Energy Strategic Issues

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AUMA Convention

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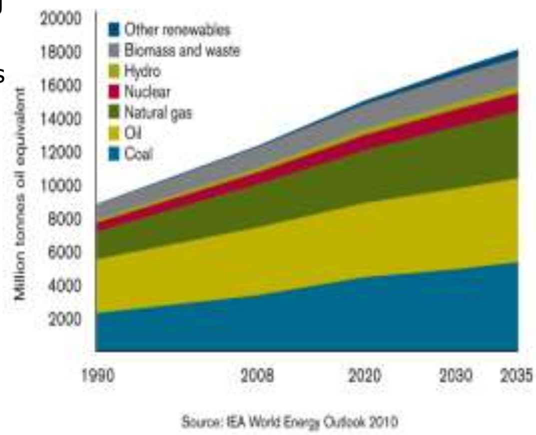
Presentation Outline

- **Global Energy Context**
- **Canadian Energy Resources**
- **Canadian Industry Overview**
- **Natural Gas**
- **Oil Sands Overview**
- **Markets and Pipelines**
- **Environmental Performance**
- **Technology Solutions**
- **Social License**
- **Impact on Municipalities**
- **Summary**
- **Q&A**

The Global Energy Context

- **Significant energy demand growth:**
  - Population, standards of living
- **Need all forms of energy:**
  - Increasing role for renewables
  - Continuing reliance on hydrocarbons
  - Increasing role for non-conventional crude oil & natural gas
- **Technology is a key lever for sustainable growth**
  - Production
  - Cost competitiveness
  - Environmental performance

Global Primary Energy Demand



Current Policies Scenario

Canada is a Global Energy Player

#3
Canada is 3rd to Saudi Arabia & Venezuela in crude oil reserves

#3
Canada is third in the world in natural gas production.

#6
Canada is sixth largest oil producer in the world.

#2
Canada is second in the world in hydro-electricity generation.

Coal

- **World's most abundant fossil fuel –** 27% of global energy needs
- **Huge Canadian reserves**….12th place globally
- **73,000 families employed**
- **16,270 MW installed coal fired electricity** (generates 15% of Canadian electricity)

Hydro-Electric

- **Canada is the world's second largest producer of hydro-electric power**
- **60% of Canada's electricity from hydro**
- **Low emissions**
- **Huge land areas flooded**

Wind Energy

- 3,300 MW – 0.5% of Canada's electricity
- 25,000 MW of wind projects under development
- Low wind energy density and low service factors
- High costs
- Concerns about birds, bats, transmission facilities, noise, aesthetics

Solar

- Very small Canadian installed capacity
- Low emissions but very high cost
- Low energy density with large collector area
- Electrons cannot be stored

Biofuel

- **Canada is a world leader in Biofuels**…about 1% of Canadian energy supply
- **Ethanol production in BC, AB, SK, MB, ON and QC**
- **Food to fuel concerns**

Biomass

- **1,380 MW of associated electrical production**

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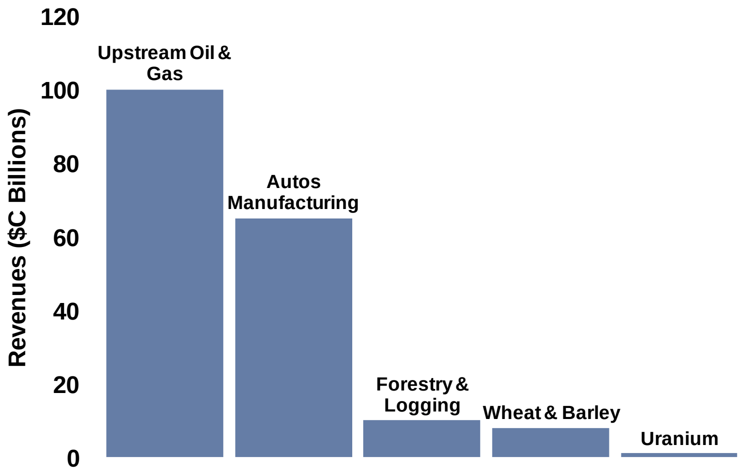
Geothermal

- **30,000 geothermal energy installations in Canada**

Nuclear

- **Canada has the world's largest known high-grade uranium deposits** and is the **2nd largest producer**
- **15% of Canadian electricity**
- **Very low emissions, GHGs**
- **Very high full cycle costs**
- **Significant public concerns**

A Comparison of Annual Revenues
Major Canadian Product-Selling Industries



Source: Statistics Canada, CAPP, Canadian Wheat Board, Natural Resources Canada, Canadian Nuclear Association, ARC Financial Corp.

