, who each provided their views on sustainability issues in Canada. The first speaker was Dennis McConaghy from TransCanada Pipeline Corporation and the second speaker was Tim Weis from the Pembina Institute.

Speaker 1**:** *Perspectives on Canadian Energy/Climate Policy*

Dennis McConaghy, Executive Vice-President, Pipeline Strategy and Development, TransCanada Pipeline Corporation.

Summary

The session began with an explanation of the evolution of Canadian energy policy since 1985, when markets were first deregulated in Canada. This was beneficial to Canada as it increased production, employment and trade balances. The installment of NAFTA in 1994 further enabled free trade in oil and gas and ramped up exports of these commodities.

Recently, there have been signals of government intervention in the North American energy sector. In Canada, policies have been implemented to promote the growth of renewable development via mandatory subsidies, which is seen as well in the U.S. with federal subsidies for proposed State Renewable Portfolio Standards. The issue concerning increased intervention by the political and regulatory bodies is that they decrease the efficiency and timeliness of projects and consequently create difficulties in important resource development. These setbacks are exemplified through the need for infrastructure development and facilities.

Another threat to resource development has been climate policy. Canada has stated that we will match U.S. climate policy in terms of targets and emissions. There are however major differences between the two countries, which may not make this ideal: Canada is a large energy exporter, more energy-intensive and has much larger oil and gas emissions. The U.S. is a larger energy importer and has a great deal of emissions stemming from coal-fired power generation. This means that the U.S. has more opportunity to reduce emissions, by switching to natural gas from coal in power generation.

The timeframe for reducing emissions is also a conundrum. How does one make substantial reductions in emissions without the loss of still-productive capital? Realistic timeframes must be considered on a provincial and national level.

Speaker 2: *Renewing Canada's Future*

Tim Weis, Director of Renewable Energy and Efficiency Policy, Pembina Institute

Summary

Tim Weis started his presentation by demonstrating the need to combat climate change in order to achieve a sustainable future for Canadians. By extrapolating observed anthropogenic $C0_2$ emissions from 2002 to 2007, numerous scenarios were shown for the future of average growth of carbon rates. The A1F1 scenario, which is part of the Intergovernmental Panel on Climate Change IPCC Special Report on Emissions Scenarios[1], was discussed. It was described as a setting where environmental concerns were a second thought to the drive of personal wealth. This scenario resulted in the highest emissions generated and where the 2C° "safe" limit is reached by 2040. It was shown that emissions would have to be halved by 2050 in order to stay within the safe zone. Canada, as a top-ten world greenhouse gas (GHG) emitter, must take responsibility to do its part to reduce emissions. Therefore, by 2020, Canada must meet the 2C° target while still enjoying a high quality of life, a growing economy and steady job creation[2].

One way of reaching this type of sustainable future is to reduce major emissions from electricity generation, which accounted for 16 per cent of Canada's emissions in 2007. Currently, provinces are targeting 15 000 MW of wind power by the year 2015. The federal government target is that 90 per cent of generation will be non-emitting by 2020. To reach the 90 per cent goal by 2020, provinces (such as Ontario and Nova Scotia) must decrease the use of coal and nationally increase the use of renewable energy so that it represents 15 per cent of our supply by 2020.

The development of renewables is quickly evolving in other parts of the world. In 2008, Germany, a country with the same electricity demand as Canada, succeeded in generating 15 per cent of its electricity via renewables. The cost of the German Energy Renewable Act was a negligible four dollars per month per household and approximately 280 000 people were employed in the renewables sector. On a global scale, investments in renewable electricity are becoming more frequent with the additional benefit of job creation. Ontario recently launched FIT, which not only aims to create an efficient transmission grid, but also promotes the generation of renewable energy.

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[1] IPCC Special Report on Emissions Scenarios available at: http://www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/emission/

[2] Climate Leadership Economic Prosperity Report-Pembina available at:http://pubs.pembina.org/reports/climate-leadership-report-en.pdf

In summary, Canada relies on its energy development for employment, growth and a major economic driver. Carbon caps may have a huge impact on Canada's investment, and economic growth and policy needs to reflect this by reaching targets at minimum costs. Natural gas presently appears to be a good alternative to reduce emissions. With new technology and increased production, natural gas could be the key player in climate policy. The development of renewable energy is becoming mainstream and being seen everywhere from the U.S. to China. With the aid of strong leadership and effort, Canada's renewable energy vision can be a part of the sustainability solution.

Concurrent Sessions

Session 1A – Boom, Doom or Gloom? The Future of Economic and Energy Markets

Speakers

Moderator
Abha Bhargava, Team Leader, Energy Demand, National Energy Board

Current Macroeconomic Conditions
Kevin Page, Parliamentary Budget Officer, Library of Parliament

Future of Oil and Natural Gas Prices and their Interrelationship
Joe Benneche, Natural Gas Analyst, Energy Information Agency

Commodity Price Analysis at the Bank of Canada
Ilan Kolet, Senior Analyst, Bank of Canada

Summary

Macroeconomic conditions, in Canada and around the world, influence Canadian and global energy markets. Economic growth drives energy demand. Oil prices are determined in the global market by balancing global oil demand and supply and natural gas prices are determined by balancing North American demand and supply. Further, energy market conditions provide context for monetary policy. The interrelationship between macroeconomic conditions and energy markets was explored in this session.

The economy is a critical issue this year as the world recovers from an economic recession. Impacts of the recession were seen in the energy markets as demand decreased, projects were shelved and commodity prices lowered. In Canada, the energy sector and the economy are closely tied; many Canadians earn their living working for the energy industry and the Canadian economy is heavily fueled by energy exports.

