

CANADIAN OIL SANDS – A RENAISSANCE OR A SUNSET INDUSTRY?

Oil Sands Trade Show and Conference
Dinara Millington,
Vice President, Research
September 11-12, 2018



Canadian Energy Research Institute

Overview

Founded in 1975, the Canadian Energy Research Institute (CERI) is an independent, registered charitable organization specializing in the analysis of energy economics and related environmental policy issues in the energy production, transportation, and consumption sectors.

Our mission is to provide relevant, independent, and objective economic research of energy and environmental issues to benefit business, government, academia and the public.

CERI publications include:

- Market specific studies
- Geopolitical analyses
- Energy Market reports (crude oil, electricity and natural gas)

In addition, CERI hosts an annual Petrochemical Conference and supports Argus Media Canada Week Conference.

Canadian Energy Research Institute

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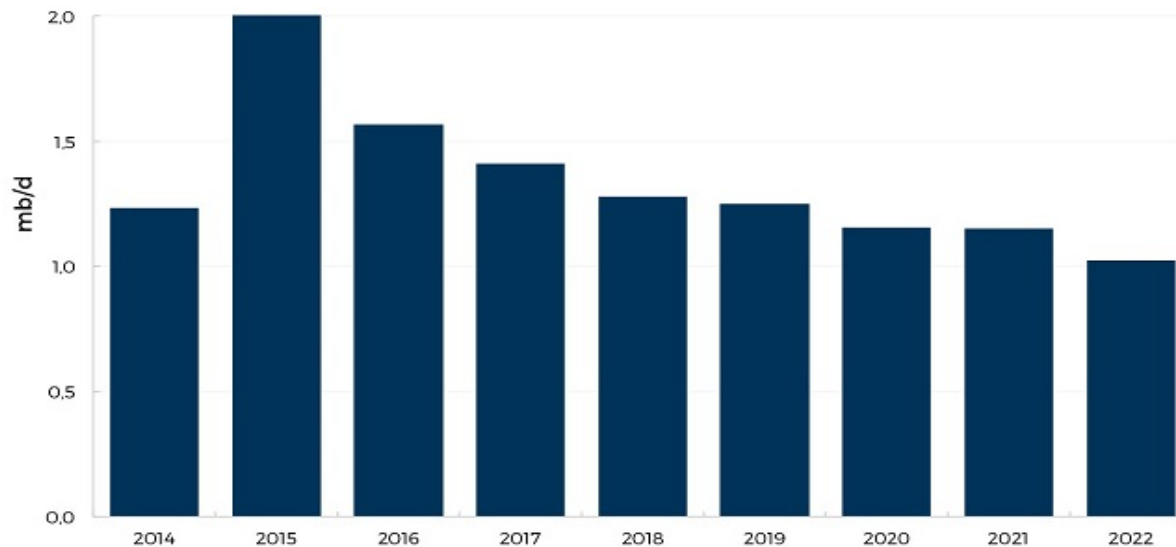
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- Bow Valley College
- Canadian Council for Aboriginal Business
- Canadian Global Affairs Institute

Presentation Outline

- Background
- Production and Investment Outlook
- Supply Costs
- Emissions
- Downstream Markets
- Conclusions

Imminent undersupply and price volatility?

