

Canadian Energy Supply – Challenges and Opportunities

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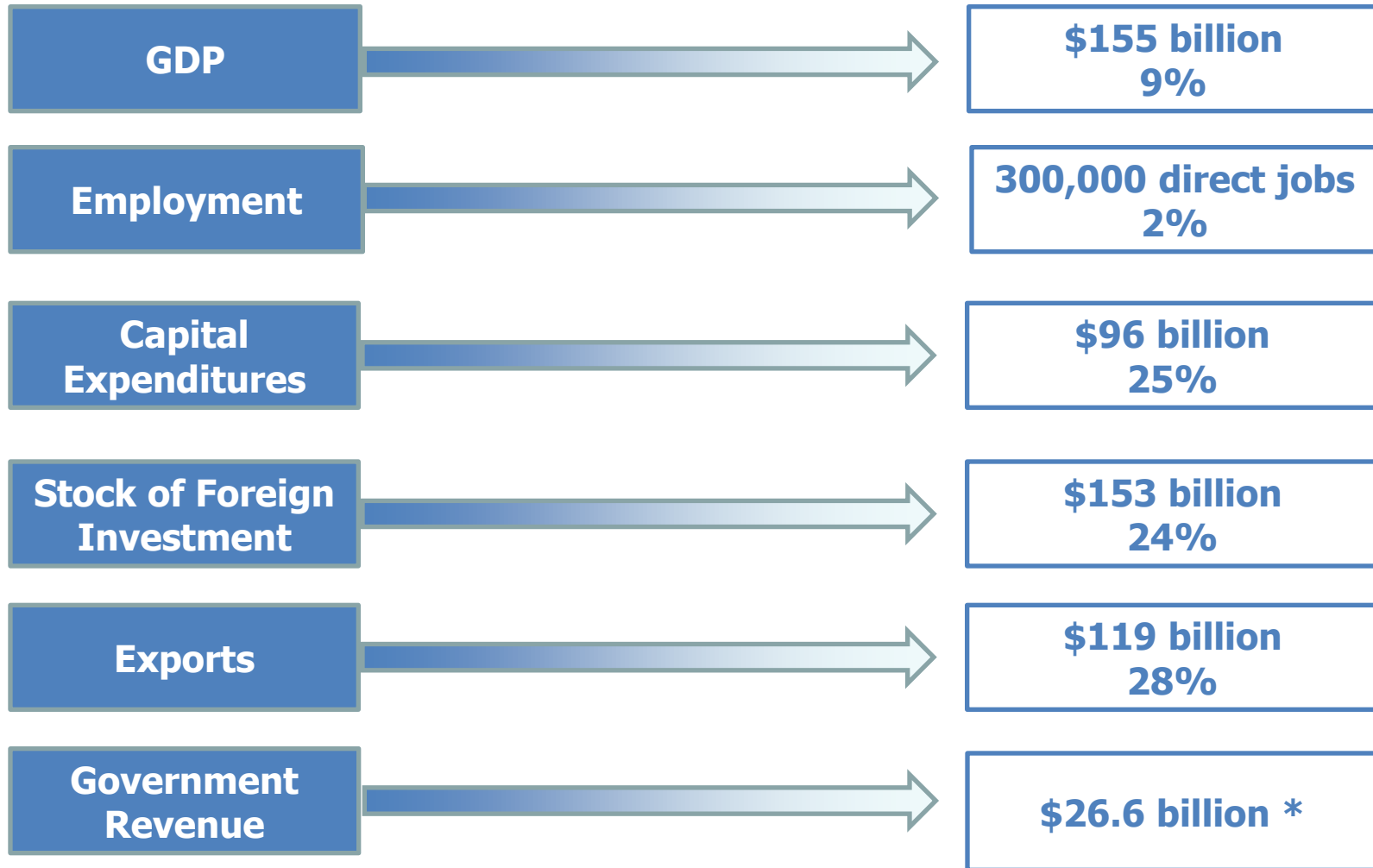


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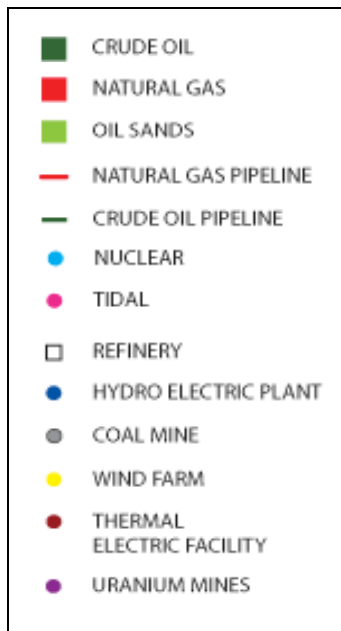
Energy makes a large direct contribution to the Canadian economy...



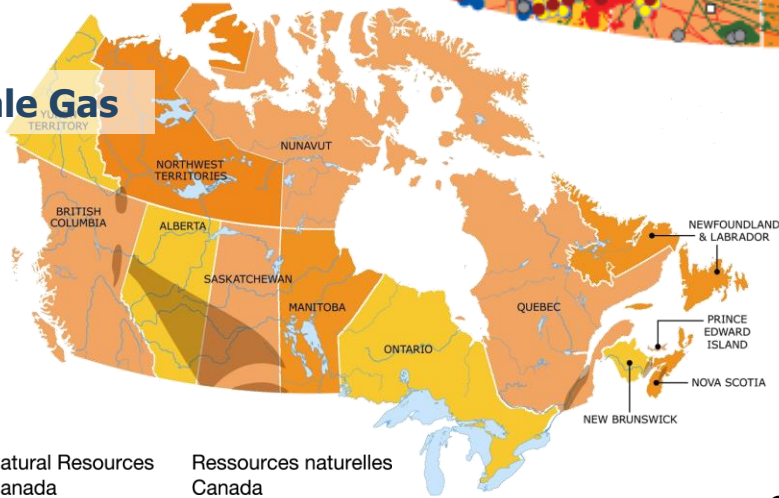
* Annual average (2007-2011)



