IOSA

IN SITU OIL SANDS ALLIANCE

In Situ Breakthrough in Canada's Oil Sands Leads to a Secure and Sustainable Energy Future

Presentation to The Energy Council - December 11, 2010

Presenter: Cameron Todd, Sr. VP Connacher Oil and Gas

Canada's Oil Sands – A Secure Energy Future

- Canada's oil sands are an outstanding North American Energy Resource
  - Abundant
  - Secure
  - Sustainable
- A new breed of company is at work developing the next generation of energy from the oil sands
  - Breakthrough technologies
  - Economically attractive today
  - Environmentally responsible

Agenda

- IOSA and Canada’s oil sands
- In-situ technologies
- Energy, economics and environment in balance
- A secure and sustainable energy future

IOSA – In Situ Oil Sands Alliance

- A group of independent, Alberta-based oil companies dedicated to innovative and responsible development of Canada's oil sands using in-situ (in-the-ground) technologies

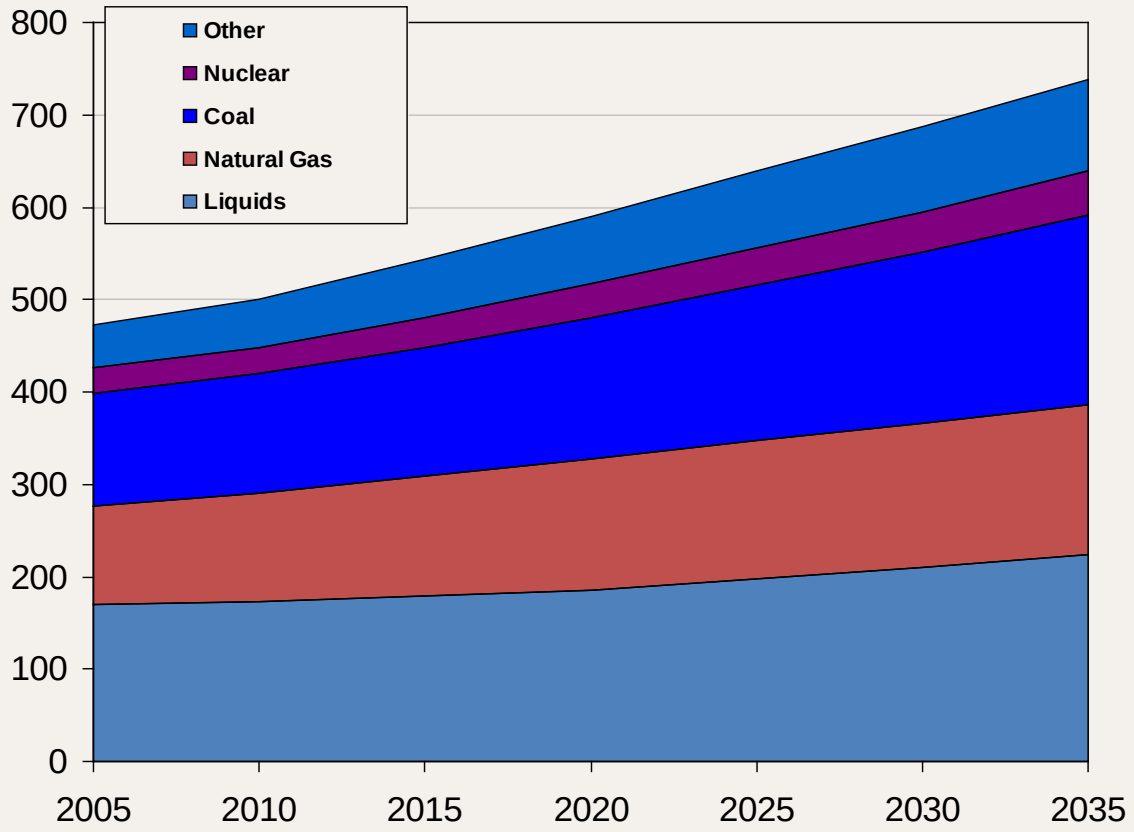
(We are drillers, NOT miners)

IOSA
IN SITU OIL SANDS ALLIANCE

The World Needs More Energy – All Types

- **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
- **Environmental challenges**
- **Technology is a key lever for sustainable growth**

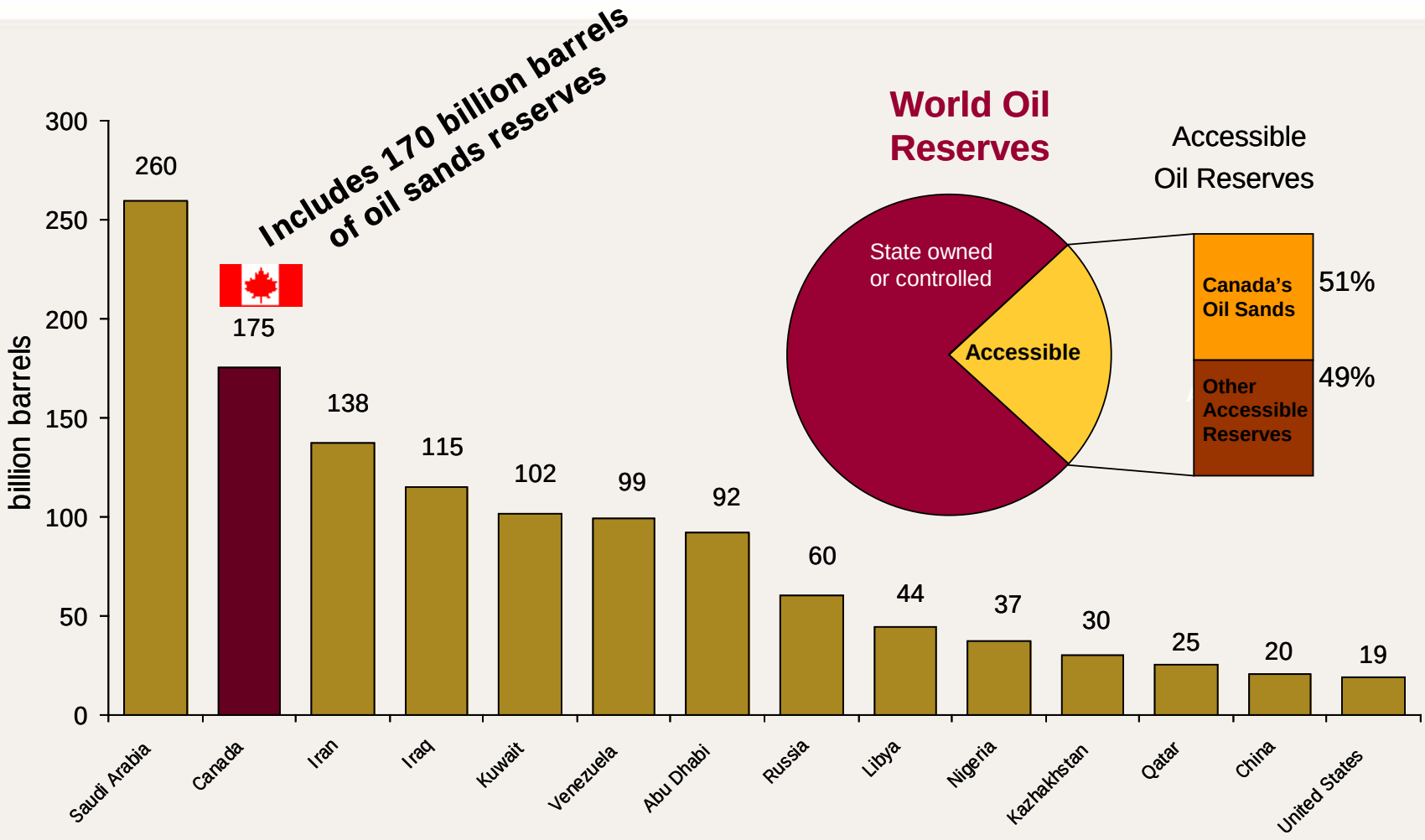
World Energy Demand 2005 - 2035
EIA – International Energy Outlook 2010