Global oil demand growth, 2014-22



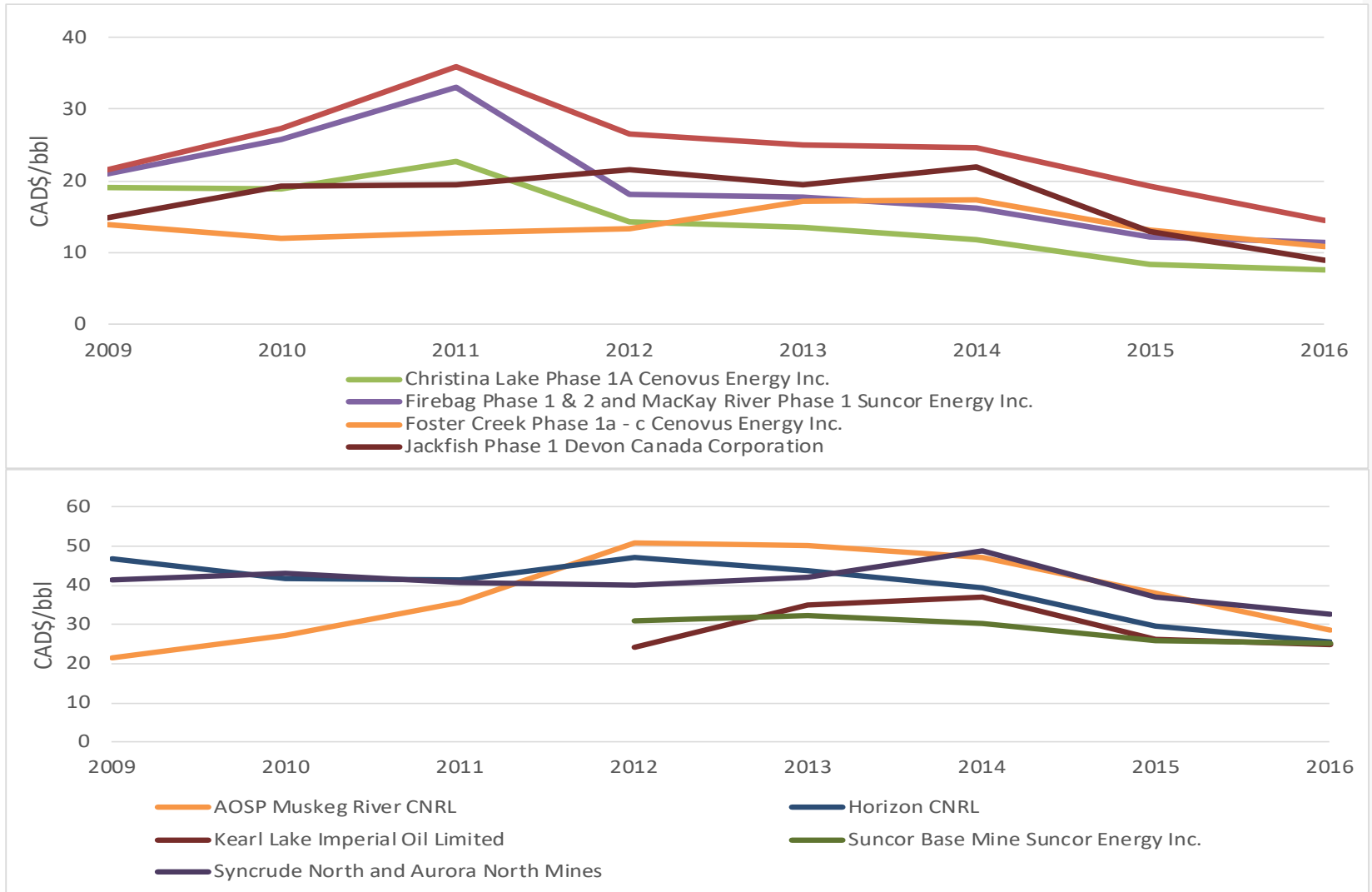
Oil 2017: Analysis & forecasts to 2022



Source: IEA

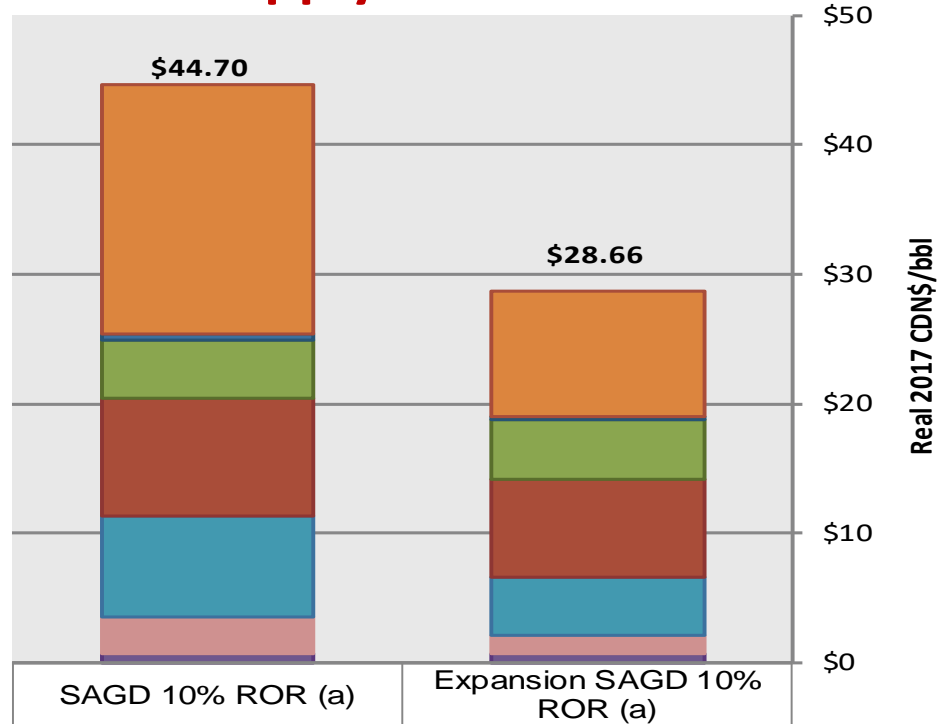
Towards the end of 2022 available spare production capacity will fall below 2 million b/d if there is no significant growth in investments (IEA, March 2017)

Oil Sands Operating Costs by Project



Source: CERI, CanOils

Bitumen Supply Costs



| | SAGD 10% ROR (a) | Expansion SAGD 10% ROR (a) |
|--------------------------------------|------------------|----------------------------|
| Fixed Capital (Initial & Sustaining) | \$19.33 | \$9.67 |
| Operating Working Capital | \$0.41 | \$0.21 |
| Fuel (Natural Gas) | \$4.57 | \$4.57 |
| Other Operating Costs (incl. Elec.) | \$9.02 | \$7.65 |
| Royalties | \$7.81 | \$4.43 |
| Income Taxes | \$2.87 | \$1.45 |
| Emissions Compliance Costs | \$0.67 | \$0.67 |
| Abandonment Costs | \$0.03 | \$0.01 |

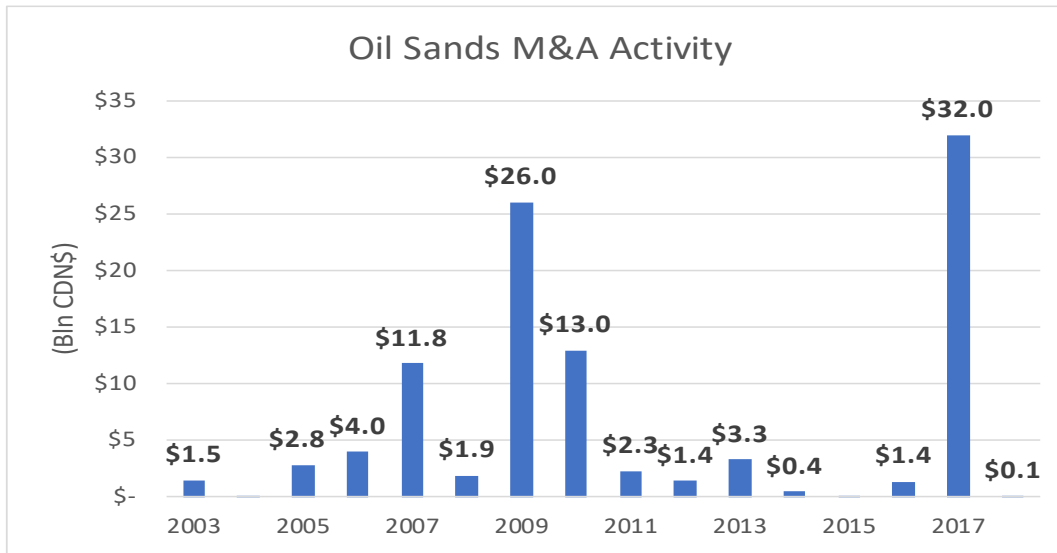
Source: CERI, Canoils

WTI eq. Oil Sands Supply Costs

| Supply Cost | Expansion SAGD | |
|---|-------------------|-------------------|
| | SAGD 10% ROR (a) | 10% ROR (a) |
| Net Present Value (C\$ Millions) | \$0 | \$0 |
| Discount Rate | 10% | 10% |
| Base Year | 2017 | 2017 |
| Costs (C\$/b) | Discounted | Discounted |
| Return on Investment | Included | Included |
| Fixed Capital (Initial & Sustaining) | \$19.33 | \$9.67 |
| Operating Working Capital | \$0.41 | \$0.21 |
| Fuel (Natural Gas) | \$4.57 | \$4.57 |
| Other Operating Costs (incl. Elec.) | \$9.02 | \$7.65 |
| Abandonment Costs | \$0.03 | \$0.01 |
| Royalties | \$7.81 | \$4.43 |
| Income Taxes | \$2.87 | \$1.45 |
| Emissions Compliance Costs | \$0.67 | \$0.67 |
| Subtotal | \$44.70 | \$28.66 |
| Electricity Sales | 0.0 | 0.0 |
| Subtotal | 0.0 | 0.0 |
| Total Supply Cost (C\$/b) | \$44.70 | \$28.66 |
| Blend Product @ Hardisty in C\$/b | \$49.90 | \$39.17 |
| Blend Product @ Hardisty in US\$/b | \$39.92 | \$31.34 |
| Blend Product's WTI Equivalent @ Edmonton in US\$/b | \$54.92 | \$46.34 |
| WTI Equivalent (US\$/b) | \$60.17 | \$51.59 |