... with sources of production and exports across the country



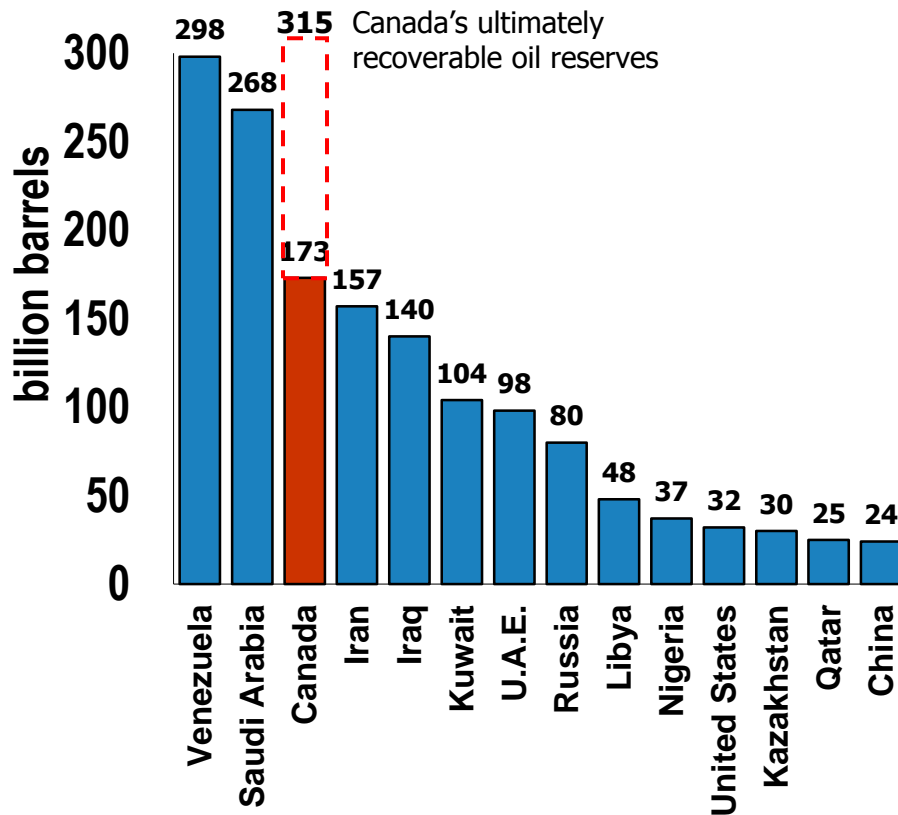
Shale Gas



Source: Centre for Energy Information

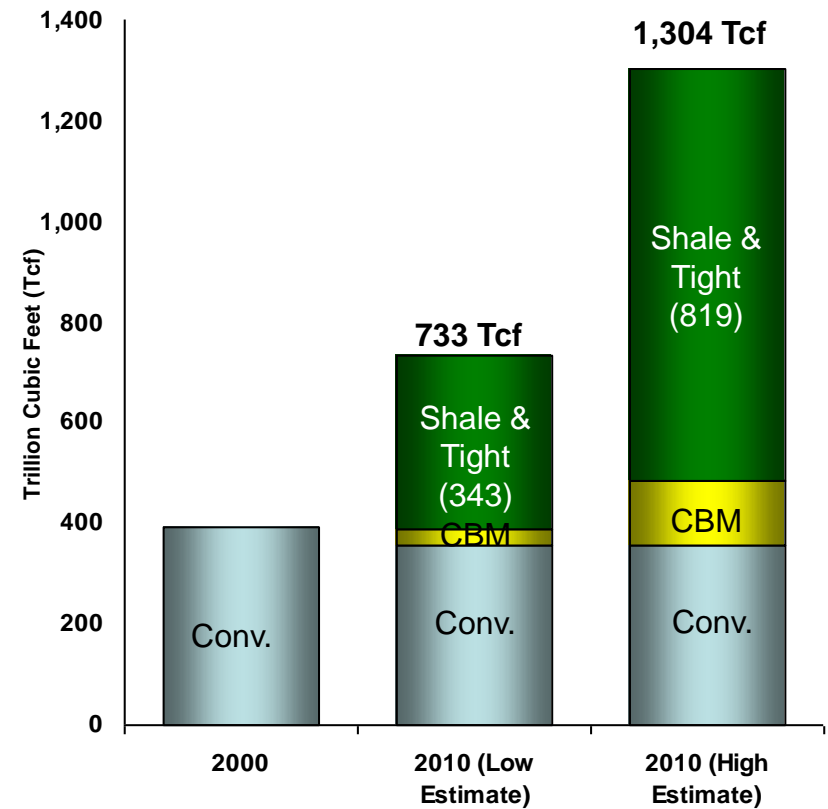
Advances in technology mean Canada has the potential to be a major global player in oil and gas markets

Proven oil reserves by country



Source: Oil & Gas Journal, data as of December 2013

Canadian natural gas resources



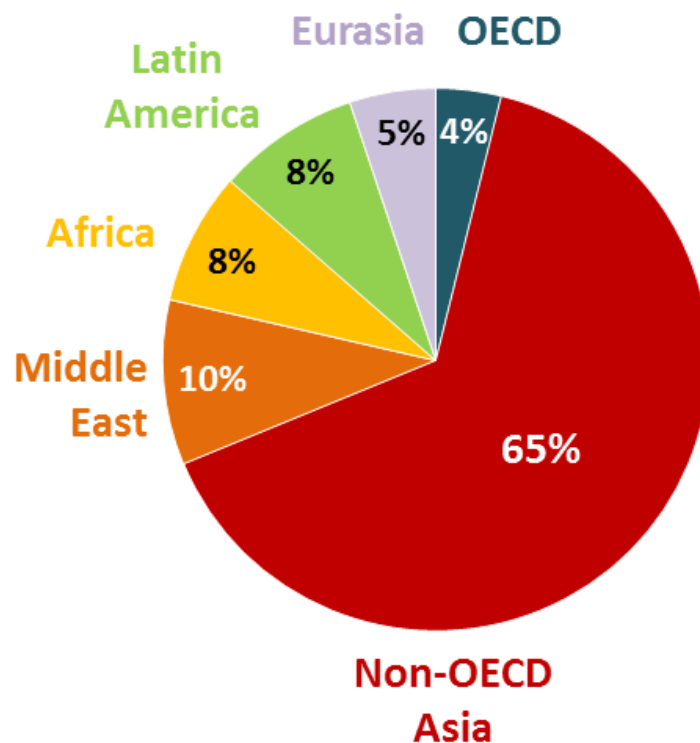
Source: Canadian Society for Unconventional Resources



The global energy landscape is undergoing a major transformation

- Two speed global economy: developed vs. emerging economies
- IEA projects 90 per cent of demand growth originates outside OECD zone
- Growing demand and volatility drives need for expanded, secure sources of supply