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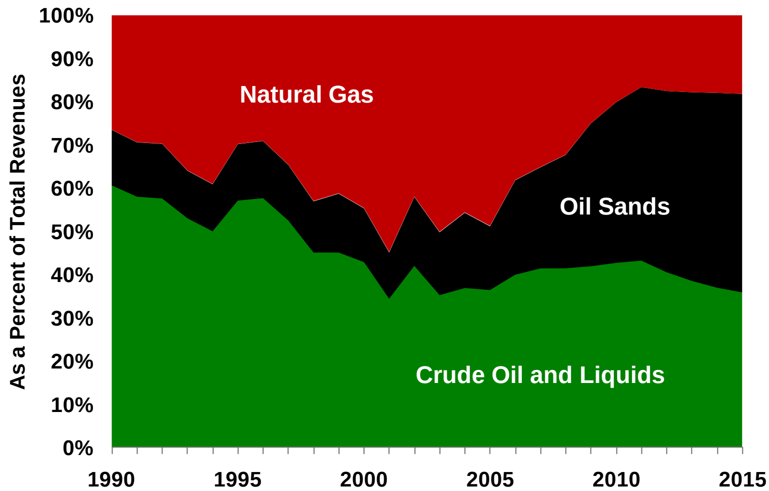
Contribution to Upstream Revenue
(% of Total Revenue by Commodity)



Source: CAPP, ARC Financial Corp.

Canada - Some Current Industry Trends

- **A period of political transition**
  - Federal
  - Key provinces? (AB,BC,ON)
- **Increasing divergence between crude oil & natural gas markets & business outlook……with commensurate shifts in activity**
- **Growth cycle……w/ increasing pressure on cost structure & skilled labor availability as activity ramps up**
- **Increasing interest by Asian investors**
- **Evolving public policy and regulatory context**
- **Increasing collaboration among producers & along value chain to address reputation / social license issues**

Canadian Oil and Gas Industry - A Key Driving Force in the Economy

- **Industry will invest $53 billion in Canada in 2011**
  - Largest single private sector investor in Canada
- **Payments to governments in 2010 - $18 billion**
- **Oil and gas accounts for ~ 25% value of TMX**
- **Industry employs more than 550,000 Canadians (direct & indirect).**
- **Broad impact across Canada – employment, taxes, supply chain**

Natural Gas

- Generates 24% of energy in Canada
- Canada is the world's third-largest producer and exporter
- Transportation fuel?
- Significant reserves

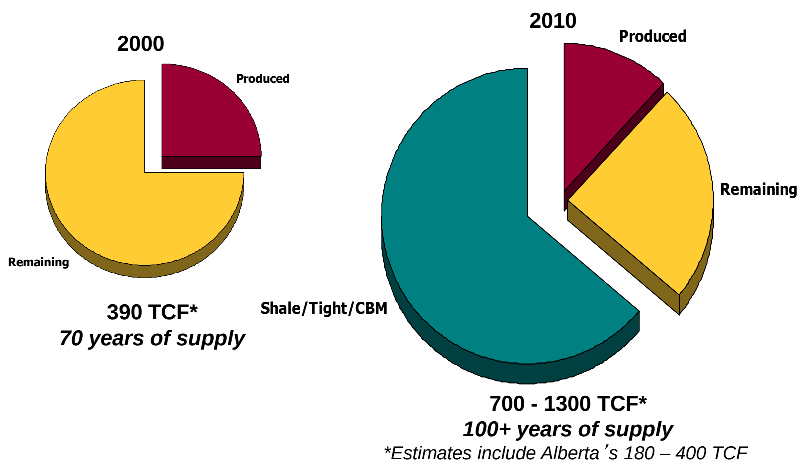
The Duvernay……Canada's Eagle Ford?

- **Land sales:**
  - 2009 to July 2011 = $2.5 billion to provincial revenues
  - August 24 sale: 90% of $464mm sale. Likely target….Devonian
  - Land cost increased from $416/acre (2009) to $1,200/acre
- **Previous sales targeting Deep Rights:**
  - Dec 2009 - $248mm
  - July 2010 - $213mm
  - Dec 2010 - $130mm
  - Mar 2011 - $145mm
  - Jun 2011 - $750mm (record sale)