Source: CERl, Canoils

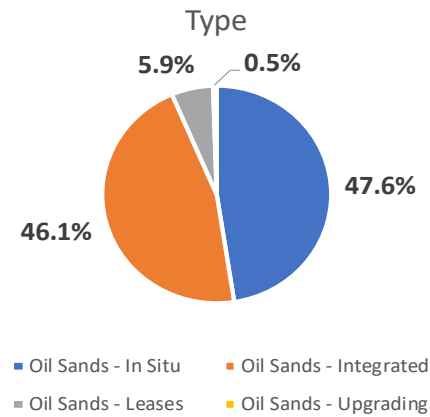
Canadian Oil Sands M&A Activity



- Total M&A activity amounted to \$102 billion over 2003-2018 period

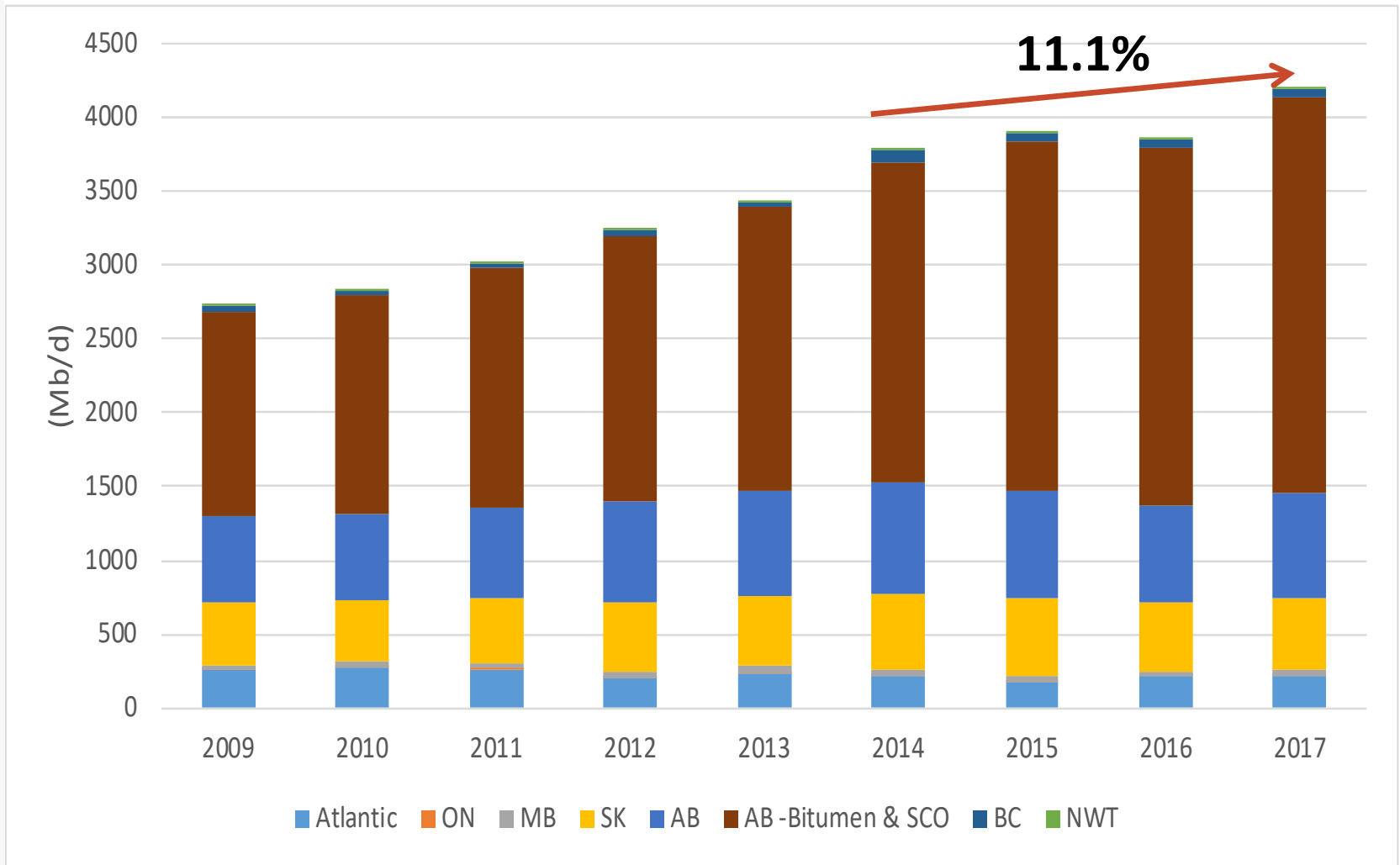
- 2009 M&A is comprised of predominantly of foreign direct investment
- 2017 M&A was complete by majority of Canadian companies