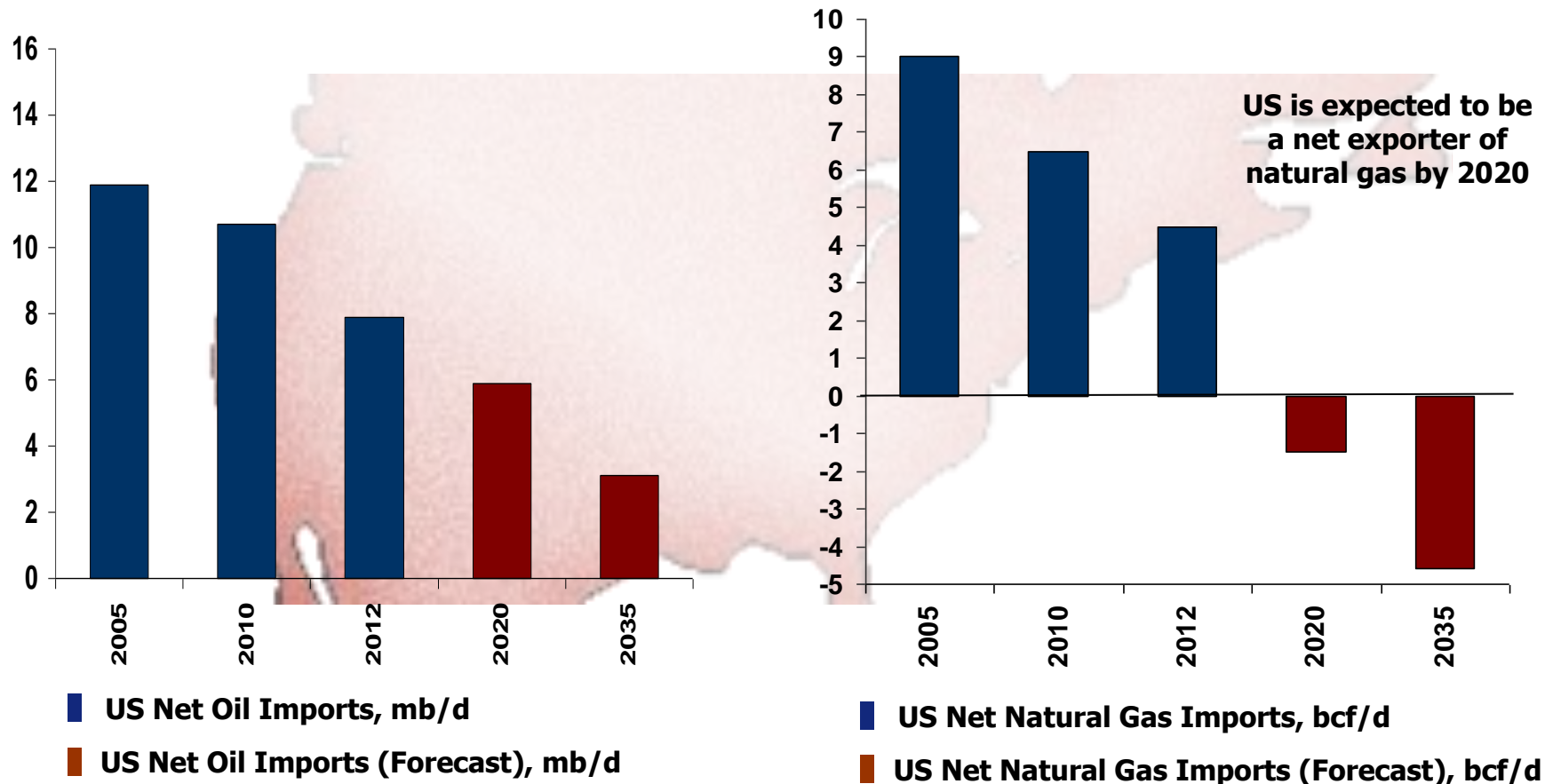
Share of global energy demand growth 2012-2035



Source: IEA World Energy Outlook 2013



Over the same period, the US is expected to reduce its energy import requirements...



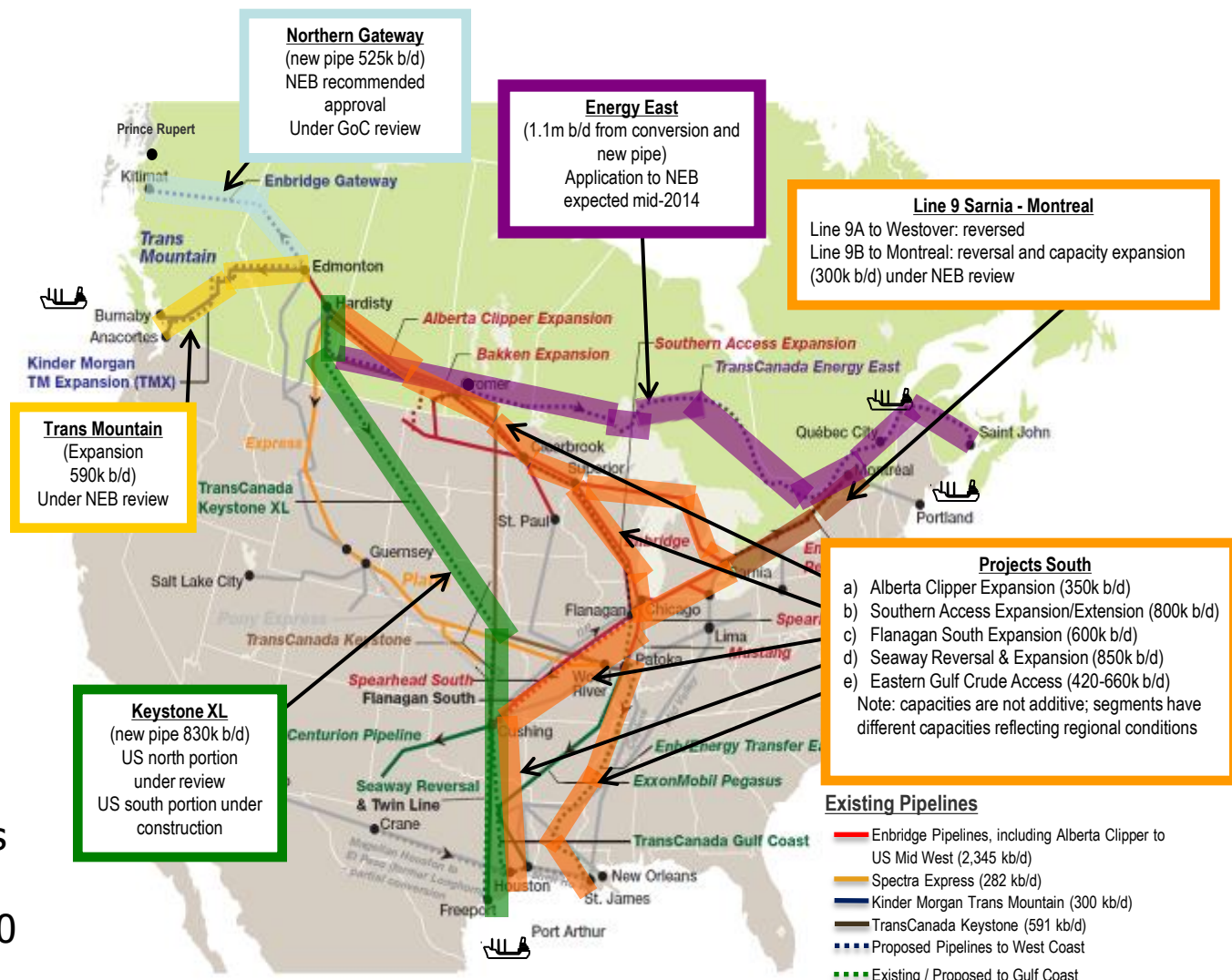
Source: International Energy Agency, 2013