Western Canada – Resource Plays

Source: TransCanada

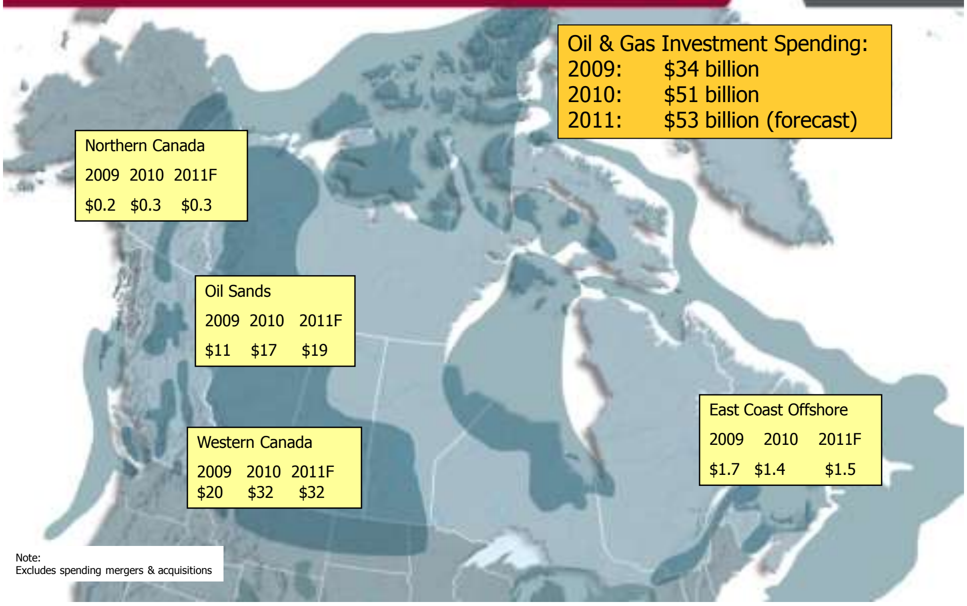
Canadian Natural Gas Resource is Growing



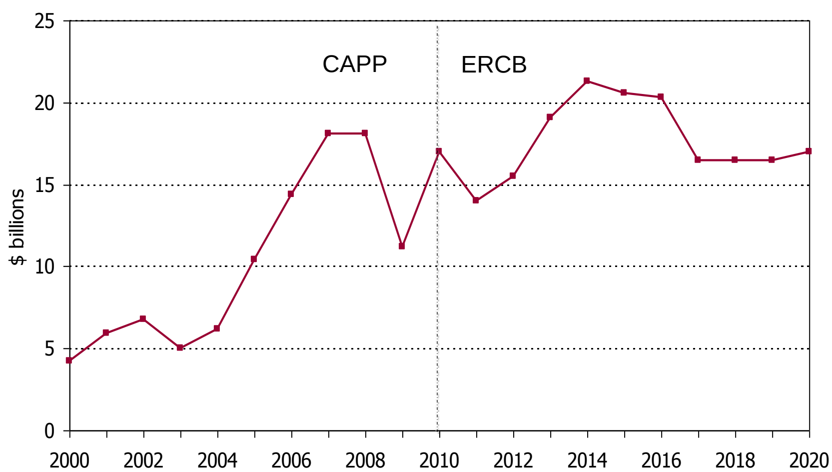
- **Technological advances have "unlocked" vast unconventional gas resources**.

*Estimated Recoverable Marketable Gas:
Source: CSUG

Industry Capital Spending
Cdn $billions



Oil Sands Projected Capital Investment

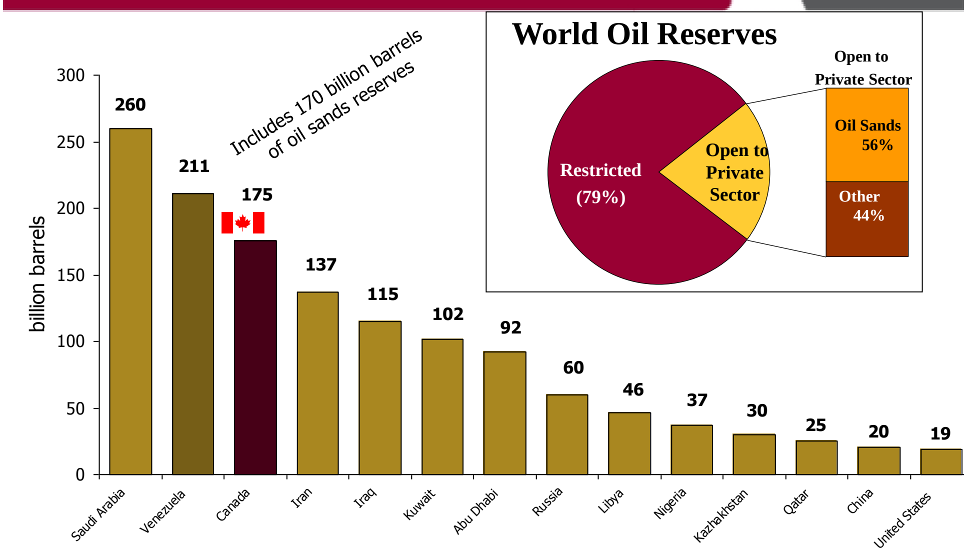


Source: CAPP & ERCB

Economic Benefits of Oil Sands – CERI 2010 - 2035

- **Economic impact generated = $2.1 trillion (GDP)**
  - Alberta = 94%
  - Ontario = 3.0%
  - B.C. = 1.3%
  - Quebec = 0.1%
- **Employment created = 11.7 million person-years**
  - Alberta = 86%
  - Ontario = 7.3%
  - B.C. = 3.6%
  - Quebec = 1.8%
  - Saskatchewan = 0.1%
- **Government Revenues**
  - Federal Tax = $311 billion
  - Provincial Tax = $122 billion
    - Alberta = 86% of total
  - Alberta Royalties = $350 billion
    - $14 billion per year