2003-2018 Oil Sands M&A Activity by Project Type



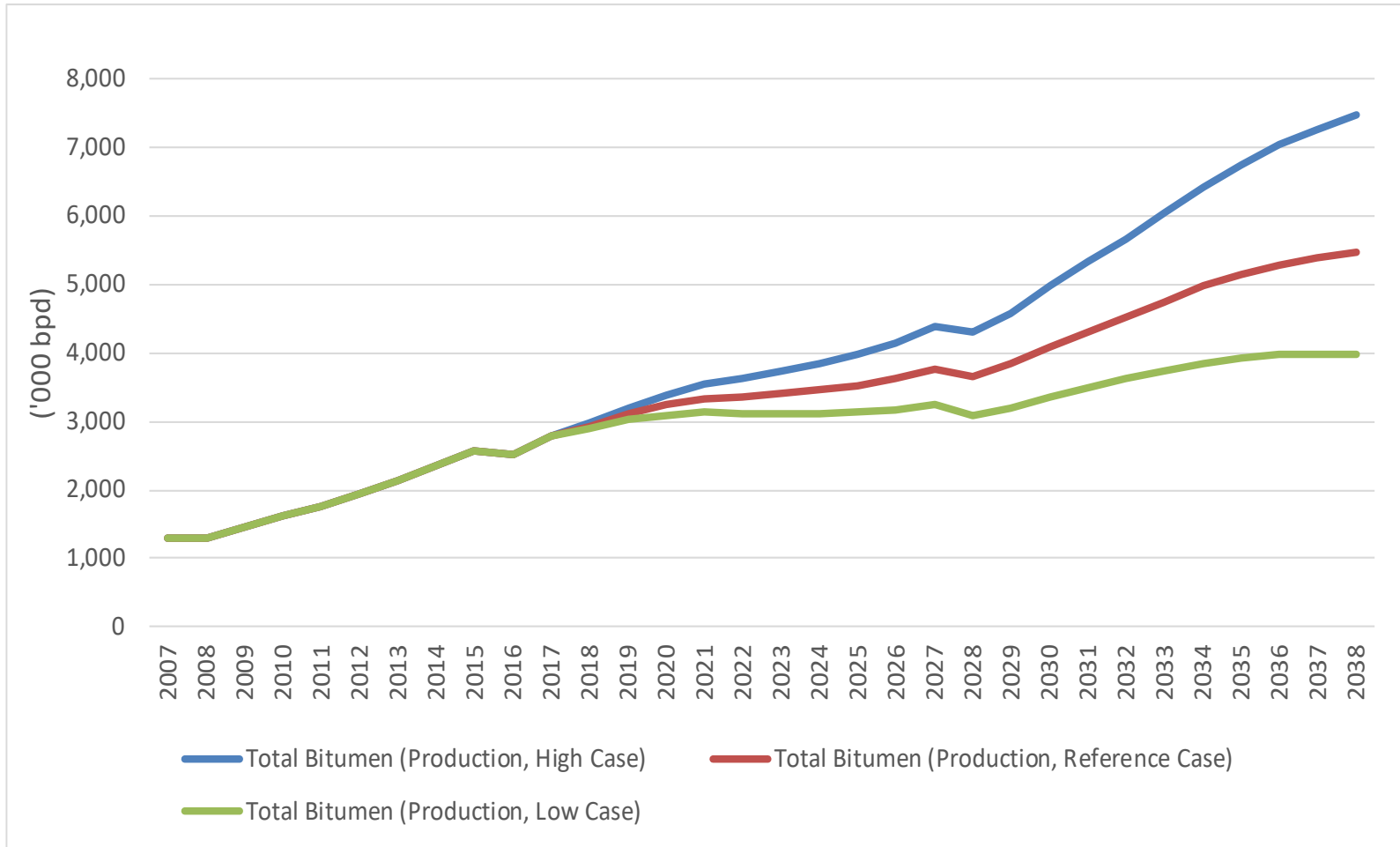
Source: CERl, Canoils

Total Canadian oil production

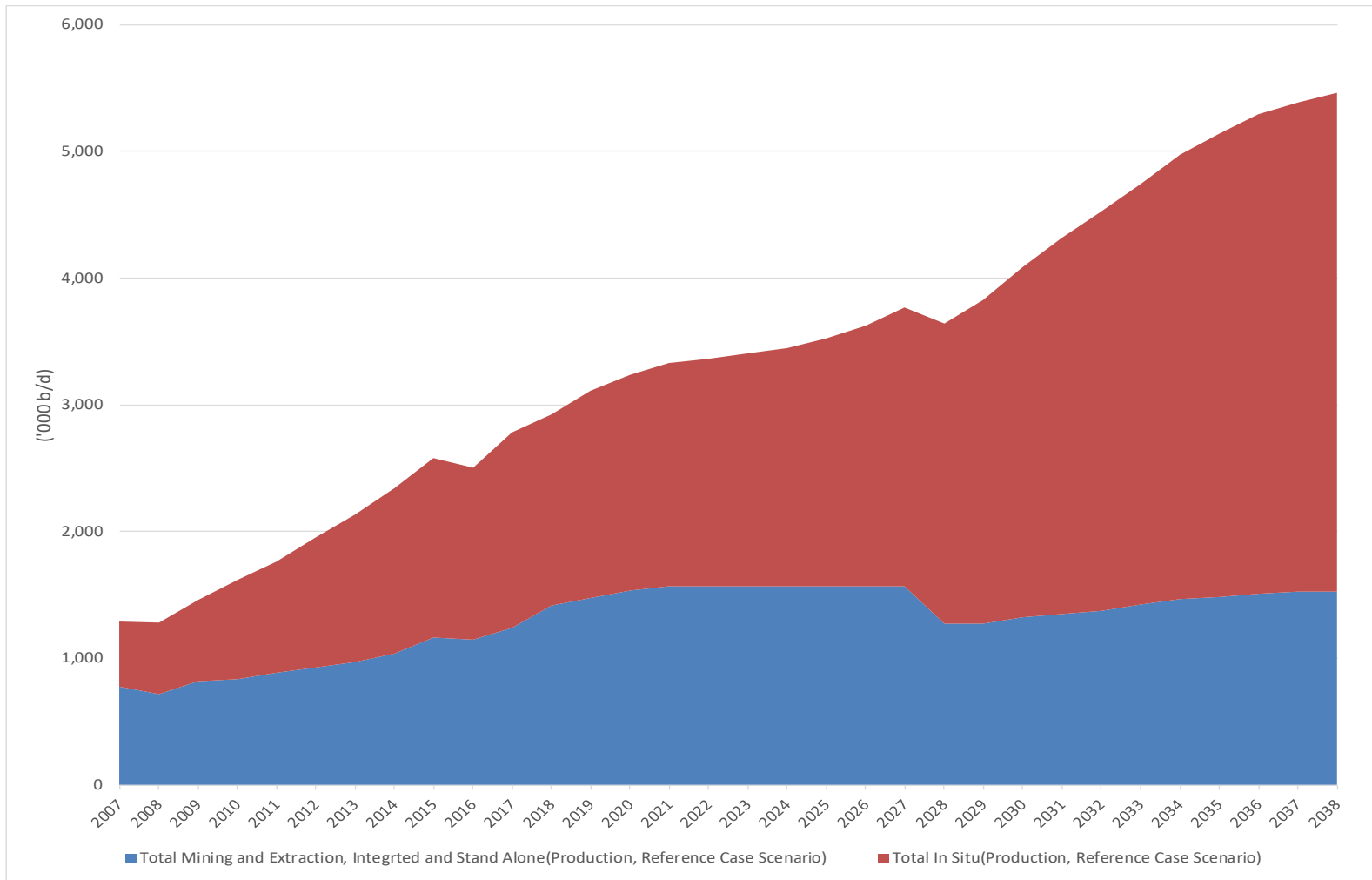


Source: Statistics Canada, CANSIM Table 126-0003

Canadian Oil Sands Production

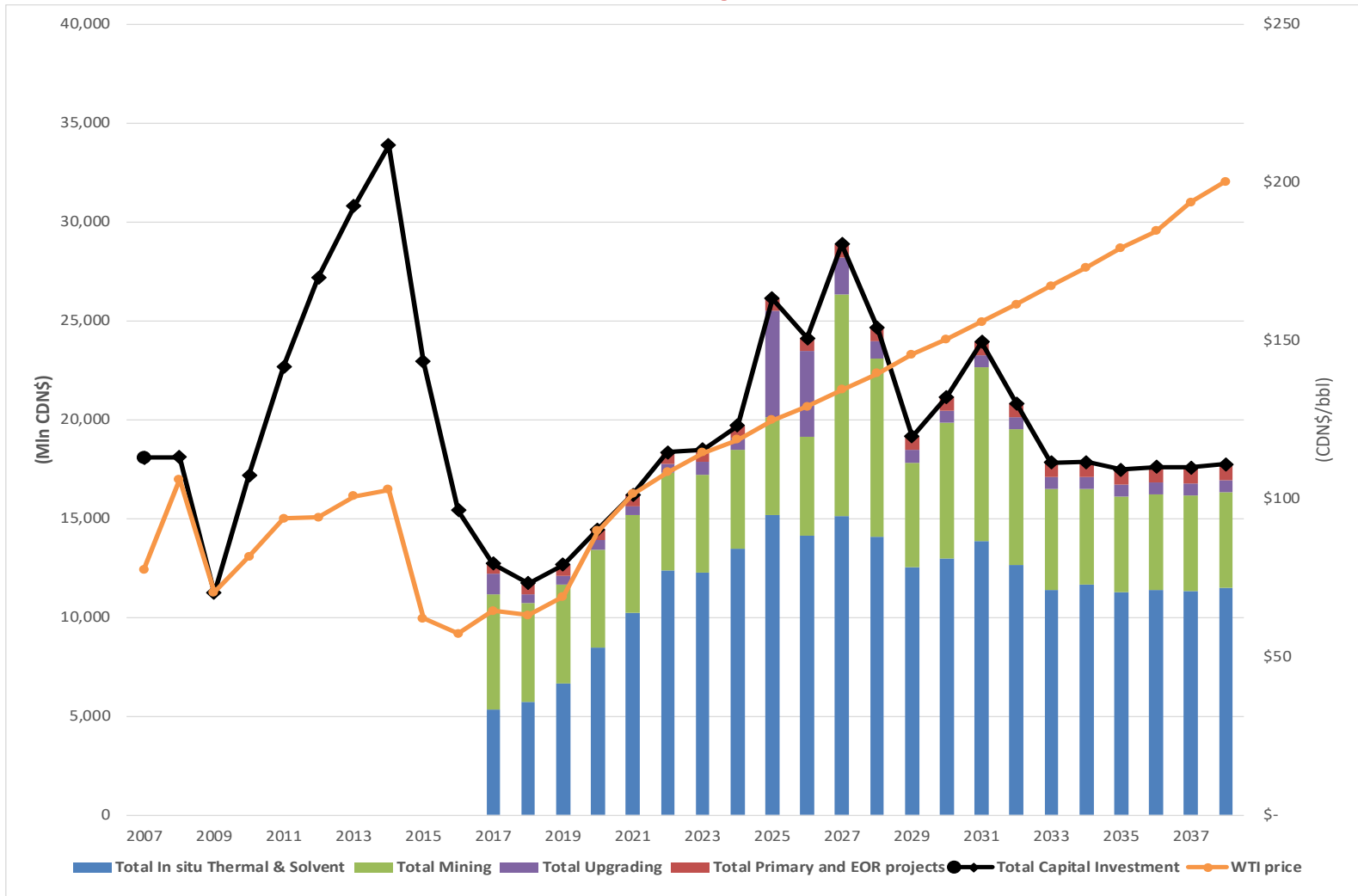


Canadian Oil Sands Production by Project Type



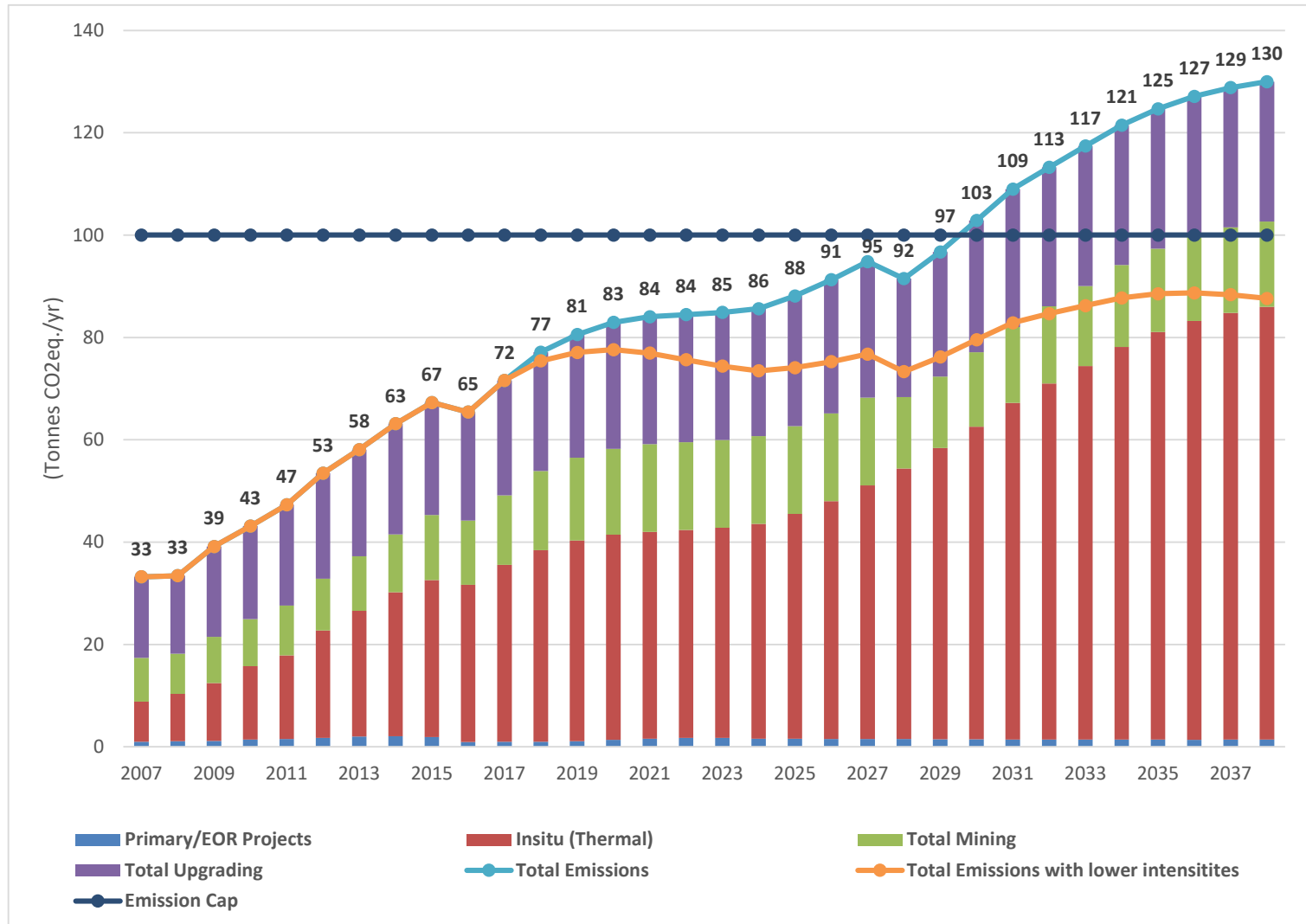
Source: CERI, Canoils

Canadian Oil Sands Capital Investment

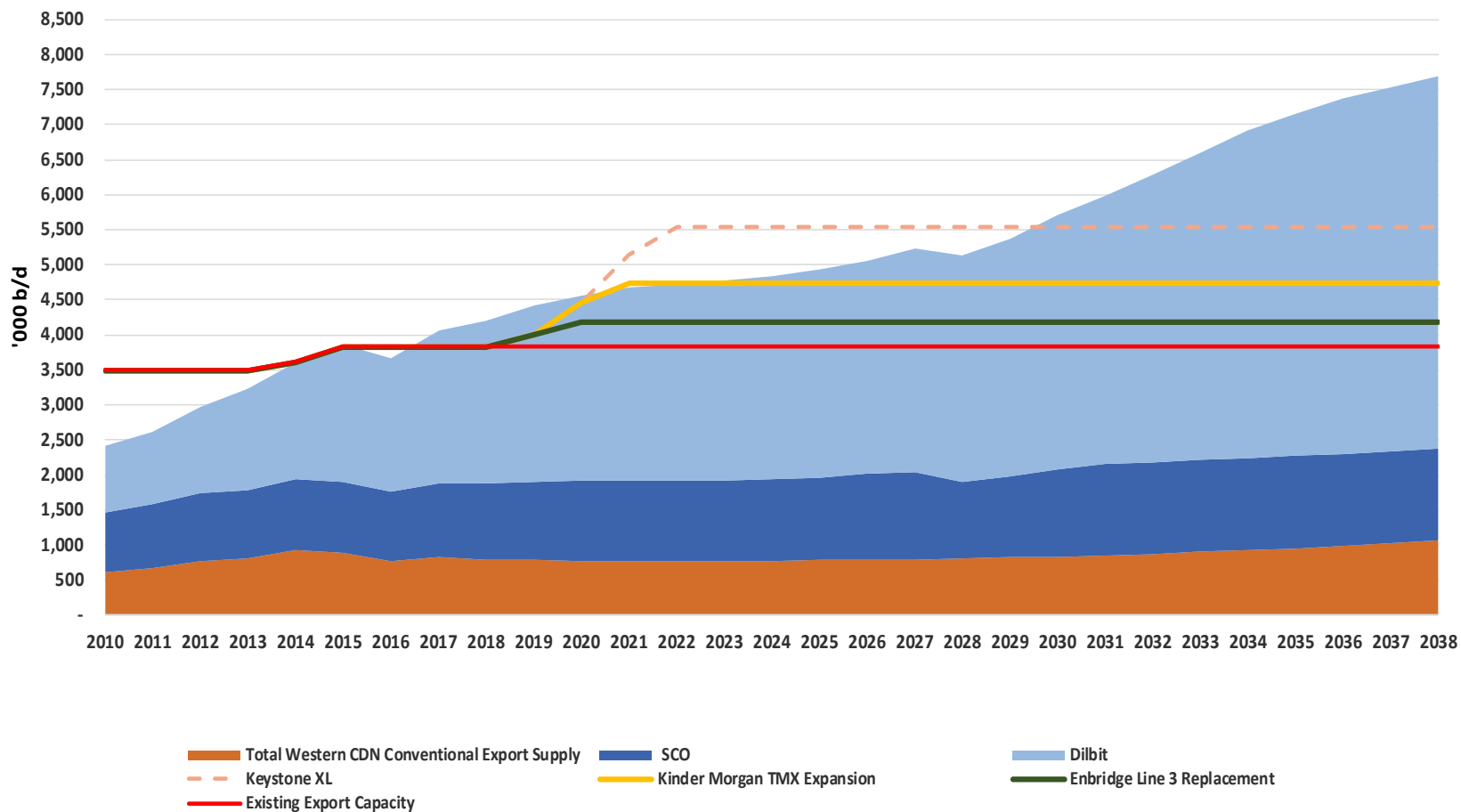