...creating an imperative for Canada to diversify its energy markets



Reaching new markets requires new oil transportation infrastructure...

- TransCanada
 - Keystone XL
 - Energy East
- Enbridge
 - Northern Gateway
 - Line 9 Reversal
 - Line 3 replacement
 - Projects South
- Kinder Morgan
 - Trans Mountain Expansion
- International Monetary Fund estimates that improved market access could increase Canada's real GDP by 2% by 2020



Source: CAPP / NRCan

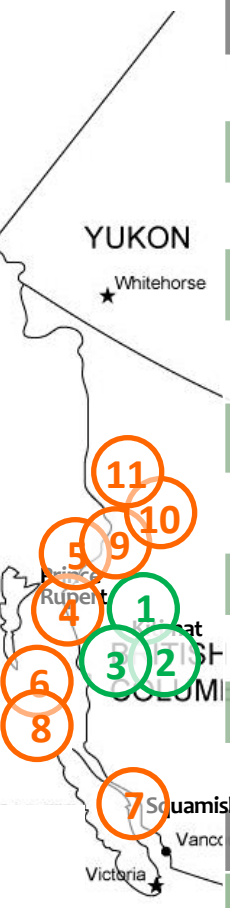


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... and new LNG export capacity

NO.	NAME	CAPACITY	IN SERVICE
WEST COAST (proposed) – 185 million tonnes per annum (mtpa) (25 bcf/d)			
1	Douglas Channel LNG	1.8 mtpa / (0.25 bcf/d)	2015
2	Kitimat LNG	10 mtpa / (1.4 bcf/d)	2017
3	LNG Canada	24 mtpa / (3.4 bcf/d)	2019/20
4	Prince Rupert LNG	21.6 mtpa / (2.91 bcf/d)	2022
5	Pacific Northwest LNG	19.68 mtpa / 2.74 bcf/d)	2018
6	WCC LNG	30 mtpa / (4 bcf/d)	2021
7	Woodfibre LNG	2.1 mtpa / (0.33 bcf/d)	2016
8	Triton LNG	2.3 mtpa / (0.32 bcf/d)	2017
9	Aurora LNG	24 mtpa / (3.1 bcf/d)	2021/23
10	Kitsault Energy	20 mtpa / (2.63 bcf/d)	2018/19
11	Stewart Energy LNG	30 mtpa / (4.04 bcf/d)	2017
EAST COAST (proposed) – 10 mtpa (1.4 bcf/d)			
12	Goldboro LNG	10 mtpa / (1.4 bcf/d)	2020
EAST COAST – IMPORT FACILITY – 7.5 mtpa (1 bcf/d)			