Fortunately, during the recession Canada did not experience the type of downturn felt by many other countries nor reach the levels of unemployment seen in the 1980s and 1990s. According to Kevin Page, Canada maintained a good position through the economic slump and it is imperative to maintain this position should there be aftershocks from the recession, as recovery trends still remain unclear. In order for Canada to sustain its ability to withstand economic downturns, there needs to be growth in our labour force and ways to deal with the fiscal issues of old age dependencies as the population ages. The government will need to focus and act on these issues today so that we can prevent a crisis in the future. Encouragingly, low interest rates and stimulus packages are helping to stimulate the economy. By 2014, Canada should be back to a natural unemployment rate and fully employed capital.

Future oil and natural gas prices as well as their interrelationship are key factors for forecasting future energy market trends. In the U.S., the Energy Information Agency (EIA) 2010 Annual Energy Outlook, future oil prices are forecast to range from US$51 to US$210 in the year 2035, with the Reference Case price reaching US$133[3]. The Reference Case price track is slightly lower in the 2010 forecast compared to the 2009 Annual Energy Outlook.

The forecasted oil price is derived from assumptions on many uncertain factors, including OPEC and non-OPEC production, weather and inventories, financial factors (hedging, exchange rates etc), spare production, consumption and geopolitical factors. To determine the long-term oil price path, the EIA examines demand and supply fundamentals for liquid fuels. The key drivers for determining world oil demand are global economic activity and population. The factors that feed into supply issues, include assuming a rule for OPEC market behavior, determining reasonable non-OPEC conventional supply estimates and estimating unconventional liquids production,

The EIA assumes natural gas prices in the Reference Case will reach US$7.31 by 2035. In the near-term prices will be much lower. Gas prices customarily have a strong correlation with oil prices. However, recent fundamental factors including shale gas developments in the United States have driven oil and gas prices apart. In the longer-term, natural gas prices will be influenced by potential for natural gas power generation, LNG import assumptions and technology developments.

In the EIA's 2009 and 2010 Annual Energy Outlooks, the projected oil-to-gas price ratio trends above previous historical average with the Reference Case assuming a 2.5 oil-to-

[3] Note prices are in $2008 constant dollars unless otherwise stated.

gas ratio on a BTU equivalent basis by the end of the forecast period. However, there continues to be a large range - the ratio ranges from 1.0 to 3.8 in the Low Oil Price and High Oil Price Scenarios, respectively. Factors that can widen the gap moving from oil-price based gas contracts, excess liquefaction capacity, further gas shale developments and the long-term potential for gas hydrates. Issues that could close the gap are related to demand side issues, such as increase in natural gas vehicles, development of gas-to-liquids plants and North American LNG exports.

Natural gas prices will be harder to predict as the market drivers change and future natural gas supply originates from various sources.

The Bank of Canada sets monetary policy in the country, which creates a framework for Canadian economic conditions. Ilan Kolet noted that commodity prices are an important input into the Bank of Canada's analysis. Each quarter, the Bank of Canada uses a demand-based model to forecast commodity prices. This information is used to provide policy advice to the Governing Council. The largest component of the Bank of Canada's Commodity Price Index is energy prices. The remaining two-thirds of the index are made up of forest product prices, metals and minerals and food prices.

The rapid growth and increasing intensity of commodity use in emerging Asian countries has important implications for price movements. This was not being captured in previous Bank of Canada's commodity price projection models. Therefore, the Bank is developing a new model. The goal of the new model is to try to capture the role of emerging Asian economies on the projection of commodity prices, while at the same time capturing the impact of global gross domestic product (GDP) growth on commodity demand.

On the upside, the new model is able to capture elasticity and shocks throughout diverse regions, has an explicit role for emerging markets and is easily understood. However, there are limitations of the model. The data is only available after 1996, when estimations for Asia began. Financial factors such as interest rates are not explicitly accounted for in the model.

Besides the demand based model, the supply side is also studied to understand the effects of long-term prospects of oil supply, game changers in supply such as natural gas and the impacts of Chinese stockpiling and OPEC cuts on commodity prices.

The global economy and energy markets are strongly interrelated. Changes to economic conditions influence energy demand and supply, resulting in changes to energy prices. Similarly, energy market conditions feedback into macroeconomic decisions, such as monetary policy. It is important to understand and further explore this relationship to make informed decisions about future trends.

Session 1B – Making Connections: Energy Infrastructure in Canada

Speakers

Moderator **Eli Turk, Vice President, Canadian Electricity Association**

Pipelines: Delivering Energy Solutions
Dr. Brenda Kenny, President and CEO, Canadian Energy Pipeline Association

Major Projects Management Office Initiative
Jim Clarke, Director General, Operations, Major Projects Management Office

Integrated Community Energy Systems and Energy Infrastructure in Canada
Bob Oliver, Executive Director, Pollution Probe

Summary

Canada is a country with a vast supply of natural resources and a comprehensive infrastructure system that ensures Canadians have access to an adequate supply of energy. Investing and developing infrastructure in a timely manner is critical in transporting energy across long distances in our country. In this session, Dr.Kenny explained the challenges and opportunities of energy infrastructure in Canada and discussed why pipeline investment is important for energy transport. Jim Clarke spoke on the need for the Major Projects Management Office (MPMO) and how it has facilitated regulatory processes. Finally, Bob Oliver demonstrated the need for integrated community energy systems in Canada by providing a background of the type of work Quality Urban Energy Systems of Tomorrow (QUEST) does to increase safe and reliable energy deliverability to Canadians.

