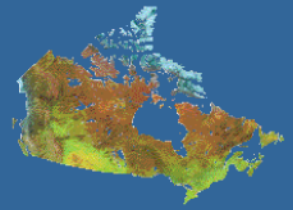
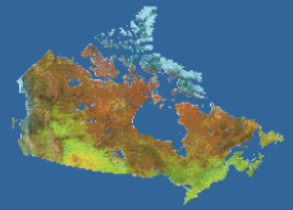


Energy Regulation and Markets in Canada

›› Electricity and Natural Gas

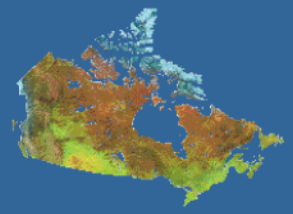
Asia-Pacific Partnership
Energy Regulatory and Market Development Forum
Anoop Kapoor, Natural Resources Canada
November 5th, 2010

Outline

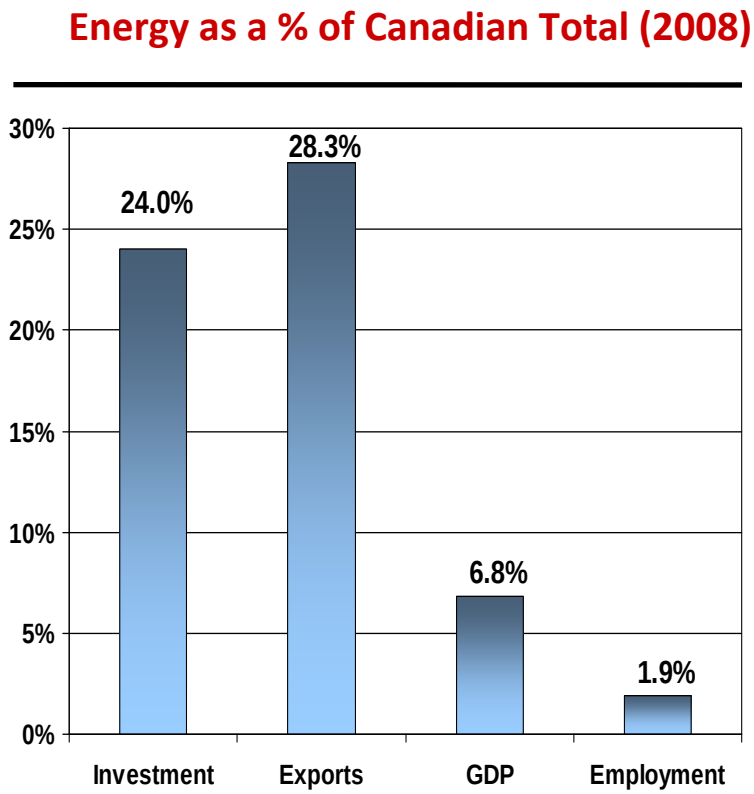


1. Federal/provincial jurisdiction
2. Electricity
   - Production and Trade
   - Markets and regulation
3. Natural gas
   - Jurisdiction
   - Resource
4. Concluding remarks

Energy is Important to Canada's Prosperity

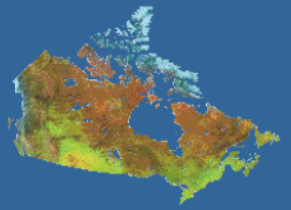


- Energy means more to Canada than any other industrialized country
  - Only OECD country with growing oil production
  - Stable and secure energy supplier
  - Major consumer
- $137 billion in exports (2008), primarily oil and gas – down to $84 billion in 2009:
  - 28.3% of total exports (2008)
  - 23.4% of total exports (2009)



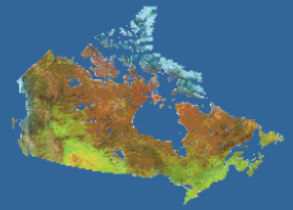
Source: Statistics Canada

Federal and provincial jurisdiction



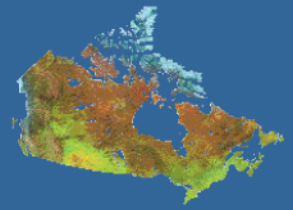
- Canada is a federation of ten provinces and three territories
- Canada's Constitution provides to the provinces the authority over natural resources
  - Provinces responsible for exploration, development, conservation and management of energy resources within their boundaries
- Federal regulatory jurisdiction exists in:
  - International and interprovincial pipelines (oil/gas)
  - International power lines
  - Nuclear energy
  - Resources in federal areas (e.g. territories, federal waters with some exceptions)