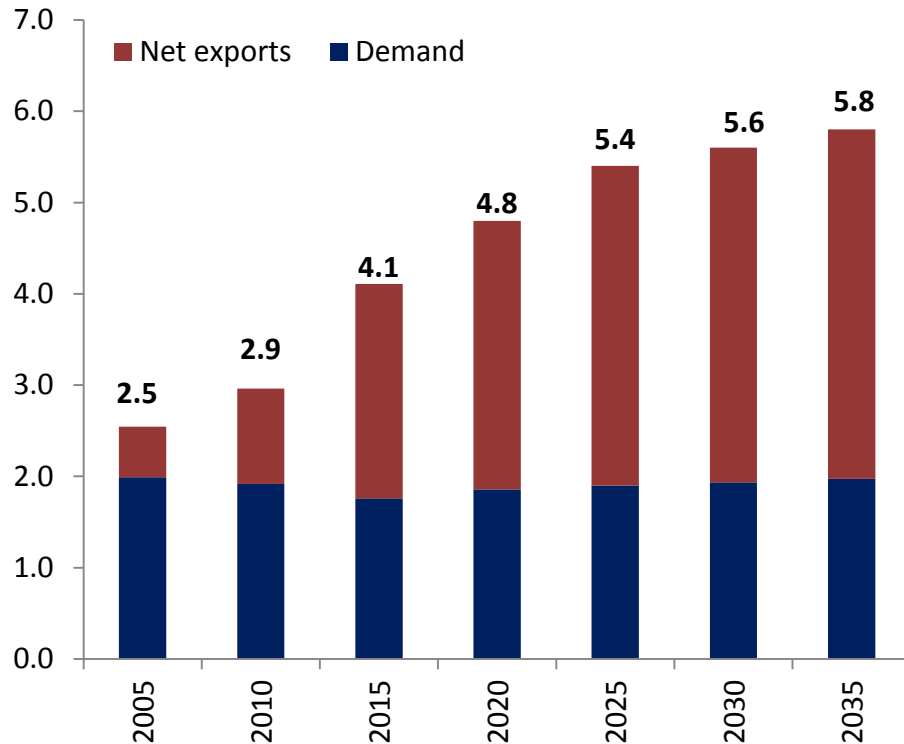
13 Canaport LNG 7.5 mtpa

Existing import facility with authority to export LNG

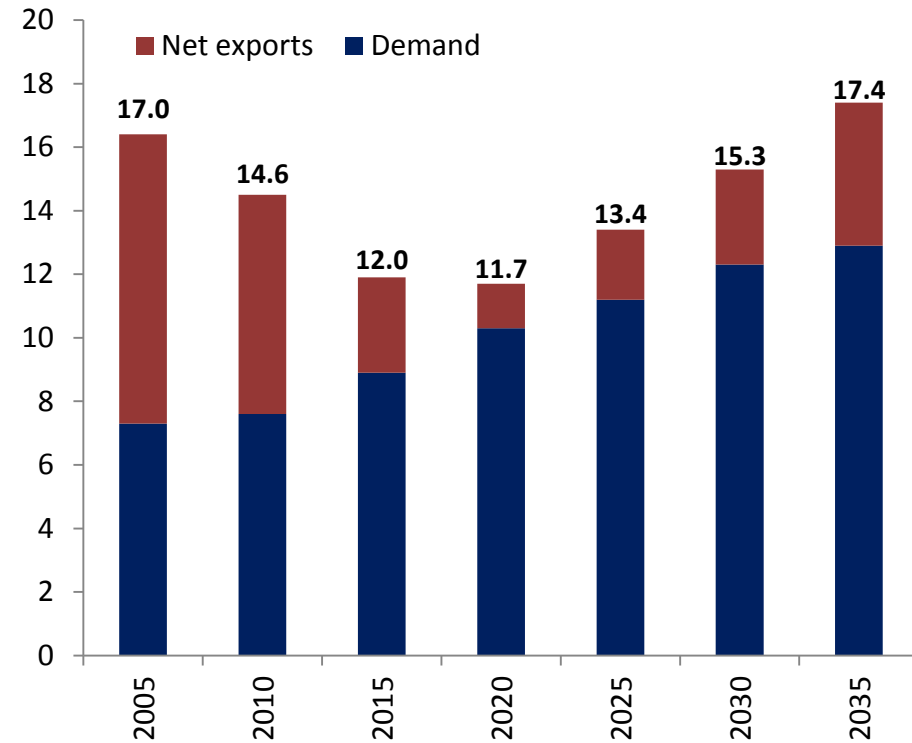


Exports expected to drive energy production as Canada diversifies markets

Canadian Oil Production, Demand and Net Exports (mb/d)



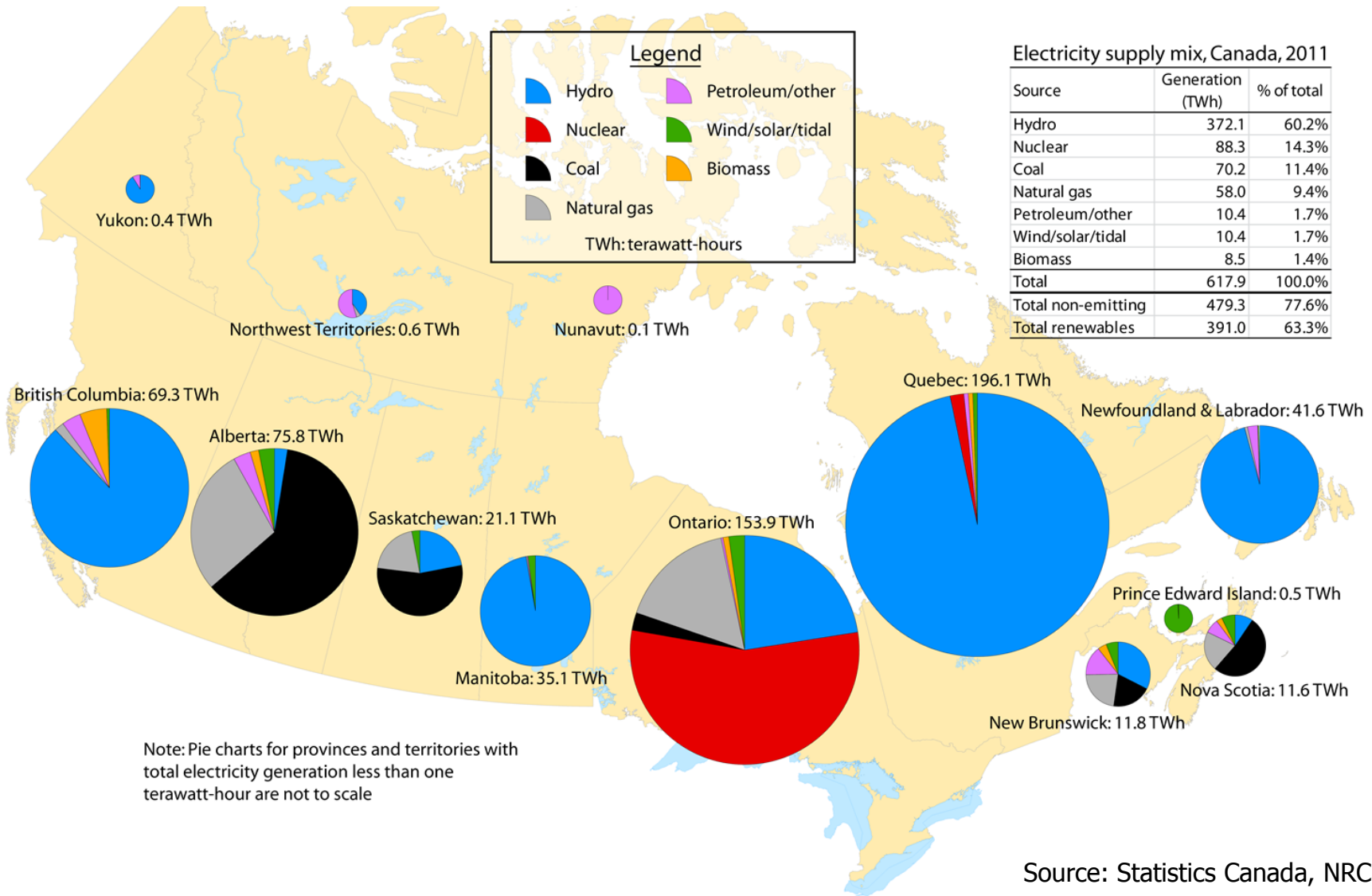
Canadian Natural Gas Production, Demand, and Net Exports (bcf/d)



Source: National Energy Board: Energy Futures, 2013



Electricity system illustrates the diversity of the energy supply mix across Canada