With over 100,000 km of pipeline in Canada and the U.S., pipelines are both a safe and environmental way to transport oil and gas. A natural gas pipeline from Canada to the U.S., for instance, could help reduce CO_2 emissions from coal power plants by enabling a fuel substitution even though there would not likely be a full turnover. Dr.Kenny outlined pipeline development issues such as the need for investments in a timely manner and incorporating the new supply of shale gas into the infrastructure system. She concluded that the Government and industry have worked together to deliver safe and reliable energy to Canadian consumers.

The MPMO was implemented due to a system under regulatory and capacity constraints south of 60. The MPMO initiative resulted in a predictable, timely and transparent

organization that promotes competitiveness of Canada's resource industries. The MPMO has employed an online "MPMO Tracker" where the public can monitor project statuses and to further accelerate the regulatory process, each project has a manager to supervise project progression and updates are sent to Deputy Ministers as part of the senior level accountability. Because of the timeliness and efficiency, investments are being facilitated and resource opportunities are not being lost. Currently there are 53 projects worth $100 billion in investments that are being managed.

Residential communities represent about 50 per cent of Canadian energy use and GHG emissions. QUEST demonstrates an integrated approach to lessen environmental impacts and energy costs and to increase safe and reliable energy deliverability. In order to achieve this, all aspects of community must be integrated from housing to waste management. An example of an integrated community energy system model is Dockside Green in Victoria, B.C. This 15-acre parcel of land was a former industrial site that was redeveloped into a self-sufficient community of 26 buildings. The community is interrelated and interdependent via mechanical and electrical systems and by using waste heat from one area to sustain fuel to another.

Capital investments in energy infrastructure are key to sustaining Canada's energy future. Developing new infrastructure facilitates the transportation of shale gas production to market while the implementation of organizations such as MPMO and QUEST help increase the efficiency of regulatory processes and assist in creating a greener Canada.

Session 2A – Watts up: Issues in Canadian Electricity Supply and Demand

Speakers

Moderator
Bob Modray, Team Leader, Electricity, National Energy Board

Are we Ready for Transportation Electrification?
Angelo Giumento, Engineer, Electric Transportation, Hydro Québec

Access to Capital Markets for Renewable Energy Projects
Todd Williams, Director, Energy Navigant Consulting, Inc.

Challenge of the "Green Economy" for Electricity Network Regulation
Peter Fraser, Senior Manager, Infrastructure and Renewables, Ontario Energy Board

Summary

Innovation, capital investments and green energy were the key themes in the electricity supply and demand session.

Angelo Giumento commenced the discussion with an overview of the potential to electrify Quebec's transportation sector. The Quebec government has set the goal of reducing GHG emissions by 20 per cent under the levels of 1990 by 2020. In 2007, it was noted that a significant 42 per cent of all GHG emissions in the province stemmed from the transportation sector. By developing infrastructure for electrified public transit as well as electric cars, GHG emissions could be reduced. Currently, plug-in hybrid vehicles are being tested to assess the load on the electricity grid. Advanced battery technology will facilitate fast charging and low temperature (-50 degrees Celsius) operation. Questions remain on how much infrastructure will be needed to accommodate an electric transportation system and are presently being studied. The role of Hydro Québec is to assist in electric transport technologies.

This was followed by a presentation by Todd Williams on access to capital for renewable energy projects. The key challenge for obtaining capital for renewable energy projects is funding and de-risking the investment. Numerous sources such as private and public bond issues and vendor financing are available for debt for renewable projects in Canada. A bank's risk tolerance depends a great deal on their previous experience with renewable projects. Currently, there is more experience in Europe than in North America and therefore the European banks often take the lead. Typically, the price of debt is five to seven per cent. Sources of equity can stem from pension funds, private firms and income trusts. Renewable energy projects can cost in the order of hundreds of millions of dollars and therefore require a high level of due diligence before any investment decision is reached. Sample projects show that money can flow, if projects are sufficiently de-risked. Power Purchase Agreements are a key step in de-risking projects.

Peter Fraser ended the session focusing on three key points pertaining to Ontario's feed-in-tariff (FIT): why a green economy is a fundamental shift, how successful FITs transmission and how regulators will have to adapt to the shift. In Ontario, FIT prices are not chosen on the basis of minimizing generation costs, but rather on the bases of ensuring technological diversity, resulting in investors receiving a reasonable rate of return. There is a large expansion of renewable generation in Ontario and the Ontario government has not set any limits for the amount of green energy obtained under this program. New transmission will be needed to absorb all the new generation available under the FIT.

Regulators will be needed to implement new policy and to partake in a challenging role in approving transmission construction based only on the anticipation of new generation. Permission to build may result in expropriation of property, so a good deal of risk is present. These risks can be mitigated by separating approval stages and construction. A

green economy, such as promoted by the FIT program, will not only be beneficial for the environment, but for job creation in the electricity generation sector.

Session 2B – Natural Gas Supply: The Next Generation

Speakers

Moderator
Jim Davidson, Team Leader, Gas, National Energy Board

North American Natural Gas
Zoe Anderson, Manager, Market Analysis Canada, BP Canada Energy Company

Natural Gas Supply - The New Paradigm
Kim Joslin, Vice President, Fundamentals, EnCana

Canadian Natural Gas is Going Global
Alfred Sorensen, President, CEO and Director, Galvenston LNG

Canadian Natural Gas Demand Trends
Bryan Gormley, Director of Policy and Economics, Canadian Gas Association

Summary

The production of North American gas is evolving due to advancements in technology. As conventional gas becomes increasingly uneconomic to drill, unconventional gas production is gaining momentum and filling the void in supply. This session examines the production of Canadian shale gas and its impact on domestic demand and global energy markets.

