Perspectives on Canadian Energy / Climate Policy

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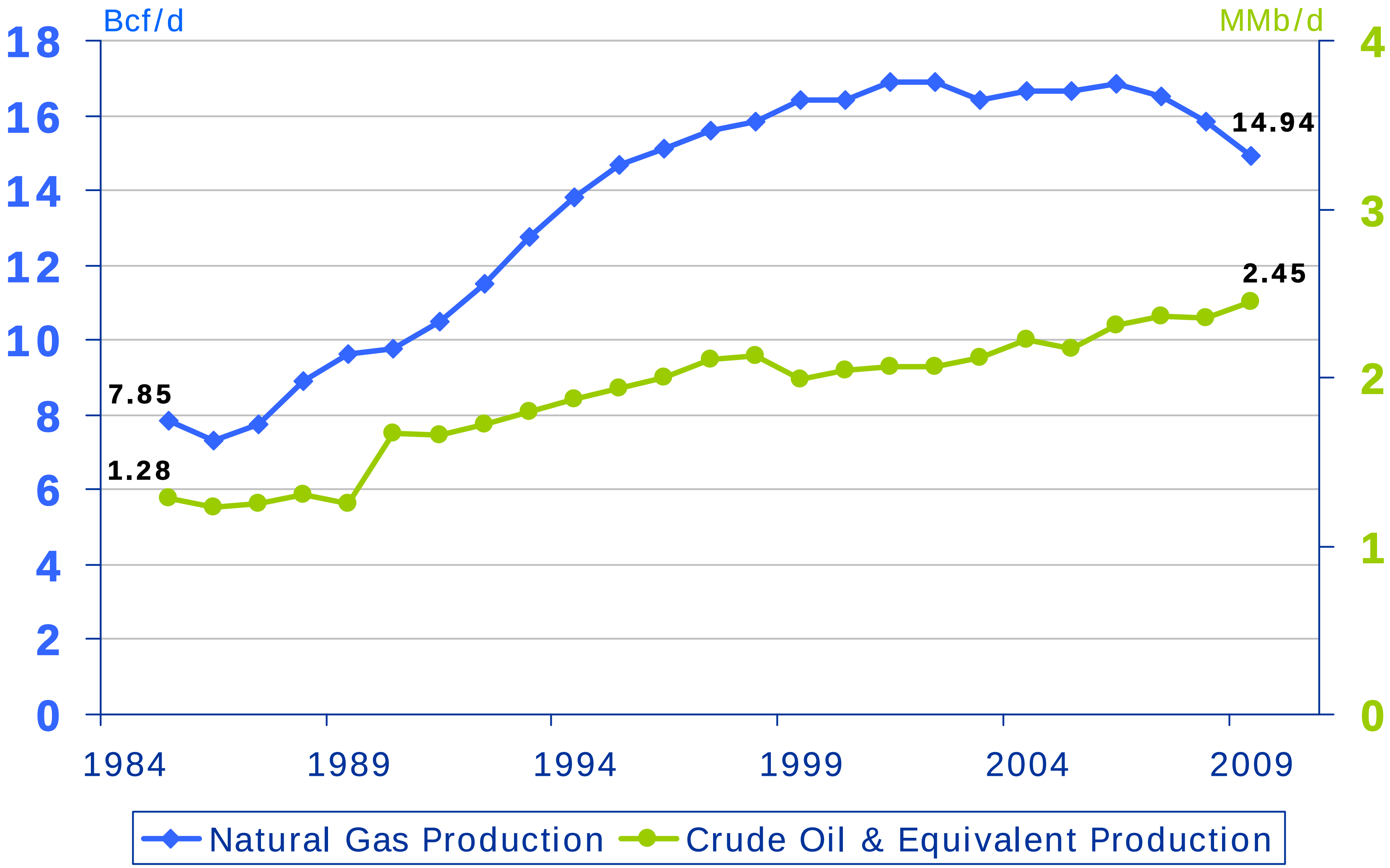
Introduction

- Canadian Energy Policy – Historical Context
- Climate/Energy Policy Nexus
- Climate/Energy/Economic Policy Nexus
- The Natural Gas Opportunity
- Comments on Canadian Policy

