Shale Gas -
*Transforming Natural Gas Flows and Opportunities*

Doug Bloom
President, Spectra Energy Transmission West
October 18, 2011
Natural Gas’ Golden Age

*Natural gas is in the midst of a dramatic upsurge – in terms of both supply dynamics and public/policy consideration*

Why Natural Gas?
*Proven contributor to economy, environment and energy security*

**Jobs & economic growth**
- Creates jobs – direct & indirect
- Creates investment opportunities
- Contributes to economy – delivering significant government revenues
- Contributes to global competitiveness

**Environmental benefits**
- Low emissions
- Small land footprint
- Sustainable
- Essential to complement renewable energy sources

**Domestic energy security**
- More than a 100-year supply and growing
Spectra Energy
Our Diverse Portfolio of Assets

2010 Pipeline Throughput: 4.1 Tcf
Transmission Pipe: 19,200 mi
Gathering Pipe: 63,800 mi
Distribution Pipe: 40,600 mi
Storage Capacity: 305 Bcf
Retail Customers: 1.3 million

Gas storage facility
Gas processing plant
Propane terminal
Shale gas formations
Abundant Unconventional Gas Widespread Across North America
Rapidly Shifting Supply

- Regional nature of new supply positioned to serve regional markets creating increased gas on gas competition
- Shifting supply sources altering gas flow patterns
Spectra Energy
North American Growth Opportunities in Execution

- Projects in Execution: ~$3.7B
- Growth Opportunities: ~$5B

DCP Financed Opportunities

Gas storage facility
Shale gas formations
The Unconventional Nature of Shale Gas
Unconventional Gas
Conventional / Unconventional Spectrum

Conventional Gas

- Shale Gas
- Tight Gas Sands
- Coal-bed methane

Small Trap in Large Aquifer
- Excellent Permeability
- Less Technology Application
- Lower Well Densities

Continuous Reservoir in Large Trap
- Poor Permeability
- More Technology Application
- Higher Well Densities
What is “Shale Gas”? 

Shale gas is found in very fine-grained sedimentary rock tightly locked in very small spaces and requires advanced technologies to drill and extract.

Source: EIA
Shale Gas Technology
Advances in Technology and Techniques a Key Development Driver

• Drilling technology improvements and efficiencies in shale have emerged
  – Longer horizontal laterals
  – Multiple-stage hydraulic fractures per lateral
• Small surface footprint for multiple, extended wells
• Horizontal drilling and hydraulic fracturing result in gas wells with long stable production lives
• Ground water is separated by thousands of metres and tonnes of impermeable rock and protected by regulation
• Significant amount of water is recycled
• “Micro-seismic” technology evolving and enabling even greater precision in fracturing wells

Source: American Petroleum Institute
Shale wells tend to have supply stability with high initial production rates and long, stable production lives.

Initial Production from Typical Shale Well = 2 – 15 million cubic feet/day*

* Based on one company’s experience of typical production from the Haynesville shale wells
Advancing Resource Play Hub Design and Development

Advances in unconventional gas development = Increased efficiencies + reduced development footprint

Source: Encana October 2011
Debolt Water – Zero Emissions Process
Reducing Environmental Footprint – Improves Economics

3 Debolt Source Wells
31,000 ~ 50,000 bbls/d

Water Treatment Plant
100,000 bbls/d

Water Storage
10,000 bbls

Horn River 63-K Pad

Debolt Disposal Well

Source: Encana October 2011
Unconventional Gas Supply Is Game Changing
Natural Gas Supply Outlook
Shale Gas Has Redefined North American Gas Markets

With rapid development of shale plays, North America now has more than 100 years of natural gas resource availability at current consumption levels.
BC Supply in Competition

**HORN RIVER**
- Original Gas in Place (Tcf): 500
- Current Production (Bcf/d): 0.4
- Producer Peak Forecast (Bcf/d): 2.0

**MONTNEY**
- Original Gas in Place (Tcf): 450
- Current Production (Bcf/d): 1.0
- Producer Peak Forecast (Bcf/d): 4.0

**FAYETTEVILLE**
- Original Gas in Place (Tcf): 52
- Current Production (Bcf/d): 2.5
- Producer Peak Forecast (Bcf/d): 3.0

**BARNETT**
- Original Gas in Place (Tcf): 327
- Current Production (Bcf/d): 5.2
- Producer Peak Forecast (Bcf/d): 6.0

**WOODFORD**
- Original Gas in Place (Tcf): 23
- Current Production (Bcf/d): 1.2
- Producer Peak Forecast (Bcf/d): 1.7

**MARCELLUS**
- Original Gas in Place (Tcf): 1,500
- Current Production (Bcf/d): 2.0+
- Producer Peak Forecast (Bcf/d): 10.0