Zoe Anderson began the session stating that prices in natural gas markets work to balance supply and demand. Between 2000 and 2007, natural gas prices were high because of tight supply/demand balances. These higher prices encouraged investment in technology and exploration of unconventional gas resources, resulting in the development of shale gas plays in the U.S. In 2009, prices remained soft even through one of the coldest winters in the last century. This was partially due to the global economic collapse and the fears of a double dip recession but the development of shale gas on the supply side has been the real story. In fact, the development has been termed a "game changer".

Kim Joslin provided more details on shale gas developments in North America. Shale gas is producing two times the amount as that of a conventional well in its first year. Drilling and completion technologies have allowed for continual cost reductions: Montney costs are down 80 per cent in the last four years with similar results seen in the Horn River and drilling times have decreased from 65 to 35 days.

Alfred Sorensen gave an overview of the proposed Kitimat LNG project, which would be the largest western Canadian infrastructure project built since the Alliance pipeline and will cost an estimated $3.7 billion. The objective of the facility is to allow natural gas producers access to new markets and to the price differential between North America and Asia. It also provides incentive to develop additional natural gas reserves in western Canada as it allows producers to compete in the global gas market. For end users, it is a new low-geopolitical risk supply source. It provides supply diversity as Malaysia/Indonesia/Oman reduces contract volumes and shorten delivery terms.

Shipping will take approximately 10 days to major markets and less when the Panama Canal is expanded in 2014, providing an opportunity to ship to Europe. The terminal has gone through environmental and First Nations regulatory processes and is currently moving forward with Front End Engineering and Design (FEED) processes. Estimated on-stream time is 2015.

Bryan Gormley closed the discussion with a look at natural gas consumption trends. Residential, industrial and commercial demand slowed in growth as improved energy efficiency has reduced demand per customer. Demand from the residential sector is largely for space and water heating. Although, there has been an increase in both the size and number of houses, there has not been an increase in demand for gas. New houses are being built with higher energy efficiency standards and increasingly being equipped with high efficiency furnaces, which has led to a reduction in per capita natural gas use.

Similarly, new commercial buildings are being designed and built more efficiently. A notable example of this is the Manitoba hydro building, which only consumes 0.32 GJ/m^2. Although not all buildings are built to this level of "green", the trend towards efficiency is heading in that direction. On the industrial side, the pulp and paper, cement and upstream mining sectors have reduced their demand on gas as companies are becoming more resourceful by recycling their wastes as energy.

When it comes to power generation, gas will be valuable in enabling renewable fuels such as wind and solar to penetrate into the market. A smart energy use strategy will need to encompass supporting alternative and local renewable energy solutions, using energy efficiently and developing integrated community energy systems. In the future, local distribution companies will seek to deliver energy services, not just piped gas.

In summary, shale gas is becoming increasingly cost-effective to drill and new infrastructure will be required to bring the energy source to market. The Kitimat LNG project could aid producers to penetrate international markets and enable them to become competitive global players. As gas markets become globalized, future drivers of the market will be likely based on the environment (GHG reductions), demand from developing countries and energy pricing on carbon and electricity.

New infrastructure is needed to bring these new sources to market. Gas markets are becoming more interconnected and there will be more gas-on-gas competition in the mid-

Atlantic market and the western U.S. Canadian gas will be less in demand in traditional markets.

Session 3A – The Temperature is Heating up: Climate Change Policy Updates

Speakers

Moderator
Tara Smolak, Market Analyst, National Energy Board

Where to now? The Uncertain Future of Climate Change in the World of Negotiations
John Drexhage, Director, Climate Change and Energy, International Institute for Sustainable Development

Status of U.S. Federal Climate Policy
Katie Sullivan, Canadian Policy Director, International Emissions Trading Association

Western Climate Initiative Overview
Doug MacCallum, Manager, Energy Markets, Ontario Ministry of Energy and Infrastructure

Summary

Climate change policy has the potential to significantly impact energy market trends. Future limitations on GHG emissions will impact the way energy is produced and consumed in Canada. There are a number of initiatives under development that are shaping future Canadian policy.

In December 2009, the international community came together at the 15th Conference of the Parties (COP15) and developed the Copenhagen Accord. John Drexhage provided an overview of the meeting.

One of the key achievements of the Copenhagen Accord is that it recognizes the need to keep temperature change to 2 degrees Celsius. However, it does not specify emissions reductions needed to achieve this target.

Another achievement was that developed countries agreed to inscribe actions for economy-wide emissions targets for the year 2020. As a result, Canada has agreed to reduce GHG emissions 17 per cent below 2005 levels by the year 2020 and to be aligned

with the U.S. legislative target. The U.S. has agreed to reduce emissions "in the range of" 17 per cent from 2005 levels but that target would need to conform with anticipated U.S. legislation. The European Union has agreed to reduce emissions 20 per cent below 1990 levels, but would be willing to reduce by 30 per cent with commensurate action from other countries.

Finally, developing countries agreed to inscribe mitigation actions. China has stated that it will reduce GHG emissions 40 to 45 per cent per unit of GDP. However, these actions have been labeled autonomous domestic mitigation actions, with no reference to the Copenhagen Accord. India has committed to reduce GHG emissions intensity 20 to 25 per cent but there is no reference to this target in the letter to the Copenhagen Accord. Other countries, such as Brazil and Indonesia, have committed to more proactive action.