Source: CERl, Canoils

CO₂ eq. Emissions from Oil Sands Production



Western Canadian Crude Supply and Market Access

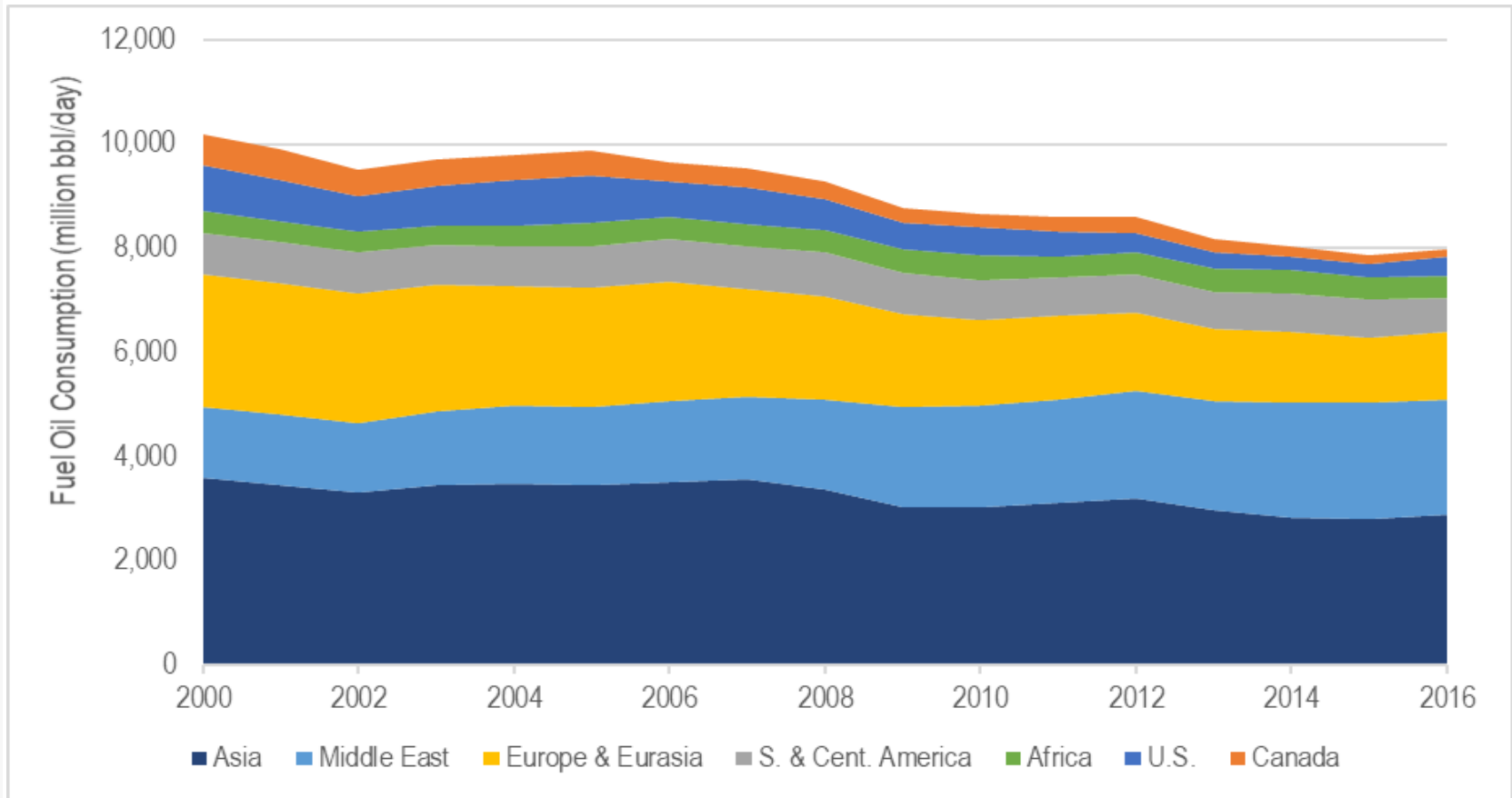


IMO and the Sulphur Regulation

- International Maritime Organization established in 1948 – original mandate was safety
- Pollution became part of its mandate after a marine oil spill in 1967 – focus on oil tanker safety
- International Convention for the Prevention of Pollution from Ships (MARPOL) – 1973 – disposal of liquid, solid and gas wastes
- Sulphur cap has been getting progressively stricter – 4.5% prior to 2012, after 2012 the cap moved to 3.5% for international waters
- Emission Control Areas – North America and Europe – Sulphur cap was 1.5% prior to 2010, after 2010 it was 1.0% and as of 2015 it is 0.1%
- New regulation moves the international waters cap to 0.5% effective 2020
- Previous changes in Sulphur standards have been addressed by new fuel formulations and installation of Sulphur scrubbers on ships

