

THE OIL SANDS

LILLEHAMMER

March 2011

Doug Bassett FCIP P.Eng



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energy

What are the Oil Sands



Water layer

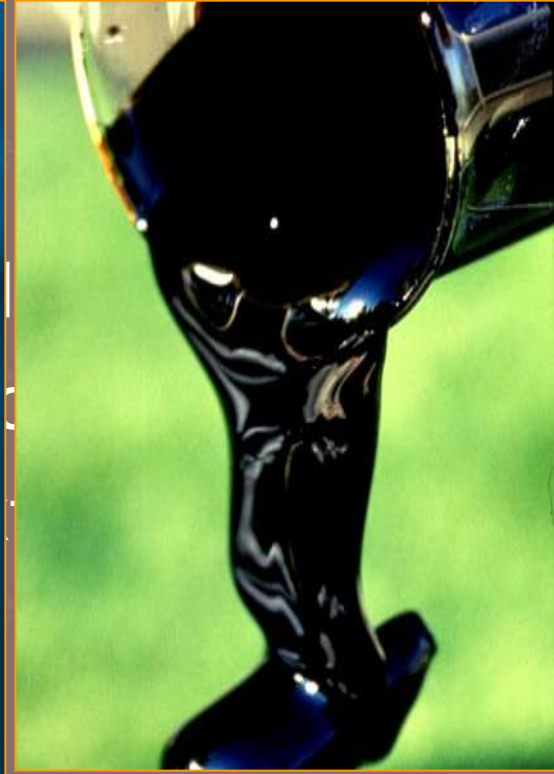
Sand particle

Bitumen film

A naturally occurring mixture of sand, water, clay and bitumen



What is Oil Sands



Too thick to be pumped without being diluted or heated. At 10°C, it is as hard as a hockey puck.

Where are Oil Sands?

In addition to Canada, oil sands are found in about 70 countries around the world, including:

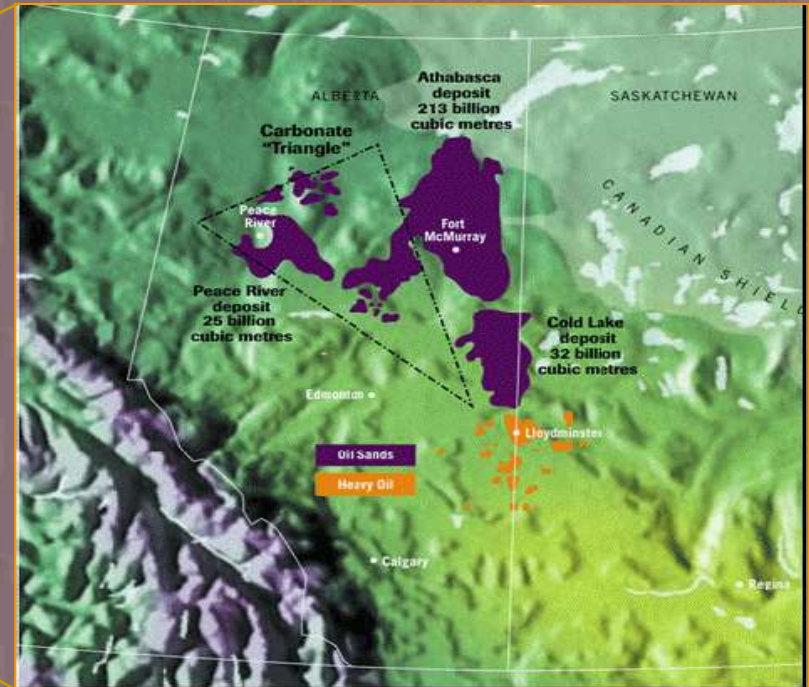
Portugal,
USA oil sand deposits
Nigeria,
Algeria
Argentina
Venezuela,
Russia,
Alabama,
Cuba
S.W. Texas,
Albania,
California,
Romania,
Kentucky,
Spain
Indonesia,
Brazil
Missouri
Trinidad and Tobago