In terms of success of the meeting, John Drexhage noted that barriers remained between U.S. and China causing roadblocks for policy advancements. The U.S. upholds domestic policy over international agreements with Congress refusing to make any commitments until China confirms reduction obligations. Subsequently, China perceives monitoring and verification as a violation on its sovereignty and has refused any deals from developed countries. The Canadian government on the other hand was pleased with the results of Copenhagen as they had the opportunity to meet with developing countries and deemed that the Copenhagen accord supersedes the Kyoto Agreement.

The next step for Canada is to begin a real national dialogue. There seems to be significant action at the provincial level with less action occurring at the federal level. Therefore, a good first step could be to hold a First Ministers meeting.

As the stated policy of Canada is to align federal climate change policy with the U.S., it is important to examine developments south of the border.

Katie Sulivan provided a detailed overview of climate change policies in the U.S. It was noted that the U.S. Environmental Protection Agency (EPA) is continuing to advance GHG emissions regulations following the U.S. Supreme Court's 2007 ruling that confirmed the EPA had the authority to regulate GHGs. The EPA would regulate GHGs under the *Clean Air Act*. New and modified facilities would be subject to a permit review process and would be required to evaluate Best Available Control Technology (BACT) for all GHG emissions. As BACT for GHG emissions is not defined, it will likely be determined on a case-by-case basis. This process is likely to become both complicated and costly.

The EPA's activities are increasingly putting pressure on Congress to introduce climate legislation, which would be market-based and more flexible. As a result of this pressure, Senator Murkowski introduced a resolution that, if passed, would block the EPA from regulating GHG emissions (although this bill is now currently on hold). Senator Rockefeller will soon release legislation to delay EPA GHG regulation by two years, giving congress more time to develop climate change legislation.

There has been a number of economy-wide cap-and-trade legislations proposed. The bills are all on hold waiting for the release of the Bipartisan Climate Bill, which is being developed by Senators Kerry, Graham and Lieberman. The objective of this plan is to promote U.S. domestic energy production while putting a price on GHG emissions. Although the draft starts with an overall goal of reducing U.S. GHG emissions by 17 per cent below 2005 levels by 2020 (the same as other proposed cap-and-trade bills) the carbon pricing mechanisms are expected to look different and to move away from economy-wide cap- and-trade. There is speculation that the power sector will be capped with industry phased-in. Further, the expectation is that a domestic offset system will be included in the bipartisan climate bill.

Despite the unknowns at the U.S. federal level, there is activity occurring at the subnational level, with various regional and provincial/state initiatives moving forward, including the Western Climate Initiative (WCI). The WCI is a state and provincial effort to reduce GHG emissions. Signatories to the agreement include British Columbia, Manitoba, Ontario, Quebec, Montana and Utah. The objective of the initiative is to set a regional emissions reduction goal and to design a regional multi-sector market-based mechanism. The regional goal is to reduce GHG emissions by 15 per cent from 2005 levels by the year 2020 using a cap-and-trade system.

Significant headway has been made on the design of the cap-and-trade system. The design elements describe what must be the same between jurisdictions to make it a regional program. However, the specific details will be developed within individual jurisdictions and come about through legislative and rule making processes. Some of the key design issues are:

- It will cover all six primary GHGs.
- Various states and provinces are required to start reporting emissions in 2010.
- Cap-and-trade program will commence in the year 2012. Initially, the system will cover large stationary sources of emissions as well as electricity generators (including imports). In 2015, the cap-and-trade program will be extended to cover transportation, residential and upstream industrial fuels.
- Compliance mechanisms include offsets, banking but not borrowing of allowances, early reduction allowances and allowing allowances from other cap-and-trade programs.

Additional details on these design elements and others can be found in Doug MacCallum's presentation.

In terms of a national context, Mr. MacCallum noted that the WCI Partner jurisdiction support a national approach for cap-and-trade. The Partners have and will continue to share learnings with federal staff and agencies and to identify where national and regional complementary polices may be needed. Further, the hope is that the WCI program will serve as a national model.

In summary, there continues to be advancement in climate change policies at various levels of governments. The most advanced are those that are occurring at the subnational level. It is likely that these programs and policies will influence national and international targets and agreements. The impact of these developments will have far reaching impacts for Canadian energy consumption and production.

Session 3B – Balancing Act: The Role of Canada's Oil in Sustaining World Oil Supply and Meeting Global Demand

Speakers

Moderator
Chris Loewen, Team Leader, Oil/NGL, National Energy Board

The Look for Oil: A View to 2030
Jim Hughes, Manager, Energy Analysis, Corporate Planning Department, Imperial Oil Limited

Canadian Oil Outlook
Deborah Yedlin, Business Columnist, the Calgary Herald

Bitumen Markets and Economics
Michael Ekelund, Assistant Deputy Minister, Strategic Initiatives, Alberta Department of Energy

Outlook for East Coast Oil Developments
Dr.Wade Locke, Professor of Economics, Memorial University of Newfoundland

Summary

Canada is a net crude oil exporter and is endowed with a significant supply of oil both on and offshore. Newfoundland has found success with offshore projects such as Hebron and is continuing to make progress with new exploratory projects. Onshore, in Northern Alberta, a large source of bitumen lies in the oil sands where energy, environment and economics are strong development drivers. The oil sands and offshore production could potentially be the solution to compensate for the declining production in maturing basins, supply disruptions in unstable geopolitical countries and increased demand in developing countries. The "unconventional barrel" will certainly be key to Canada's role in sustaining world oil supply and meeting global demand.

