

National Energy
Board



Office national
de l'énergie

ENERGY FUTURES PROJECT

BACKGROUND FOR CONSULTATION SESSIONS

MAY 2006

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Background

The National Energy Board (the NEB or the Board) is an independent federal regulatory agency that was established in 1959. The NEB's main responsibilities are the regulation of the construction and operation of interprovincial and international pipelines; pipeline traffic, tolls and tariffs; the construction and operation of international and designated interprovincial power lines; the export and import of natural gas; the export of oil and electricity; and frontier oil and gas activities.

In addition to the regulatory role, the Board monitors and reports to the government and the public on the function of energy markets. It provides energy advice to the Minister of Natural Resources in areas where the Board has expertise derived from its regulatory functions; carries out studies and prepares reports when requested by the Minister; conducts studies into specific energy matters; holds public inquiries when appropriate; and monitors current and future supplies of Canada's major energy commodities.

In a July 1987 decision, the Board adopted the Market-Based Procedure (MBP), as a replacement for the reserves surplus test, for regulating natural gas exports. Ongoing monitoring is one of the two important components of the MBP. Market monitoring also forms the basis for any advice or recommendations that the NEB may be asked to provide on energy markets and exports.

As part of its ongoing monitoring, the Board periodically publishes a long-term energy supply and demand report and other Energy Market Assessments (EMAs). The first long-term outlook was published in 1967, with the most recent energy supply and demand report being released in 2003. The next report is planned for release in October, 2007. The key objectives of the upcoming report are:

- to provide unbiased, relevant, comprehensive, expert analysis on energy supply, demand and its economic and environmental implications to serve as a standard of reference for parties interested in Canadian energy issues and trends;
- to provide stimulus for discussion with and amongst stakeholders, both during and after the completion of the report on emerging issues of national importance; and
- to inform decision makers of key risks and uncertainties facing the energy future, and advise them of regulatory and other issues that need to be addressed.

In developing the 2007 Energy Futures report, the Board seeks the views of Canadians interested in energy matters. Through this report and its process, the Board also creates a dialogue on key energy issues. Between now and the release of the final report in October, 2007, the Board will engage in two sets of public consultations. The first round being held in May, 2006 will focus on the proposed analytical approach, major assumptions for the reference case, and the scenario storylines and assumptions. The second round of consultations will focus on preliminary results and is expected to take place in early 2007. The objective of the public consultations is to provide stakeholders an opportunity to comment on the Board's methodology and analysis of long-term energy supply and demand in Canada.

The purpose of this background document is to ensure that consultation participants have a common understanding of key issues to be addressed during the cross-country consultations as well as to highlight areas where we will be seeking comments and an interchange of ideas.

The Board looks forward to your feedback on the background material provided in the next sections, as well as material presented during the consultations. In addition, written comments are welcome and can be directed to:

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Methodology Overview

Introduction:

In a distinct change from the previous reports, the NEB adopted a scenario-based technique in its 2003 report to help better understand the forces impacting Canada's energy environment and address the uncertainties and issues associated with evolving energy markets. This shift was appropriately reflected in the name change to Energy Futures Report.

Two alternate scenarios of Canada's energy future were analysed to capture two very different but plausible energy futures for Canada. The Supply Push scenario represented a world in which technology advanced gradually, Canadians took limited action with respect to the environment and emphasis was placed on developing Canada's energy resources. The Techno-Vert scenario represented a world in which technology advanced rapidly and Canadians took broad action with respect to the environment and demonstrated a preference for environmentally-friendly products and cleaner-burning fuels.

The scenarios approach was received positively by many stakeholders, who found the scenarios "stimulating, insightful and thought provoking". The two scenarios inspired public debate on emerging issues and trends and shifted the focus from pure numbers to an understanding of issues. However, many stakeholders expressed the need for a "reference case" in addition to the scenarios. The stakeholder input can be best summarized by the following remark:

"The scenarios set out a more hypothetical and speculative picture of Canada's long-term energy future than the case-based analysis in previous studies. The strong reliance by industry, governments and the public on the NEB reports demonstrates that the Board has a strong reputation of producing sound work. NEB reports are a primary source of reference used by consultants, governments and other groups conducting secondary research".