American Association of Petroleum Geologists



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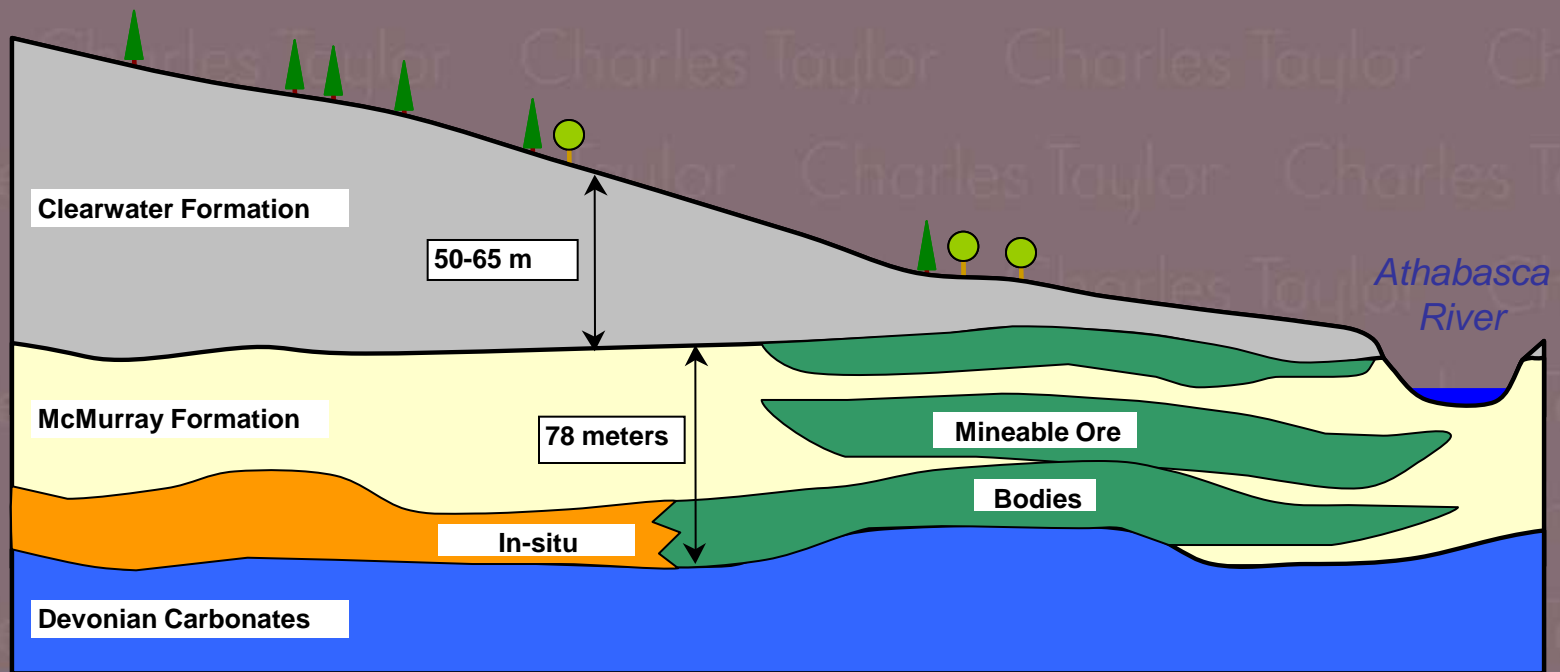
Where are the Alberta Oil Sands Deposits?



Where are the Alberta Oil Sands Deposits

Western Canada Sedimentary Basin

Schematic Cross Section of the Horizon Project



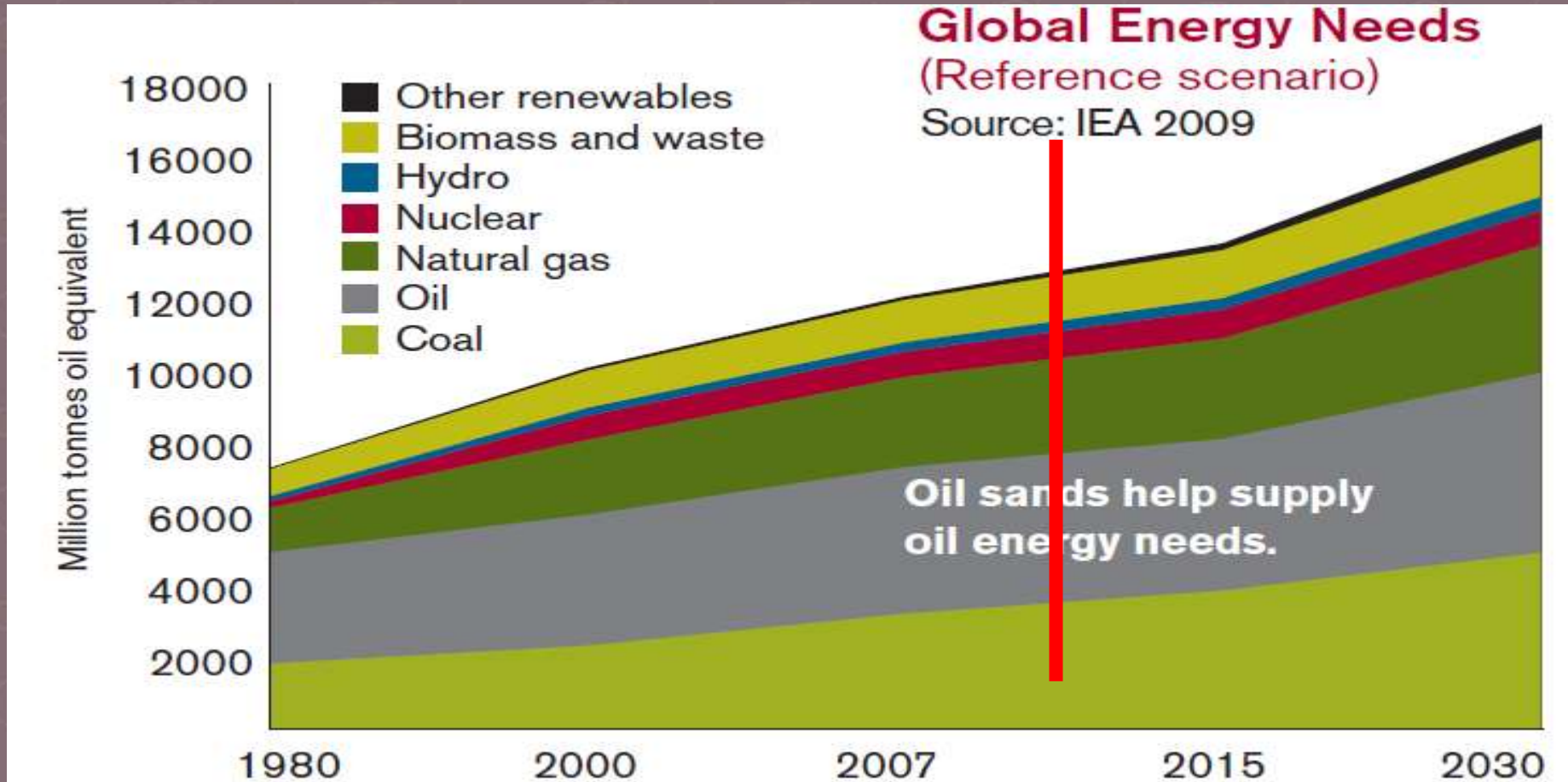
Who is involved in Oil Sands?