Energy regulators in Canada



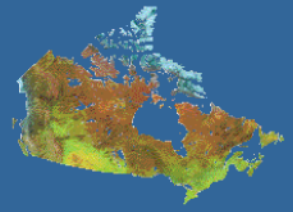
- Federal
  - National Energy Board (international and interprovincial pipelines, international power lines, exports, imports)
  - Canadian Nuclear Safety Commission (Nuclear safety and security; environmental impacts)
- Majority of electricity generation, transmission and distribution is overseen the provincial regulatory agencies. Some provincial examples:
  - Alberta Utilities Commission (natural gas, electric, and water utilities)
  - Alberta Energy Resources and Conservation Board (regulates oil and gas)
  - Ontario Energy Board (electricity and gas)
  - Island Regulatory and Appeals Commission (electricity, auto insurance, waste management, water & sewer)
  - Saskatchewan – advisory body to the Cabinet (electricity and gas rates)

Role of the National Energy Board

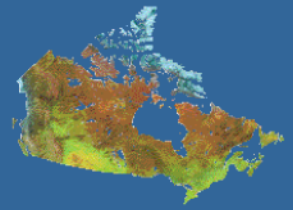


- NEB is an independent, quasi-judicial tribunal responsible for the regulation of
  - Construction and operation of international and interprovincial pipelines
  - Construction and operation of international power lines
  - Pipeline tolls and tariffs
  - Exports and imports of oil and gas
  - Exports of electricity
  - Oil and gas in “frontier” areas
- Also has an advisory role
  - Advice to federal government
  - Monitors energy markets
  - Publishes reports on energy

Federal greenhouse gas regulations – coal power plants



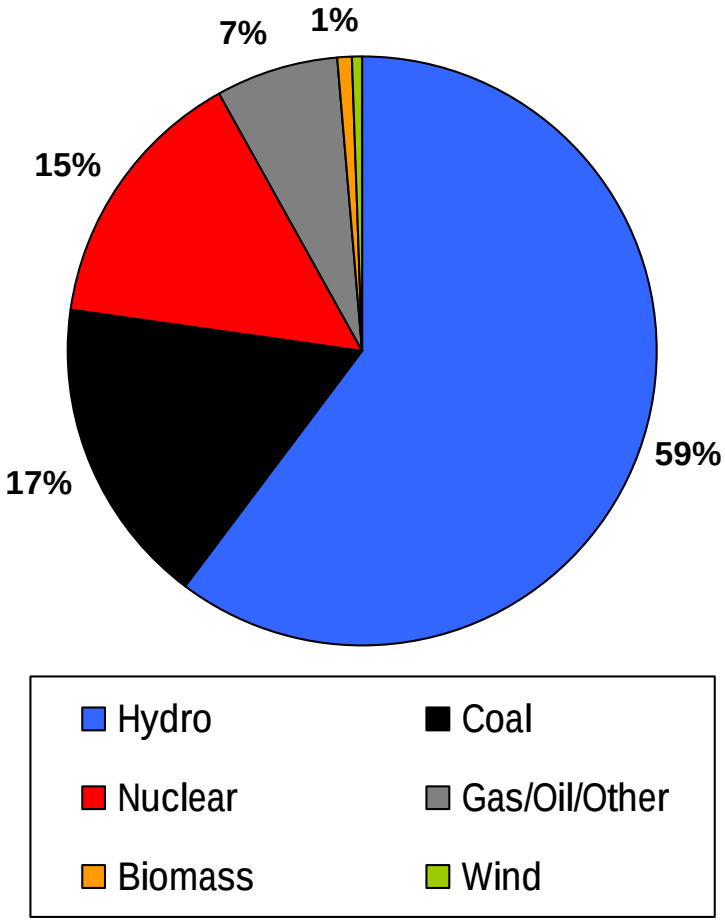
- As part of the Copenhagen Accord, Canada committed to a 17% reduction from 2005 levels by 2020
- In June, the Minister of the Environment announced a plan to develop regulations to reduce GHGs from coal-fired power
- New coal units, and existing coal units operating beyond 45 years, would be required to meet an emissions performance standard equivalent to NGCC
- Regulations and provincial actions are expected to reduce annual GHG emissions by 15 megatonnes by 2020
- Objective is to transition from coal to low- and non-emitting sources, including renewable energy, nuclear, natural gas and coal with CCS