Global Crude Oil Reserves by Country



Source: Oil & Gas Journal Dec. 2010

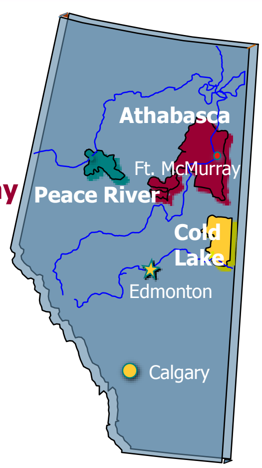
Oil Sands Transactions 2007 - 2011

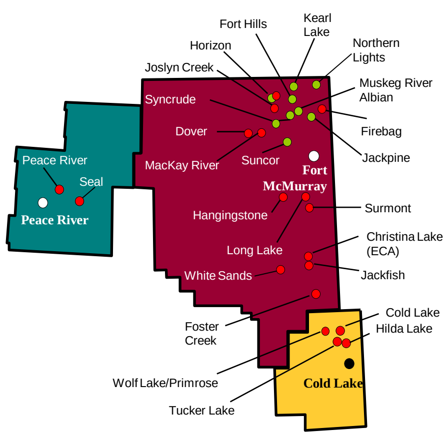
Year	Buyer	Seller	Project	Value $MM
2011	CNOOC Limited	OPTI	OPTI interest in Nexen/OPTI Long Lake	$2,100
2010	Korea Investment Corp	OSUM		$100
	PTT Expl. & Prod.	Statoil Canada	40% Kai Kos Dehseh	$2,280
	China Investment Corp.	Penn West	45% Seal Project JV	C$817
	Sinopec	ConocoPhillips	9% Syncrude	$4650
	BP p.l.c.	Value Creation	75% Terre de Grace	$900
	Devon	BP	50% Kirby	$650
2009	Suncor/Petro-Canada	Merger – (C$19.3 billion)	Incl. oil sands assets	
	Korean National Oil Co.	Harvest Energy	Incl. oil sands assets	
	Petro China	Athabasca Oil Sands Corp.	60% MacKay River & Dover	C$1900
	Imperial/ExxonMobil	UTS	50% Lease 421	$232
2008	Nexen	OPTI Canada	15% Long Lake and Future	$735
	Occidental Petroleum	Enerplus	15% Joslyn	$500
	Total	Synenco	Synenco	$381
2007	BP	Husky	Sunrise JV	$1163
	Petro-Can/Teck Cominco	UTS	10% Fort Hills	$740
	Marathon	Western Oil Sands	Company	$6200
	MEG	Paramount	Surmont	$281
	Statoil	NAOSC	Company	$2000
	Teck Cominco	UTS	50% Lease 14	$177
	Enerplus	Kirby Oil Sands	90% of Company	$158

Note: US$ unless stated otherwise

Oil Sands Projects in Three Deposits

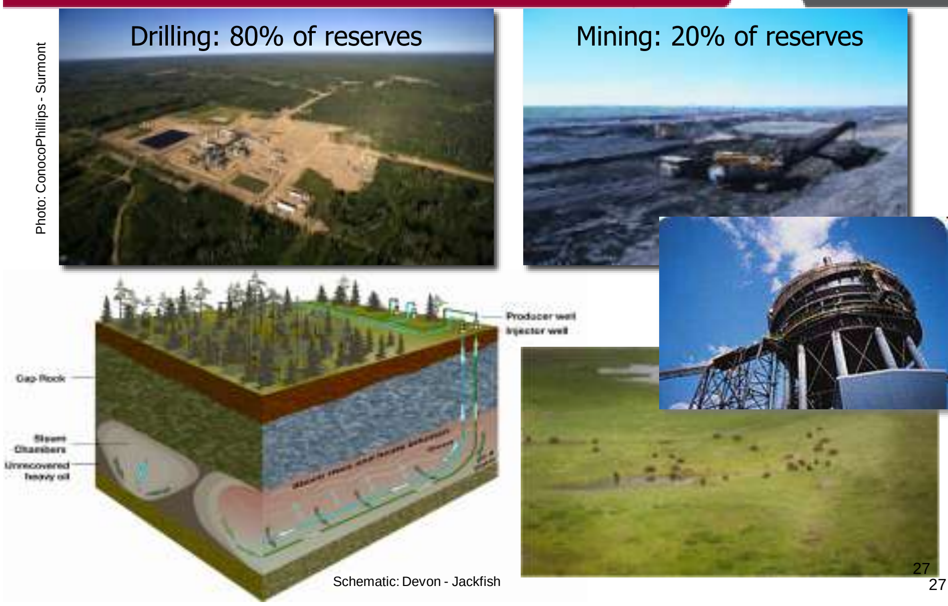
- **Oil sands production now exceeds 1.5 million barrels per day**
- **$123 billion built from 1997-2010**