The 2007 Energy Futures Approach:

The 2003 experience and the stakeholder feedback are important determinants of the Board's proposed 2007 Energy Futures Report. A "hybrid" approach consisting of a reference case and scenarios is being proposed for the upcoming report. The approach is consistent with the analytical approach being adopted quite widely by several international energy agencies. This approach should appeal to the needs of a wider group of stakeholders.

However, the proposed approach differs somewhat from the hybrid approach adopted by others. The reference case analysis is undertaken for only the short to medium timeframe, and spans over the years 2005-2012, as opposed to the full long term. Overall, certainty is inversely related to time, with the immediate future holding greater certainty than the distant future. As such, the reference case, if defined as the most likely case, is most meaningful in the short term.

The word "scenarios" itself reflects uncertainty and therefore these are more meaningful in the longer term. The proposed timeframe for scenario analysis is 2013-2030. Three plausible energy scenarios are proposed:

- "*TREEES*" explores a world where energy, environment and economic criteria are considered in key decision making processes. Sustainability is the overarching theme of this scenario;

- “*Fortified Islands*” explores a world where security issues become more and more relevant and leads to slower economic growth and demand for energy, ultimately impacting the Canadian economy; and
- “*Continuing Trends*” assumes the force of globalization continues with strong global economic growth fueled by the developing world, which leads to strong demand for Canadian resources and a strong Canadian economy.

The Board will not assign probabilities to these scenarios but rather each scenario is plausible. Greater detail on these three proposed scenarios is provided in later sections.

In line with the previous work undertaken on long-term analysis of energy supply and demand, the 2007 Energy Futures Report will provide projections of energy supply, demand, and energy prices for the reference case and the three scenarios. Energy supply will include projections of oil, natural gas, natural gas liquids, electricity and coal supply. Energy demand will be detailed by energy fuel and major consuming sectors and end-uses. Energy prices will be provided for each major energy fuel.

It is expected that the 2007 Energy Futures Report will also include projections of greenhouse gas emissions and the macroeconomic impact in each of the reference case and scenarios. All analysis will be detailed by province. The timeframe for analysis is 2005-2030.

Reference Case (2005 – 2012)

The Reference Case will provide an outlook for energy supply and demand in Canada to 2012. This section provides a high level overview of key assumptions and issues that will be explored in the Reference Case as well as highlights areas where we would like to engage consultation participants and receive feedback. Please note that although key discussion questions are described below, insights on other aspects of energy supply and demand through to 2012 are also encouraged.

1. Energy Supply

The following are the key oil, natural gas and natural gas liquids (NGL) assumptions that will be used to develop the Reference Case:

- Crude oil price is US\$50/bbl (West Texas Intermediate (WTI));
- Natural gas price is US\$7.50/MMBtu (90% price parity with oil and a 6:1 Btu parity);
- Condensate premium is 5%;
- Light/Heavy oil price differential is 30%;
- Propane price is valued at between 65% and 70% of WTI;
- Extraction of NGL is economic over the long term;
- Domestic and imported coal prices are stable over the long term;
- Unconventional natural gas supply (e.g., liquefied natural gas and coal bed methane) does not contribute to NGL supply.

Electricity prices are an outcome of the analysis.

1.1 Oil

Since late 2002, the world has experienced very strong oil markets. As benchmark crude oils around the world flirt with record high prices, global oil demand is robust and demonstrating remarkable resilience. In this environment, Canada is in an enviable position as the holder of the world's second largest reserves.

The high price environment has translated into record profits for the Canadian oil and gas industry and has spurred billions of dollars in investment, with Alberta's oil sands being a major beneficiary. At the same time, however, consumers and industries have faced sharply higher prices for energy and petroleum products.

Conventional Oil: Western Canada Sedimentary Basin (WCSB)

Higher oil prices have sparked activity in conventional oil drilling, with a 20-year-high for oil strikes in the first quarter of 2006¹. This should result in production decline curves flattening out somewhat. Consequently, the NEB needs to update the assessment of resources and supply profiles as they are now about four or five years old. This will involve updating the resource potential and reserves picture for western Canada and the NWT.

¹ Daily Oil Bulletin

Reserves additions are currently coming primarily from exploration and development drilling, and from enhanced oil recovery (EOR) through waterflooding.