Canadian Energy Policy Post-1985: Free Markets for Oil and Natural Gas

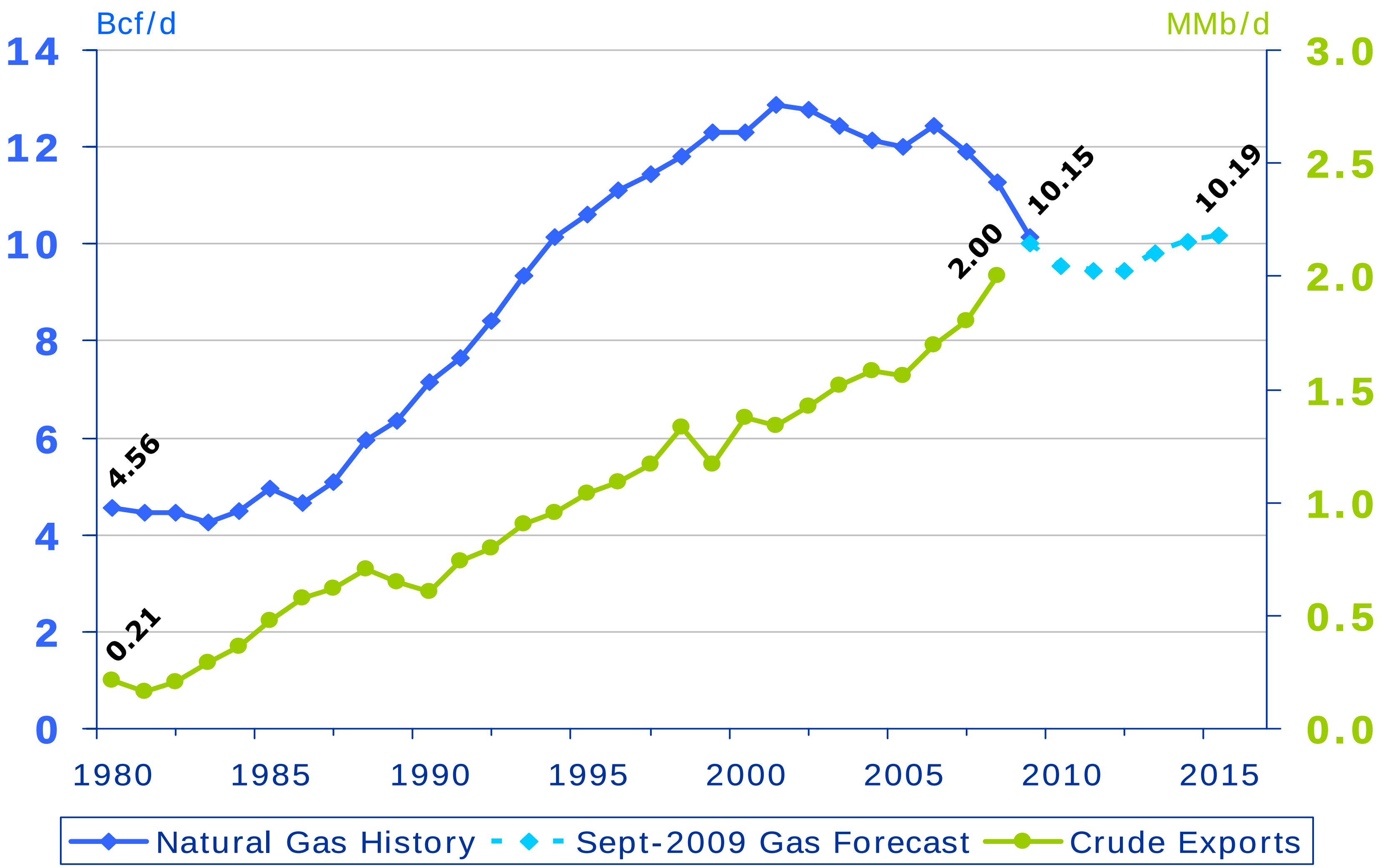
- Deregulation of natural gas and oil markets in 1985 positive for:
  - Production
  - Employment
  - Trade balance
- NAFTA
  - Free trade in oil and natural gas
    - Increased exports of oil and natural gas

Post-deregulation Oil and Gas Production



Source: TransCanada

Western Canadian Exports



Source: TransCanada

Recently More Government Involvement in North American Energy Markets

- Canada
  - Biofuels subsidies
  - Renewables subsidies
  - Ontario's Green Energy Plan
  - Renewables investment is not a "market response"
- U.S.
  - State and Federal Government initiatives
    - State Renewable Portfolio Standards (RPS)
    - Federal subsidies for renewables and proposed RPS (Waxman-Markey)

Energy Infrastructure Gets Harder to Build

Regulatory, political and permitting issues impact:

- New nuclear
- Major new hydro
- Major pipelines:
  - Mackenzie Valley Pipeline
  - Gateway Pipeline Project
- Electricity transmission lines
- Gas-fired generation close to markets (NIMBY)
- LNG facilities

Energy Infrastructure – Approval Process

- We cannot continue to fail in the regulatory process if we want new sources of energy to replace older, higher emission sources
  - Takes too long to get approvals
  - Can be second-guessed by other levels of government
- Current reality makes it difficult for companies to spend development dollars over extended periods of time given the ‘approval risk’