In Situ Projects
Mining Projects

Oil Sands Recovery – Drilling and Mining



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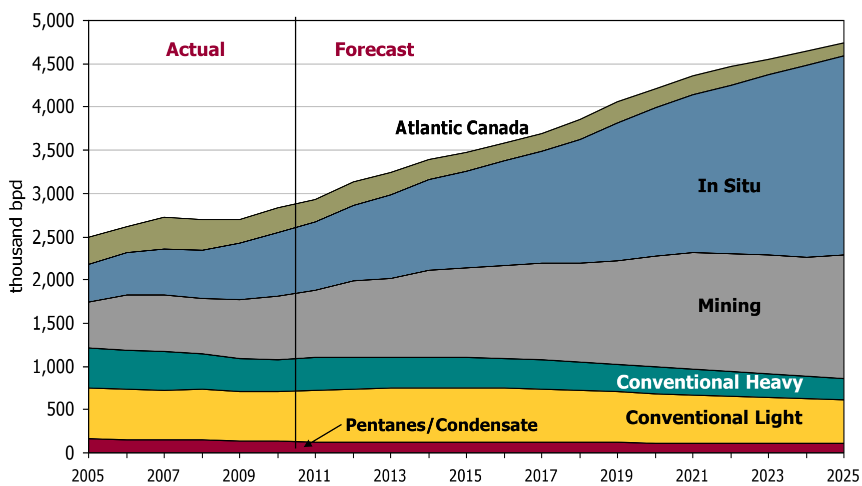
Canadian Oil Sands and Conventional Oil Production Forecast (2011-2025)



Access to Current and New Oil Markets

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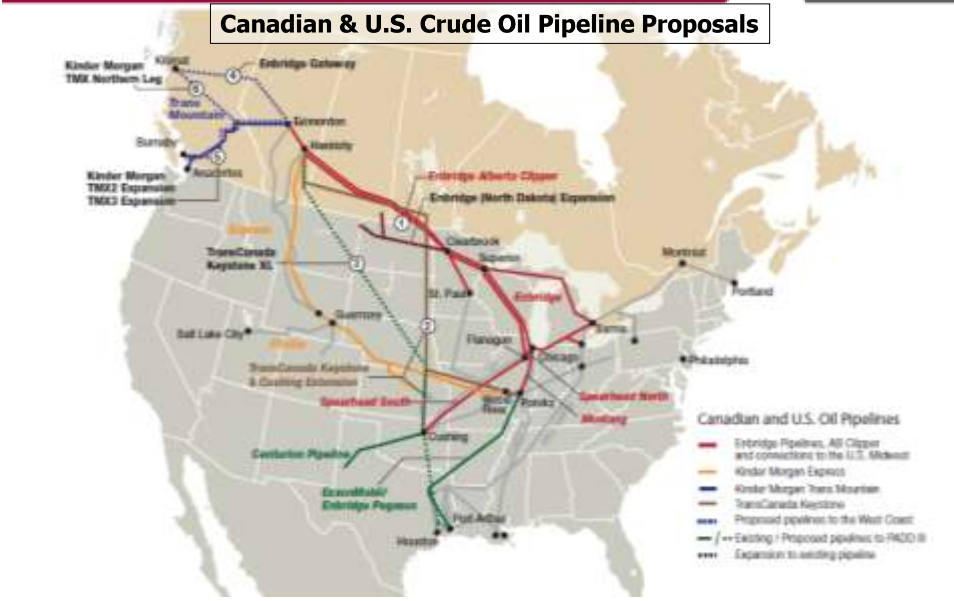
Canadian & U.S. Crude Oil Pipeline Proposals



Demand for W. Canadian Crude Oil – 2010 versus 2015 (kbpd)