Source: Canadian Association of Petroleum Producers

IOSA
IN SITU OIL SANDS ALLIANCE

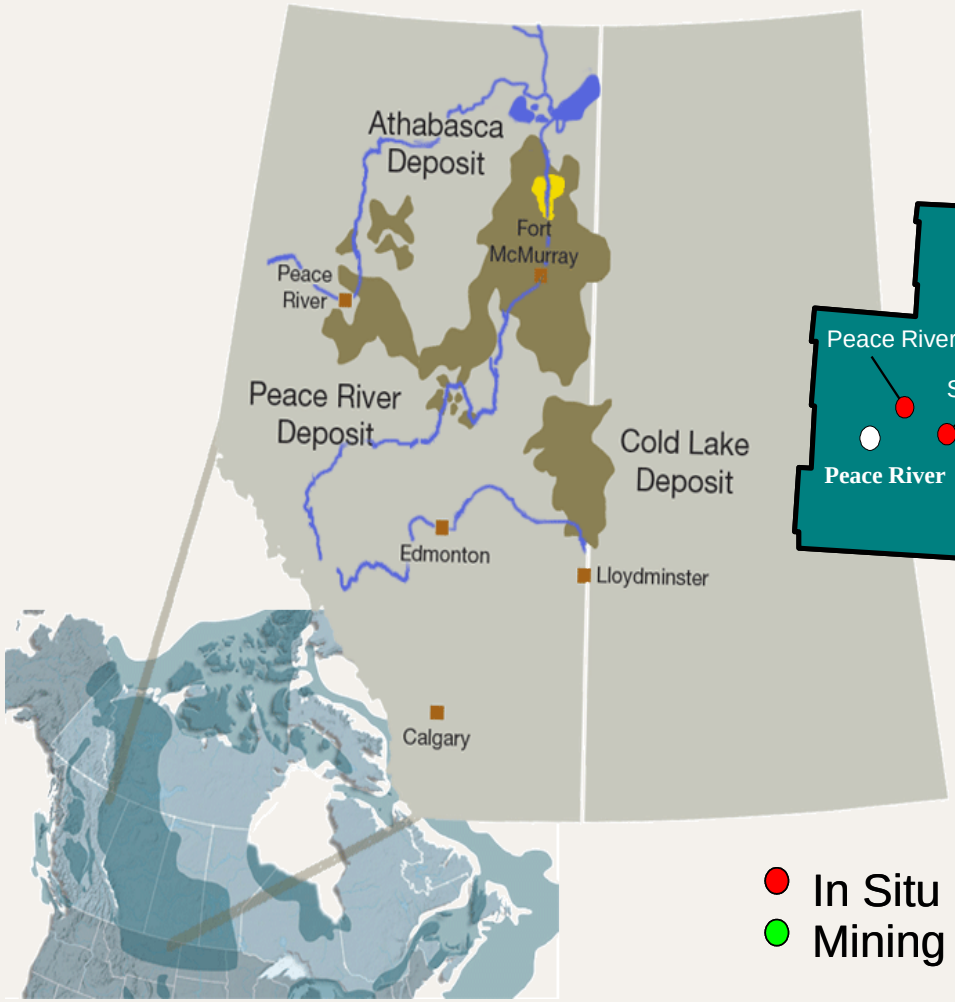
Canada's Oil Sands Reserves are Enormous and Accessible

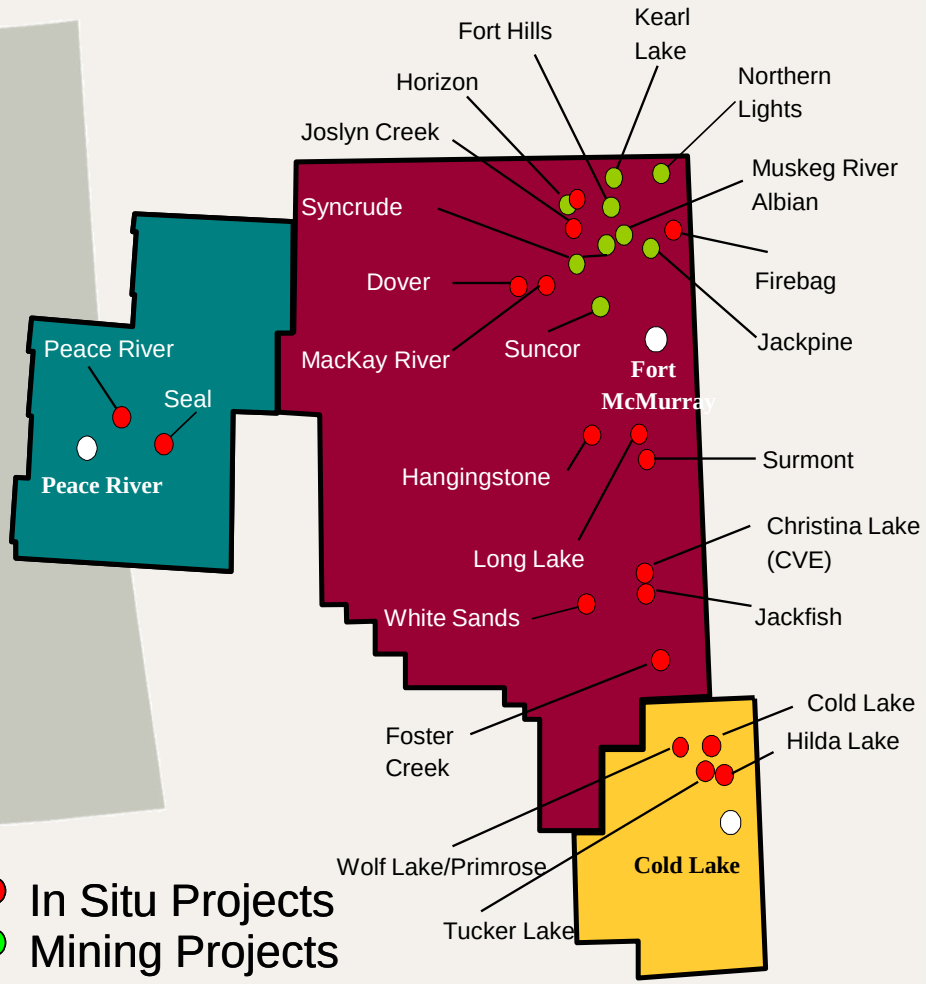


Source: Oil & Gas Journal December 2009

IOSA
IN SITU OIL SANDS ALLIANCE

Canada's Oil Sands – 3 Large Deposits



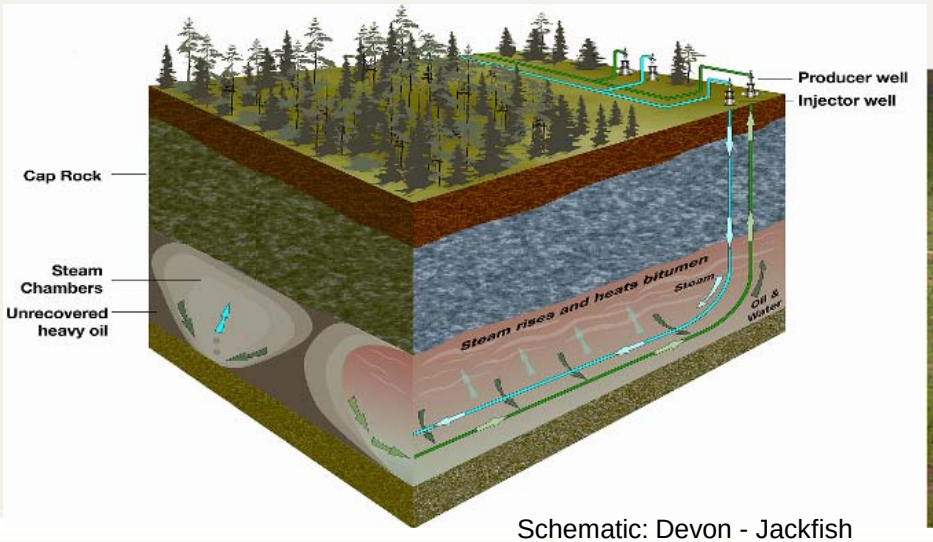


Source: Canadian Association of Petroleum Producers

IOSA
IN SITU OIL SANDS ALLIANCE

Two Methods: In situ (80%), Mining (20%)

