

Natural Gas: Staying Competitive in Changing Times

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The External Environment



- Stabilized....but jobs are a key issue and U.S. recovery remains very tenuous.
- Markets
 - Financial markets stabilized....but access to & cost of capital can be a challenge.
 - Crude oil market more stable....but light/heavy differential remains narrow.
 - Natural gas market very challenging.

Public

- Primary focus is on jobs/economy.
- Expect demonstrated improvement in oil & gas environmental & social performance ("proof points").
- ENGOs remain very engaged in "off hydrocarbons" activism.

• Political

- Unsettled, difficult to advance policy @ federal level (Canada & U.S.).
- AB, BC, Sask generally supportive of oil & gas sector.
- Generally focused on economy, but environment remains a high priority for some key decision-makers & influencers.
- GoM event, Enbridge p/l spills, California natural gas incident have raised profile on energy & environment.

Canadian Opportunity: Oil Sands





Source: Oil & Gas Journal Dec. 2009

W. Canadian Oil Sands & Conventional Oil Production Outlook



thousand barrels per day



Reputation and Oil Sands



- **Reputation = Performance + Communication**
- Key concerns expressed regarding oil sands development:
 - Local / regional environmental & social impacts
 - Global climate change
 - Role of fossil fuels in future energy system.



Which is the best goal when it comes to the oil sands?

To develop the oil sands with an effort to limit the environmental impacts To stop the development of the oil sands altogether To focus on maximizing the full economic benefits of the oil sands resource Total 74% 17% Conservative 78% 4% 18% 79% Liberal 12% NDP 65% 31% Green 58% 38% BQ 78% 20% 29 0% 20% 40% 60% 80% 100%

Communicating with the Public

The show that industry takes these issues seriously and to demonstrate what is being done by real people to address them





"HEAVY OIL IS LIKE PEANUT BUTTER. WE HAVE TO MAKE IT THINNER SO IT CAN FLOW."

We use steam to recover the off a factor sands. Generating steam also creates greenhouse gases. Our challenge is to reduce these ensistem. In 2005, here in our Calgory research centre, we developed a new technology that makes the process more efficient, reducing these emissions by 25%, it's called Liquid Addition to Steam for Enhanced Recovery. Today, we've started implementing this innovation at cur Cold Lake operation.

Finding innovative ways to limit environmental impacts is key to meeting our energy needs responsibly. Get the real story at capp.ca/oilsands

A message from Canada's Oil Sands Producers C P P Transfer Association of Petsteurs Producers (SAPP) represent sentime consents the producers processing to par use of Canada's method or consents the producers processing to par use of Canada's method or consents the producers processing to par use of Canada's method or consents the producers processing to par use of Canada's method or consents the producers processing to part of Canada's method or consents the producers processing to part of Canada's method or consents the producers processing to part of Canada's method or consents the producers of Canada's method of Canada's and the produce

"I GREW UP ON A FARM. I KNOW WHAT IT MEANS TO HAVE THE LAND RESTORED."

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Getting a forest started is the entirelations pair of reclaiming, if the land. For years, at oil sands drilling locations, we shared the process by planting grass, and it would take 10 to 20 years for the tases to samere from the natural seed bank. Recently, drawing on research from the University of Aberta, we learned how to create conditions that allow tas to plant aspen, spruce and preseedings right away. So now, the forest can re-statistic teel in a few years, rather than a few decides

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message from Canada's Oil Sands Prod

Environmental & Social Performance

Guiding Principles for Oil Sands Development

- People
- Air
- Water
- Land



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Canada's oil sands industry will provide a secure source of energy, reduce its impact on the environment and provide economic benefits to society while developing this globally significant resource. We will achieve this through continuous improvement, by developing new technology and by committing to these guiding principles:

	 We will provide a safe environment for our employees, contractors, and the communities where we operate. 					
	 We will provide employment and business opportunities for regional communities, including Aboriginal peoples. 					
PEOPLE	• We will consult with directly-affected stakeholders through all stages of our operations.					
	 We will design and operate our facilities to ensure that regional air quality continues to exceed provincial air quality objectives. 					
AIR	 We will continue to reduce greenhouse gas emissions per barrel of production by improving our energy efficiency and by developing new technologies. 					
WATER	 We will continue to reduce the amount of fresh water required per barrel of production by improving water recycle rates, using non-potable water sources where feasible, and by developing new technologies. We will safeguard the quality of regional surface and groundwater resources. 					
	 We will mitigate our impact on the land while maintaining regional ecosystems and biodiversity. We will progressively reclaim all lands affected by oil sands operations, 					
	returning them to self-sustaining landscapes.					
Canadian Natural	Concoordillings Concoo					
—	September 2009 2009-0033					

North American GHG Emissions – Oil Sands and Coal



North American Natural Gas – Supply Outlook

- Shale gas supply a gamechanger
- Technology breakthroughs
- New producing regions
- Emerging stakeholder environmental concerns (footprint, water)
- Shifting S/D dynamic



Canadian Opportunity: Natural Gas

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- Abundant, high quality resource.
- Improved fiscal regimes.
- Improving regulatory system.
- "Open for business" approach.
- Established infrastructure
- Well-established skills and capacity.

Western Canada – Resource Plays



Key Characteristics – Canadian & U.S. Shales



States and an and a state of the second	Barnett	Haynesville	Marcellus	Horn River	Montney
Depth (ft.)	6,500 - 9,000	10,500 - 13,500	3,000 - 8,500	6,500 - 13,000	5,000 - 10,000
Thickness of Shale (ft.)	100 - 500	200 - 300	50 - 250	300 - 600	300 - 500
Total Organic Content (%)	3.0 - 7.0	3.0 - 5.0	3.0 – 12.0	3.0 - 10.0	2.5 - 6.0
Original Gas in Place (Bcf / Section)	50 – 200	150 – 250	50 – 150	130 - 320	60 - 150
Recovery Factor (%)	20 – 40	20 - 40	20 - 40	20 - 40	20 - 40
Est. Ultimate Recovery (Bcf / Well)	1.0 - 4.0	4.5 - 8.5	2.2 - 4.1	3.0 - 9.0	2.0 - 6.0

By any measure involving purely geological reservoir parameters, the Horn River and the Montney resource plays compare very favourably to their U.S. counterparts.

Canadian Resource Plays -Continuing Operational Improvements

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Well Cost Evolution (\$C)

Alberta Deep Basin – (vertical wells)



CBM – Well costs (\$MM)



Montney - Per Interval



Source: Encana

Industry Capital Spending Cdn \$billions





Cdn. Natural Gas Production Forecast



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Assumes a price that renders production economic * Subject to commercial and regulatory approval Sources: CAPP

Canadian Natural Gas Challenges

• Competitiveness

Geographic, cost and infrastructure challenges.

• Local / Regional Environmental & Social Impacts

- Water:
 - Sustainable water supply
 - Public perception of risk to aquifers
- Land:
 - Surface footprint
 - Species at risk (focus on caribou)
- Social license issues

Environment Policy

- Potential competitiveness impacts e.g., climate policy in B.C.
- Jurisdictional overlap & complexity e.g., Species-at-risk (caribou)

N.A. Natural Gas Pipelines & 2009 Cdn. Exports to U.S. (bcf/d)



Potential Impacts of New Shale Gas Basins on N.A. Gas Flow



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Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

Natural Gas Supply Costs



Required NYMEX Natural Gas Strip for 10% IRR



B.C. GHG Emissions Forecast - BAU



Canadian Natural Gas Initiative ("CNGI")



• Who: CAPP, CGA, CEPA, CNGVA, CSUG



- What is it?
 - Education
 - Communications
 - Policy Advocacy

• Policy Priorities:

- Establish natural gas as a priority in energy policy dialogue a "foundation", not a "bridge".
- Enable upstream development and transmission (e.g., regulatory reform)
- Broaden use focus on natural gas use in power generation and medium / heavy duty vehicles.
- Competitiveness, technology investment, alignment key principles for climate policy.
- Underpinned by fiscal competitiveness, regulatory reform, technology & innovation.



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