- * KIMBERLY-CLARK CANADA CORP.
- * SIBUR OIL SERVICES LTD.
- * COCHRAN OIL SERVICES LTD.
- * EXXON MOBIL ENERGY CORP.
- * DELORO RESOURCES LTD.
- * OILSANDS DISCOVERY INC.
- * EXCO RESOURCES LIMITED
- * BRUNO BANK ENERGY AND RESOURCES
- * SYNCRUDE CANADA LTD.
- * ALBERTA OILSANDS INC.
- * CANADIAN OILSANDS TRUST
- * PENGROW ENERGY TRUST
- * CANADIAN OILSANDS LIMITED
- * PATCH INTERNATIONAL INC.
- * PARTNERSHIP OIL LIMITED
- * BHP BILLITON OIL AND GAS INC.
- * SHELL OIL AND GAS INC.
- * MURPHY OIL CORP.
- * OCCIDENTAL PETROLEUM CORP.
- * CHINA INVESTMENT CORPORATIO

WHY ARE OIL SANDS IMPORTANT?



ENERGY DEMAND



Global Needs

Global demand for energy is expected to increase 40%* by 2030 as economies in both developed and emerging countries continue to grow and standards of living improve. Source: IEA *Growth from 2007 to 2030, based on IEA's Reference scenario.

OIL DEMAND

At 87.8 mb/d in 2010, global oil demand rose by 2.8 mb/d year-on-year, and should reach 89.3 mb/d in 2011

Source - International Energy Agency IAC



OIL SUPPLY

Daily Production BBL/Day (top 10 2008)

Saudi Arabia (OPEC)

Russia

United States

Iran (OPEC)