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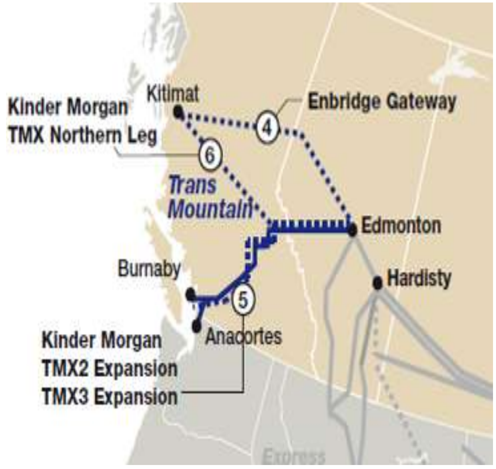
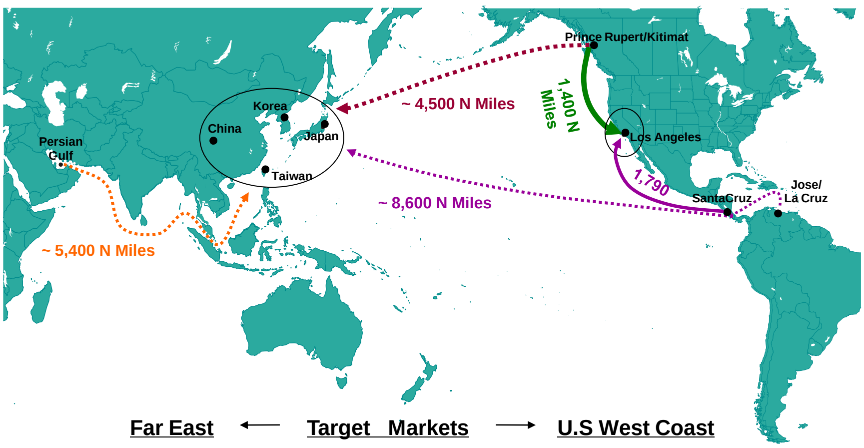
Access to the West Coast (offshore markets)

Existing
- **Transmountain shipments over the dock**
  - Jan – July 2011 = 45,000 b/d
  - Peak April 2010 = 143,000 b/d

Future
- **Transmountain**
  - TMX2 – 80,000 b/d
  - TMX3 – 320,000 b/d
  - Northern Leg – 400,000 b/d
- **Enbridge**
  - Gateway – 525,000 b/d
  - NEB application filed



Potential Tanker Markets for Canadian Oil Sands Production



Far East ⟵ Target Markets ⟶ U.S West Coast

Competitive travel distances for Canadian supply to both markets

Source: Enbridge Pipelines

Full Cycle GHG Emissions

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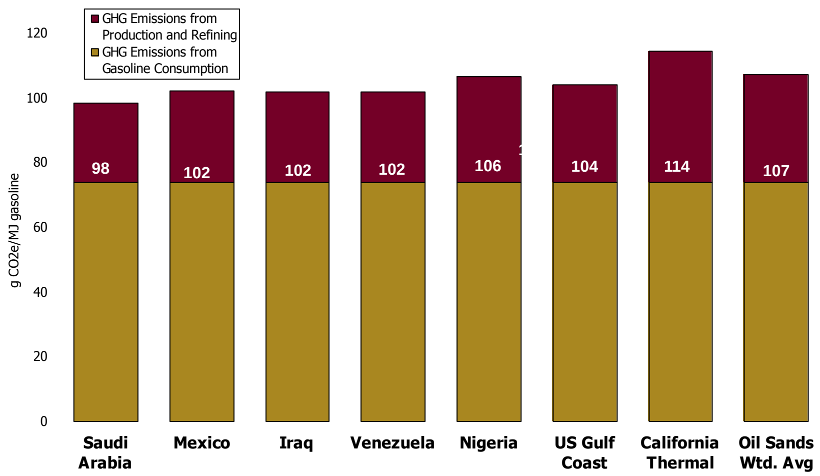

Source: Jacobs Consultancy, *Life Cycle Assessment Comparison for North America and Imported Crudes, June 2009*

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North American GHG Emissions (2009): Coal-Fired Power and Oil Sands

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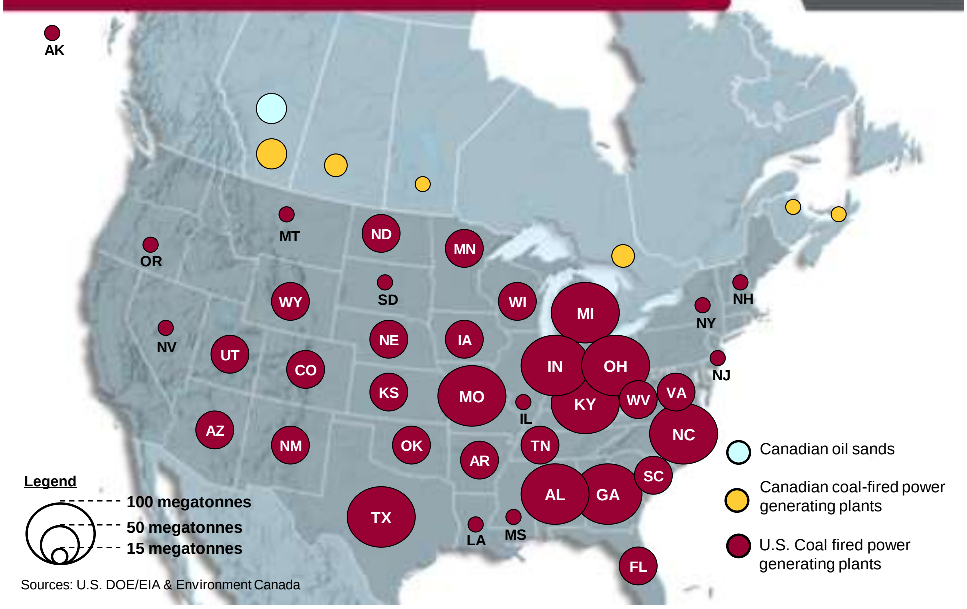

