‘Business-as-Usual’ (BAU) Models of Alberta’s Energy Future:

Comparing Scenarios for High and Low Oil Sands Growth

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INTRODUCTION

Transforming energy systems to meet environmental and economic objectives requires a detailed quantitative understanding of current systems, how they are changing and how they would be impacted by existing and new technologies or policies.

Using scenario modeling tools, alternative technology and policy options can be compared to a ‘Business-as-usual’ (BAU) model that assumes a continuation of existing trends, technologies & policies.

This study provides a high level comparison of two BAU models of Alberta’s energy systems from 2000 to 2060; one based on high [HOSG] and one on low [LOSG] oil sands growth projections.

METHODS

The Canadian Energy Systems Simulator (CanESS) model from whatIf? Technologies Inc. [1] integrates a wide variety of datasets [2] from 1978 to present to create a coherent technology-rich model of the energy systems of Alberta and the other provinces.

CanESS was the used to generate two BAU scenarios to 2040. The HOSG scenario was made to be similar to the NEB’s 2013 Energy Future [3] and the AB treasury Board [4] while the LOSG scenario was similar to that used by AESO [5]. Assumed key parameters are provided below:

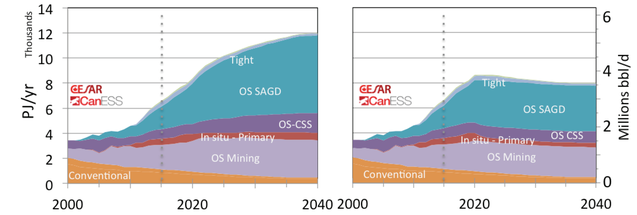
Sector	HOSG Scenario	LOSG Scenario
Crude Oil	5.4 M barrels / day [3]	3.8 M barrels / day [3]
Natural gas	185.8 M M^3 / day [3]	121.3 M M^3 / day [3]
Electricity	Replacement of coal with NG-CC [3,5]	Development at slower pace [5]
Population	6.2 million in 2041 [3,4]	5.4 million in 2041 [4]
GDP	$61K / capita [3]	$55K / capita

RESULTS and DISCUSSION

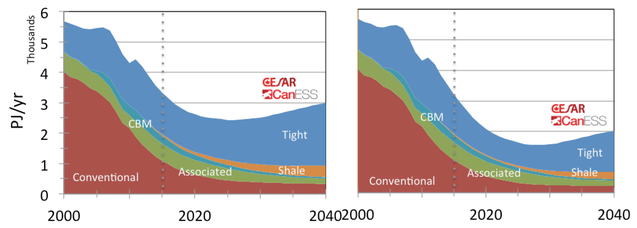
HIGH OIL SANDS GROWTH (HOSG)

LOW OIL SANDS GROWTH (LOSG)

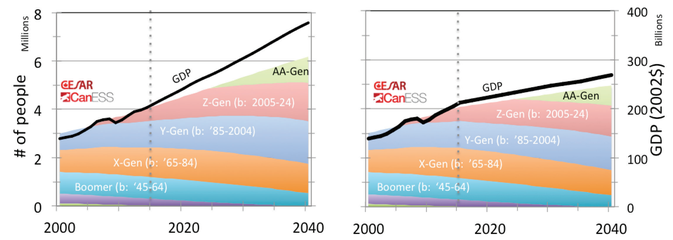
Crude Oil Production:



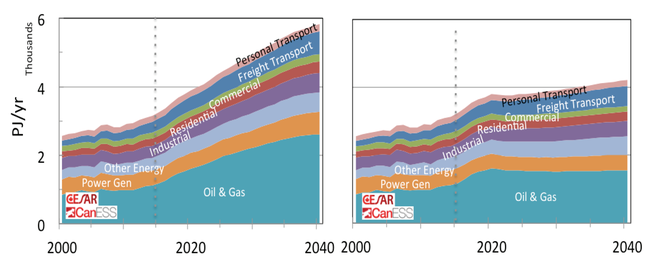
Natural Gas Production



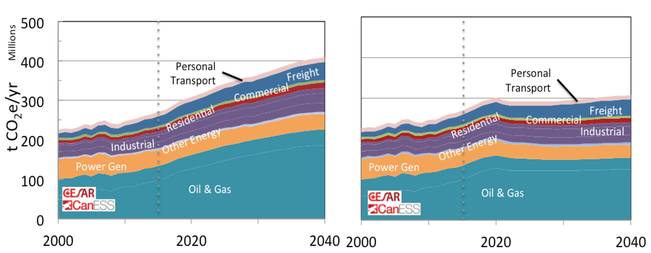
Population and Gross Domestic Product (GDP)



Energy Demand



GHG Emissions



NOTE:

- **HOSG** assumed rapid growth corresponding to price of oil ca. $100/bbl & NG≥ $4/GJ
- **LOSG** assumed reduced growth corresponding to price of oil ≤$60/bbl & NG ≤ $4/GJ
- Compared with **HOSG,** the **LOSG** scenario assumes lower population & GDP growth
- Compared with **HOSG,** the **LOSG** scenario projected 28% lower energy demand
- Compared with **HOSG,** the **LOSG** scenario projected 25% lower GHG emissions

*** Note that Alberta’s new (Nov 2015) climate change targets have not been incorporated into these scenarios. ***

CONCLUSIONS

Scenarios describing future energy systems are ***NOT predictions*** of energy futures, but ***projections*** based on a number of assumptions regarding the economic and population growth and the technologies and energy resources used to provide energy services and to support the economy.

The value of the BAU scenario projections presented here is that they provide a ‘reference’ or ‘benchmark’ to explore the systems level implications of **Alternative Scenarios**, that might include:

- How population or economic growth will impact energy use and GHG emissions;
- How policies such as the accelerated coal retirements are likely to play out;
- The impacts on energy systems of new technologies such as electric, self driving and car shared vehicles (including oil demand & air emissions);
- The impacts of energy efficiency programs or carbon taxes in different sectors;
- How behavioural changes (where we live, how we travel, the food we eat, etc.) will impact energy demand and GHG emissions.

However, scenario modeling of energy systems is most powerful when used to explore the system level implications of a combination of technological, behavioural and policy changes.

REFERENCES

[1] whatIf? Technologies Inc., 2014. Canadian Energy Systems Simulator (CanESS) - version 6. www.caness.ca

[2] Incl. Statistics Canada, National Energy Board, NRCan, Transport Canada, Environment Canada, research publications etc. etc

[3] NEB 2013. Canada’s Energy Future 2013 – Energy Supply and Demand Projections to 2035 - An Energy Market Assessment.

[4] Alberta Treasury Board and Finance 2015. http://finance.alberta.ca/aboutalberta/population-projections/

[5] AESO long term outlook 2014 http://www.aeso.ca/downloads/AESO_2014_Long-term_Outlook.pdf

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