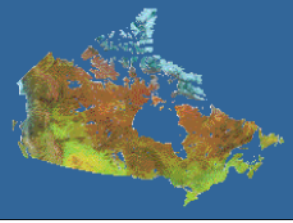
Electricity

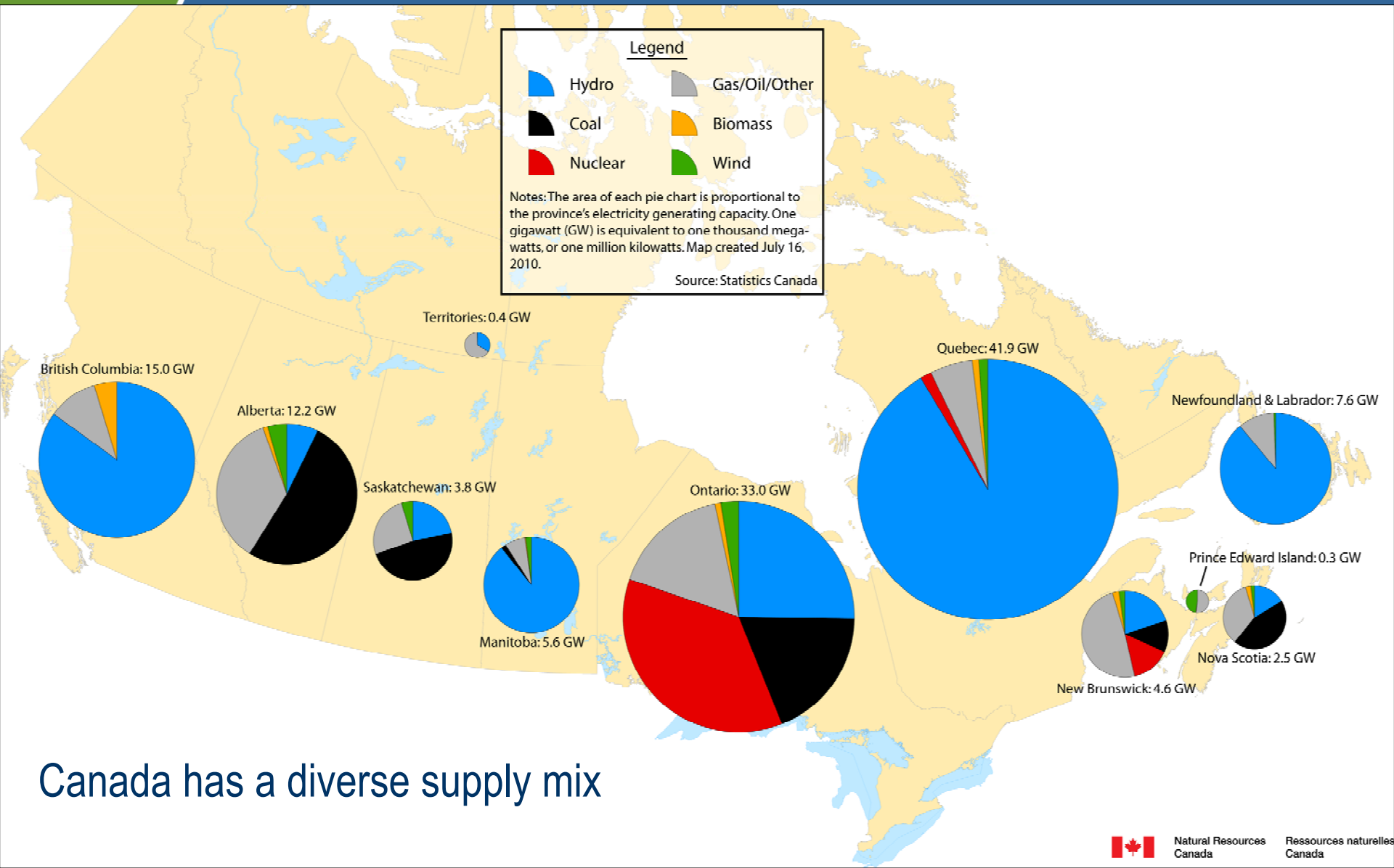
Electricity: The supply mix

- Canada has an exceptionally clean electricity supply mix
  - ≈ 60% of total supply from hydroelectricity
  - 76.5% from non GHG emitting sources
- Generation capacity = 125.6 GW
  - Public utilities ownership is 73 %
  - Private utilities ownership is 20 %
  - Industry ownership is 7 %
- Total supply in 2008: 618 TWh
- Domestic demand in 2008: 591 TWh