Enhanced oil recovery through carbon dioxide (CO₂) flooding has proven successful at the Weyburn Midale field in Saskatchewan, and studies indicate there are many other pools in western Canada suitable for CO₂ flooding. Carbon dioxide flooding in mature oil reservoirs could increase production from mature Canadian oil reserves by between 8 and 25 percent, which means increasing potential recovery by between 3 and 9 billion barrels of oil². In Alberta, the wide-scale adoption of CO₂ flooding will depend on developing a pipeline distribution system to move the CO₂ from major sources, such as the oil sands upgraders at Fort McMurray and the refineries/upgraders near Edmonton, to the central Alberta oil fields. Building such a pipeline would be an expensive undertaking, and may not happen without some government incentive. CO₂ flooding has great potential including environmental benefits; but, its economic feasibility is still in question.

The historical recovery factor for conventional heavy pools in western Canada is about 15 percent on average, leaving a large target for EOR techniques. Higher oil prices generate greater interest in EOR, and a variety of recovery methods are likely to be tested and employed, including a greater emphasis on thermal methods, such as steam assisted gravity drainage (SAGD).

We will also be gauging the contribution to production of new plays like the Summit Creek field near Norman Wells in the NWT and the Bakken play in southeast Saskatchewan and Manitoba. The question of the oil potential offshore British Columbia, and the status of the moratorium on exploration, will be revisited.

Conventional Oil: Eastern Canada

We will be seeking feedback from stakeholders on the status of conventional oil in eastern Canada, to develop updated views on conventional crude oil resources, reserves and supply potential.

Oil Sands

The Board is currently updating its production outlook for the oil sands and will outline the preliminary results of this work at the consultation meetings.

Oil Pipelines

High crude oil prices and strong global oil demand growth are key drivers in the expansion of the oil sands. Pipeline expansions or new pipelines will be required to deliver this growing product to existing markets and to facilitate the development of new markets.

² Government of Canada, *Moving Forward on Climate Change – A Plan for Honouring our Kyoto Commitment* (2005) p. 5, http://www.climatechange.gc.ca/kyoto_commitments

Oil Discussion Questions

- a) Is the oil price assumption reasonable?
- b) In eastern Canada, the major issues/questions are:
 - developing updated production profiles for Hibernia, Terra Nova and White Rose
 - when should we include Hebron/Ben Nevis?
 - what are the reserves for South Hibernia and other possible satellite pools?
 - what are the prospects in Orphan Basin or other prospective areas?
 - what is the potential related to oil shows in the St. Lawrence Lowlands and Gaspé region of Quebec, and on Anticosti Island?

1.2 Natural Gas Liquids (NGL)

In response to flattening natural gas production from the WCSB and rising demand, natural gas prices, and therefore NGL prices, have increased significantly since the late 1990s.

Of the various NGLs, propane is used mostly as a heating fuel. Propane prices have historically tracked crude oil prices at about 75 percent to 80 percent of the value of crude oil, on a heat content basis. Going forward, propane prices, relative to oil, are expected to track crude oil at about 65 percent to 70 percent of the value of oil. The rationale behind this somewhat lower price relationship is that global oil supply is expected to continue to be tight whereas world liquefied petroleum gas (LPG) supply, from Asia and the Middle East in particular, is expected to continue to grow.

In Canada, given the expected outlook for conventional natural gas supply, the current ethane and condensate supply shortfalls could intensify if WCSB conventional natural gas production declines. If domestic natural gas demand in Alberta increases, as expected, ethane supply will be negatively impacted even more. Additionally, propane and butane exports could decline unless alternative liquids source (e.g., from Mackenzie Delta, Alaska or from oil sands resources) can be accessed.

Given the price assumptions for oil and natural gas (US\$50/bbl and US\$7.50/MMBtu, respectively), extraction of liquids is assumed to be economic over the long term. Of note, if natural gas prices increase relative to oil periodically - to parity or above oil - it is assumed that extraction of liquids would not be economic for short periods of time. Eventually, the NGL supply and demand balance would tighten, NGL prices would increase, and liquids extraction would once again be economic.

NGL Discussion Questions

- a) Is the relative value of NGL to oil prices and the extraction economic assumption reasonable?
- b) In western Canada, the major issues/questions are:
 - Will the current ethane and condensate supply shortfalls intensify?
 - Will a butane supply shortfall develop?
 - Will propane exports decline?