China

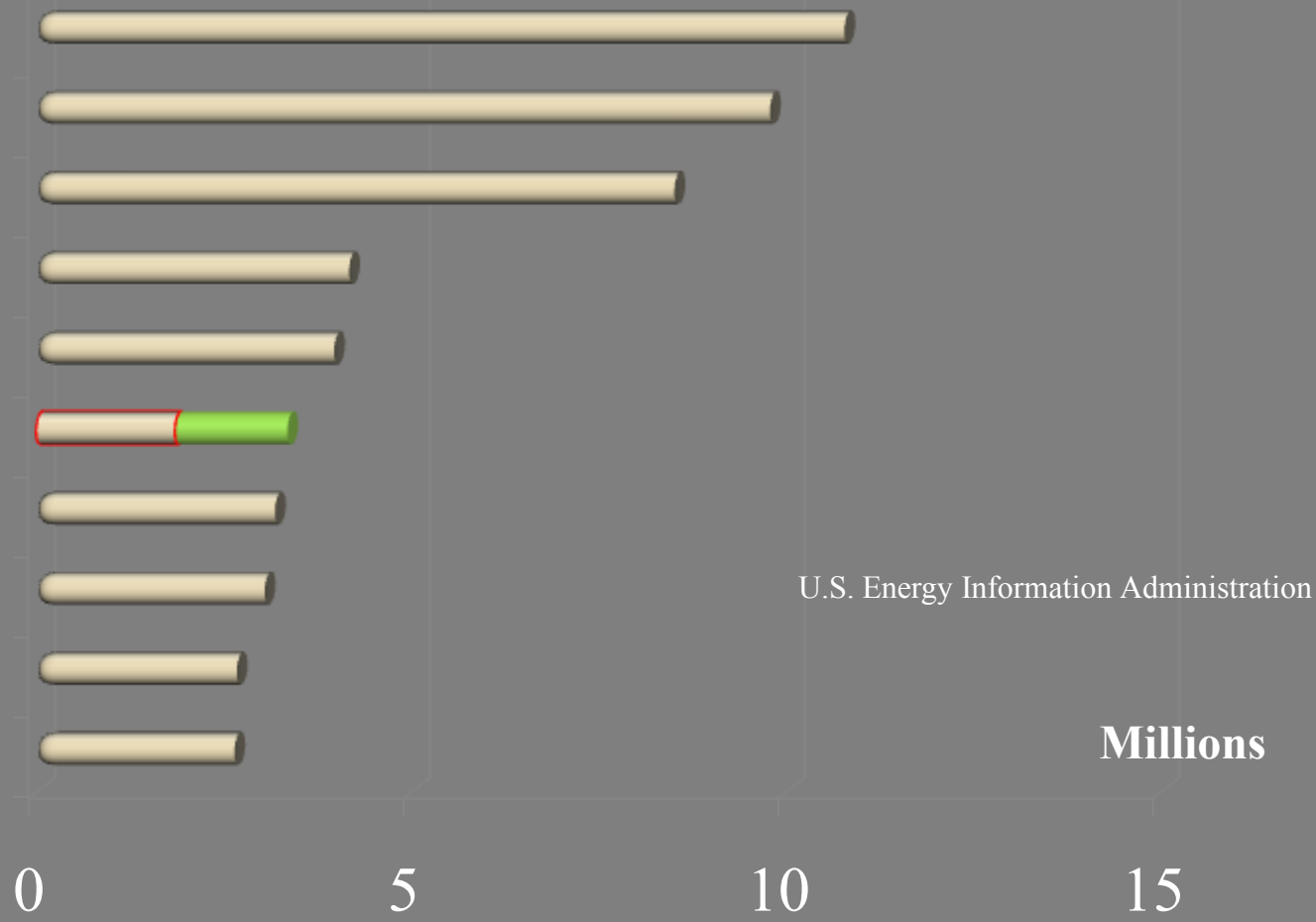
Canada

Mexico

UAE (OPEC)

Kuwait (OPEC)

Venezuela



U.S. Energy Information Administration

Millions

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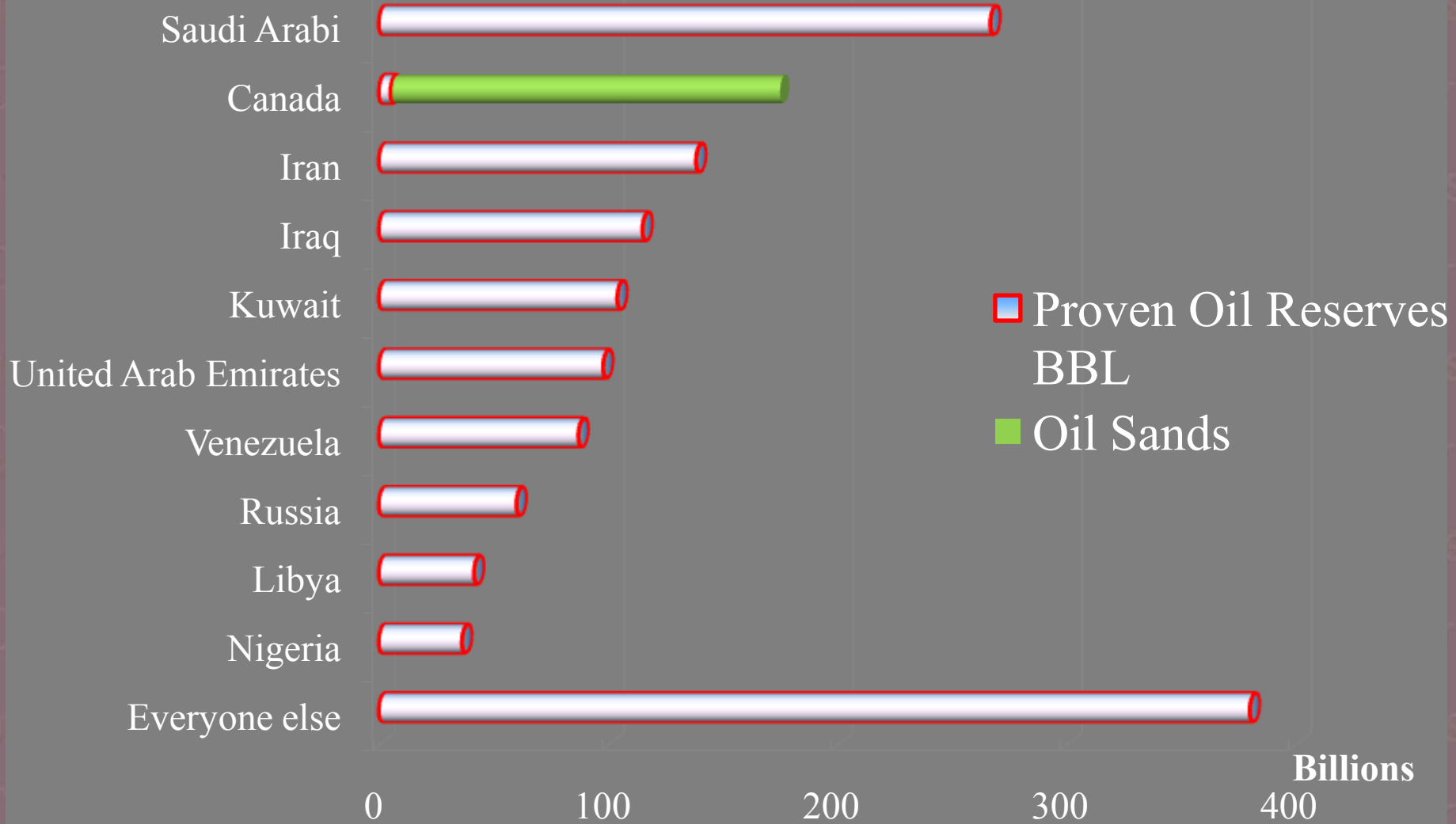
5