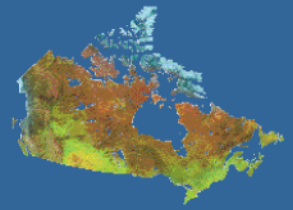
Electricity supply mix

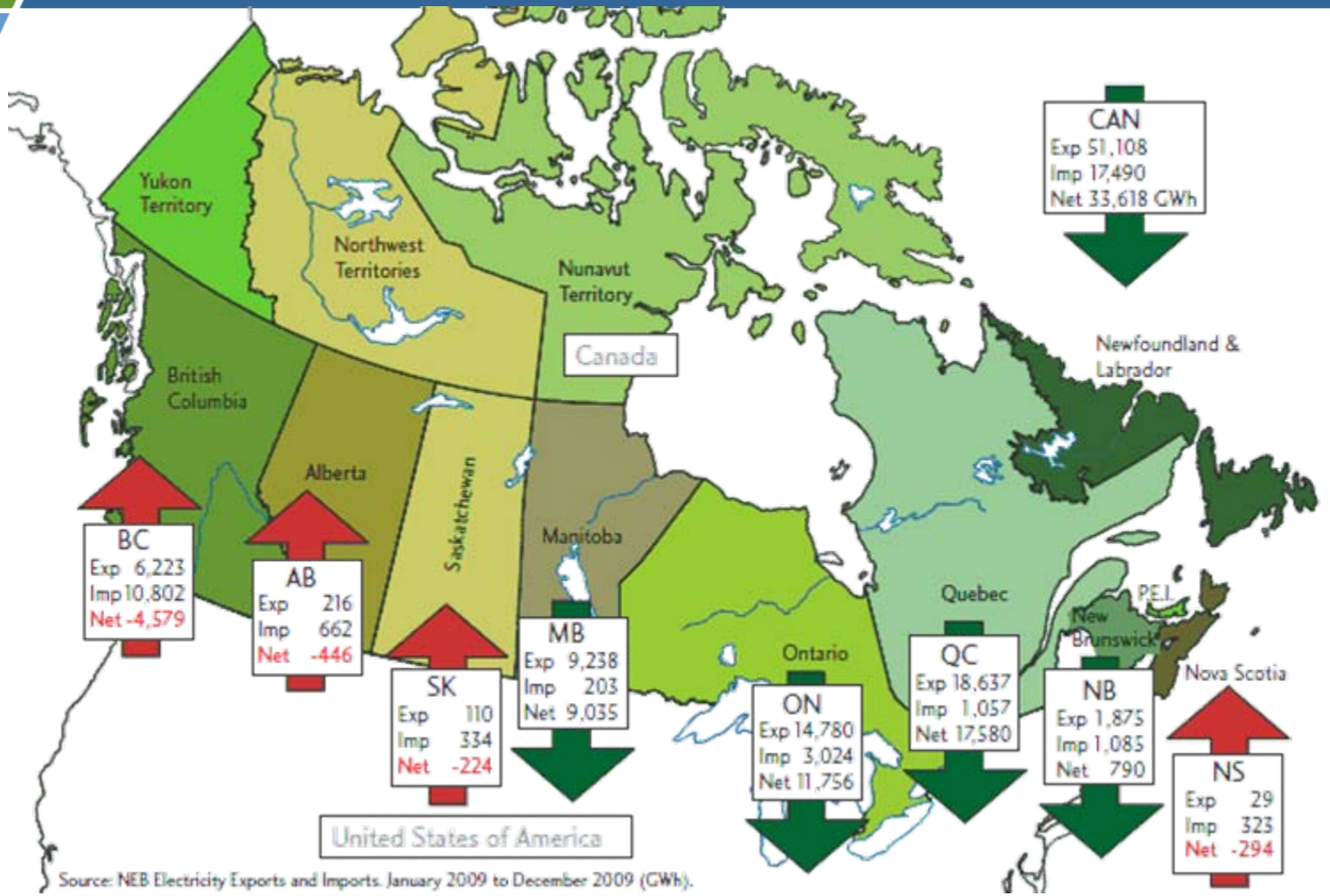




Canada has a diverse supply mix

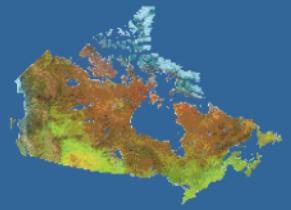
Canada - US electricity trade is bi-directional