1.3 Natural Gas

North American natural gas prices have been influenced by the significant increase in world crude oil prices and a tight balance between natural gas supply and demand. Rising prices have created economic challenges for Canadian consumers and industries while also providing an incentive to develop additional natural gas supplies in producing areas and frontier regions. Through record-breaking drilling activity, Canadian gas production has remained relatively flat and demand is adjusting in response to price pressures. The following sub-sections describe key aspects of the reference case outlook to 2012.

Western Canadian Gas Supply

Despite record drilling, gas production growth has stalled due to declining well productivity. Rising activity is increasing pressure on land access, drilling costs, and availability of labour and equipment. Expectations regarding ongoing increases in drilling activity and if resulting gas production will remain relatively flat to 2012, are major components of the reference case analysis.

Horseshoe Canyon coal bed methane (CBM) appears to be ramping up to full scale development. Mannville CBM is a potentially larger resource, but is at a much earlier stage of development and may face greater technical, economic and environmental challenges. The contribution of Horseshoe Canyon CBM to western Canadian production and the pace of development of Mannville CBM will be significant considerations for the outlook.

Liquefied Natural Gas (LNG) Imports

Liquefied natural gas import capacity is increasing in North America through expansion of existing facilities and development of new projects in Canada, the U.S. and Mexico. Utilization of the existing capacity has been relatively low and the short-term nature of North American gas markets differs from the traditional long-term contracting practices of the LNG business. The amount of LNG import capacity to be built by 2012 in Canada and in North America as a whole, and how heavily it is utilized, are key drivers for the analysis. A related factor is the potential impact of LNG imports on pipeline flows, basis and overall North American gas prices.

Canadian Frontier Gas Projects

The Sable project has been on production since the start of the decade and has a major role in regional markets. Other prospects on the Scotian shelf and slope have yet to be developed. Significant volumes of gas have been identified in association with the oil developments on the Grand Banks, but challenges may exist regarding commercialization. The potential impact of LNG imports on the economics of future offshore projects is a consideration.

Development of Mackenzie Delta and other northern gas discoveries awaits the availability of a pipeline to move the gas to southern markets. A key consideration is the extent that development of frontier gas projects (approved, under construction, or operational) should be included over the period to 2012.

Natural Gas Pipeline Flow Dynamics

The desire to serve high-value markets, particularly in the U.S. northeast, is currently driving proposals to add LNG import capacity and to construct major pipeline systems from the U.S.

Rockies. Additional gas from frontier projects could also begin to be available later in the period. These gas volumes could change traditional gas flow patterns in North America.

Natural Gas Discussion Questions

- a) Is the natural gas price outlook and the assumed ongoing relationship with crude oil reasonable?
- b) What are your views on North American natural gas prices through 2012 and their potential impact on gas supply, demand and LNG imports?

1.4 Electricity

Canada's electricity markets continue to develop along provincial or regional boundaries and the extent of restructuring varies among provinces. Yet, all regions are faced with increasing demand, the prospect of higher prices and a need to increase and diversify generation supply. To meet these challenges, governments and electric utilities across the country are focusing on three common long-term objectives: adequate and reliable supply; sustainable development; and acceptable electricity prices. Below is a list of electricity market assumptions over the Reference Case timeframe.

Fossil Fuel Generation

High natural gas prices will limit the development of natural gas-fired generation, except in niche applications such as cogeneration. For instance, in the near-term, Ontario will pursue natural gas-fired generation and wind energy to replace retired coal facilities. Reliability concerns may not allow for the retirement of all coal units in Ontario by 2009. Alberta might also pursue additional natural gas-fired generation and construct new supercritical coal facilities. New coal projects are being proposed in B.C.

New Integrated Gasification Combined-Cycle (IGCC) facilities will likely be developed in the long-term, as the technology improves and as CO₂ sequestration develops.

Hydro and New Renewable Generation

Quebec, Manitoba and Labrador will likely construct new hydro storage facilities. Ontario will actively pursue hydro imports.

Renewable generation will continue to experience rapid growth in Canada.

Nuclear Generation

All Bruce nuclear units in Ontario will return to service, two of the Pickering units in Ontario will not be started and the Point Lepreau nuclear facility in New Brunswick will be refurbished. It is uncertain if Gentilly in Quebec will be refurbished or shut-down after 2009.

The development of nuclear energy in the oil sands is uncertain.