Sources: U.S. DOE/EIA & Environment Canada

Global Energy Related Emissions

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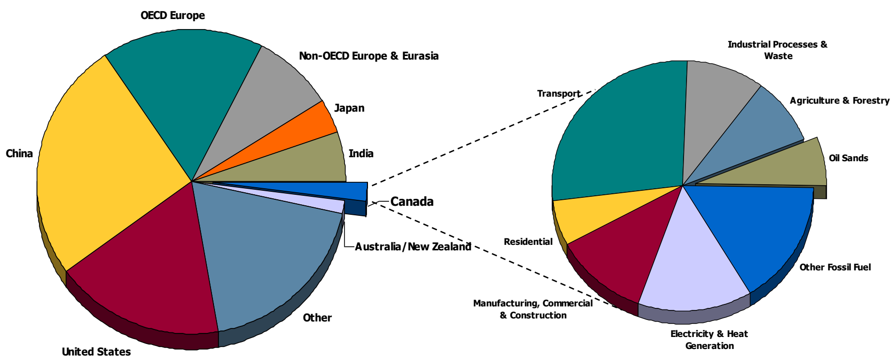
Global Emissions

Canada's 2%



GHG emissions from oil sands:

- **just over 1/1000th of global GHG emissions**
- **6.5% of Canada's GHG emissions**

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Reducing GHG Emissions in Oil Sands

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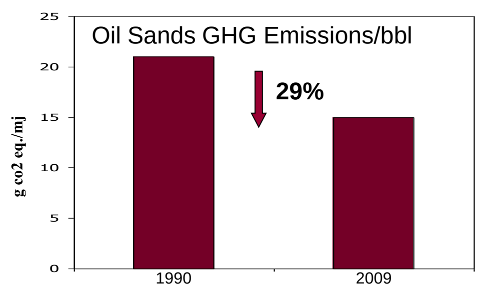
- **Energy Efficiency**
  - Using less energy input
  - Reducing energy waste/losses
  - Capturing waste heat
  - Cogeneration power/steam
- **Improved recovery processes**
  - Lower temperature extraction
  - Additives to reduce use of both water and energy (steam)
  - Use of electricity rather than steam
  - Underground combustion rather than steam
- **Carbon capture & sequestration**
  - Most effective at upgraders



Land Use and Reclamation in the Boreal Forest

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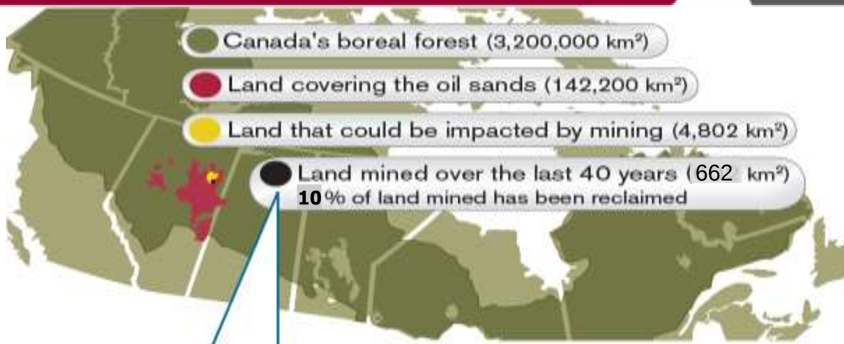

How big is 662 km²?

Area (km²)	City proper	Greater metropolitan
Edmonton, Alberta	684	9,418
Toronto, Ontario	630	7,125
Chicago, Illinois	606	28,164
Olso, Norway	454	8,900

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Oil Sands Tailings – Mining

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- **Accelerating reclamation**
- **Minimizing future tailings**
- **Industry Tailings Collaborative**
  - Accelerate new technology implementation

Suncor Pond 1

Research on dry and consolidated tailings

Technology Solutions – Less Energy, Greater Recovery and Less Water

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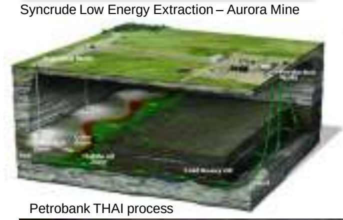
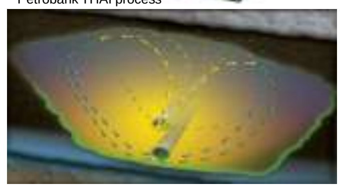
- **Low energy extraction**
  - 35ºC instead of 80ºC = 1/3 less energy
- **Underground combustion**
  - Petrobank Whitesands – THAI process
- **Additives to reduce the need for both water and energy (steam)**
  - LASER (Imperial), SAP (Cenovus), N-Solv
  - SC-SAGD (Laricina), SOLVE (Statoil/PTRC)
- **Electricity instead of steam to warm the heavy oil underground**
  - ET-Energy, Shell