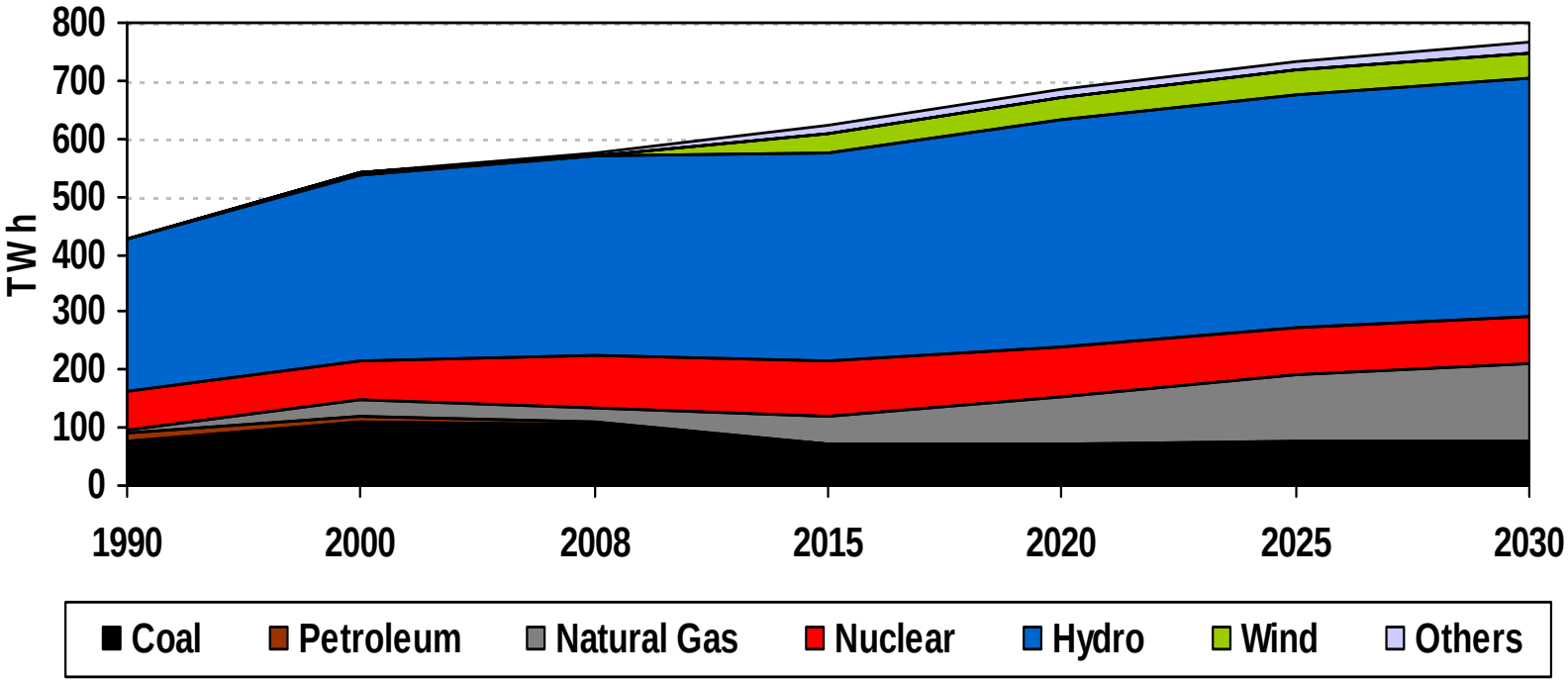




Source: NEB Electricity Exports and Imports. January 2009 to December 2009 (GWh).

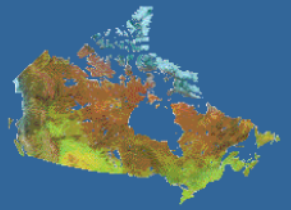
Electricity supply outlook





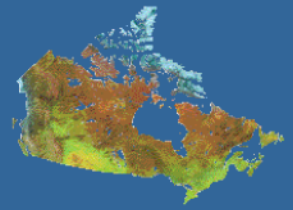
- Total generation reaches 769 TWh by 2030 (24% increase from 2008)
- Generation increases will be from natural gas, hydro and wind – 112 TWh, 70 TWh and 39 TWh respectively by 2030
- Impact of Federal GHG coal regs not included in the above analysis

Electricity: Markets and regulation



- Ten provinces and three territories means **wide variety of** different market structures and regulatory approaches
- Three examples
  - Quebec
    - Government-owned and regulated, vertically integrated utility
  - Alberta
    - Competitive wholesale and retail markets, transmission and distribution is regulated
  - Ontario
    - Hybrid market – wholesale market exists but generation (some exception), transmission and distribution are regulated