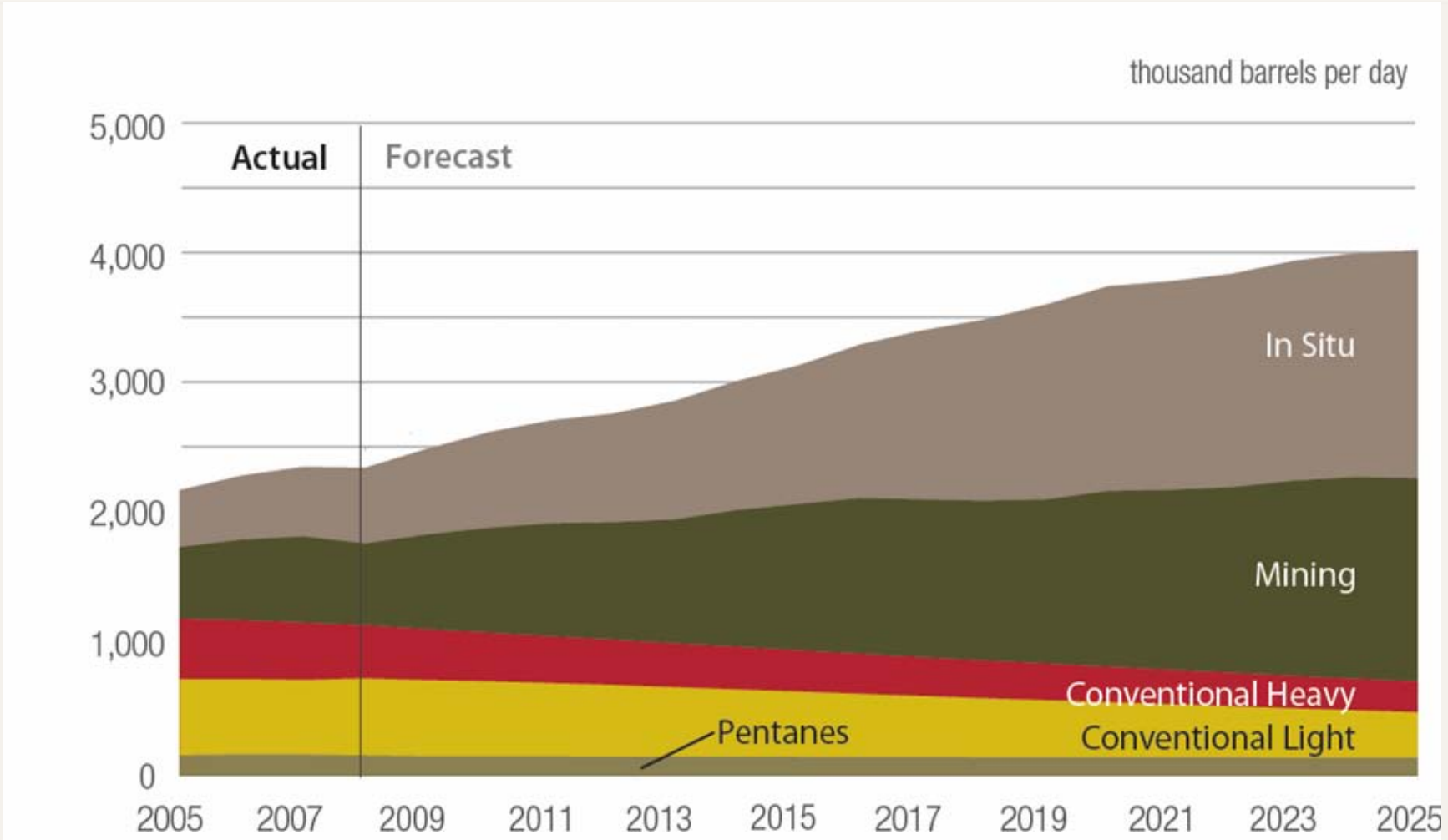
Photo: ConocoPhillips - Surmont



Schematic: Devon - Jackfish

IOSA
IN SITU OIL SANDS ALLIANCE

Western Canadian Oil Production



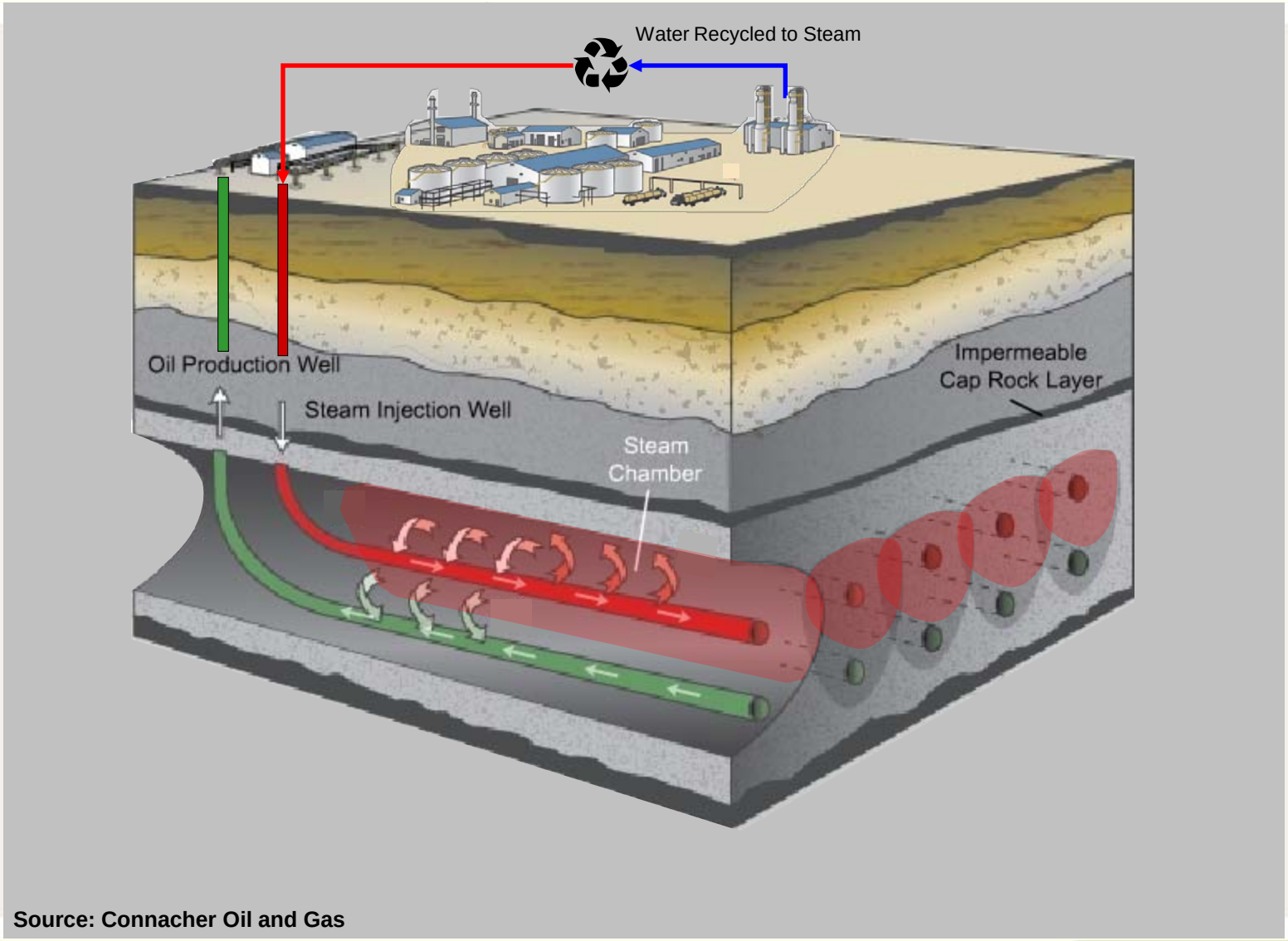
Source: Canadian Association of Petroleum Producers

IOSA
IN SITU OIL SANDS ALLIANCE

SAGD Technology Breakthrough Opens New In Situ Era

- SAGD – Steam Assisted Gravity Drainage
  - Drilling pairs of horizontal wells into oil sands
  - Injection of steam into bitumen reservoir
  - Unlocks recovery of deep bitumen
  - Reduces cost and time
  - Improves environmental performance