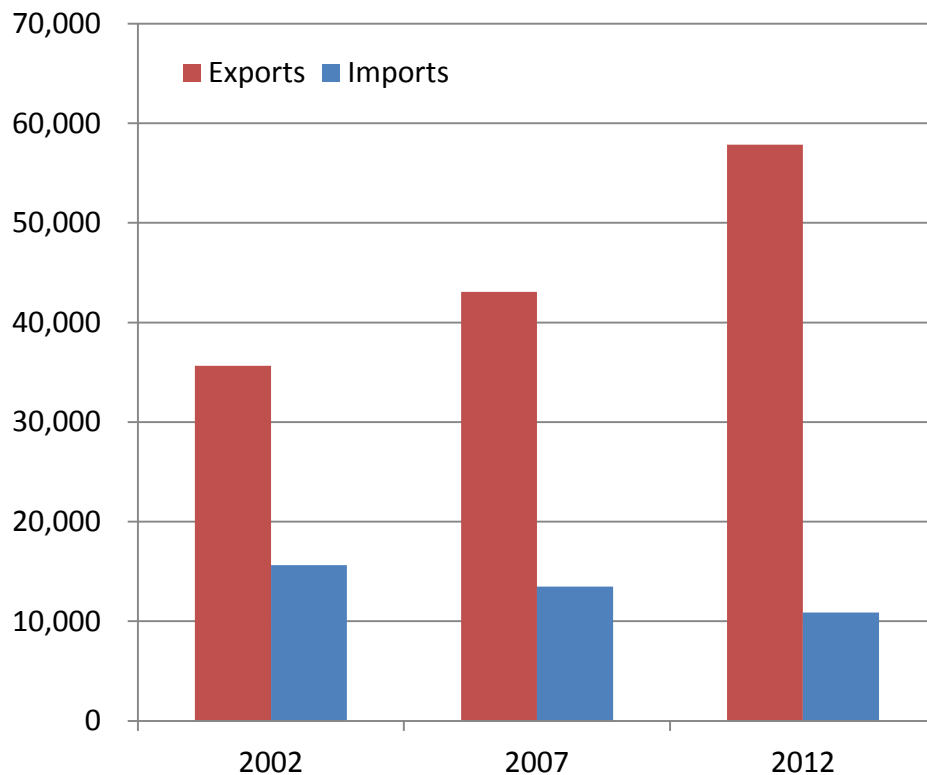


Source: Statistics Canada, NRCan



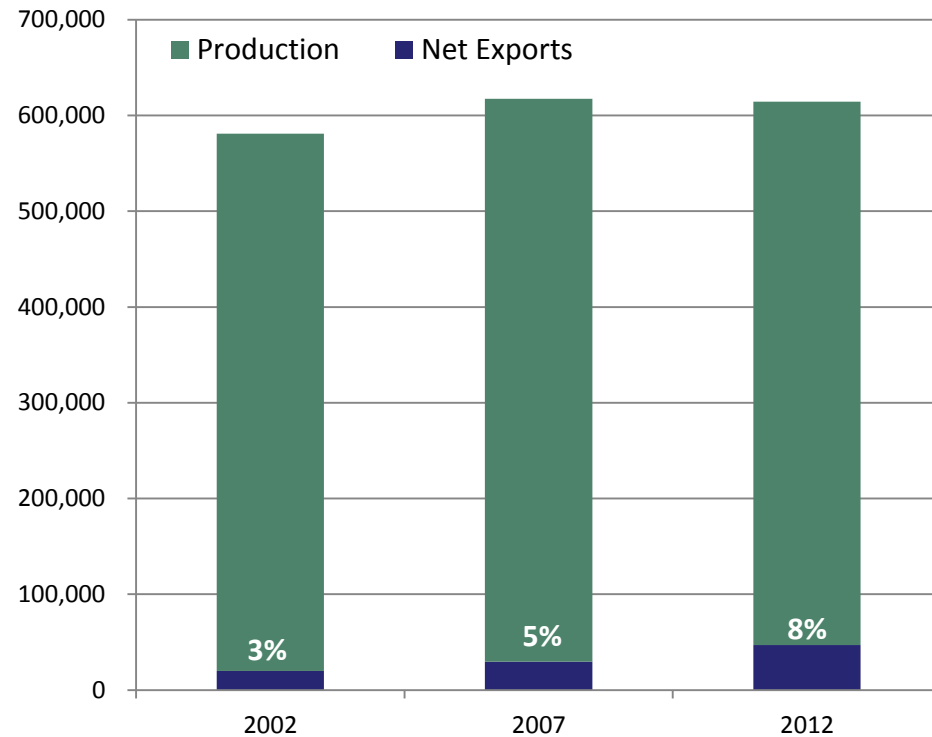
Canadian electricity exports to the US have grown in recent years, but the sector remains domestically focussed

Canadian Electricity Exports and Imports to the US (GWh)



Source: National Energy Board, 2013

Canadian Electricity Net Exports as Percentage of Production (GWh)



Sources: National Energy Board, 2013 and Statistics Canada, 2014



Securing access to new markets is a top priority

- Canada has key strengths:
 - Very strong economic fundamentals and positive investment climate
 - Holds 60% of global oil reserves that are open to market development
 - \$480 billion worth of energy projects planned over the next decade
- But there is more to do – collaboration on Responsible Resource Development is critical to developing the energy sector and reaching new markets:
 - improving the regulatory system;
 - strengthening safety systems;
 - working to ensure environmentally responsible production;
 - enhancing participation of Aboriginal communities;
 - accelerating energy innovation; and
 - continuing progress on energy efficiency



The responsible resource development agenda is improving the regulatory system

More Predictable and Timely Reviews

- Consolidated responsibility for EA (from 40 to 3 federal agencies)
- Legislated beginning-to-end EA timelines
- Legally-binding timelines for permitting processes
- Clearly-defined information requirements

Reduced Duplication

- Substitution or equivalency with provinces
- Clarified accountability for major pipeline projects
- Equivalency of *Fisheries Act* regulations with provincial regulations

Strengthened Environmental Protection

- Resources focused on major projects
- Enforceable EA conditions
- Administrative Monetary Penalties
- Measures to strengthen pipeline & marine safety

Enhanced Aboriginal Participation

- Consultations integrated into review processes, with funding
- Designated lead Crown Consultation Coordinator for each project
- Consultation protocols and MOUs
- Broader engagement on economic opportunities and environmental safety



The Government is working to increase confidence in energy transportation systems

- In the process of strengthening the safety regimes for pipelines, marine, offshore, rail and nuclear to ensure they are world-class through action on...
 - ...Prevention
 - NEB annual inspections of pipelines have increased by 50% and annual comprehensive safety audits have doubled
 - ...Preparedness and response
 - Implementing a suite of new major tanker safety measures
 - ...Liability and compensation
 - *Energy Safety and Security Act* will increase absolute liability for nuclear and offshore oil and gas operators to \$1 billion
 - NEB can impose penalties on companies of up to \$100,000 a day for non-compliance with safety and environmental regulations
- Additional measures are in development in all three areas



Continuing to work to ensure environmentally responsible production...