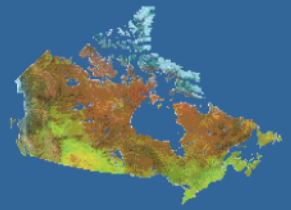
Quebec



- Supply mix - Electricity has been provided by large hydroelectric projects built by Hydro-Québec, a vertically integrated Crown (government-owned) corporation
  - More recently, smaller projects (e.g. wind farms) have been built by private developers under a request-for-proposals system
  - Large hydro projects are still built, owned and operated by Hydro-Québec

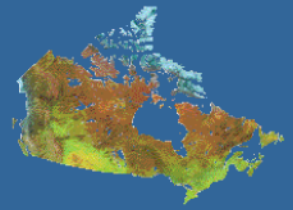
- Provincial regulator is la Régie de l'Énergie
  - Regulates transmission and distribution of energy (electricity, natural gas and petroleum)
  - Regulates investments, retail prices, transmission tariffs
  - Monitors the prices of petroleum products and steam

Alberta



- Supply mix - Most electricity is generated at mine-to-mouth coal-fired power plants and using natural gas
- Deregulated in late 1990s
  - Competitive wholesale market created
  - Long-term power purchase agreements auctioned to reduce market power
  - Gradual transition to a competitive retail market
- Alberta Electric System Operator is responsible for safe, reliable operation of Alberta Interconnected Electric System and its economic planning
  - Manages wholesale market and transmissions services
- Provincial regulator is Alberta Utilities Commission regulates (utilities – electric, gas and water):
  - Siting of electric transmission facilities, electric power plants and natural gas transmission pipelines
  - Oversees the tolls, tariffs and service regulations of energy transmission through natural gas pipelines and transmission lines

Ontario

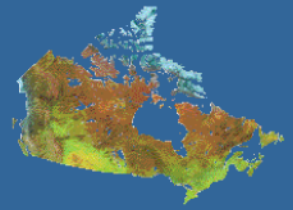


- Supply mix - Main electricity source is nuclear, with coal, hydro and natural gas playing secondary roles - current policy to phase out all coal-fired power by the end of 2014

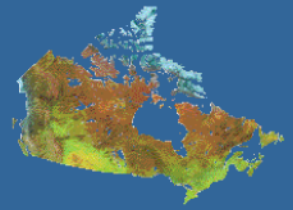
- Deregulation in early 2000s
  - Implemented a hybrid regulated-competitive model unique in Canada
  - Now a more centrally planned system

- Some of key players in Ontario's electric system
  - Ontario Power Authority - long term supply planning, procures electricity supply from diverse resources, facilitate achievement of ambitious conservation targets, implements provincial governments policies
  - Ontario Power Generation – Large generator wholly owned by the provincial government – regulated to prevent market power
  - Independent power producers sell power under long-term contracts and in the wholesale market

Ontario

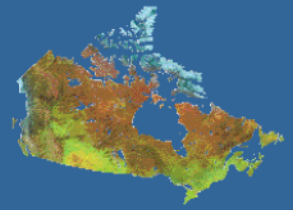


- Some of key players in Ontario's electric system (contd.)
  - Hydro One – Owns the bulk transmission system and distribution and is wholly owned by the provincial government
  - Independent Electricity System Operator (IESO) operates the wholesale electricity market, bulk power system, reliability, and short term forecasts
- Wholesale market exists – level of competition is limited
  - Since large part of the wholesale power is either price regulated or is subject to long-term power purchase agreements
- Provincial regulator is Ontario Energy Board that regulates electricity and natural gas sectors. Some of the Boards regulatory roles are
  - Approving delivery rates for electricity distribution and transmission and natural gas distribution
  - Approving transmission of electricity and natural gas storage facilities
  - Setting the price of electricity for certain consumers
  - Approving amalgamations, acquisitions, divestitures and mergers of regulated entities



Natural Gas

Natural gas: Jurisdiction



Pipelines

Production

Provincial

- Exploration & Production
- Gathering
- Intraprovincial transmission
- Royalties
- Provincial taxes

Federal

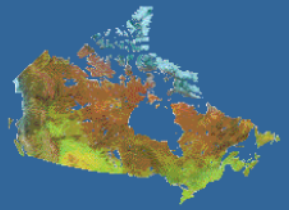
- Interprovincial & international transmission (incl. tolls and tariffs)
- Exports / Imports
- Exploration & production on federal lands
- Federal taxes