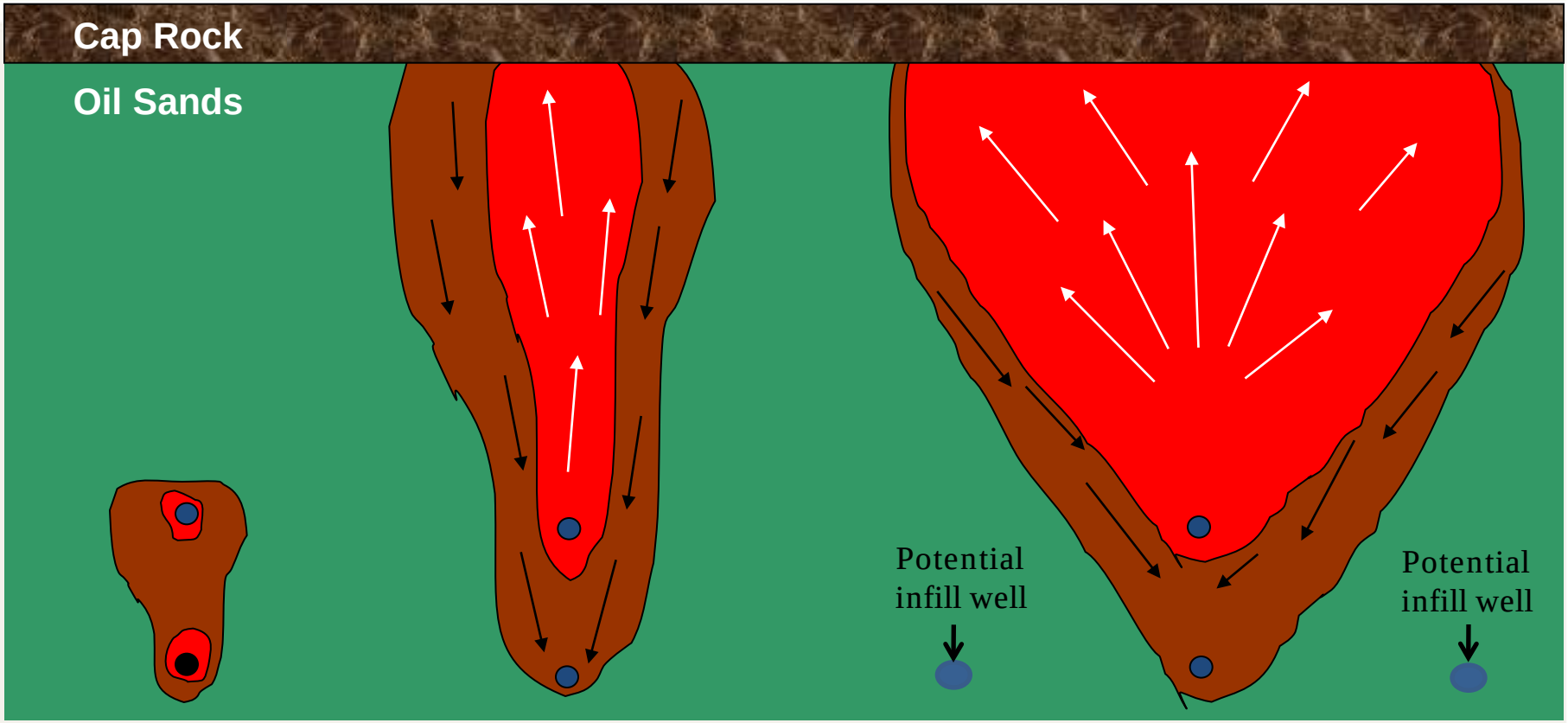
Steam Assisted Gravity Drainage Process



Source: Connacher Oil and Gas

IOSA
IN SITU OIL SANDS ALLIANCE

SAGD Wells Over Time

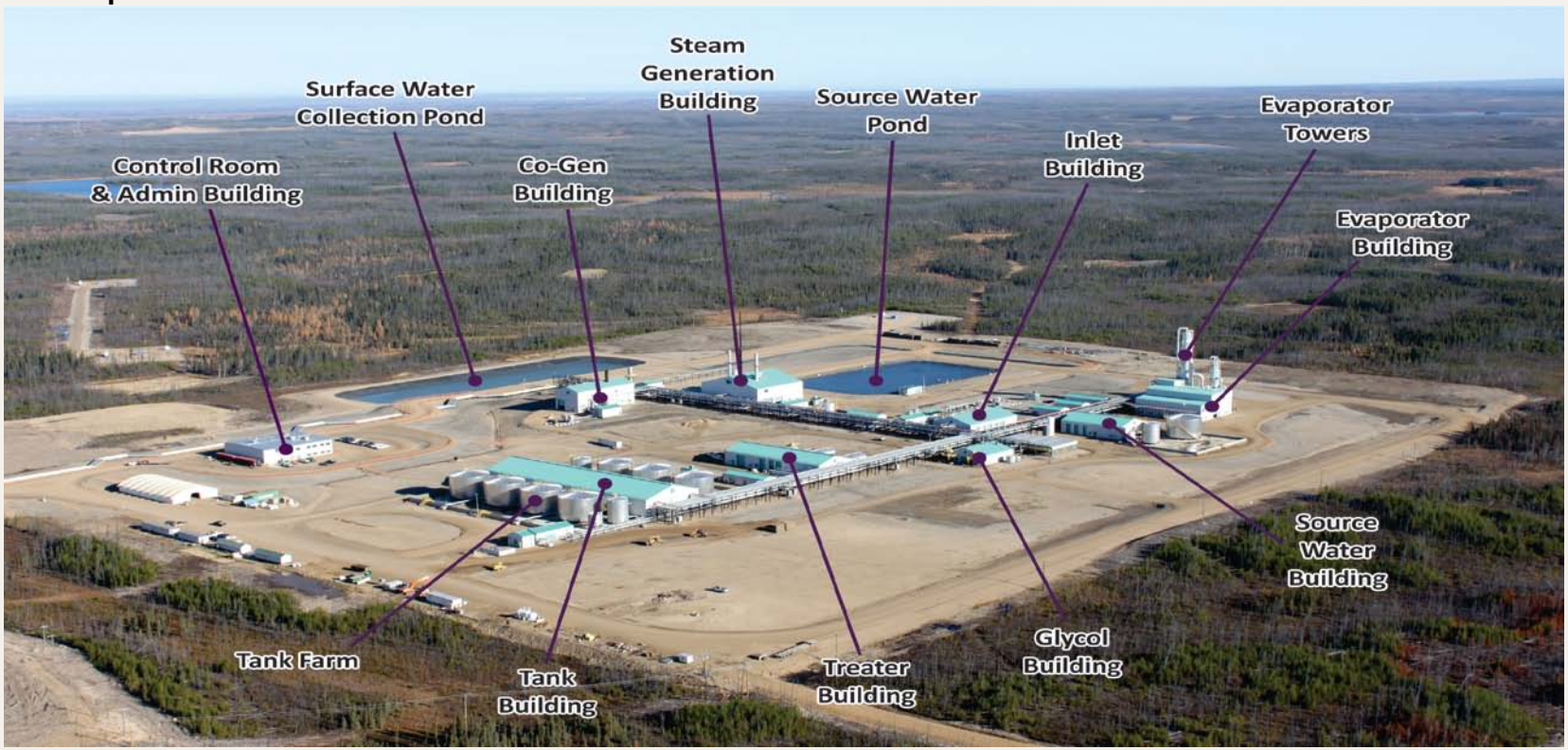


Circulation	Peak SAGD Production	Declining SAGD Production
~90 days	~12 - 18 months	~4 to 6 years

Source: Connacher Oil and Gas

In Situ Allows Scaled Development

- Manage costs
- Incorporates learnings and new technologies in subsequent phases
- Reduced footprint, easy to expand
- Rapid evolution



Source: Connacher Algar Project

IOSA IN SITU OIL SANDS ALLIANCE

SAGD Development Today

- A young technology
- Commercial less than 10 years
- A series of innovations and associated technologies leading to a rapid evolution of in-situ
    - Steam control in reservoir
        - 4D seismic
        - Downhole hot pumps
        - New completion designs
    - Water recycle technologies
        - Evaporators
    - Co-generation
        - High energy efficiencies

Evaporator Technology – Water Recycling

- Efficiently produces high quality boiler water
- Second stage evaporator improves water recycle
- Recycle 90% to 95% of water used, sourced from non-potable subsurface aquifer

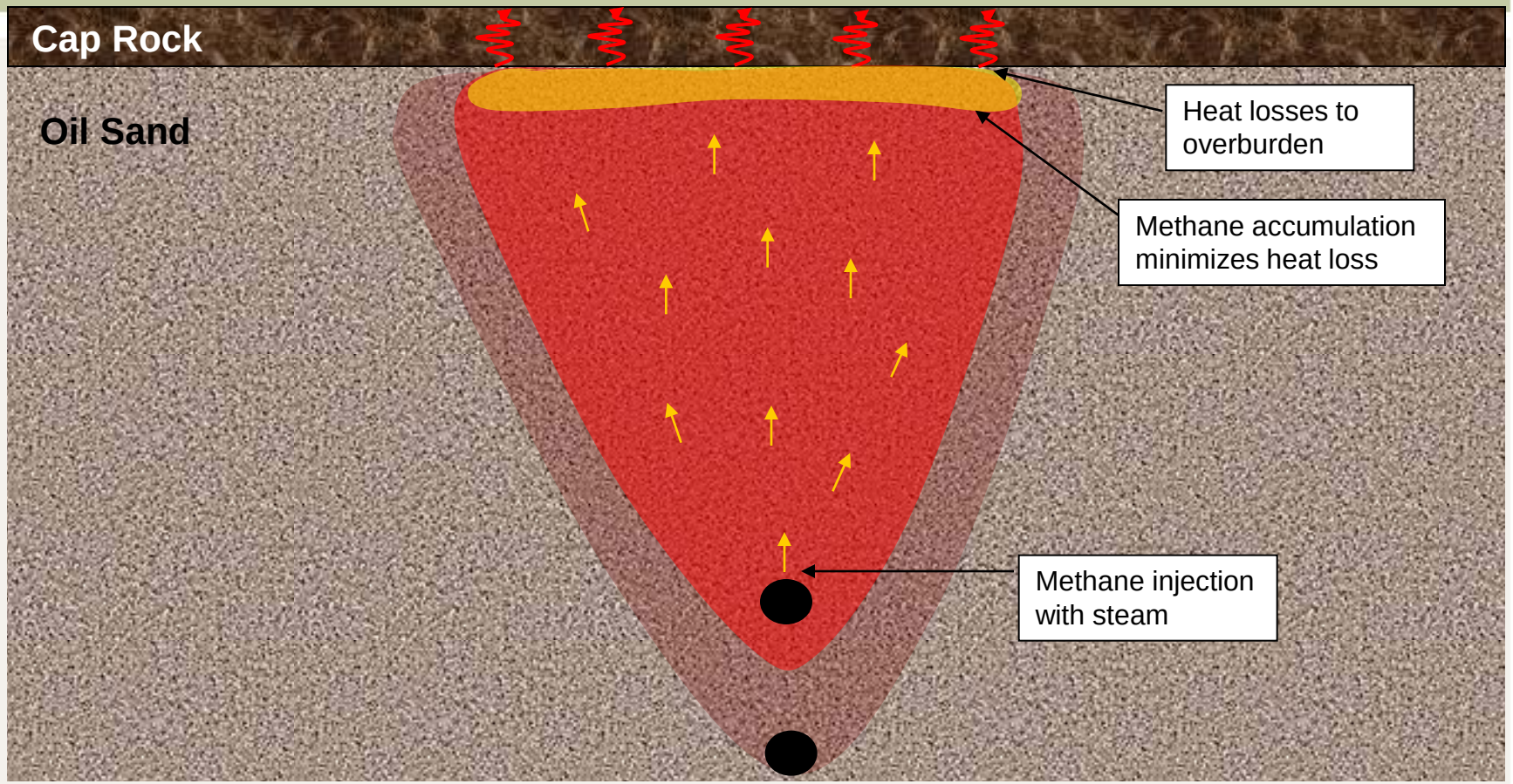
Source: Connacher Oil and Gas Great Divide Project

Connacher Cogeneration Plant – Cleaner Power

- Generates steam and electricity, most energy efficient mechanism
- Clean fuel replaces coal based power supply