Since the industrial revolution, the world has consumed approximately a trillion barrels of oil and currently has a trillion barrels left. Energy demand continues to rise in non-OECD countries as their populations and economic activity increases. In OECD countries, the demand for oil in commercial transportation shows potential growth for trucking and shipping, but is flat for personal use as cars become more efficient. Jim Hughes noted that in China, only eight per cent of the population owns vehicles thereby creating a major opportunity for growth in vehicle ownership. It is expected that the demand for personal energy will double in non – OECD countries.

The production in Canadian conventional oil has been decreasing and is looking to decline at a rate of three per cent annually. Deborah Yedlin remarked that it is the unconventional barrel that is becoming progressively more important for Canada and its ability to play a larger role in supplying the U.S. The oil sands have experienced economic setbacks and are now facing environmental obstacles. It would be advantageous to develop them in situ, which lessen the risks associated with the uncertainty in U.S. environmental and climate policy.

Canada is well positioned for transporting oil to market. The Altex pipeline will be using rail to ship bitumen to the West Coast and more pipeline capacity will be needed as oil sands production increases. While the midwestern U.S. shows great demand for bitumen, Canada will need to globalize itself by sending bitumen further down to the U.S. Gulf Coast to be competitive. Penetrating more of the U.S. market will change the pricing as Canada would be competing with Saudi Arabia and South America.

Michael Ekelund indicated that the production of bitumen will continue to increase. The differential between heavy and light crudes will become narrower as heavy crude prices become stronger. This will allow more refining work in the province of Alberta and less bitumen royalty payments. A range of market factors continue to support the weak investments in building new upgraders.

Wade Locke finished the session speaking on Canadian offshore projects. Offshore investments have made Newfoundland one of the riches provinces per capita. Hebron is expected to cost $4 to 6 billion and first oil is set for 2017. The Hibernia field is dwindling, but other projects are being explored such as the Orphan basin, which will have an exploratory well drilled in the spring of 2010. Additional projects include Mizzen, a standalone development; West Coast and the Ballicatters.

In summary, Canada has an array of oil sources. Newfoundland has benefitted from the investments made offshore and is continuing to explore more opportunities that may lie at sea. On the other side of the country, oil sands development has been continuing in the face of economic and environmental regulatory uncertainty. With increased demand from developing countries and the U.S.'s desire to emancipate itself from Middle East oil, Canada could become a strong competitor in the global oil markets. This should be strong incentive for the Canadian oil industry and government to prepare and strive for improved technology, infrastructure and advancements in climate policy.

Appendix 1 – Participant List

Participant List

The Board would like to take this opportunity to recognize and thank all the participants of the 2010 Energy Futures Conference.

Organization

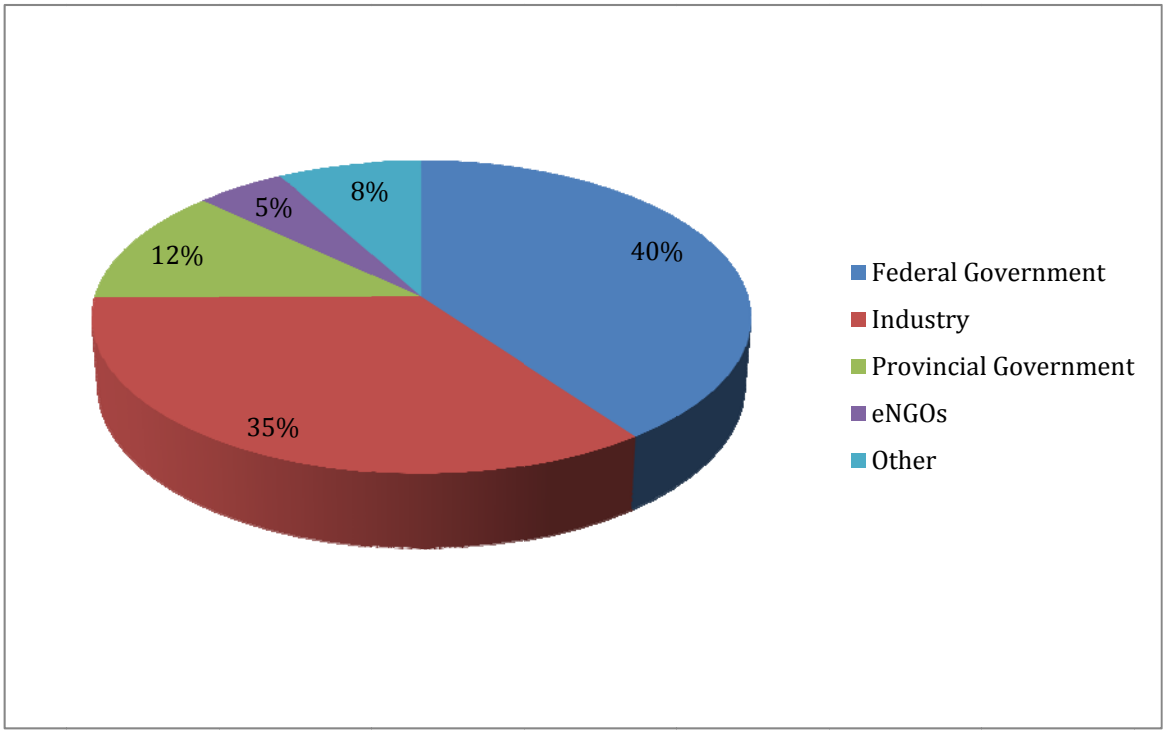
Air Liquide Canada
Alberta Chamber of Resources
Alberta Energy
Alberta Research Council
Alberta Utilities Commission (AUC)
AMEC
Association of Power Producers of Ontario
Atlantic Canada Energy Office (ACOA)
Atlantic Provinces Economic Council
Atomic Energy of Canada Limited (AECL)
Bank Of Canada
Blue Source Canada
BP Canada Energy
British Columbia Utilities Commission
Brookfield Renewable Power
Canadian Association of Energy and Pipeline Landowner Associations (CAEPLA)
Canadian Association of Members of Public Utility Tribunals (CAMPUT)
Canadian Association of Petroleum Producers (CAPP)
Canadian Association for Renewable Energies
Canadian Chemical Producers' Association
Canadian Electricity Association
Canadian Energy Research Institute (CERI)
Canadian Environmental Law Association
Canadian Hydropower Association
Canadian Nuclear Safety Commission
Canadian Vehicle Manufacturers Association
Carleton University
Cenovus Energy
Centre for Research and Teaching in Economics
Chemistry Industry Association of Canada
City of Ottawa
COGEN Canada
Conference Board of Canada
Conservation Bureau
Department of Finance Canada
Department of Foreign Affairs & International Trade Canada
Dow Jones & Co.
Elenchus Research Associates
Enbridge Gas Distribution
Enbridge Inc.
ENE (Environment Northeast)
Énergie Brookfield Marketing Inc.
Energy Council of Canada
Environ
Environment Canada
Environment Policy & Law
Environmental Group STOP
Eurasia Group
Fraser Milner Casgrain, LLP
Gaz Métro
GE Canada
Government of Newfoundland and Labrador, Department of Natural Resources
Hydro Québec
Hydrogen & Fuel Cells Canada
Indian and Northern Affairs Canada
Industry Canada
Informetrica Limited
International Emissions Trading
Intragaz Inc.
Mackenzie Valley Land and Water Board
McGill University