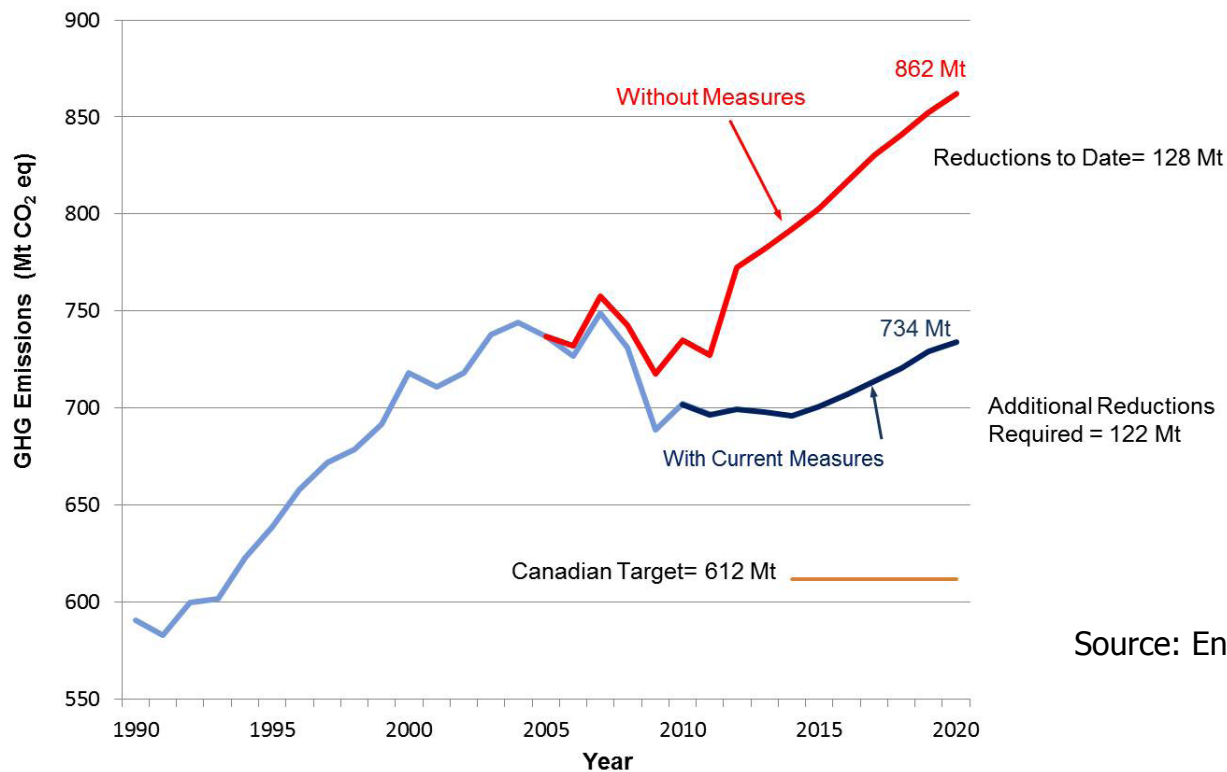
- Industry is working to find innovative solutions to environmental issues – Canada's Oil Sands Innovation Alliance is a good example
- The Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring will provide scientifically-rigorous environmental data
- More than 77% of electricity generates no greenhouse gas emissions
- First major coal user to ban conventional coal power plants

Table: Forecasted change in electricity production and emissions between 2010 and 2035 (source: Environment Canada)

	% Change
Electricity production	42%
Greenhouse gases	-31%
Mercury	-9%
Sulphur oxides (SO_x)	-73%
Nitrogen oxides (NO_x)	-37%
Particulate matter <2.5 microns (PM_{2.5})	-7%



...and progress on greenhouse gas emissions



Source: Environment Canada 2013

- Have de-linked GHG emissions from economic growth
- GHG emissions per barrel of oil from the oil sands have been reduced by an average of 26% between 1990 and 2011
- Lowest per capita emissions since tracking began in 1990



The Government is also working to enhance the participation of Aboriginal communities

- Energy projects represent an historic opportunity for sustainable economic development for many First Nations *if* projects are developed in a way that directly involves Aboriginal communities throughout the process, are environmentally safe and respect the inherent rights of First Nations
- Douglas Eyford was appointed Special Federal Representative on West Coast Energy Infrastructure in March 2013 – his final report was released publically in December 2013
- The report made 29 recommendations in 4 key areas:
 - Building Trust, Fostering Inclusion, Advancing Reconciliation, and Taking Action to enhance Aboriginal support for and participation in West Coast energy development
- The Government is engaging on the report with Aboriginal communities and will be taking action shortly on these recommendations, in partnership with First Nations



Energy innovation is key to Canada's competitiveness and productivity

- McKinsey & Co. identified Canada's energy technology advantages and global market opportunities
 - Canada could gain 500,000 jobs and \$74 billion in gross domestic product by 2020
- In fall 2013, NRCan launched the energy innovation roundtables
 - To improve alignment and collaboration among governments, academic and industry stakeholders
- Sustainable Development Technology Canada brings new technologies closer to commercialization
 - Since 2002, the SD Tech Fund has leveraged more than \$1.6 billion from other project partners

Canada has strategic advantages in key technology clusters:

1

Unconventional oil and gas

2

Next generation transportation

3

Energy efficiency

4

Distributed power generation

5

Longer term R&D opportunities



Energy Efficiency must remain a priority

- Significant efficiency improvements since 1990 have resulted in:
 - \$32 billion in annual energy efficiency savings across the economy in 2010
 - Lower energy costs for Canadian consumers
 - Improved productivity and competitiveness for industry
 - Cleaner environment and lower greenhouse gas emissions
- The IEA ranked Canada 2nd among 15 countries in energy efficiency improvements between 1990-2010
- 70-90% of energy savings potential from available technologies and strategies remain untapped
- Efficiency allows increased energy exports without increases in production
- 95% of Canadians believe saving energy is important – over 50% say they need help (Gandalf Survey, 2013)