Source: Connacher Oil and Gas

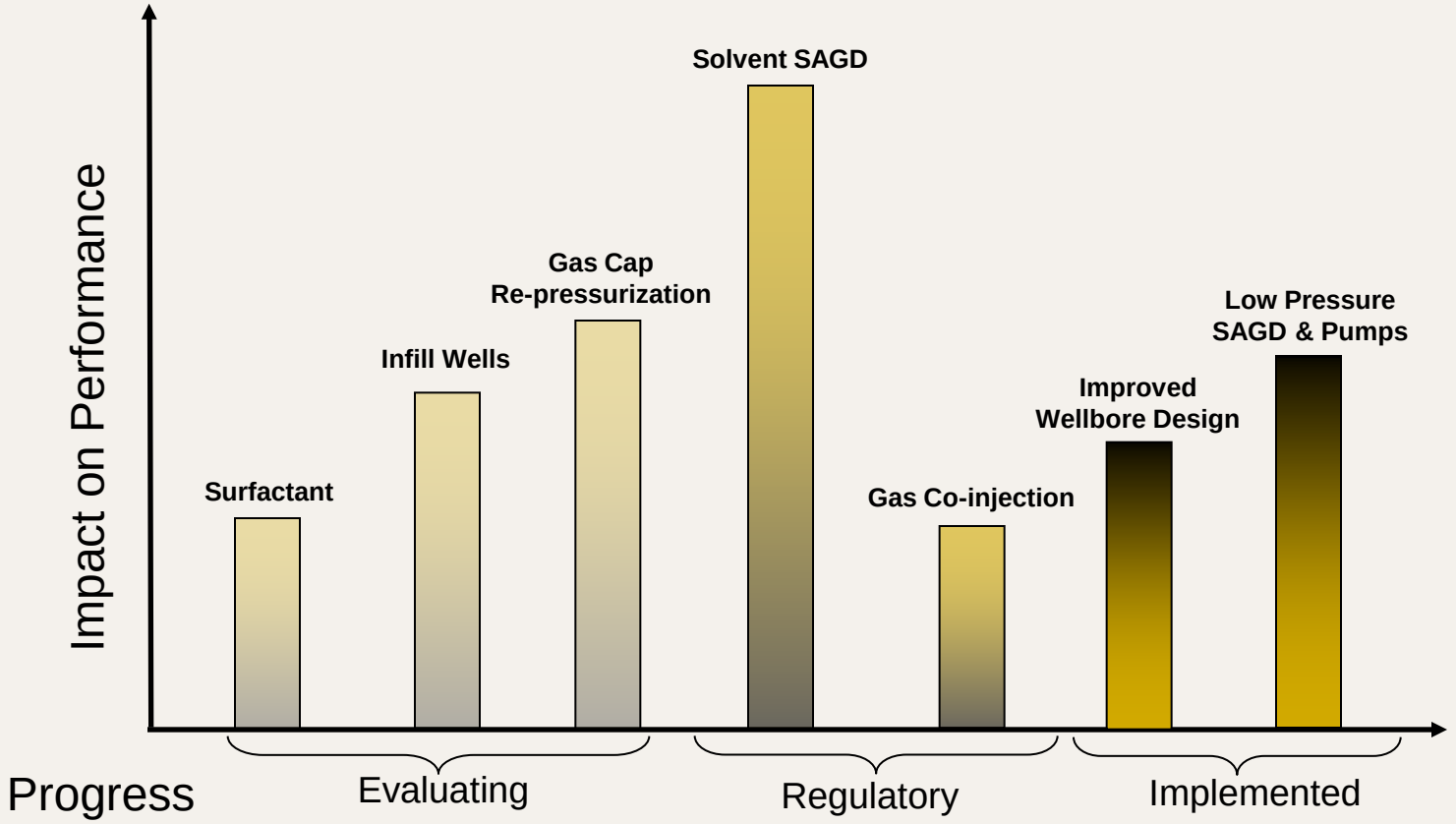
Gas Co-Injection – Higher Recoveries



- Methane gas injected along with steam insulates against heat loss

Source: Connacher Oil and Gas

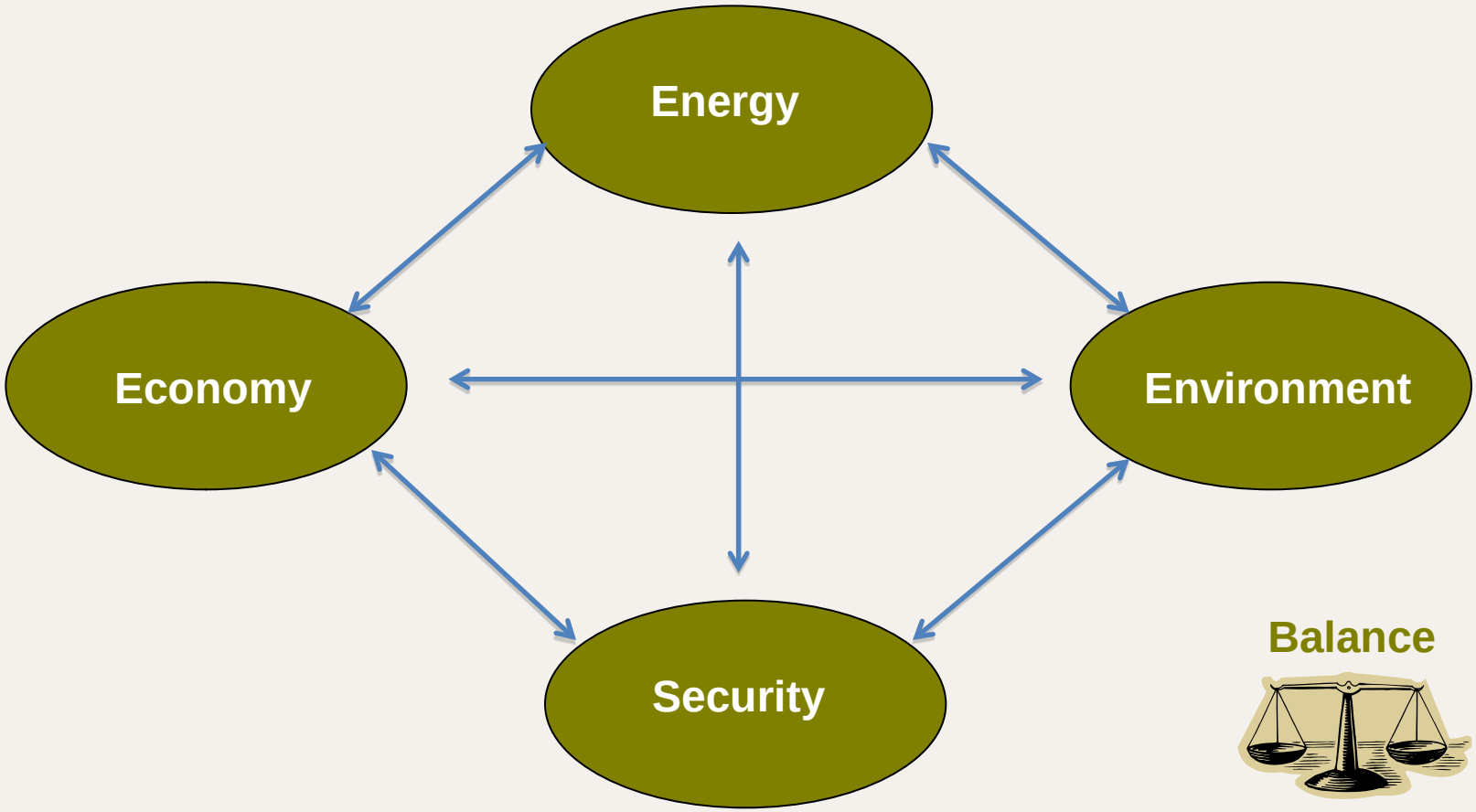
Innovation Takes Time



- Connacher and others are actively pursuing SAGD innovations
- Goal: reduce steam use; increase reliability, recovery and production