Transmission

The potential east-west grid will not likely develop in the near-term, apart from specific projects like the Clean Energy Transfer Initiative (Conawapa) and the Churchill Falls expansion. Siting may be an issue with new transmission development.

Conservation and Demand Response Programs

In the near-term, Conservation and Demand Response programs will be continued in all regions. Ontario will introduce smart meters to all consumers.

Electricity Discussion Questions

- a) Will reliability concerns allow the retirement of all Ontario coal units by 2009?
- b) Is IGCC a feasible generation option in the near term? In the long term? In which region(s)?
- c) What are the government and utility cogeneration strategies, by region?
- d) What government or industry initiatives will be required to enable needed transmission projects to develop?
- e) What is the likelihood that new hydro storage will be developed? Will siting be an issue?
- f) What is the pace of renewable development in each region? What type of renewables will be built? What incentives are required to enable additional renewable generation? What incentives will drive investment in renewable electricity projects in each region?
- g) What is the prospect for the development of gas-fired generation in the long-term? Which regions will likely develop it?
- h) What factors will drive the decision(s) to invest in nuclear energy? Will there be nuclear energy in the oil sands?
- i) What are the prospects in electricity trade between regions (north-south and east-west)?
- j) What does the distributed generation outlook look like, by province? Are there specific government policies or utility strategies? Is there a trend toward, or away from, distributed generation?
- k) Is demand management here to stay?
- l) Will there be any significant changes in the extent of wholesale and retail access (by region)?

2. Energy Demand

Total secondary energy demand in Canada has grown by 2.0 percent per year from 1999 to 2003, or from 7,816 petajoules (PJ) to 8,457 PJ. Total energy demand growth is slower than GDP growth, which averaged 3.1 percent per year over the same period, indicating an improvement in energy intensity (PJ/GDP).

Energy demand is commonly organized into residential, commercial, industrial and transportation demand. The industrial sector is the largest sector followed by the transportation sector, the residential sector and, finally, the commercial sector. All four sectors have experienced energy demand growth over the 1999 to 2003 period.

Energy demand by fuel source has remained relatively flat over the period 1999 to 2003. This indicates little *net* fuel switching overall. Major energy sources (oil, natural gas, electricity, motor gasoline) are all increasing at approximately the same rate as total energy demand.

Canadian Energy Demand by Sector, 2003

Residential 1670 PJ 17%	Commercial 1181 PJ 14%	Industrial 3246 PJ 41%	Transportation 2361 PJ 28%
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Source: NRCan

Canadian Energy Demand by Fuel Source, 2003

Electricity 1887 PJ 22%	Natural Gas 2189 PJ 26%	Gasoline 1408 PJ 17%	Other RPPs 1427 PJ 17%	Other 1543PJ 18%
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Source: NRCan

2.1 Residential Sector

Residential energy demand in Canada has grown by 2.4 percent per year from 1999 to 2003. The largest component of residential energy demand is space heating, followed by water heating, appliances, lighting and space cooling. Natural gas and electricity are the largest sources of fuel in this sector.

Key trends that are expected to put upward pressure on energy demand in the residential sector include:

- Shrinking number of people per household;
- Increasing personal disposable income;
- Increasing phantom load or standby losses per household. This is the energy used by appliances and electronics when they are turned 'off'. This demand is usually unknown or not thought of by homeowners, hence 'phantom'; and
- Increasing demand for air conditioning

On the other hand, energy demand growth could be limited by:

- Higher energy prices than have been experienced in the recent past;
- “Natural conservation”, which occurs as older, inefficient energy using equipment reaches the end of its life and is replaced by new, more efficient stock; and
- Government energy efficiency programs and policies, including demand side management (DSM).

Canadian Residential Energy Demand by Fuel Source, 2003

Electricity 543 PJ 37%	Natural Gas 670 PJ 46%	RPPs 123 PJ 8%	Wood 110 PJ 8%
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Source: NRCan

2.2 Commercial Sector

Commercial energy demand in Canada has grown by 4.8 percent per year from 1999 to 2003. The largest component of commercial energy demand is space heating followed by lighting, auxiliary motors and equipment, water heating, and space cooling. Natural gas and electricity are also the largest sources of fuel in this sector.

A key trend that is expected to put upward pressure on commercial energy demand is a continuation of growth in office space which has corresponding high plug load and space cooling requirements.