10

15

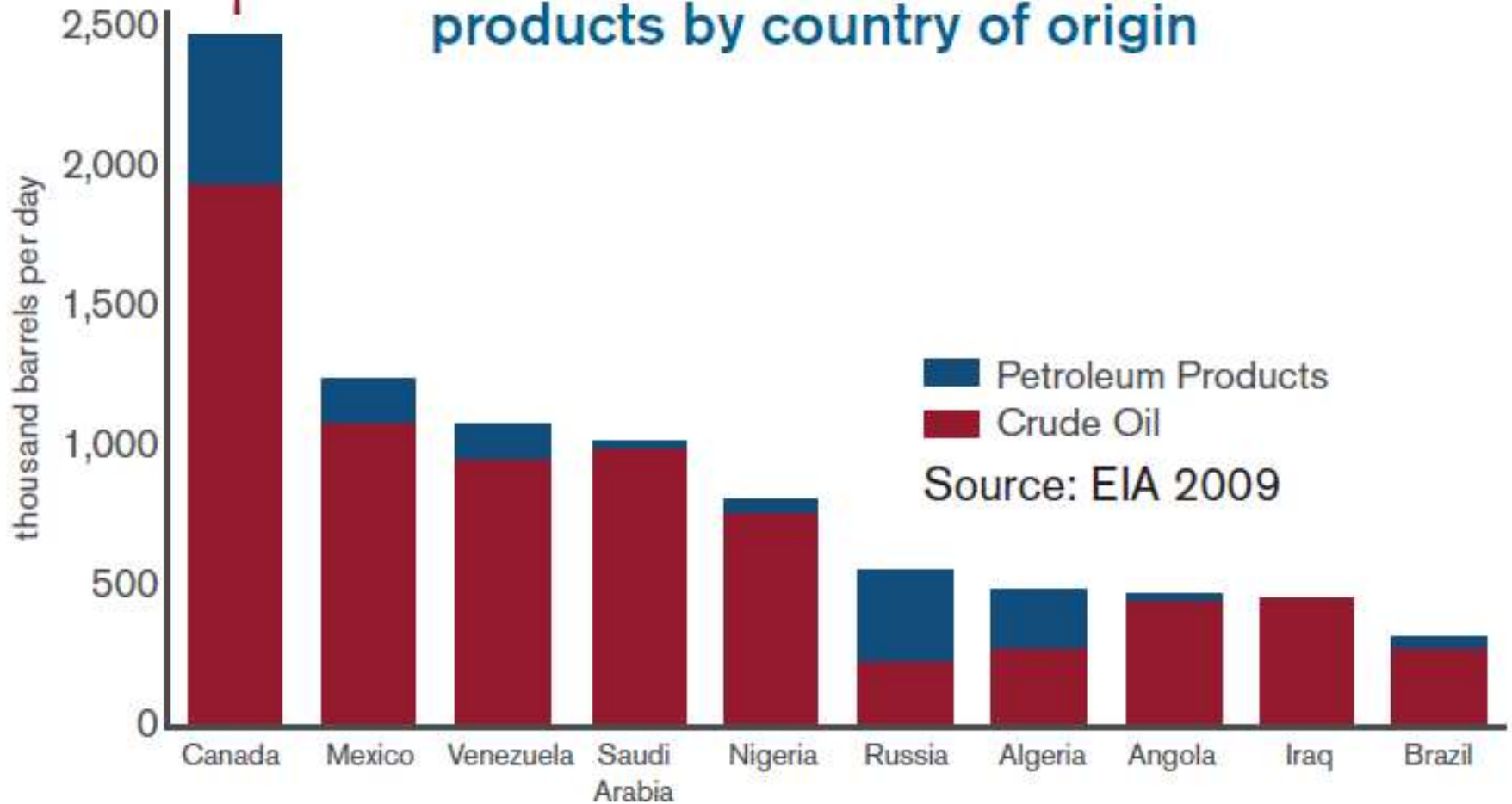


PROVEN OIL RESERVES WORLDWIDE 2008





U.S. imports of crude oil and petroleum products by country of origin



Petroleum Products

Crude Oil

Source: EIA 2009

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BUSINESS

M/BUSINESS

FRIDAY, JANUARY 7, 2011

Report predicts \$180B in oilsands spending

DINA O'MEARA

jumped to about 1.5 million

Friday, January 7, 2011

0

HERALD EX

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HERALDENERGY.com

FROM DI

OILSANDS: Spending could spur new labour crunch

Service and pipeline companies also have benefited from the rising activity levels in the oilsands, welcoming the influx of cash while at the same time anticipating increased competition for workers.

"If you get up into the \$18-\$20 billion spend rate that we saw in 2007-2008, it'll get pretty tight again," said Guy Cocquyt, with Flint Energy Services.

The oilsands services and maintenance heavyweight is gearing up for another big push in late 2011 and early 2012 after wrapping up several major projects with Shell Canada and Statoil Canada in July, Cocquyt said.