**EAGLE FORD**
- Original Gas in Place (Tcf): 95
- Current Production (Bcf/d): 0.7
- Producer Peak Forecast (Bcf/d): 3.0

*Play in early stages of development and highly variable

---

**British Columbia Gas Production**
(BCF/d - Sales Gas; Forecast period assumes $4.00/GJ)
Source: CAPP, Q1, 2011

---

**British Columbia Gas Production Map**
- BC Shale
- BC Tight
- BC Non Associated
- BC Solution

---

**Woodford**
- Original Gas in Place (Tcf): 23
- Current Production (Bcf/d): 1.2
- Producer Peak Forecast (Bcf/d): 1.7

---

**Fayetteville**
- Original Gas in Place (Tcf): 52
- Current Production (Bcf/d): 2.5
- Producer Peak Forecast (Bcf/d): 3.0

---

**Barnett**
- Original Gas in Place (Tcf): 327
- Current Production (Bcf/d): 5.2
- Producer Peak Forecast (Bcf/d): 6.0

---

**Marcellus**
- Original Gas in Place (Tcf): 1,500
- Current Production (Bcf/d): 2.0+
- Producer Peak Forecast (Bcf/d): 10.0

---

**Haynesville**
- Original Gas in Place (Tcf): 717
- Current Production (Bcf/d): 5.5
- Producer Peak Forecast (Bcf/d): 10.0

---

*Play in early stages of development and highly variable*
Robust Shale Gas Production Outlook in BC

Average Reserves per Square Mile (10 wells/mile²)

- Montney & HRB
- 00's
- 90's
- 80's
- 70's
- 60's
- 50's

(Bcf/mile²)
Natural Gas Prices

A stable price environment is critical to gas fired power generation opportunities

Monthly Average Spot Price at Henry Hub
(Nom$/MMBtu)

Source: Platts

- Monthly Price
- Average, 2004-08
- Average, Jan2009-Mar2011
Natural Gas Price Outlook

Average Annual Natural Gas Price (Henry Hub, 2010, $/MMBtu)

Source: ICF International
BC Supply Growth Driving Infrastructure Development
Montney & Horn River Driving Growth
BC Gas Supply Forecast

**Montney (MMcf/d)**

- Favorable cost structure
- Liquids present in certain areas

**Horn River (MMcf/d)**

- Efficiencies continue to drive cost reductions
- Development activities proving resource estimations

*Source: NEB, July 2009; Spectra Energy*
Fort Nelson (Horn River)

- $1 billion capital investment underway
  - Fort Nelson plant fully contracted
  - 9 of 10 expansion projects now in service
  - New Fort Nelson North plant (2012)
  - Further pipeline expansions underway now and post-2012

Fort St. John (Montney)

- $500 million capital investment underway
  - McMahon plant at full capacity, Bissette Pipeline now in service
  - New Dawson plant (2 phases, 2011/13)
  - Further expansions in development
Spectra Energy’s BC Pipeline offers:

- An extensive pipeline system that is connected to over 3 Bcf/d of raw gas gathering & processing capability, and 77 Bcf of underground storage

- Multiple bi-directional connections to the North American pipeline grid which provide supply and market security

- A growing liquid market at Station 2 where a wide range of gas supplies converge

- Ability to leverage existing facilities to achieve economies of scale and supply optionality for LNG exports

- Excellent track record of system safety and reliability, supported by a world-class pipeline integrity program
Key Development Issues for Industry and Stakeholders
Getting It Right

**Responsible Land Stewardship**

- We utilize existing infrastructure to minimize environmental footprint and social impacts
- We develop facilities on a staged basis to align with supply development
- We are sensitive to other land uses, Aboriginal concerns and stakeholder issues
  - Conduct risk assessments to identify culturally sensitive areas and biodiversity issues, including protected species and habitats
    - Addressed from the beginning of a project with active involvement of area First Nations in traditional land use studies and consultation on archaeology studies

**Stakeholder Outreach**

- We have formal processes in place to assess and monitor the environmental and social impacts of our operations
- We emphasize early engagement with local stakeholders, tailored to meet local needs and issues
- Outreach activities are company-wide and focus on continuous improvement in engagement and communications
Getting It Right

- We support community capacity-building initiatives through local contracts, scholarships, skills and leadership development programs

**Socio-Economic Development Opportunities**

- Spectra Energy is committed to enhancing the quantity and quality of Aboriginal and local community participation in our business and workforce
- We cultivate meaningful relationships and opportunities to work with us on various contracts
  - In alignment with project safety, performance and cost
  - By matching capacity of Aboriginal and local contractors to project scope
- Including the use of Aboriginal/local contract terms within our contracts to both encourage and reward contractors who assist Spectra Energy in attaining our business goals and objectives

Balancing Our Needs for Energy, Economy and Environment
Summary
Policy Priorities – Building New Markets

- Build “home grown” demand for natural gas as well as diversify access to our resources through offshore markets
  - Natural gas is a significant resource and revenue source for BC government
  - Clean energy that funds essential services
  - Skilled labour and long-term meaningful job growth
- Recognize value of our legacy natural gas assets
  - All British Columbians benefit from Spectra Energy’s system – partners since 1957
- Encourage development of natural gas fired power generation to meet BC’s energy needs
  - Demand “pull” needed to drive drilling activity
- Continue efforts on “one project, one process”
- Maintain positive fiscal track record

Natural Gas is BC’s Economic Engine - Let’s Fire on all Cylinders