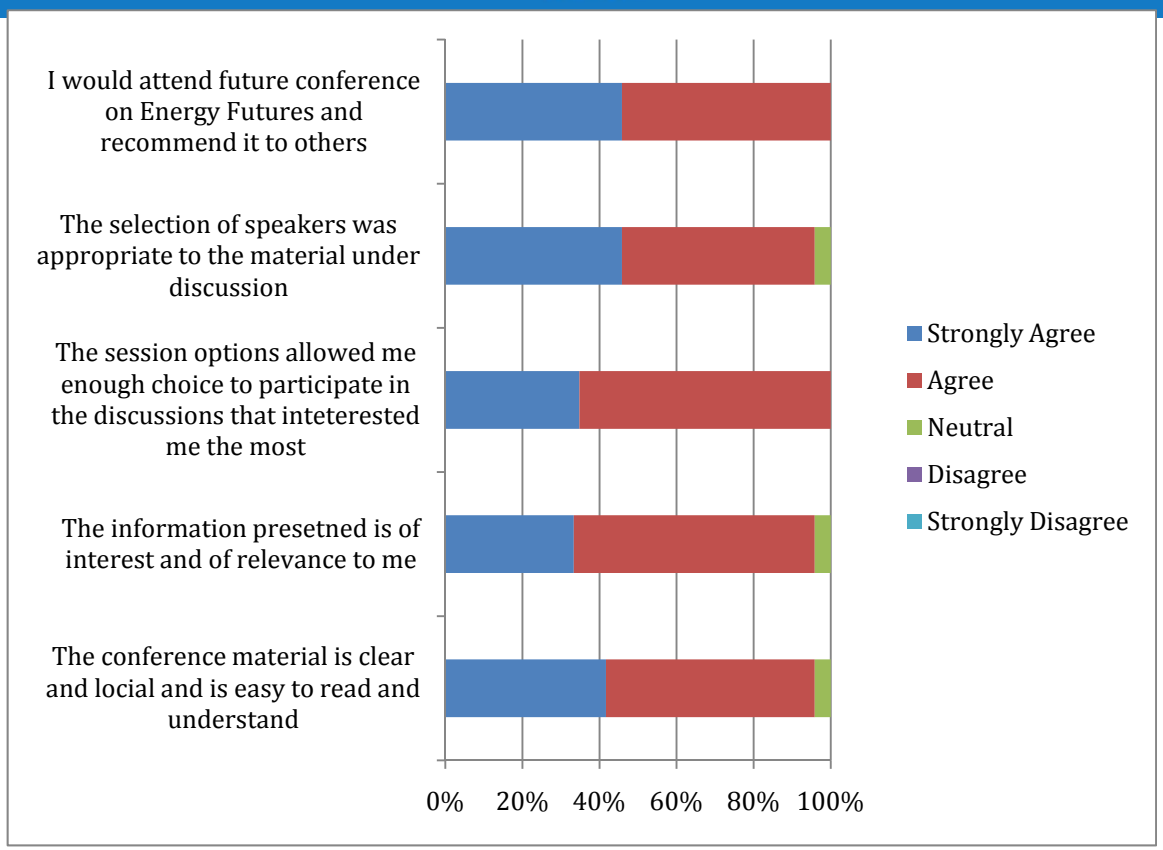
Mining Association of Canada
Ministère des ressources naturelles et de la Faune
Mouvement Au Courant
Muskoka Group
NAIMA Canada
National Research Council (NRC)
Natural Resources Canada
Navigant Consulting, Inc.
NB Climate Change Hub
Norman Paterson School of International Affairs
Office de l'Efficacité Énergétique (OEE)
Ontario Energy Board
Ontario Ministry of Energy & Infrastructure
Ontario Power Authority
Parliamentary Budget Office
Pembina Institute
Quality Urban Energy Systems of Tomorrow (QUEST)
Régie de l'énergie du Québec
Réseau des ingénieurs du Québec
Resource Conservation Manitoba
RGO Lawyers S.C.
Robert Hunt Management Services Ltd.
Saskatchewan Industry and Resources
Senate of Canada
Shell Canada Limited
Standard & Poors
Statistics Canada
Sustainability Journal
Terasen Gas
Mining Association of Canada
TransCanada PipeLines Limited
Transport Canada
Twyman Jamison LLP
Union Gas Limited
Université Laval
whatIf? Technologies
Wood Mackenzie
World Wildlife Fund - Canada (WWF)