On the gathering side, In-

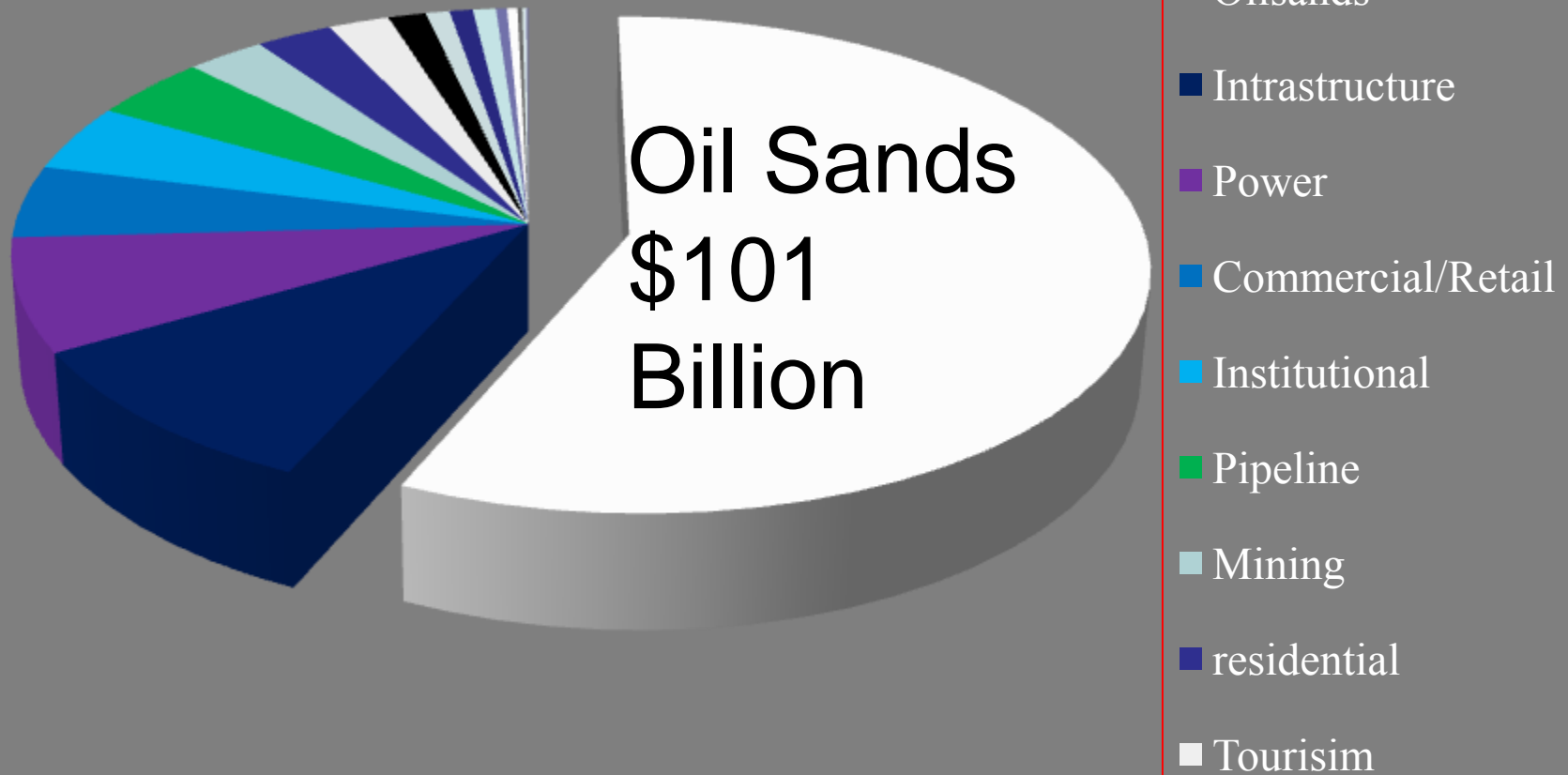


Chris Wattie, Reuters
New federal Environment
Minister Peter Kent.

"Environmental costs, particularly with respect to tailings from mining operations, are significant and will

Value of currently approved Alberta Major Projects (Jan 2011)

Projects over \$5 million , by Sector



Why is Oil Sands important?

- An enormous source of jobs
 - Contributes about \$68 billion per year to Canadian economy
 - Supports local Aboriginal businesses and jobs
 - Contributes \$30 to \$40 billion annually to US GDP
- Canada's oil sands are part of the solution to declining conventional oil reserves elsewhere in the world.

<http://www.fortmcmurrayonline.com/oilsands/welcome.aspx>

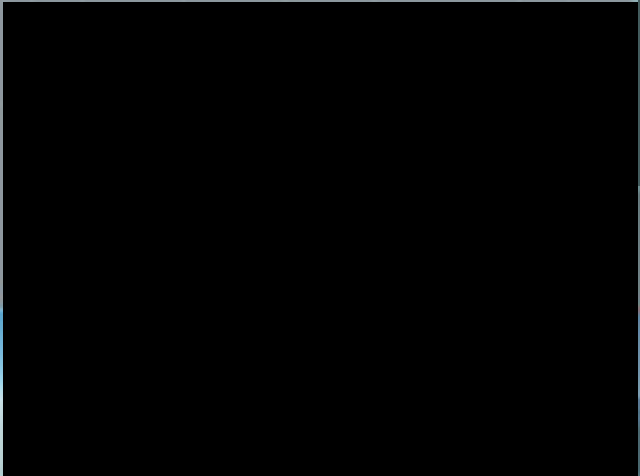
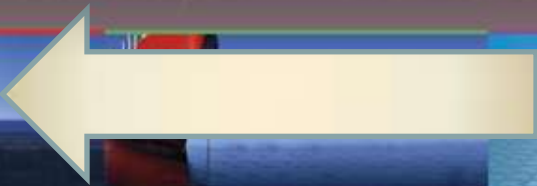


Why is Oil Sands important?