Source: Connacher Oil and Gas

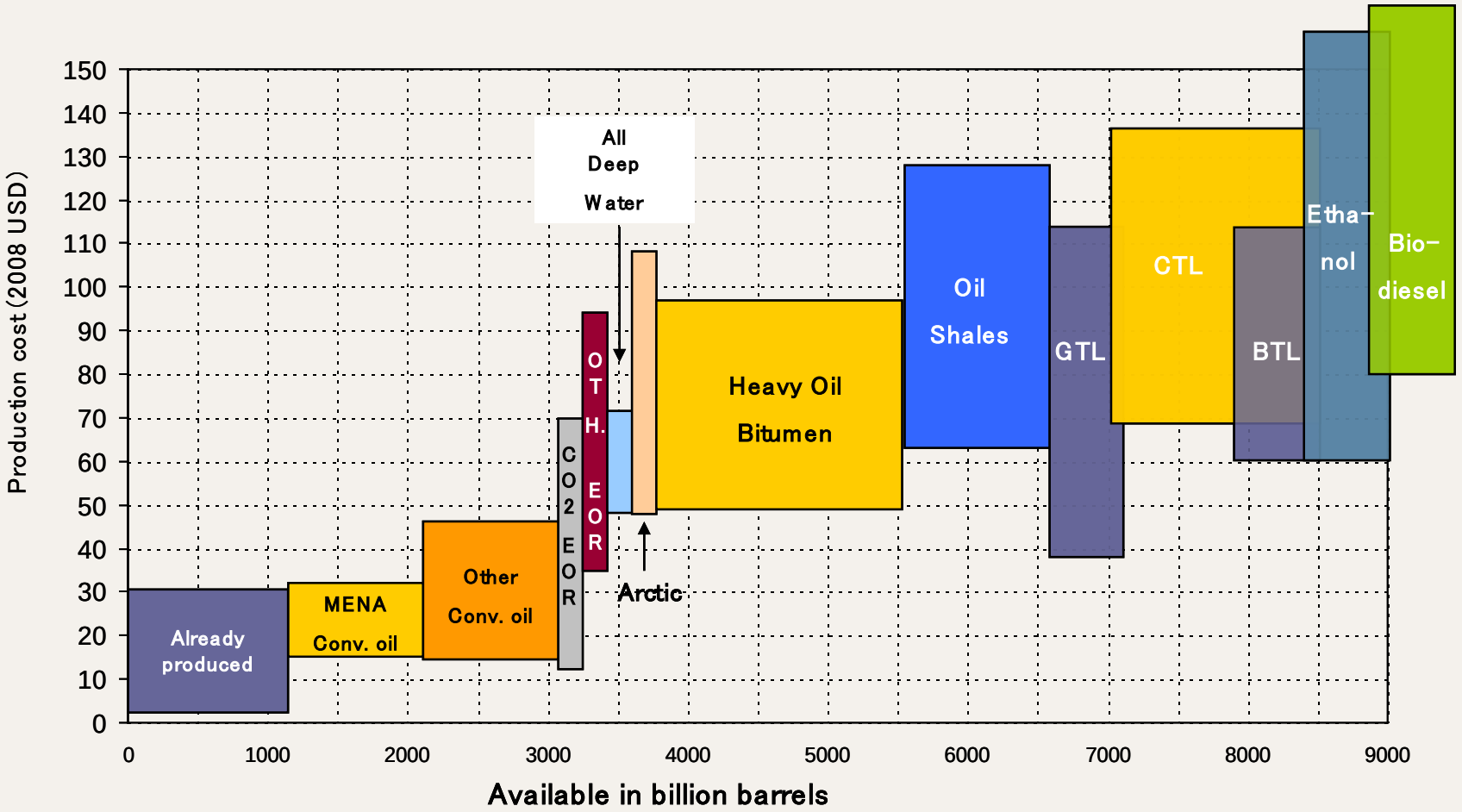
In Situ Oil Sands Provide the Right Energy Balance



IOSA
IN SITU OIL SANDS ALLIANCE

Resources to Reserves – Production Cost Curve

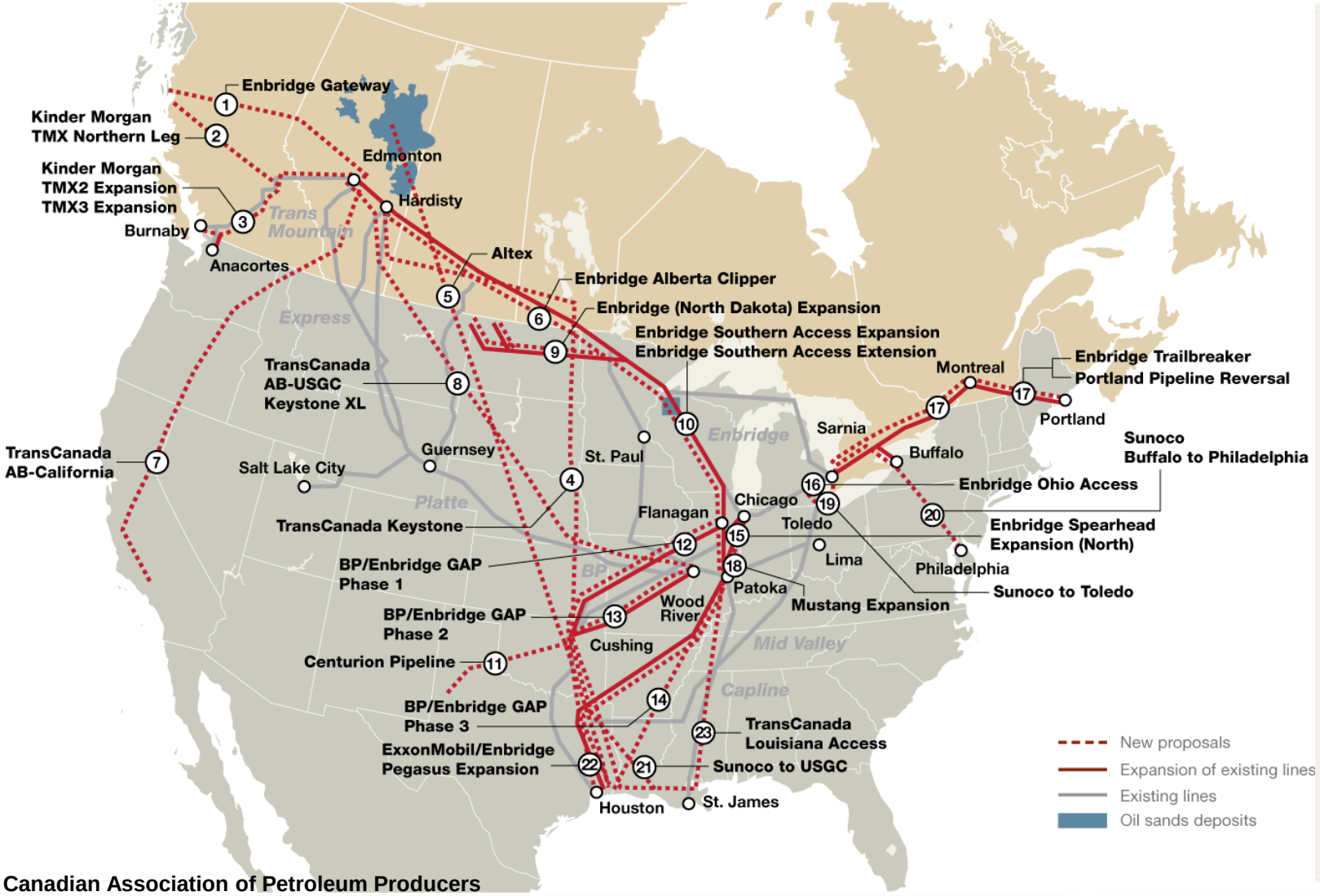
(including a carbon tax of $50 per tonne CO_2 equiv. emissions)



Source: Canadian Association of Petroleum Producers

IOSA IN SITU OIL SANDS ALLIANCE

North American Pipelines – A Rich Fabric of Energy Integration



Source: Canadian Association of Petroleum Producers

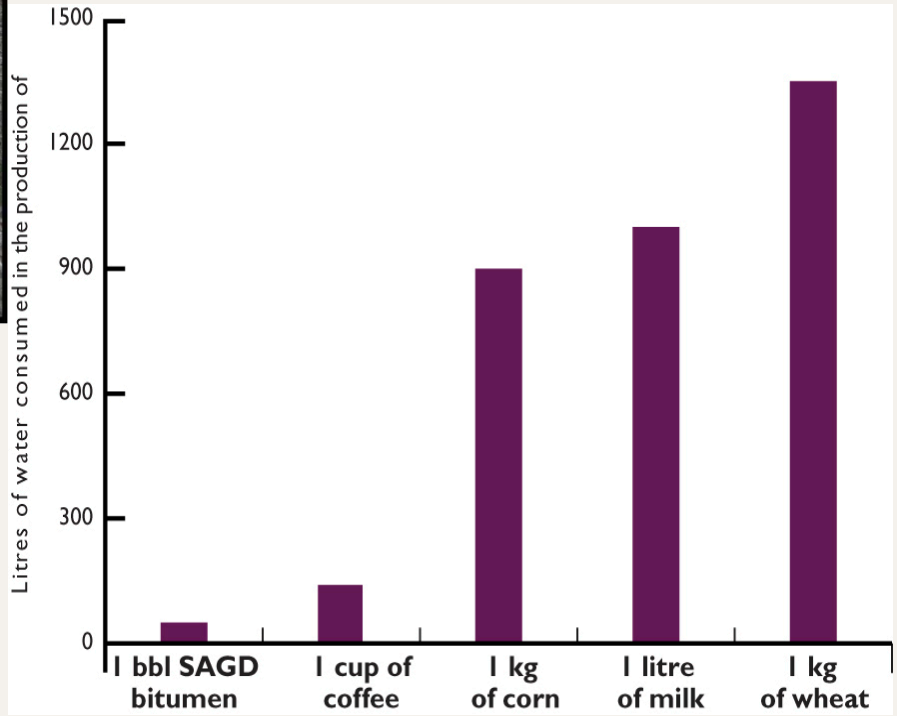
IOSA
IN SITU OIL SANDS ALLIANCE

In Situ Development – The Right Environmental Balance

- Small surface footprint
  - Minimizes disturbance
  - Better than conventional oil
- Water friendly
  - Low water use (deep saline sources)
  - No surface discharge
  - Better than biofuels
- GHGs on a par with alternative oil
  - Better than coal
  - Rapidly improving with technology