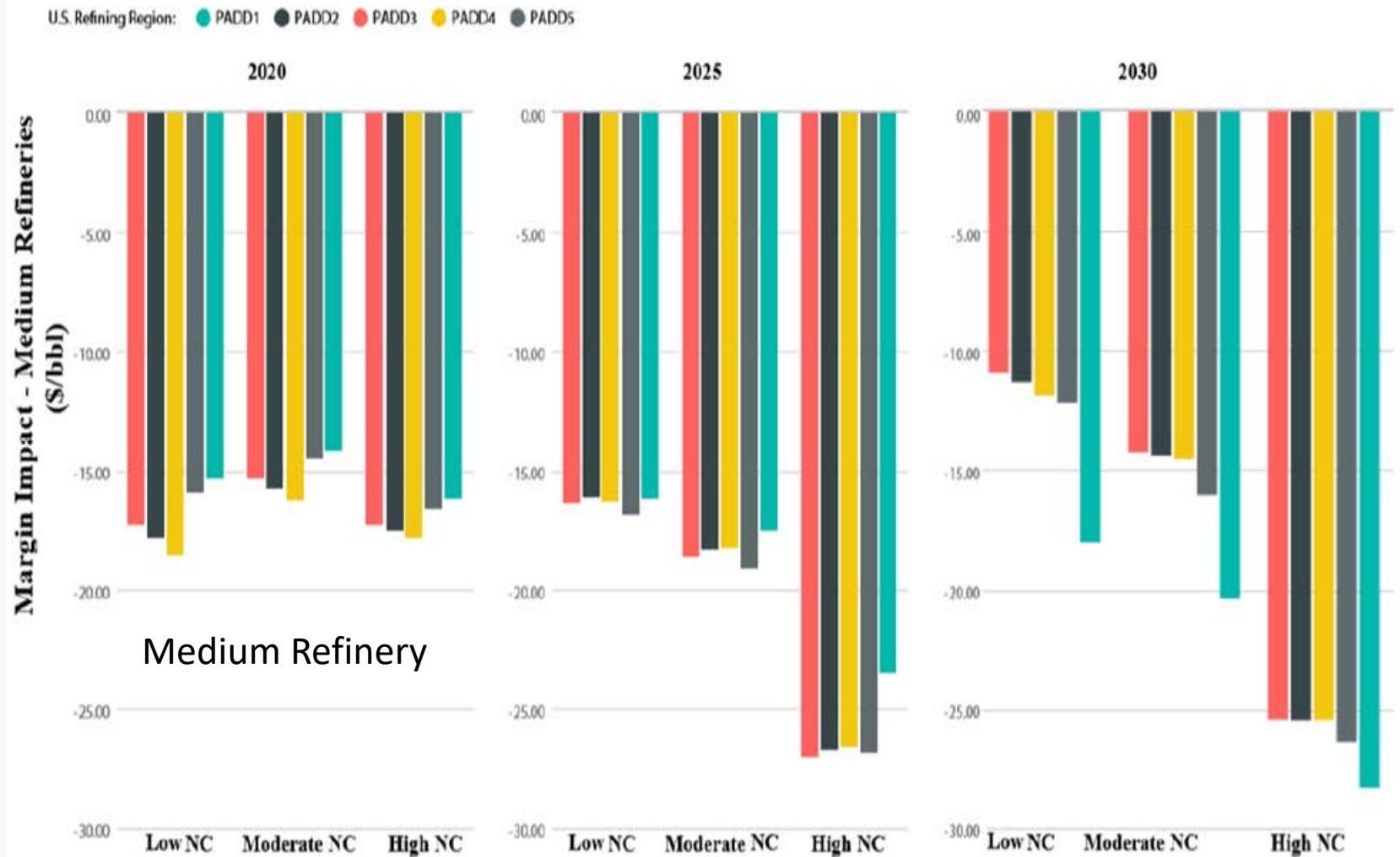
Source: Bloomberg

Global Residual Fuel Oil



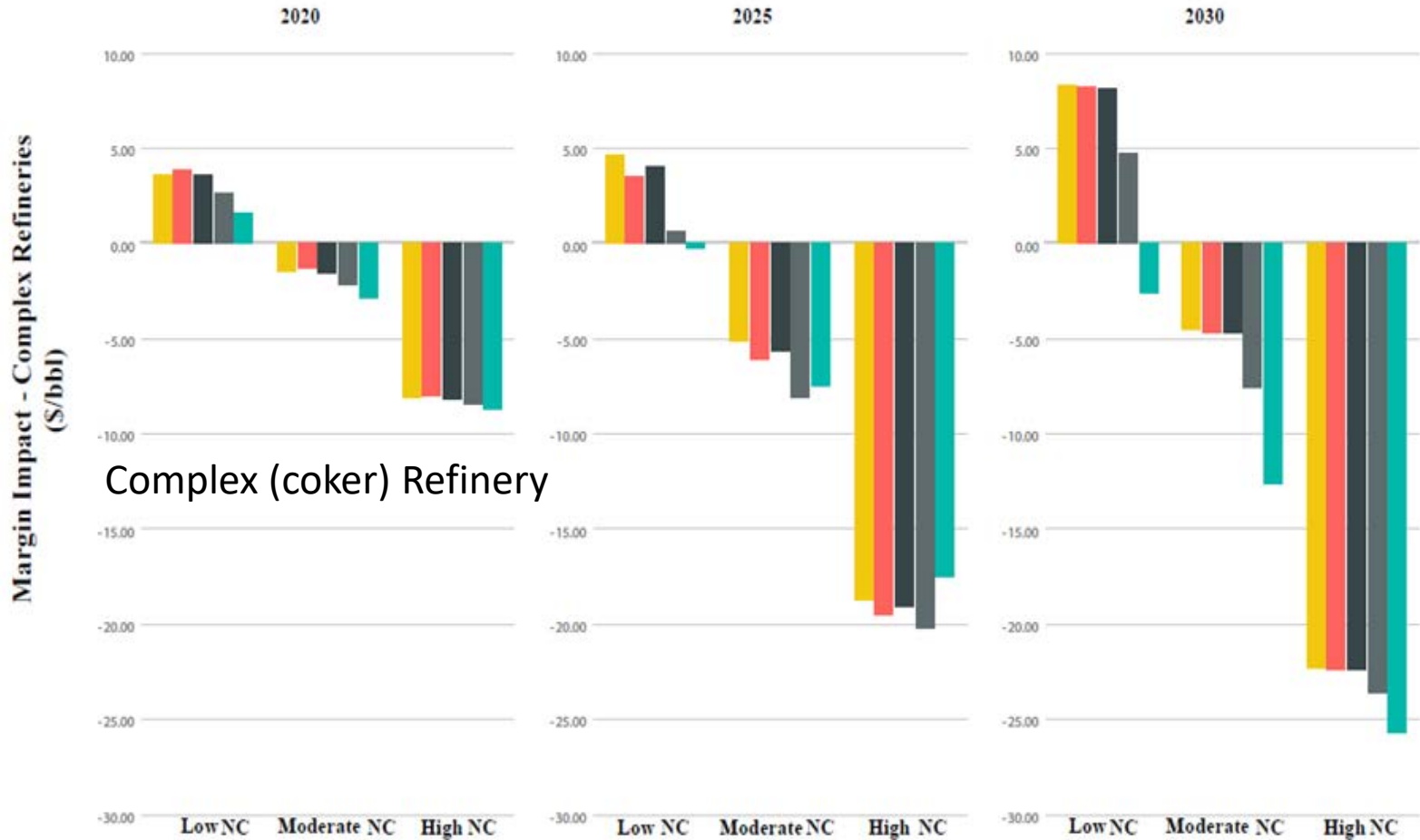
- Residual fuel oil market approx. 7.2 mil bbls/day
- High Sulphur resid is approx. 46% of that demand

Refinery Margin Differentials due to Sulphur Regulation

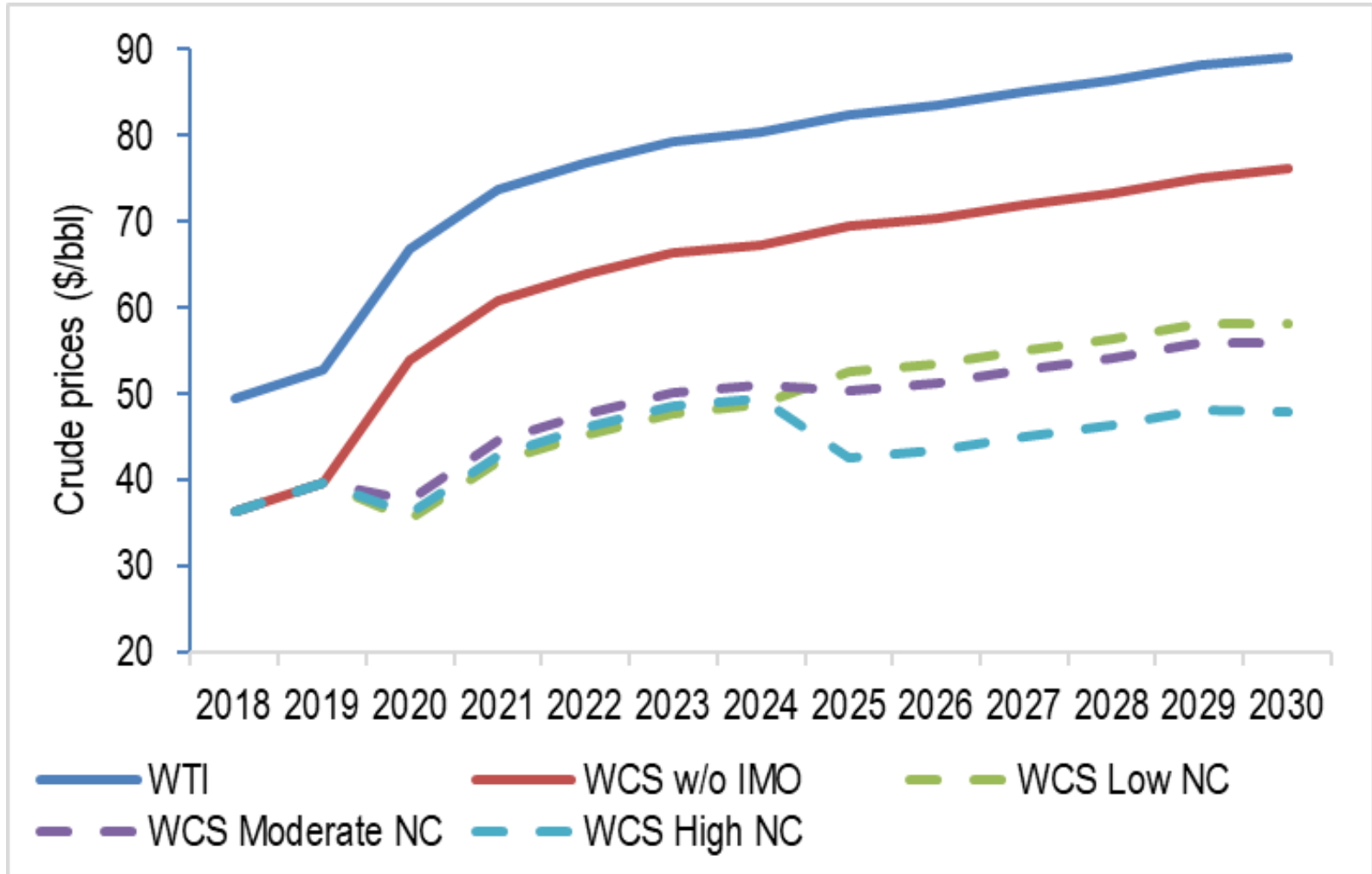


Refinery Margin Differentials due to Sulphur Regulation

U.S. Refining Region: PADD1 PADD2 PADD3 PADD4 PADD5



WCS/WTI Price Differentials



Uncertainties/Challenges

- Changes in regulatory processes (EIA process, redesign of NEB)
- Lack of market access to international and US markets
- Widening price differential between WCS and WTI
- Production and price risks from the upcoming IMO regulation regarding sulphur levels
- Concerns of competitiveness of Canadian industry versus other regions, such as the US
- NAFTA renegotiations

Opportunities

- Reasonable growth for oil sands production
- Production costs have been decreasing
- Increased differential improves the business case for domestic upgrading – full or partial
- Rail Transportation
- Innovation in extraction/drilling methods for bitumen and further processing

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Natural Gas Liquids Market and Pricing

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Emissions Reduction**

Transportation Demand Scenarios