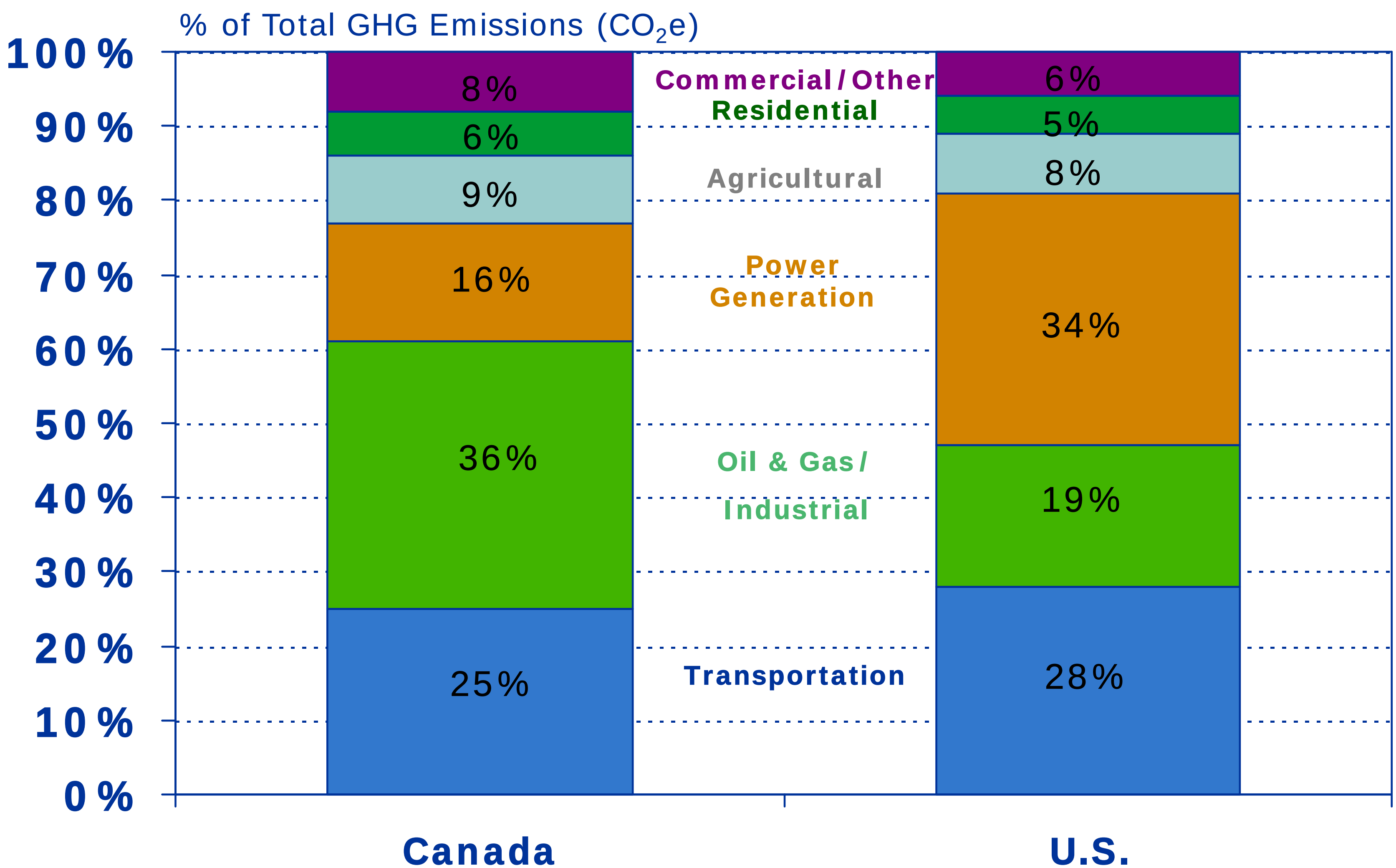
Energy Policy – Where to from Here?

- Since 1985, Energy Policy has encouraged (free markets and NAFTA) or at least accommodated hydrocarbon development
- Only in recent years has policy become a threat to continued development (Climate Policy)

Canada's Climate Policy

- Canada to match U.S. targets and timing, but structural differences in U.S. and Canadian economies:
  - Canada
    - Large energy exporter (oil, gas, electricity)
  - U.S.
    - Large energy importer
- Canada's economy is more energy intensive

Greenhouse Gas Emissions by Sector (2006)



Energy and CO_2 Emission Intensities (NAFTA Area)