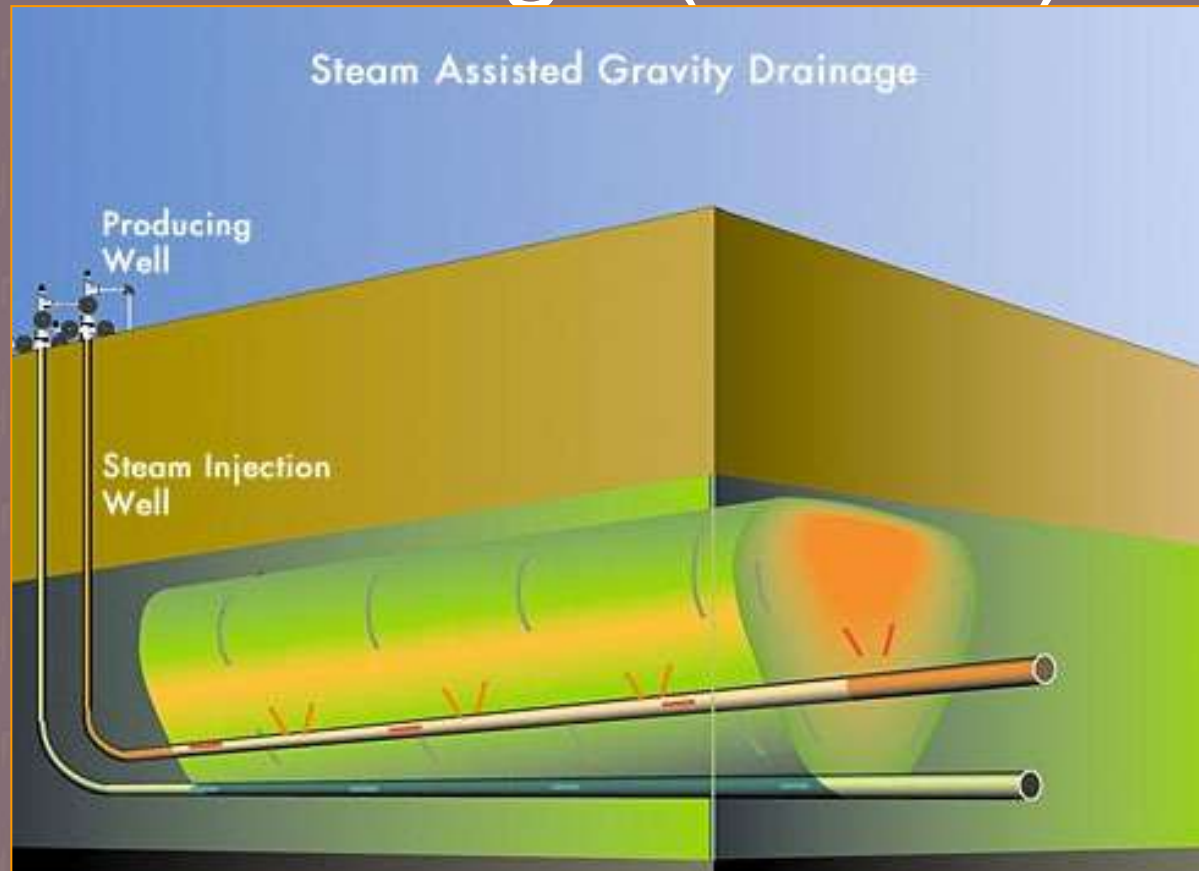
- A stable, secure and ethical source of energy, for USA and others
 - particularly considering the alternatives
- Mitigates world price of oil
- Huge projects and capital investment
- New industrial region has socio-economic effects and environmental effects that need attention



Mining Process



Steam Assisted Gravity Drainage (SAGD)