Syncrude Low Energy Extraction – Aurora Mine



Petrobank THAI process



Solvent/steam processes (Laricina diagram)

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Royal Society of Canada Report

Environmental & Health Impacts of Canada's Oil Sands Industry

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- **Science-based, independent analysis of the environmental aspects of Canada's oil sands**
- **Addresses many of the issues and perceptions of oil sands development:**
  - Reclamation is not keeping pace, but sustainable reclamation is achievable
  - Water use does not threaten viability of the Athabasca River
  - No impact on Athabasca water quality/ecosystem and no evidence of impact on human health in downstream communities
  - Tailings technologies are emerging, but tailings inventory is growing
  - GHG emissions per barrel are reducing but growing production creates a challenge in meeting international commitments
  - Minimal impacts on regional air quality

December 2010

Industry Communications & Engagement - A Portfolio of Activity

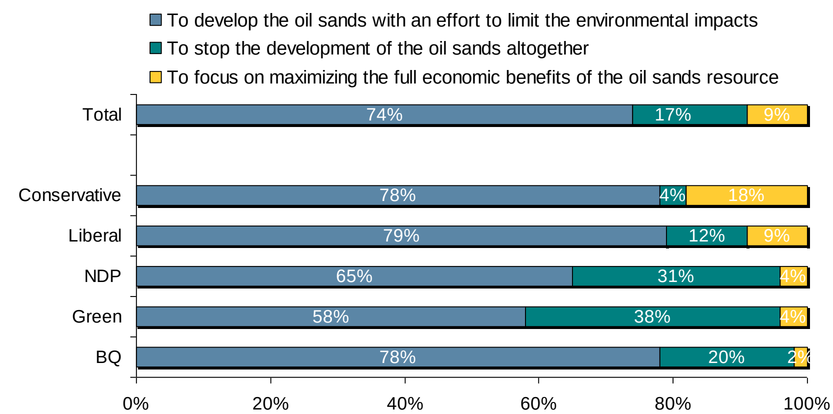
- **Communications & outreach:**
  - Advertising
  - Media – mainstream, social
  - Speeches & presentations
  - National Oil Sands Dialogues
  - Meetings & tours
  - Responsible Canadian Energy Report
  - Employees
  - Educational materials (fact books, etc.)
- **Directly by industry and via 3rd parties**
- **Canada, U.S., Europe, Asia**

Oil Sands Advertising - Communicating with the Public

To demonstrate that industry takes these issues seriously and what is being done by "real people" to address them.

Canadian Public Opinion

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



Reputation / Social License & Oil Sands

Oil Sands Reputation / Social License =

Performance + Communications

- "3E" policy framework
- Robust regional planning:
  - ✓ System-wide metrics
  - ✓ Effective monitoring
  - ✓ Transparent data
  - ✓ 3rd party validation
- World class regulation
- Technology & innovation
- Collaboration

- Proactive
- Transparent
- Verifiable
- Visible leadership
- Broad portfolio:
  - ✓ mainstream
  - ✓ social media
  - ✓ directly & via 3rd parties
  - ✓ Canada, U.S., Europe, Asia

A Canadian Energy Strategy

- **CAPP supports a Canadian Energy Strategy – clarify and communicate objectives, align resources, implement enabling policy.**
- **Proposed strategy:**
  - Growth in increasingly sustainable hydrocarbon production
  - Growth in renewable energy
  - Shifts in energy demand arising largely from energy efficiency and conservation.
- **Market forces are key determinant in decisions on energy supply, transportation and use**
- **Governments have an important role to play in developing and implementing enabling public policy:**
  - Fiscal competitiveness
  - Regulatory reform
  - Diversification of markets
  - Policy to encourage continuous improvement in environmental and social performance
  - Lower carbon domestic energy supply and use
  - Technology & innovation
  - Energy efficiency and conservation
  - Energy education
  - Workforce of future
- **Recent CEMM at Kananaskis established positive momentum.**

How Can Municipalities Help?

- **Oil Sands is Key in Generating:**
  - Business Activity
  - Revenue (Municipal)
- **Water Management**
  - Skilled Operators
  - Supply of Water
- **Skilled Labour**
- **Social License to Operate**
  - Reputation Building
  - Communication/Outreach
  - Help "Get the Message Out"

Summary

- **“3Es”**
  - Environmental performance
  - Energy security & reliability
  - Economic growth
- **Competitiveness & social license are “must haves”**
- **Reputation = Performance + Communication**
  - Technology is key performance lever
  - We all have a role in communication / outreach
- **We need to work together & we all need to step up!**

A great opportunity for Canada……needs innovative, creative, committed, determined people to make it happen!

CAPP RESPONSIBLE CANADIAN ENERGY™