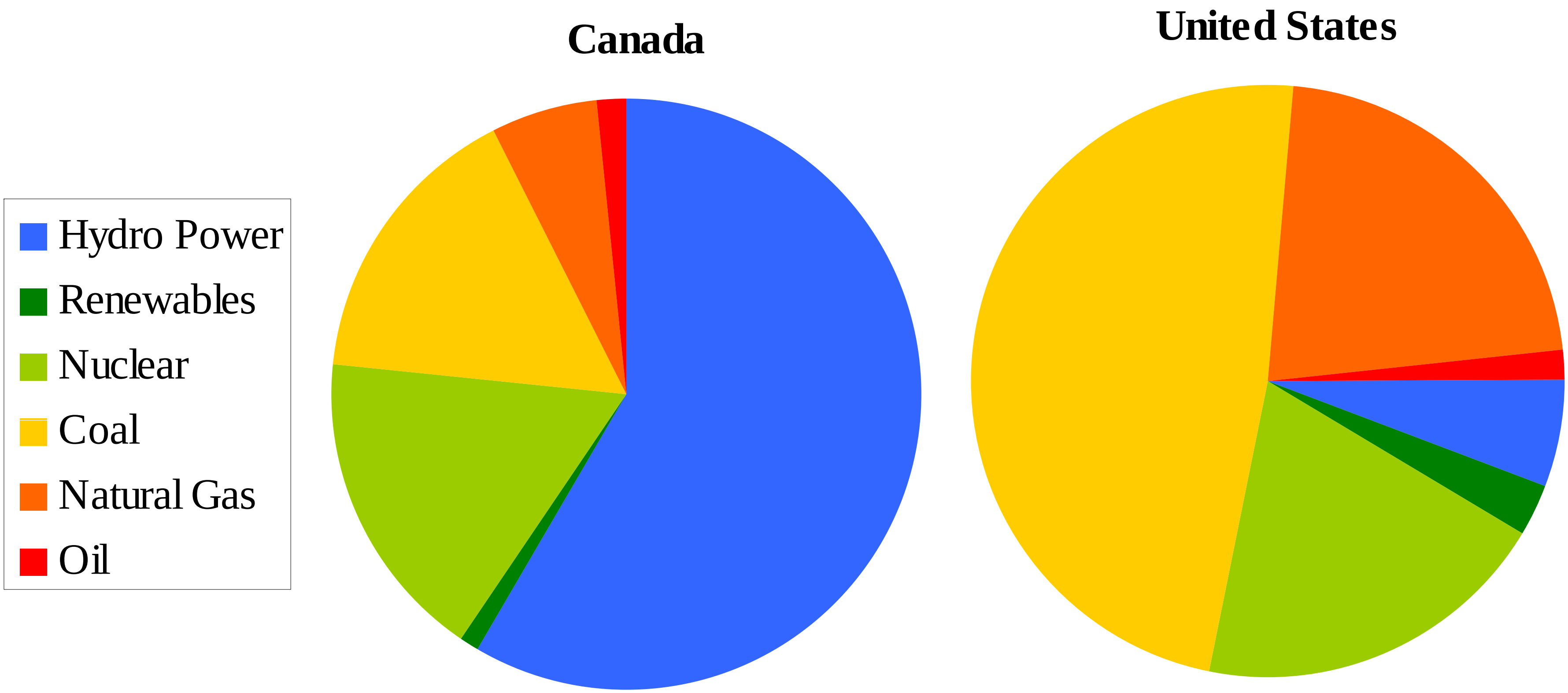
Energy Intensity **Total Primary Energy Consumption per Dollar GDP** **(Purchasing Power Parity)**		**CO_2 Emissions / GDP** **(Purchasing Power Parity)**	
2006 **(BTU / 2,000 US$)**		**2007** **(Kg CO_2 / 2,000 US$)**	
Canada	13,097	Canada	0.55
U.S.	8,841	U.S.	0.50
Mexico	6,116	Mexico	0.37

Source: US EIA, IEA 2006

Climate Policy and Electricity Generation

- Canada
  - Low emission electricity sector (hydro, nuclear)
- U.S.
  - High emission electricity sector (coal)