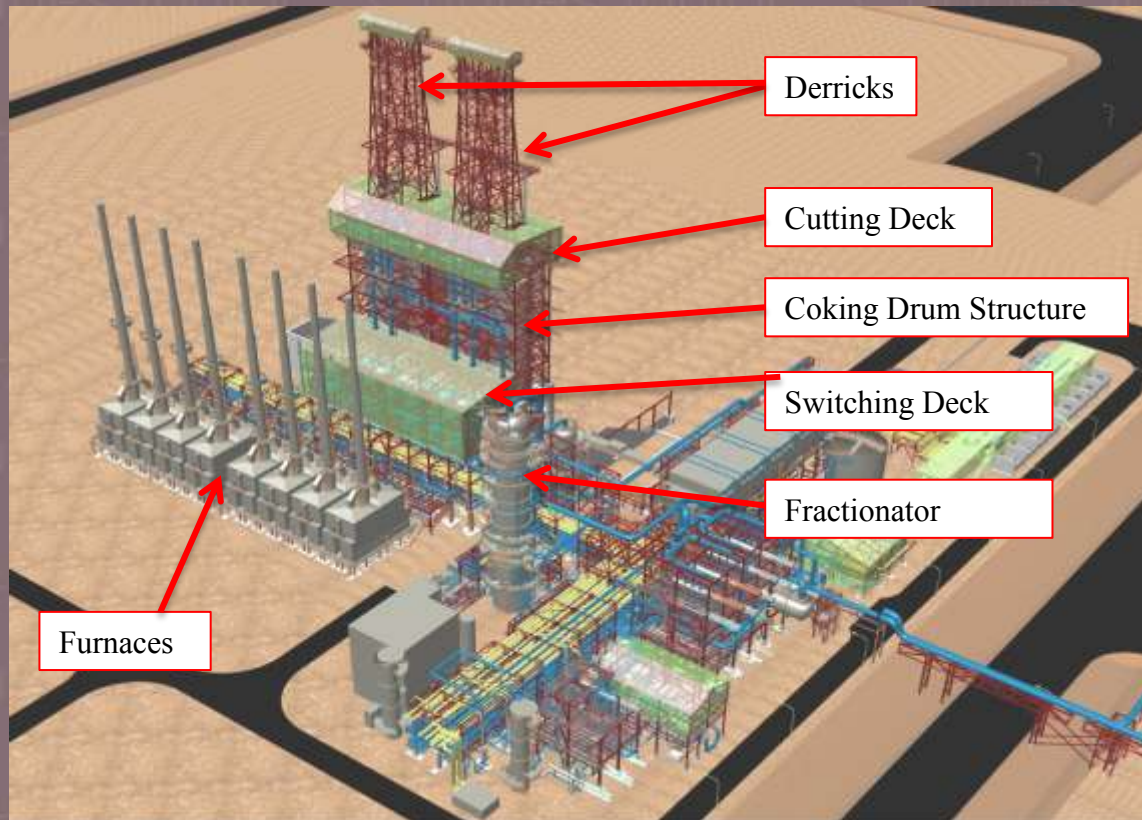


SAGD



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Delayed Coking Unit



WATER

- Approximately 1% of the flow of the Athabasca River is used in production of the oil sands.
 - **Close to 90% of water used in oil sands production is recycled.**
- In 2009, the oil sands industry withdrew 107 million m³ from the Athabasca River. This is 0.5% of average total river flows. Source: Alberta Environment
- City of Toronto total water consumption in 2008: 481 million m³

GREENHOUSE GAS EMISSIONS v. conventional oil

5 to 10 times more (dirty oil lobby)

22.8% more (EU estimate)

6% more (Industry estimate)

London emits around - **45** million tonnes of CO₂/yr

Oil sands' emissions were **37.2** in 2008



- About **75%** of oil-related CO2 comes from combustion – including automobile **exhaust.** CAPP
- Since 1990, GHG emissions associated with every barrel of oil sands crude produced have been **reduced by 39%.**

Source: Environment Canada



Claim Management Issues

- Organization complexities
- Remote facilities (frontier)
- Harsh environment
- Multiple business units
- Complex business models
- Often multiple projects underway
- Multi policy matrix
- Royalty regimes
- Subrogation – Liability Limitations



Some of the more recent losses

- 1985 – Coker Fire \$900MM
- 1988 – Fire \$ 20MM
- 2000 – 400 Tonne Truck Fire \$ 4MM
- 2000 – Mechanical Failure \$ 65MM
- 2000- Foundation subsidence ~\$100 MM
- 2001 – Refinery Overspray \$ 10MM
- 2003 – Fire in Mine Site \$400MM
- 2003 – Non Traditional \$200MM
- 2005 – Fractionator Fire >\$ 1B
- 2005 – Furnace Explosion Est. \$400MM
- 2006 Steam Injection Well Blow Out(?) - > \$1B

Loss Photos



Loss and Damage



Loss Photos





Example of tray / cable damage



Example of tray / cable damage



Example of tray / cable damage



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The Environmental Story

Two points of view

ETHICAL OIL

DIRTY OIL

A book by
Ezra Levant

A book by
Andrew Nikiforuk

Nothing in this world is good or bad

But thinking makes it so

- **William Shakespeare**



ETHICAL OIL

the opinion of Ezra Levant

Until scientists invent some fantasy fuel of the future, the world will keep burning oil.

Oil comes from two places - OPEC dictatorships and Canada - and there are no other western, liberal democracies in the top ten list of countries ranked by oil reserves.

So the choice is not oil sands oil vs. some fantasy fuel of the future;
it's oil sands oil vs. OPEC oil.



ETHICAL OIL

Using liberal criteria –

- environment, - better GHG
- peace, - last war 1812
- treatment of workers, and
- human rights –rule of law

Oil sands oil beats OPEC oil every time.

Ezra Levant



DIRTY OIL

The opinion of Andrew Nikiforuk as summarized by Quill and Quire

- the massive and irreparable destruction of the natural environment
- turning a good chunk of northern Alberta, including the world's third-largest watershed, into a toxic moonscape
- political transformation of Canada into a modern petrostate
- mind-boggling short-sightedness and stupidity of the entire enterprise



**If you can bear to hear the
truth you've spoken twisted
by knaves to make a trap for
fools,.....**

Rudyard Kipling



Royal Society of Scientists

Independent expert panel

Environmental and Health Impacts

of Canada's Oil Sands Industry

December 2010



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Royal Society of Scientists

- Sustainable land reclamation is achievable, but not keeping pace
- No credible evidence of environmental contaminant exposures from Oil Sands reaching downstream communities at levels expected to cause elevated human cancer rates
- There is “Boom town” impacts on local population health
- Current industrial water use demands do not threaten the viability of the Athabasca river system



Royal Society of Scientists

- Oil sands development activities are not a current threat to aquatic ecosystem viability
- Tailings ponds are a problem that is not being solved fast enough
- Minimal impacts on regional air quality
- Progress has been made on greenhouse gas emissions on a per barrel basis (intensity) but number of barrels is growing
- Environmental regulatory capacity has not kept pace with rate of growth of industry – EIA has serious deficiencies



CLOSING

- Oil sands require unique processes to recover the oil such as
 - Mining & Extraction
 - SAGD
- The scale of the development is large
- There are special claims issues
- The development is important for world energy supply
- There is a very political debate on environmental impact



Thank you
We hope you found this
presentation informative