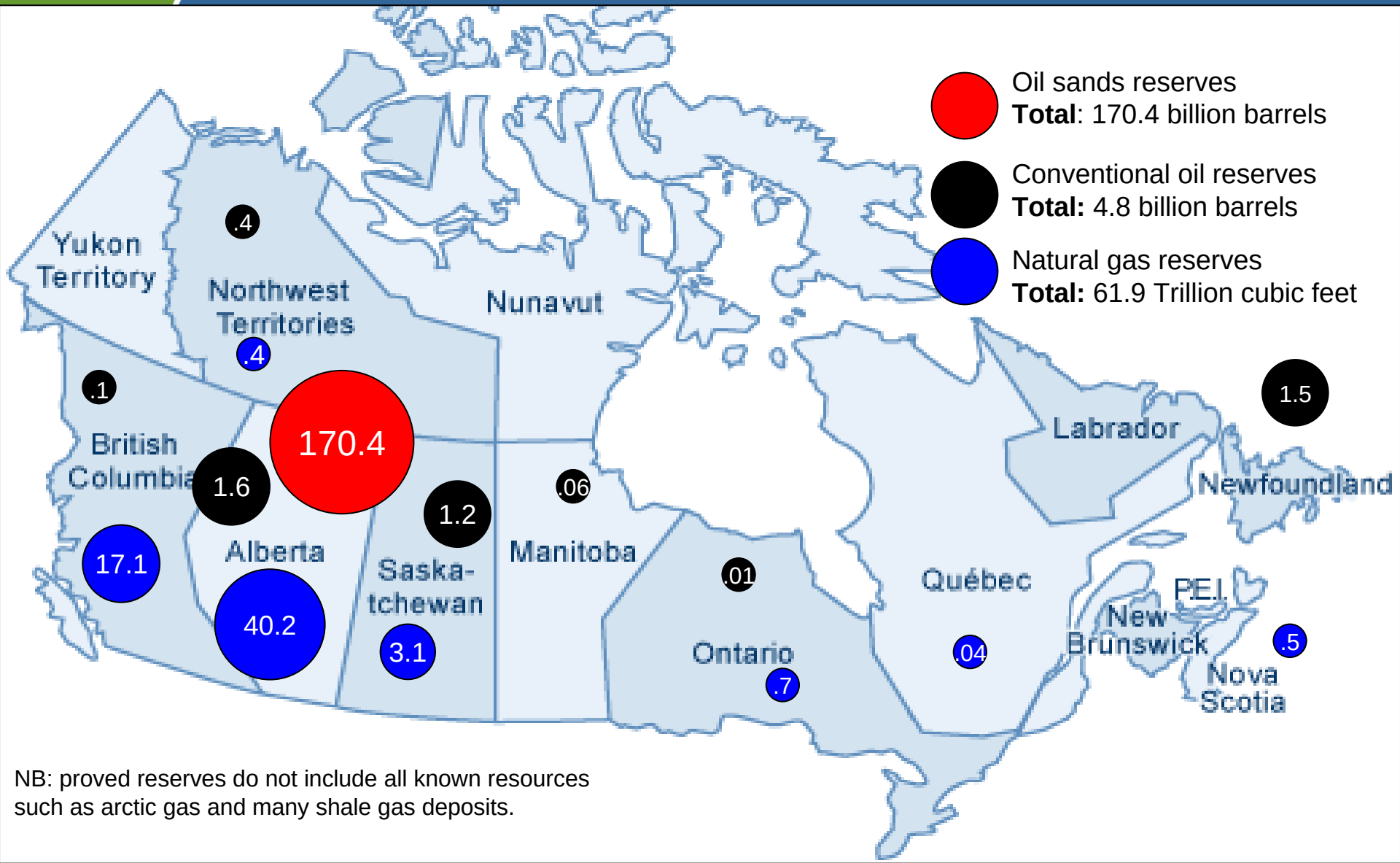
Consumption

Provincial

- Storage
- Distribution
- Intraprovincial transmission
- Provincial taxes

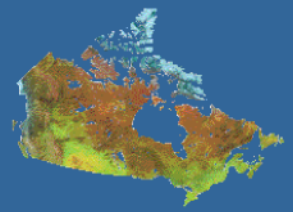
Oil and gas proven reserves

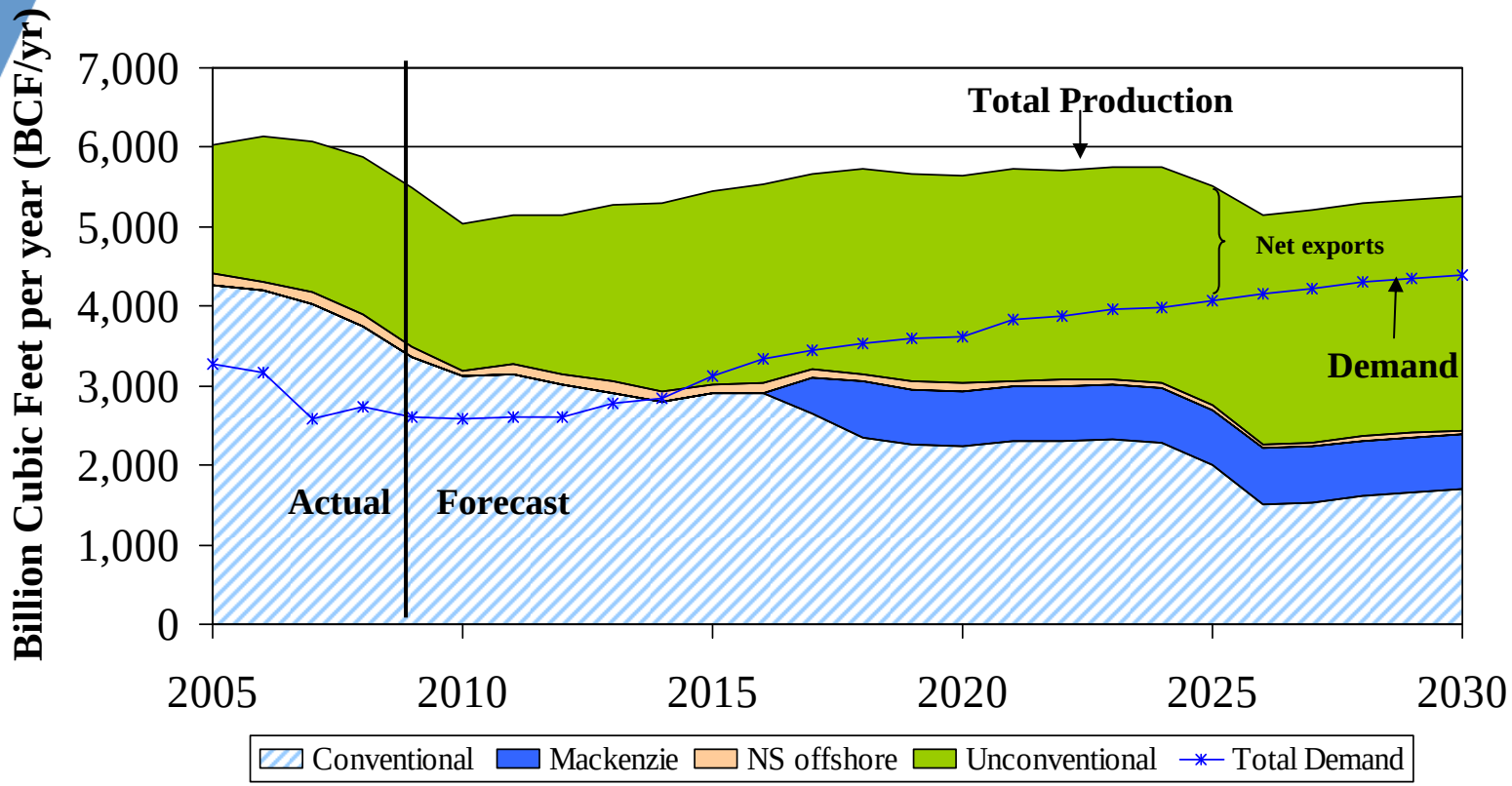




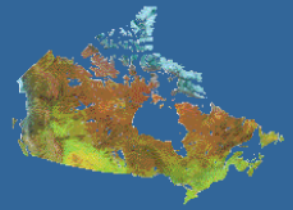
NB: proved reserves do not include all known resources such as arctic gas and many shale gas deposits.

Natural gas production outlook





Summary: Two key themes



Jurisdiction

- Provinces responsible for development of energy resources within their respective boundaries
- Federal government plays a supporting role, where there is a national interest or where developments reach across borders

Diversity

- Resource diversity – oil, gas, hydro, uranium, wind…
- Electricity supply mix – hydro-based v. fossil-based
- Market structures – competitive v. monopolistic; private v. public


Canada