The key trends that are expected to put downward pressure on commercial energy demand are very similar to the pressures in the residential sector. They include:

- Higher energy prices than have been experienced in the recent past;
- “Natural conservation”, which occurs as older, inefficient energy using equipment reaches the end of its life and is replaced by new, more efficient stock;
- Energy efficiency upgrades. There is large potential energy savings through targeted technology upgrades, particularly in lighting; and
- Government energy efficiency programs and policies, including building codes and retrofit programs.

Canadian Commercial Energy Demand by Fuel Source, 2003

Electricity 474 PJ 40%	Natural Gas 525 PJ 45%	RPPs 149 PJ 13%	Other 33 PJ 3%
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Source: NRCan

2.3. Industrial Sector

Industrial energy demand has grown by 1.5 percent per year from 1999 to 2003. The largest absolute energy users in Canada include the pulp and paper industry, mining, manufacturing and petroleum refining. The most energy intensive industries (as measured by PJ/GDP) include petroleum refining, pulp and paper, and cement industries. A wide range of fuel sources are employed in the industrial sector.

Industrial economic growth, in particular economic growth in energy intensive industries (e.g., petroleum refining) is an important factor that puts upward pressure on industrial energy demand.

Factors that put downward pressure on industrial energy demand include:

- Energy efficiency improvements; and
- Government programs and policies.

Higher energy prices could lead to reductions in energy demand or could lead to industries switching towards relatively less expensive fuels. The ability for the industrial sector to respond to higher energy prices by switching fuels or by exploring cogeneration and waste heat recovery is of key interest in the reference case.

Canadian Industrial Energy Demand by Fuel Source, 2003

Electricity 868 PJ 25%	Natural Gas 992 PJ 29%	RPPs 450 PJ 13%	Still Gas & Pet Coke 437 PJ, 13%	Wood Waste & Pulp. Liq. 465 PJ, 13%	Other 247 PJ 7%
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Source: NRCan

2.4 Transportation Sector

Canadian transportation energy demand has grown by 1.2 percent per year from 1999 to 2003. The largest component of transportation energy demand is passenger transportation followed by freight transportation. Currently, energy demand in the transportation sector is dominated by gasoline. Alternative fuels, such as ethanol or compressed natural gas (CNG), can also be used. The ability of these fuels to compete in the transportation sector is of interest in the reference case.

Issues and trends that put upward pressure on energy demand:

- Increased sales of light trucks and SUVs in passenger transportation; and
- Increased distance traveled per passenger vehicle and average distance traveled for freight trucks.

Potential areas that could put downward pressure on demand:

- Higher energy prices than have been experienced in the recent past;
- Adoption of technologies to improve energy efficiency – for example, the introduction of hybrid electric vehicle or the adoption of clean diesel vehicles in passenger transportation; and
- Government programs and policies.

Canadian Transportation Energy Demand by Fuel Source, 2003

Gasoline 1 355 PJ 57 %	Diesel 698 PJ 30 %	Aviation 223 PJ 10%	Other 87 PJ 3%
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Source: NRCan

2.5 Discussion Questions

- a) How will energy demand change in the next five to ten years (factors to consider include technology advances, environmental awareness, macroeconomics, demographics, government policy)?
- b) Since 2002, energy prices have been higher than in the recent past. How do you expect Canadian consumers to respond to these higher prices?

3. Macroeconomy³

Real gross domestic product (GDP) has grown on average 3.1 percent per year in Canada from 1999 to 2004. It is assumed that the annual growth rate from 2005 to 2012 is 2.8 percent per year. In the forecast period, the goods and services split remains steady at 33 percent of GDP from the goods sector and 67 percent from the services sector. The following table outlines historical trends and forecasts by macroeconomic variable of interest.