For Canada, it is a priority to be a competitive, reliable and responsible supplier of energy:

- committed to a market-oriented approach, with an open and competitive investment environment
- expanding existing and pursuing new markets
- improving its regulatory performance through more effective, efficient and transparent regulation
- investing in innovation and collaboration to enhance economic, social and environmental performance
- benefitting from energy development, which contributes jobs and growth across the country



Annex: Energy as % of GDP, by province

(Direct Contribution of energy to nominal GDP, 2012)

	Canada	NL	AB	SK	PEI	BC	MB	NB	QC	NS	ON
% share of GDP - Oil & Gas	6.6%	26.0%	24.9%	20.3%	0.0%	3.6%	3.8%	2.6%	0.5%	1.7%	0.3%
% share of GDP - Utilities	2.5%	2.5%	1.8%	2.0%	11.6%	2.6%	2.2%	2.2%	3.8%	2.0%	2.0%
Energy's Share of Provincial Economies	9.1%	28.5%	26.7%	22.3%	11.6%	6.2%	6.0%	4.8%	4.3%	3.7%	2.3%

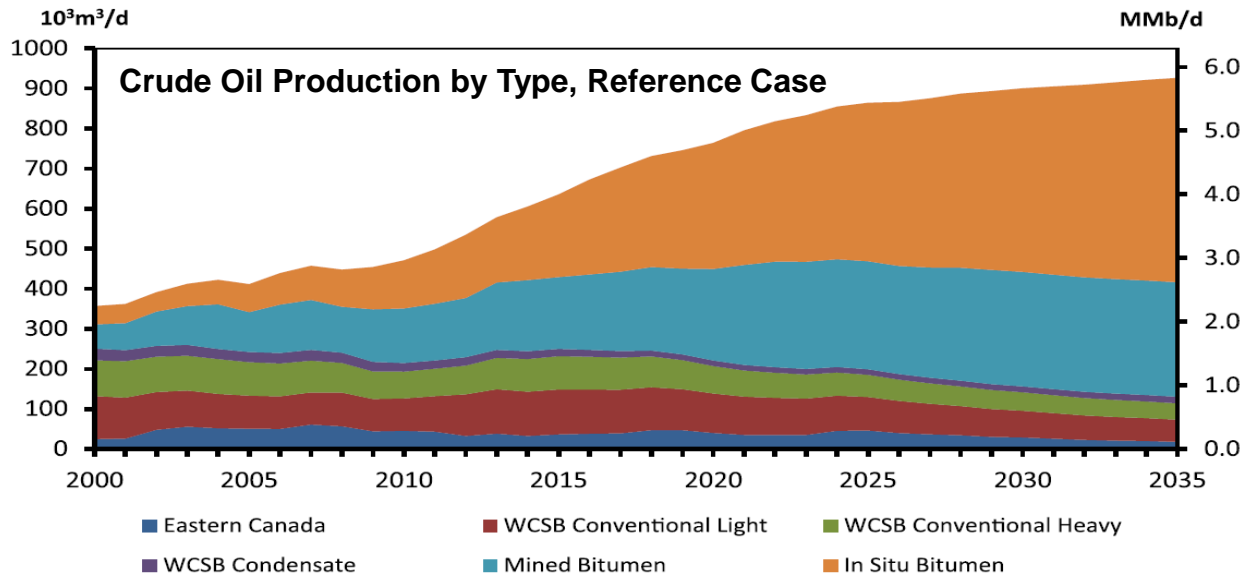
Note:

Province's Share of National Energy Sector GDP		5.8%	52.3%	10.8%	0.4%	8.2%	2.1%	0.9%	9.3%	0.8%	9.3%
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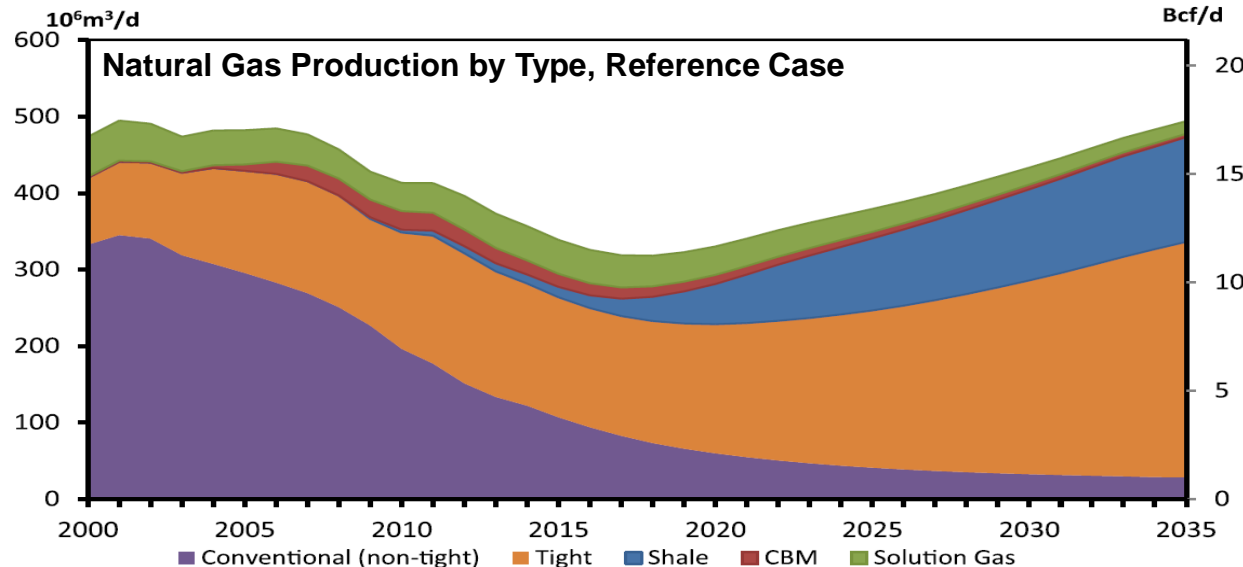
Source: NRCan estimate based on
 Statistics Canada CANSIM table [379-0028](#),
 TD Economic Estimates for Provincial GDP



Annex: Oil and gas production is projected to grow significantly as the production mix shifts



Oil production increases 75% by 2035



Natural gas production increases 25% by 2035

Source: National Energy Board: Energy Futures, 2013