In Situ Development Allows Small Footprint

- Small footprint
  - Connacher Pod One < 2% of Manhattan Island



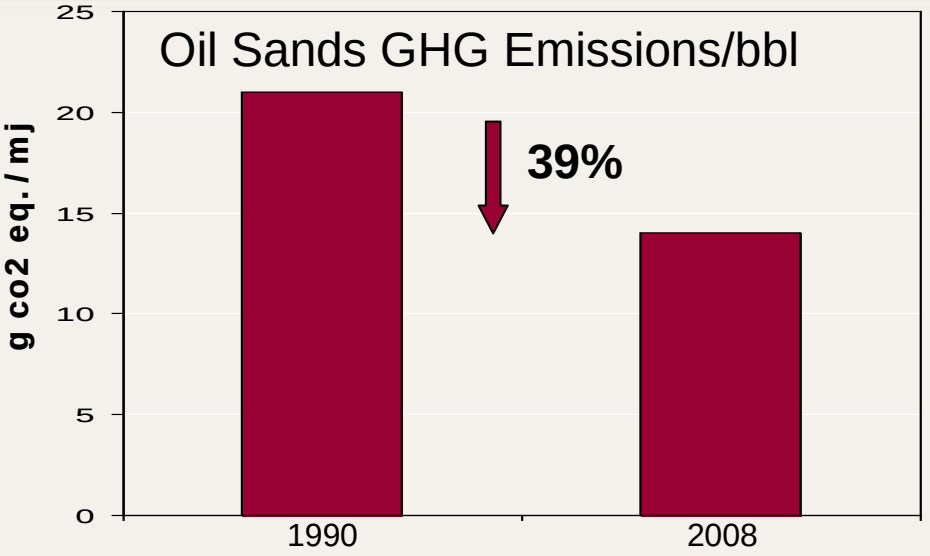
- Efficient water usage
  - Sourced from deep wells non-potable

Source: Connacher Oil and Gas

IOSA
IN SITU OIL SANDS ALLIANCE

Oil Sands Technology Improves Environmental Performance

- **Reducing GHG Emissions**
  - Using less energy input
  - Use energy more efficiently
- **Capturing CO2**
  - Governments investing over $3 billion – partners with industry
  - CO2 used in enhanced oil recovery
- **Water**
  - Increasing water recycle
  - Using saline water for steam

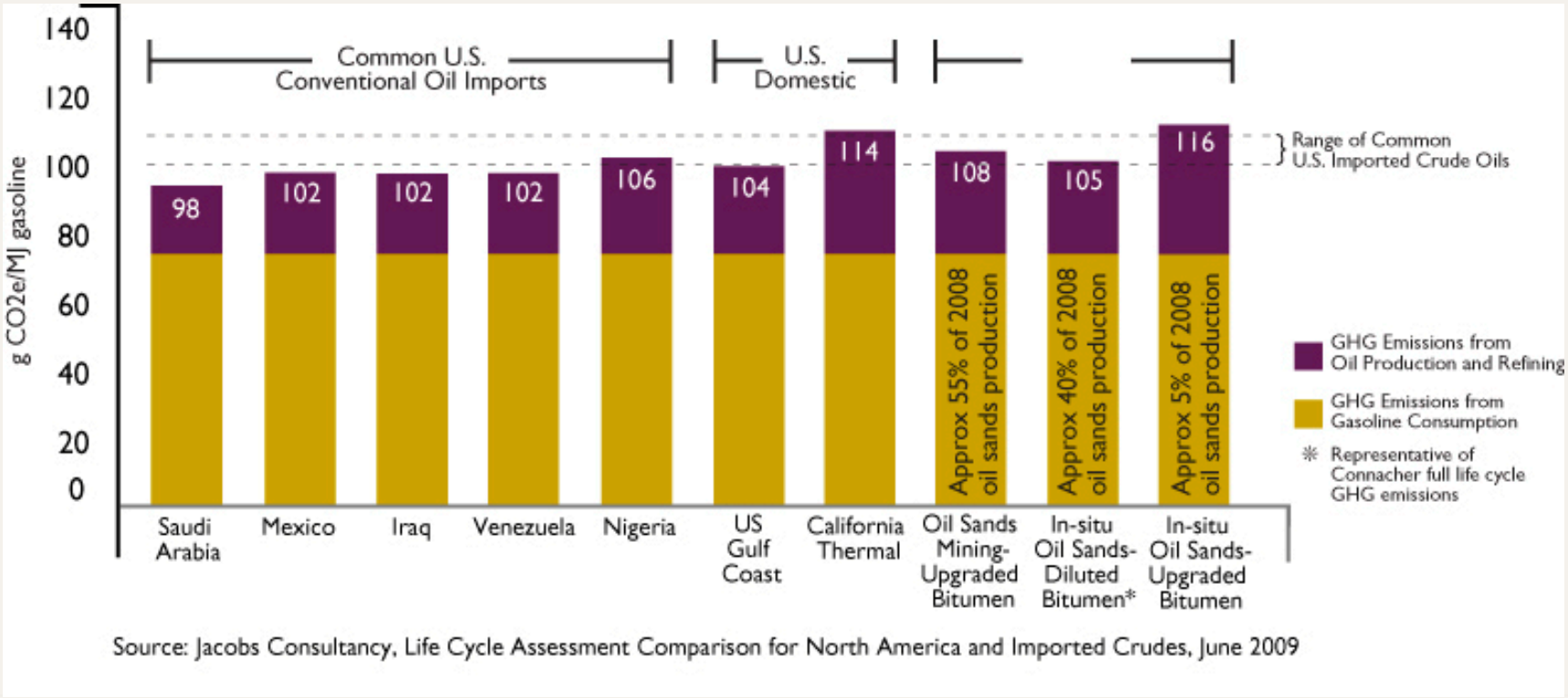


Source: Canadian Association of Petroleum Producers

IOSA
IN SITU OIL SANDS ALLIANCE

SAGD Oil Sands Greenhouse Gas Emissions Already Close to "Conventional"

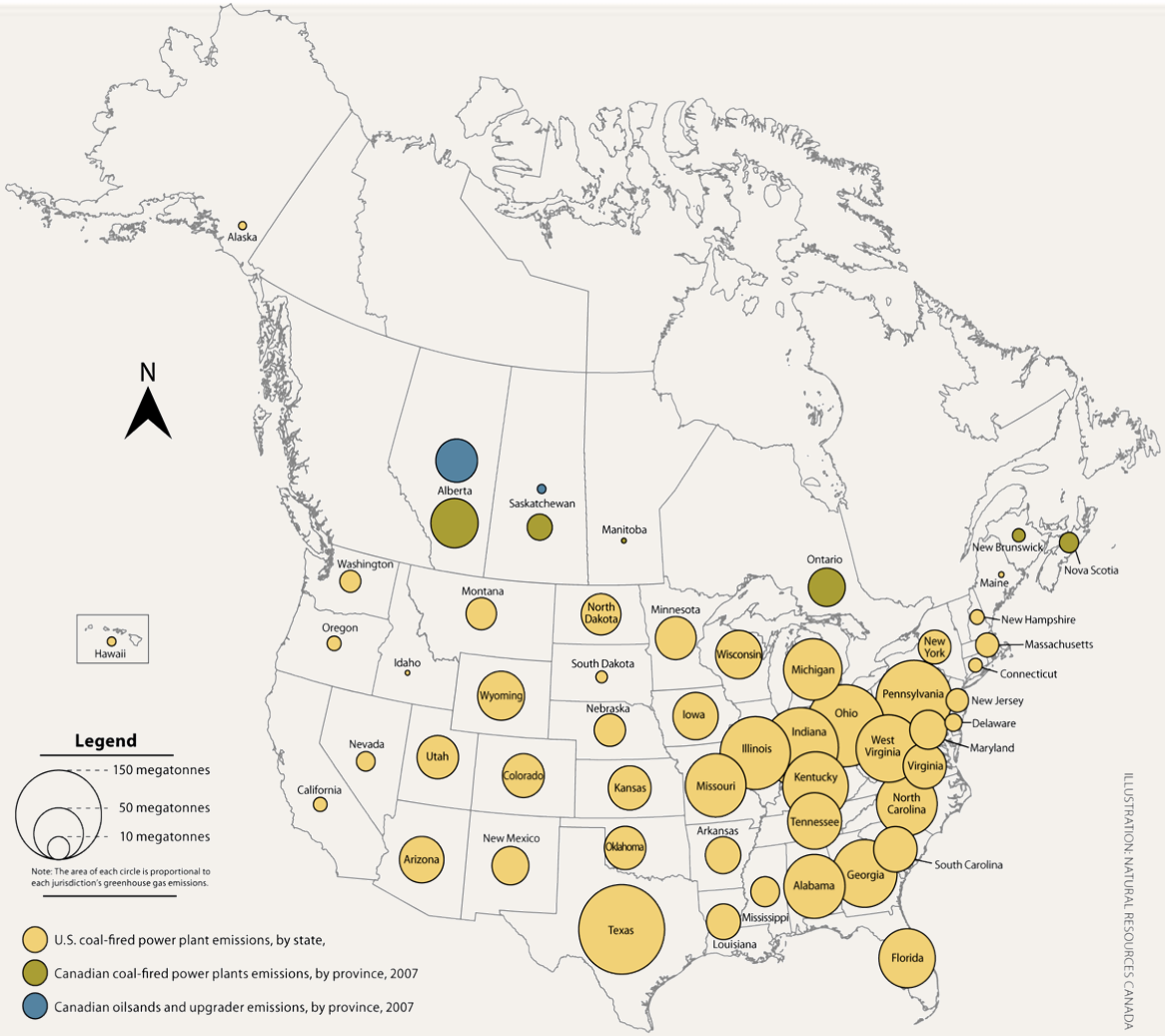
- GHG from SAGD oil sands are generally comparable to domestic US and imported crude oil, on a life-cycle basis
- Technology is further reducing GHG Footprint