Macroeconomic Variable	Average Annual Growth Rate (1999-2004)	Average Annual Growth Rate (2005-2012)	Regional Variation (2005-2012)
GDP	3.1 %	2.8 % (goods sector 3.4%, service sector 2.5%)	1.3% (PE) to 3.1% (ON)
GDP/Employee	1.0%	1.8%	1.4% (PE) to 2.0% (NL)
Population	1.0%	0.8%	-0.1% (NL, SK) to 1.2% (Terr, AB)
Immigration	5.4%	225,000 people per year	Net-migration is negative (more leaving than entering) for Saskatchewan and Atlantic provinces and is positive for all other provinces
Consumer Price Index (real)	2.4%	1.4%	1.2% (PE) to 1.6% (QC)
Real Disposable Income	1.0%	2.5%	-1.9% (Terr.) to 3.0% (BC)

Historical trends and forecasts of industrial GDP by key energy using industries are captured in the following table:

Macroeconomic Variable	Average Annual Growth Rate (1999-2004)	Average Annual Growth Rate (2005-2012)
<u>Industrial GDP</u>	3.1%	2.8%
Mining	3.3%	3.4%
Oil and Gas Mining	1.4%	3.3%
Pulp and Paper	0.3%	2.0%
Chemicals	5.0%	2.2%
Cement	7.6%	1.7%
Primary Metal	2.3%	2.7%
Petroleum and Coal Products	2.9%	2.4%

³ Forecasts of all macroeconomic variables are from Infrometrica's latest model run dated November 2005

In 2012, the average age of the population is expected to be 39.7 years (up from 38.1 in 2005 and 36.5 in 1999), the Canadian unemployment rate is forecasted to be 6.1 percent ranging from a low in Manitoba of 2.6 percent and a high in Prince Edward Island of 13.7 percent, and the Canada/US exchange rate is predicted to be US\$0.90 per Canadian dollar.

Please note that the macroeconomic forecast values should be treated as a starting point for discussion and not the final numbers.

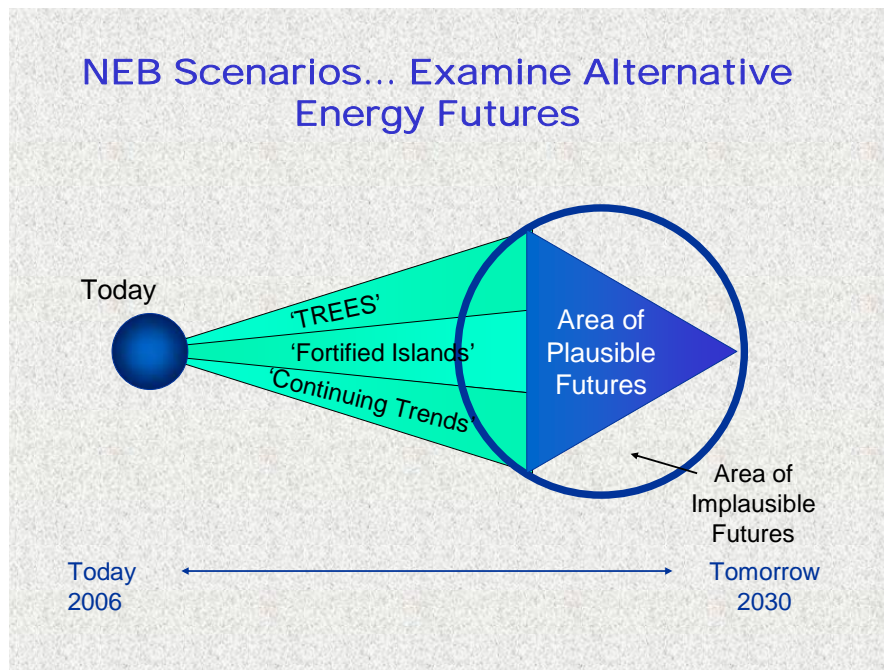
3.1 Macroeconomic Discussion Questions

- a) Do the forecasted macroeconomic values seem reasonable?
- b) How will the economy respond to higher fuel prices, higher exchange rate?
- c) What is the future of certain industries as fuel prices, technology and demand change?
- d) What will be the response in energy demand to changing demographics and immigration?

National Energy Board Energy Futures & Scenarios (to 2030)

What are Scenarios?

- Scenarios are:
 - Stories about the future – they help us develop insights into how the future may unfold for organizations, nations and the global community
 - Alternative views of the future; they must be plausible and grounded in the present, but at the same time should stretch our thinking
 - Interpretations of the present projected into the future
 - The output of an intuitive and creative shared learning process designed to gain insight not prediction
- Scenario thinking is the process through which scenarios are developed and also the process which utilizes scenarios in identifying implications, contributing to policy development/strategies and plans. Scenarios and scenario thinking can also contribute in the development of long term desired outcomes (Visions)



How do Scenarios fit with the NEB's Long-Term Energy Futures work?