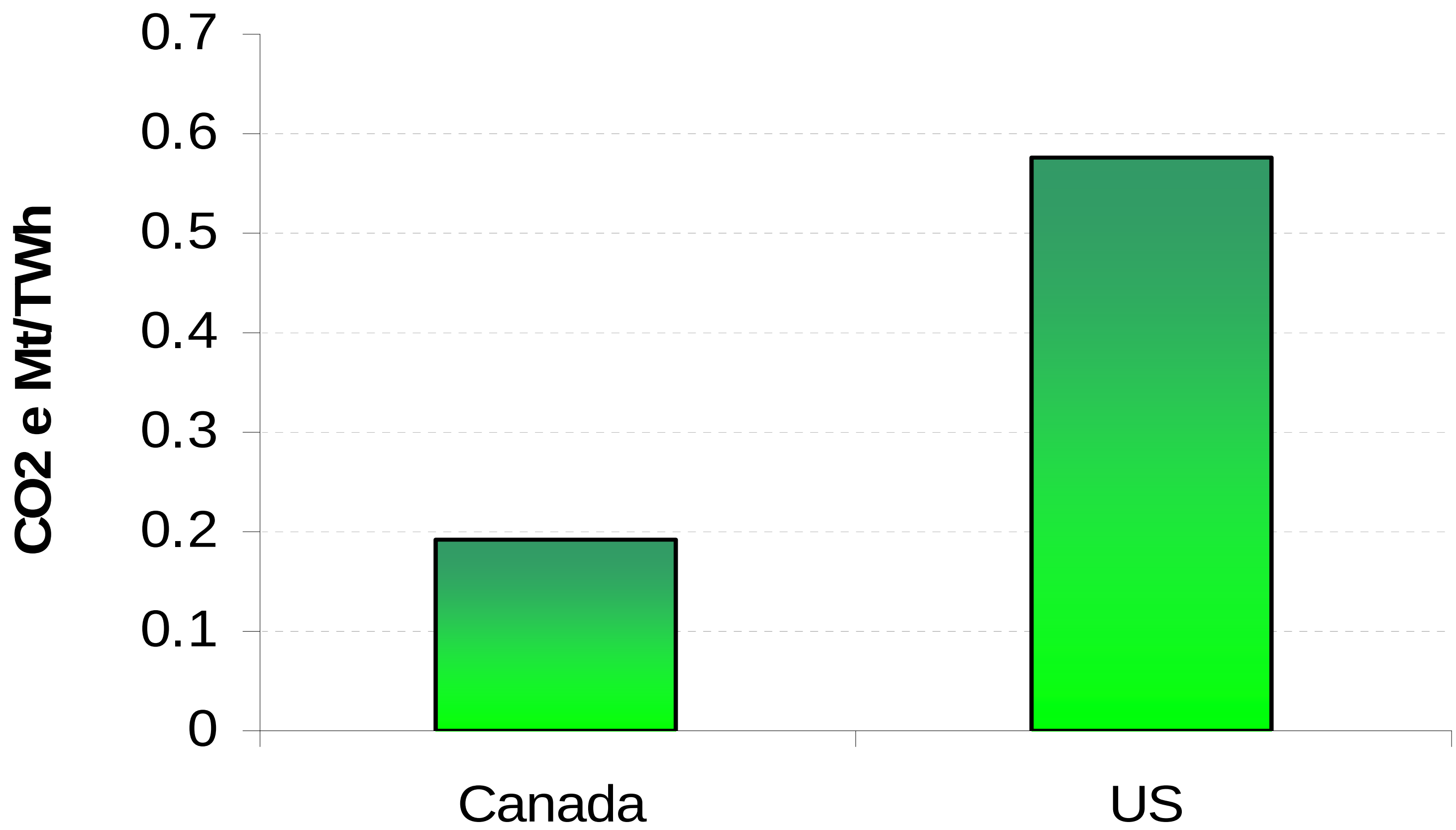
Canada and U.S. Power Generation Fuel Mix