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

IOSA
IN SITU OIL SANDS ALLIANCE

Oil Sands Emissions in North American Perspective



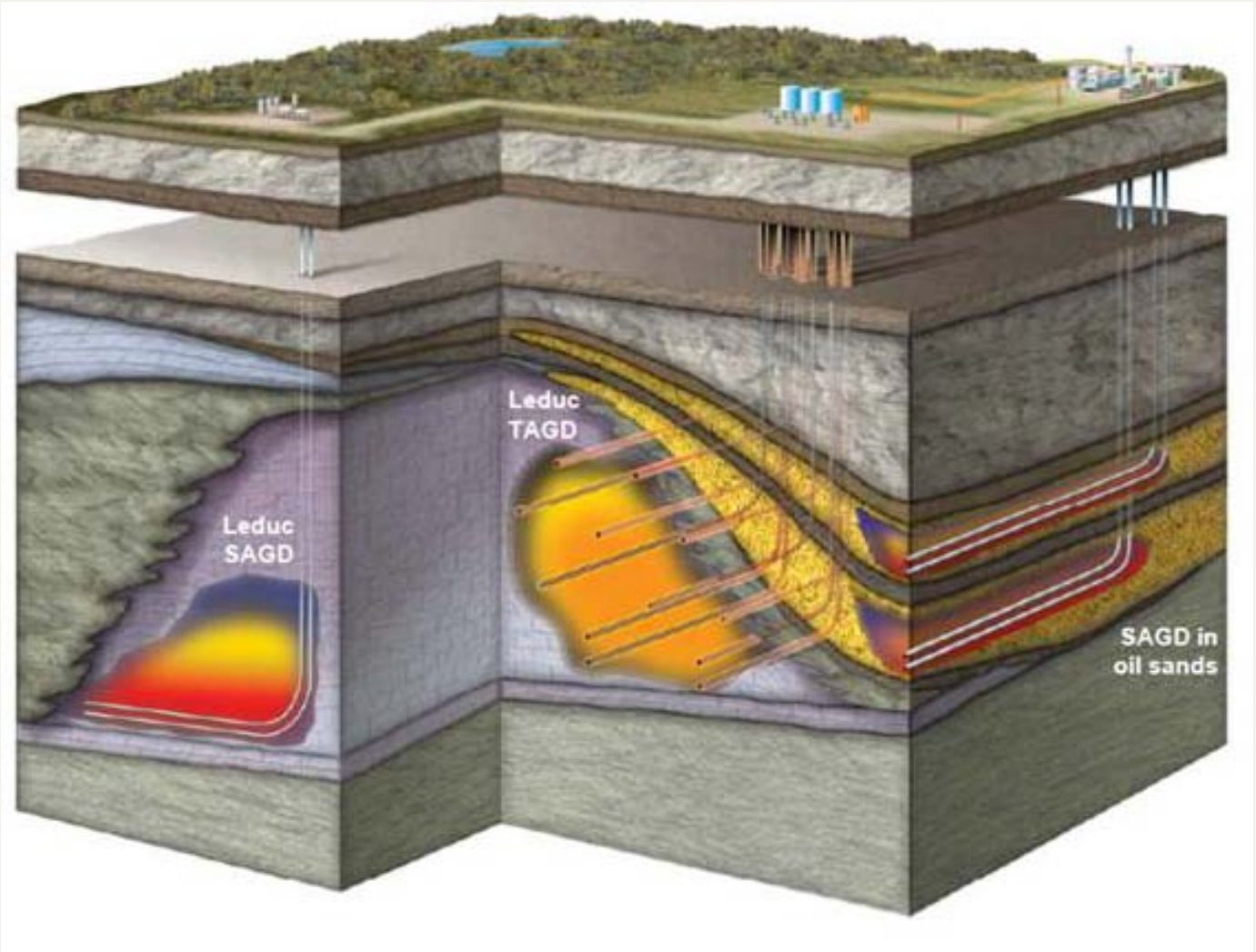
Source: Government of Canada

IOSA
IN SITU OIL SANDS ALLIANCE

In Situ – The Next Generation

- Technology breakthroughs are continuing
- SAGD plus (solvent) (Connacher and others)
- Electric heating (TAGD®) (Athabasca Oil Sands Corp.)
- Combustion in reservoir (THAI®) (Petrobank Energy)
- Carbonate SAGD and solvent (Laricina Energy)
- Environmental technologies advancing
  - Water, land, air
  - Clean bitumen technologies
- IOSA companies are leading the way

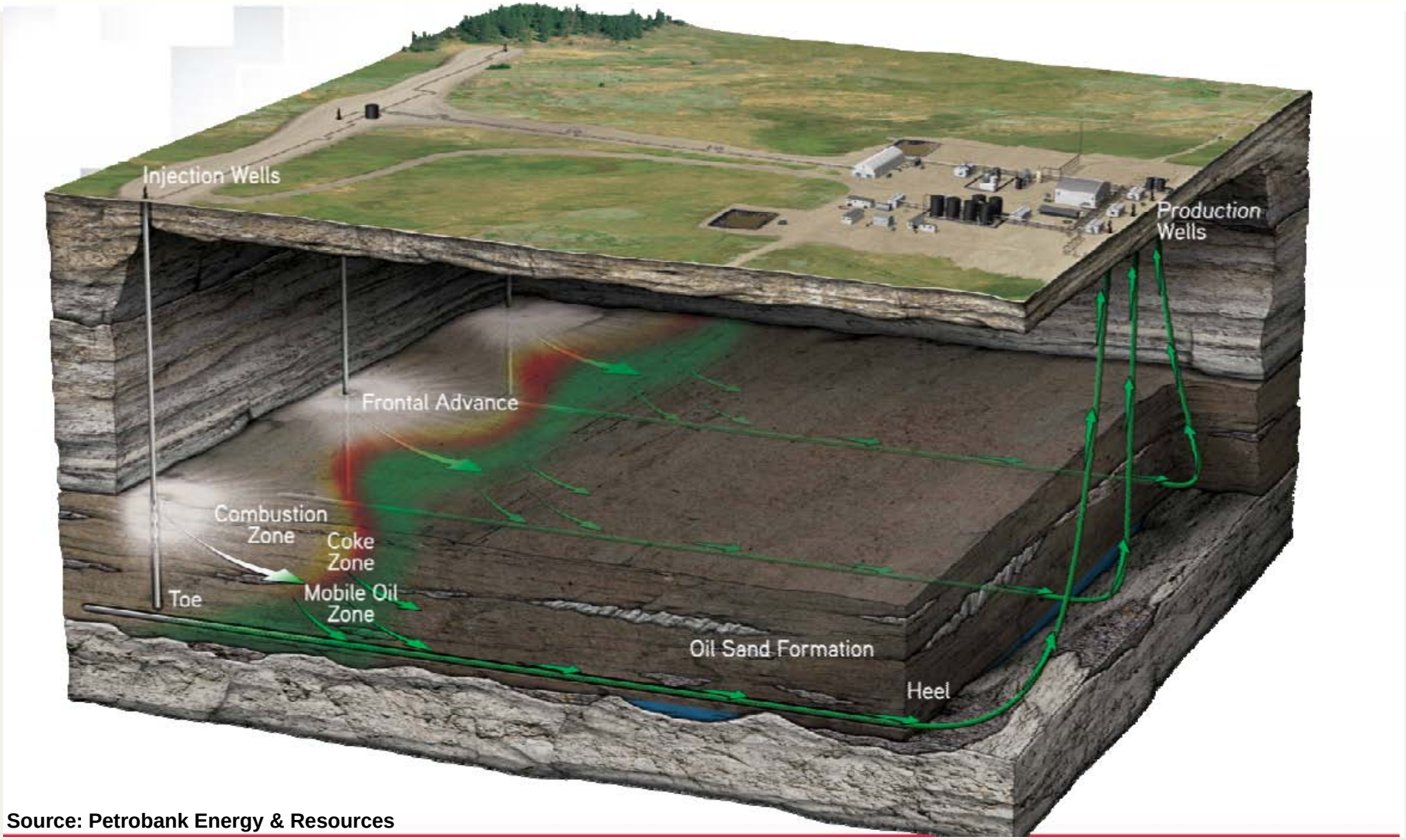
Next Generation – In Situ (TAGD®) – Electric Heating



Source: Athabasca Oil Sands Corp.

IOSA
IN SITU OIL SANDS ALLIANCE

Next Generation in-situ (THAI®) – Combustion in Reservoir



Source: Petrobank Energy & Resources

IOSA
IN SITU OIL SANDS ALLIANCE

Conclusions

- Abundant secure supply of oil is available in Canada's oil sands
- New breed of company is developing next generation of energy from in situ oil sands
- Breakthrough technologies are working today
- Optimal balance of secure energy, economy and environment for N. America

Additional IOSA Information

- To contact IOSA or for more information on what we do, please visit our website: www.iosa.ca
- Independent, innovative Alberta-based in situ oil sands companies:
  - Athabasca Oil Sands Corp.
  - Connacher Oil & Gas Limited
  - Laricina Energy Ltd.
  - MEG Energy Corp.
  - Osum Oil Sands Corp.
  - Petrobank Energy and Resources Ltd.