- The NEB introduced the concept of Scenarios and Scenario Thinking in its last report released in 2003 'Canada's Energy Future'. This report emphasized the uncertainty of two key forces (among others) expected to impact the Canadian energy system – namely the pace of technological advancement and action on the environment.
- Scenarios are alternative perspectives on Canada's energy system. They are not forecasts or predictions but do represent plausible energy futures which collectively attempt to: a) describe a range of possible futures and b) address the energy issues and questions that are important to Canadians.
- The 3 scenarios being developed by the Board for the 2007 report are designed to:
 - Encourage discussion and debate on how Canada's energy system might evolve over the next 25 years.
 - Encourage energy stakeholders to consider possible responses to a given scenario i.e. address the question 'How would we respond if a given scenario unfolded?'
 - Help enable stakeholders and policy makers define what a desirable energy outcome or long term vision might look like.

The scenarios we want to discuss at this time:

- Address key issues and uncertainties over the next 25 years to 2030
- Focus on the Canadian energy system in terms of supply, demand and supporting infrastructure across all energy forms within a North American and Global context.
- Incorporate a number of commonalities or assumptions that run across all 3 scenarios, including:
 - Canada continues to progress on environmental issues (pace differs across the scenarios)
 - The Canada-US relationship continues to be important
 - Global energy demand continues to grow (pace differs across the scenarios)
 - Governments and regulators continue to play important roles in association with energy markets

Scenario Themes:

TREES (Triple EEE Sustainability – economic, energy and environmental)

Sustainability is the overarching theme of this scenario wherein Canadians desire clean energy, are conscious of their energy demands and seek conservation opportunities and are good stewards of the environment. This set of ‘values’, in conjunction with efficient global markets and substantial advances/transfers in technology enable a sustainable global economy. Global institutions are more relevant and engaged. In Canada, sustainability values are reflected in both government policy and markets.

Fortified Islands

This is a security-focused world where the events of 9/11 and Enron and the current war and civil strife in Iraq continue to shape the thinking of the United States and other OECD nations. Geo-political instability and supply disruptions continue to feed the drive for domestic energy on the part of the United States and increasingly the EU. Security of energy supply and fears of a global pandemic are foremost in the thinking of people’s minds. Nations ‘hunker down’ and look inward. Global trade weakens and multinational institutions become increasingly irrelevant. Restricted trade leads to slower economic growth and demand for energy, ultimately impacting the Canadian economy.

Continuing Trends

The force of globalization continues with strong global economic growth fueled in part by the rapid growth of the Chinese and Indian economies leading to high energy demand and relatively high prices (by historical standards). Markets and market forces continue to shape the global energy system. The Canadian energy system operates within this global energy market. Demand for Canadian energy and other resources contribute to strong Canadian economic growth.

NEB Scenarios

Force	‘TREEES’	‘Fortified Islands’	‘Continuing Trends’
Geo-political	Calm	Very Unstable	‘Holding on’
Global Economic Growth	Strengthens to strong	Slow	Moderate
Canadian Economic Growth	Moderate	Slow	Strong
Energy Demand	Moderate	Demand growth slows	Continues
Energy Supply	Clean, global and increasingly from alternative sources	Domestically sourced, including unconventional	Ongoing global trading, conventional and unconventional with North American context
Energy Prices	Directionally lower	Directionally higher	Flat within a trading range

Conclusion

In developing the 2007 Energy Futures report, the Board seeks the views of Canadian interested in energy matters. Through this report and its process, the Board also creates a dialogue on key energy issues. Between now and the release of the final report in October, 2007, the Board will engage in two sets of public consultations. The first round will be held in May, 2006 and the second will be in early 2007.

During the first round of consultations the Board is looking for stakeholders' feedback on the proposed methodology and assumptions to be used in the analysis of the 2007 Energy Futures report. The objective of this document is to encourage discussion and dialogue on key energy issues important for the development of Canada's energy supply and demand futures.

Your feedback and comments are valuable. The information collected during the consultations will be used as an input into the development of the 2007 Energy Futures report. Following the May, 2006 consultations the Board will start rigorous analysis of the reference case and scenarios. The preliminary results of this analysis will be shared during the second round of consultations.

Thank you for taking the time to participate in the consultation process.