Source: Energy Information Administration and Statistics Canada, 2008

Canada and U.S. Electric Generation CO_2/TWh

GHG Intensity

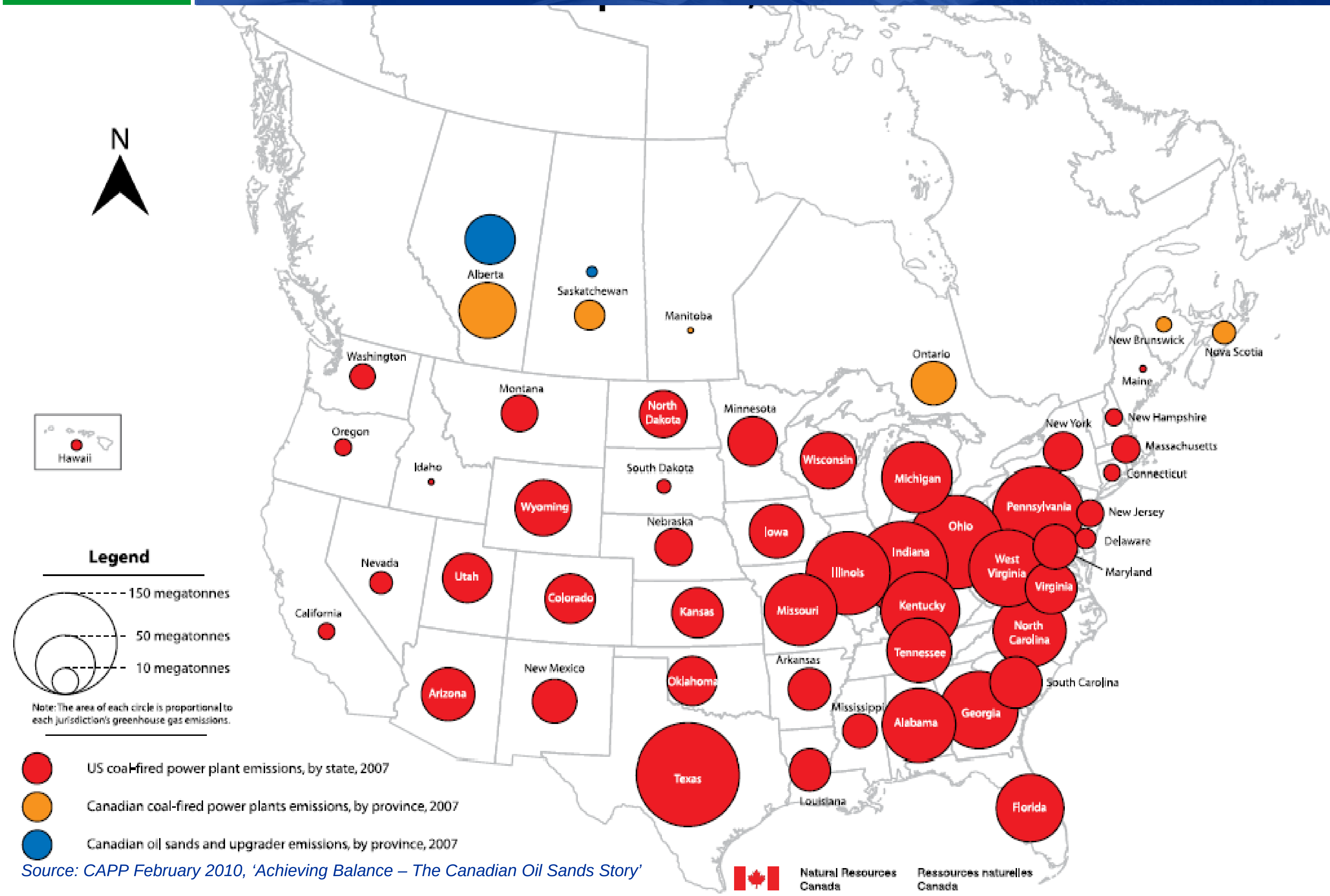


Source: Energy Information Administration and Statistics Canada 2007

GHG Emissions

- U.S.
  - Lots of scope for GHG emissions reduction by replacing coal with natural gas in the generation mix
    - Social, political and economic implications
    - Issue of timing – capital cycle
- Canada
  - Coal much less important in the generation mix
  - Timing of coal displacement an issue

Greenhouse Gas Emissions from Canadian and U.S. Coal-fired Power Plants and Oil Sands Operations, 2007



Source: CAPP February 2010, 'Achieving Balance – The Canadian Oil Sands Story'