Appendix 2 – Conference Demographics & Evaluation

Conference Demographics & Evaluation

There were over 200 registrants to the conference. This is slightly larger than the turnout from the 2008 conference, which attracted about 150 people. The breakdown of the conference attendees was 40% from the federal government, 35% from industry, 12% from provincial governments, 5% from ENGOs and the remainder from other groups, such as academics.





The majority of conference participants felt the information presented was interesting and relevant and would recommend attendance at future conferences to their colleauges.

Appendix 3 – Workshop Agenda

Start	End		
8:00	8:30	Conference Registration	
8:30	10:00	Plenary Session: Welcoming remarks - Georgette Habib, Board Member, National Energy Board Keynote Address Building a Sustainable Energy Future- What does this mean for Canada? Moderator - John McCarthy, Business Leader, Strategy and Analysis, National Energy Board Dennis McConaghy, Executive Vice-President, Pipeline Strategy and Development, TransCanada Corporation Tim Weis, Director of Renewable Energy and Efficiency Policy, Pembina Institute	
10:00	10:20	Break	
10:20	11:50	Concurrent Sessions 1: 1a - Boom, Doom or Gloom? The Future of Economic and Energy Markets Moderator - Abha Bhargava, Team Leader, Energy Demand, National Energy Board • *Current Macroeconomic Conditions* - Kevin Page, Parliamentary Budget Officer, Library of Parliament • *Future of Oil and Natural Gas Prices and their Interrelationship* - Joe Benneche, Natural Gas Analyst, Energy Information Agency • *Commodity Price Analysis at the Bank of Canada* - Ilan Kolet, Senior	1b - Making Connections: Energy Infrastructure in Canada Moderator - Eli Turk, Vice-President, Canadian Electricity Association • *Pipelines: Delivering Energy Solutions* - Dr. Brenda Kenny, President and CEO, Canadian Energy Pipeline Association • *Major Projects Management Office Initiative* - Jim Clarke, Director General, Operations, Major

		Analyst, Bank of Canada	Projects Management Office • *Integrated Community Energy Systems and Energy Infrastructure in Canada* Bob Oliver, Executive Director, Pollution Probe
11:50	12:50	Lunch (Lunch will not be provided, but there will be a cafeteria on site.)	
12:50	2:20	Concurrent Sessions 2: 2a - Watts Up: Issues in Canadian Electricity Supply and Demand Moderator - Bob Modray, Team Leader, Electricity, National Energy Board • *Are we Ready for Transportation Electrification?* - Angelo Giumento, Engineer - Electric Transportation, Hydro Québec • *Access to Capital Markets for Renewable Energy Projects* - Todd Williams, Director, Energy, Navigant Consulting, Inc. • *Challenge of the "Green Economy"Regulation* - Peter Fraser, Senior Manager, Infrastructure and Renewables, Ontario Energy Board	2b - Natural Gas Supply - The Next Generation Moderator - Jim Davidson, Team Leader, Gas, National Energy Board • *North American Natural Gas* - Zoe Anderson, Manager - Market Analysis Canada, BP Canada Energy Company • *Natural Gas Supply - The New Paradigm* - Kim Joslin, Vice-President, Fundamentals, EnCana • *Canadian Natural Gas is Going Global* - Alfred Sorensen, President, CEO and Director, Galvenston LNG • *Canadian Natural Gas Demand Trends* - Bryan Gormley, Director of Policy & Economics, Canadian Gas Association
2:20	2:40	Break	
2:40	4:20	Concurrent Sessions 3 3a - The Temperature is Heating Up: Climate Change Policy Updates Moderator - Tara Smolak, Market Analyst, National Energy Board • *Where to Now? The Uncertain Future of Climate Change in the World of Negotiations* - John Drexhage, Director, Climate Change and Energy, International	3b - Balancing Act: Role of Canada's Oil in Sustaining World Oil Supply and Meeting Global Demand Moderator - Chris Loewen, Team Leader, Oil/NGL, National Energy Board • *The Look for Oil: A View to 2030* - Jim Hughes, Manager, Energy

		Institute for Sustainable Development • *Status of U.S. Federal Climate Policy* - Katie Sullivan, Canadian Policy Director, International Emissions Trading Association • *Western Climate Initiative Overview* • Doug MacCallum, Manager, Energy Markets, Ontario Ministry of Energy and Infrastructure	Analysis, Imperial Oil Limited • *Canadian Oil Outlook* - Deborah Yedlin, Business Columnist, the *Calgary Herald* • *Bitumen Markets and Economics* - Michael Ekelund, Assistant Deputy Minister, Strategic Initiatives, Alberta Department of Energy • *Outlook for East Coast Oil Developments* - Dr. Wade Locke, Professor of Economics, Memorial University of Newfoundland
4:20	4:30	Wrap Up (within each room)	

Appendix 4 – Presentations