Emissions Reduction Targets

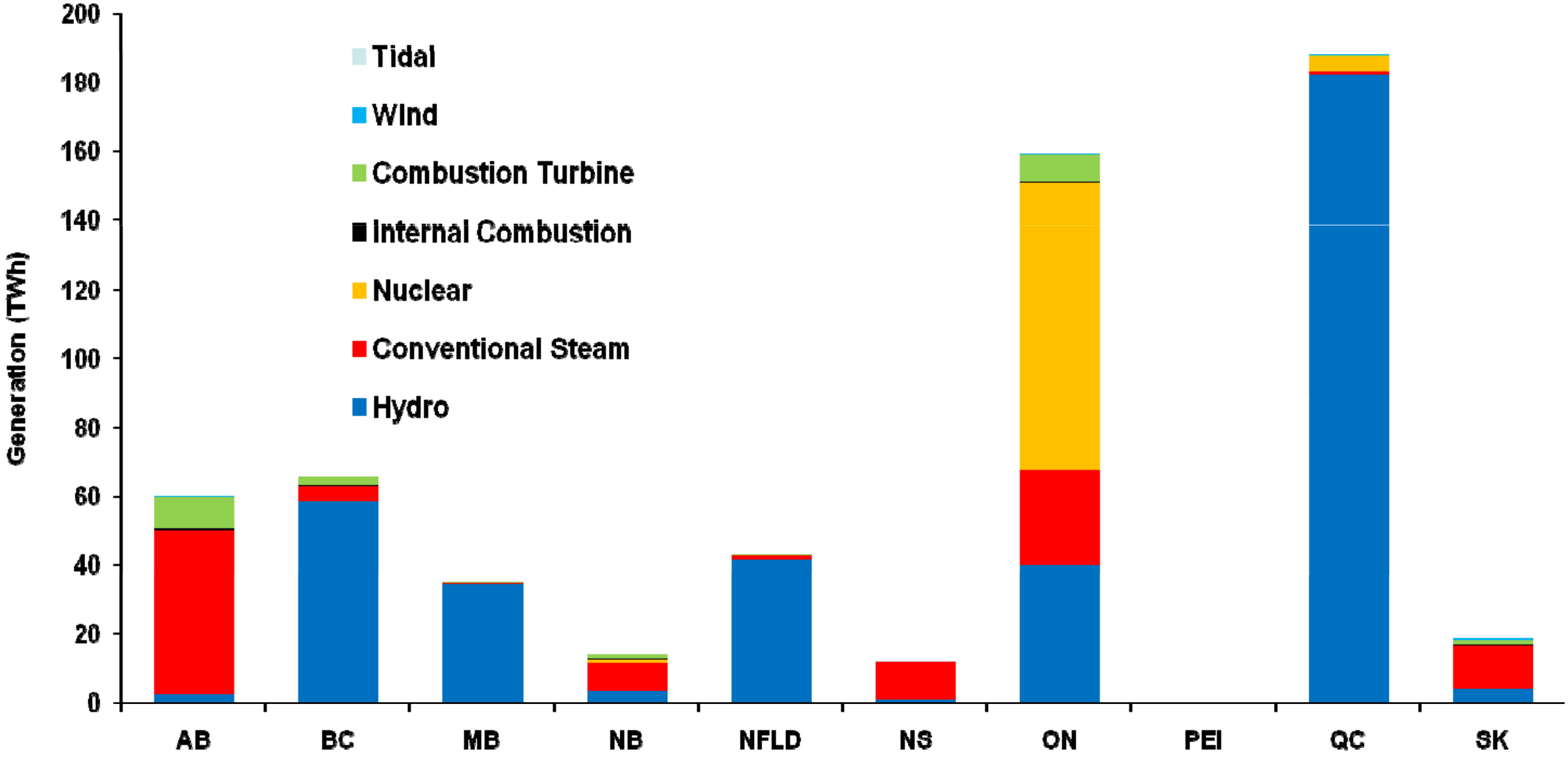
- Problem has been with the timeframe for emission reduction targets
- Large, short-term reductions cannot be achieved without idling still-productive capital (eg. coal-fired generation plants)
- Realistic timeframes would consider the capital stock replacement cycle
  - Meeting earlier targets means higher costs

National Targets Versus Provincial Realities

- Dramatic differences in provincial generation fuel mix and GHG emissions
- Provincial fuel mix reflects provincial resource endowments
  - Hydro resources in British Columbia, Manitoba, Ontario and Quebec
  - Coal resources in Alberta and Nova Scotia
- The following slide shows the generation fuel mix by province
- Displacing coal has widely varying economic impacts among provinces

Electricity Generation in Canada by Province and Fuel Type - 2008

Total Electricity Generation in Canada, 2008 = 598.8 TWh



Source: Statistics Canada, Survey 2151, 2009

Climate and Economic Policy

- Difference in growth drivers between Canada and U.S.
  - Energy and resource development a much more important driver of investment, economic growth, exports and employment in Canada
  - But the energy/resource intensive growth increases emissions
  - Caps would limit growth

Canadian Energy Industry

- World's fifth largest energy producer
  - Natural gas (third)
  - Crude oil (seventh and growing)
- Invested $50 billion in 2007, 2008
- Paid governments $246 billion in 2007
- Employment near 500,000 (direct and indirect)

Source: CAPP, November 2008

Reducing GHG Emissions

- Ideally, the challenge is to reach targets at minimum cost
- U.S. can make great strides by replacing some coal with natural gas in the power generation mix
- Canada's situation is more complicated
  - Industrial emissions (importantly including oil sands and energy production, processing and transportation in total) are large in Canada (36% versus 19% in U.S.)
  - No quick fix for oil sands except stopping development which impacts investment, economic growth and employment
- Meeting CO_2 targets in the near term probably means economic contraction or massive intervention in the transportation and power sectors.

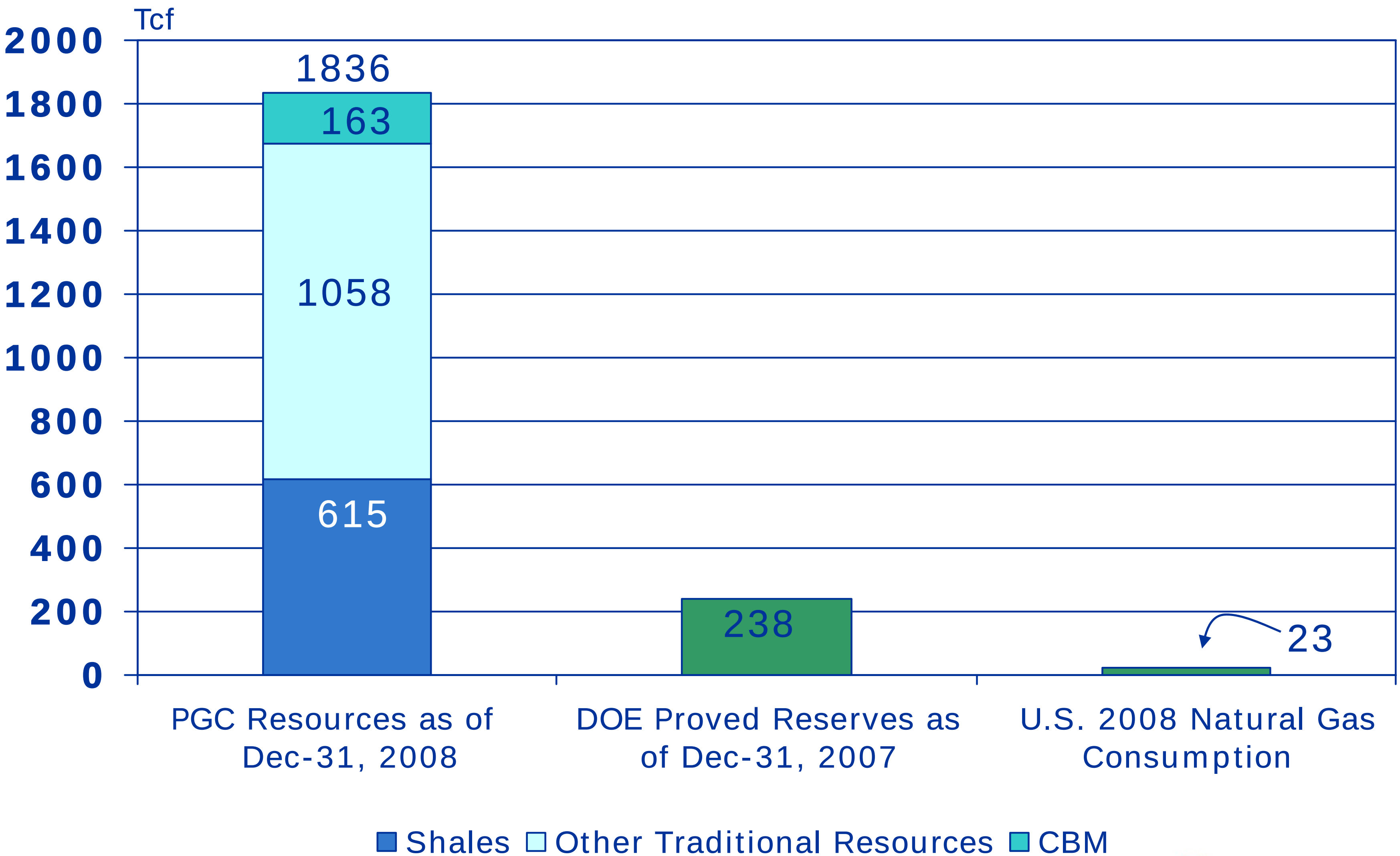
The Natural Gas Resource

- North American natural gas resource can be an important contributor to reaching CO_2 targets
- The ultimate potential for natural gas production has increased drastically over the past several years in both Canada and the U.S. as technological improvements have enabled the economic production of more unconventional resources (eg. shale gas)
- Lots of scope to displace other fuels with natural gas in the long run in both the U.S. and Canada
- A large role for natural gas is a positive for the WCSB, Canadian exports and Canada's economy in general

Ultimate Potential of the WCSB

	Cumulative Production TCF	Remaining Potential TCF	Ultimate Potential TCF
WCSB Conventional	168.0	109	277.0
WCSB CBM	0.7	55.6	56.3
Montney Shale Hybrid	0.1	30 – 50	30.1 – 50.1
Horn River Shale	negligible	40 – 100	40 – 100
WCSB Total	168.8	234.6 – 314.6	403 – 483.4

Recent Potential Gas Committee (PGC) Estimate of U.S. Total Technically Recoverable Gas Resources



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Renewables Initiatives Impact Natural Gas

- Renewable portfolio standards (for power generation) have uncertain (and sometimes perverse) impacts on fuel use and emissions
  - Increased wind generation often backs out natural gas, <u>not coal</u>
    - Texas example – more wind - more coal, less gas
    - Ontario example – more wind – less nuclear
- Costs of achieving the renewable portfolio standard is not known

Summary and Conclusions

- Climate policy is intertwined with energy policy
  - Important implications for economic development for Canada
    - Caps on emissions can impact investment and economic growth
  - Timeframe for GHG reductions is critical
    - Quicker means more costly
    - More options in longer term
  - Stock of capital will eventually ‘turn over’
    - Replacement decisions need to consider evolving carbon policy

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