

# IMPACTS OF THE IMO SULPHUR REGULATIONS ON THE CANADIAN CRUDE OIL MARKET



# 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 Energy Conference.

# Canadian Energy Research Institute

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# Presentation Outline

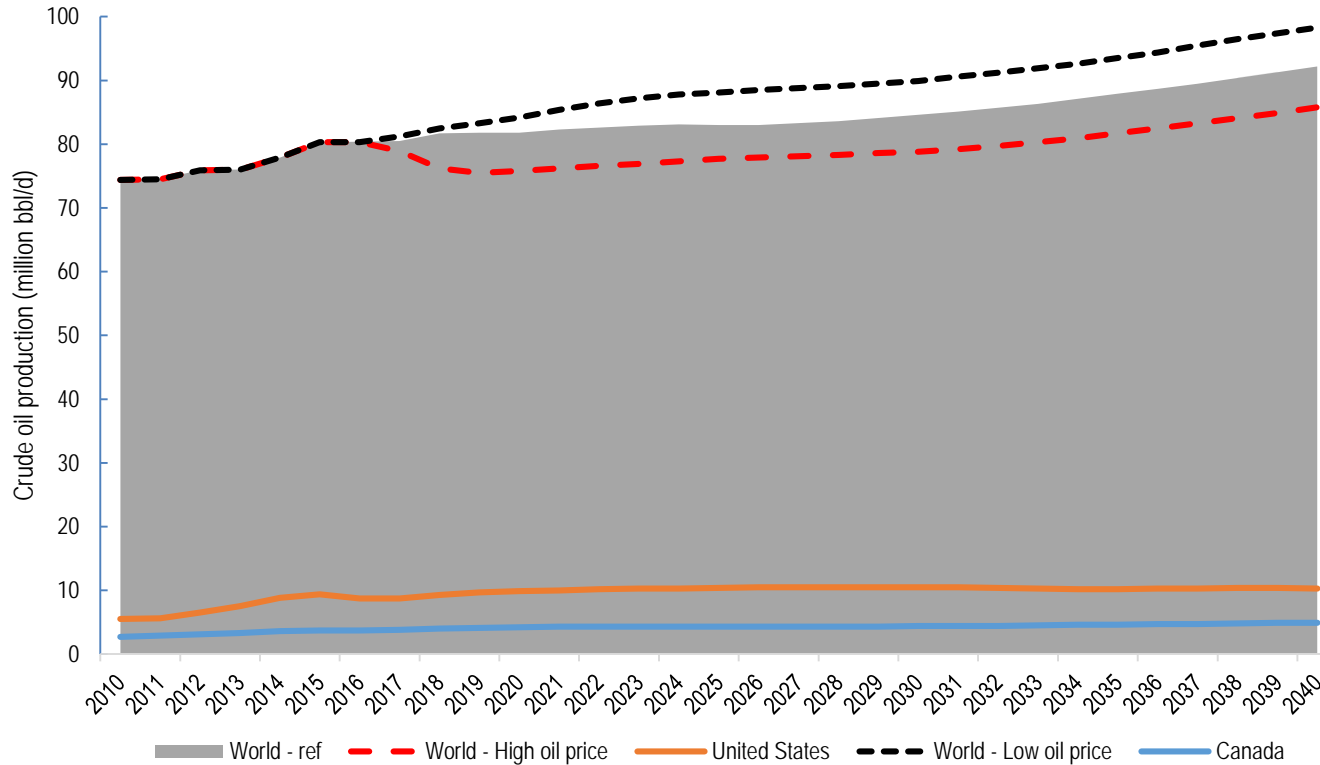
- IMO and Sulphur Regulations
- Marine Crude Market
- Refinery Market
- Marine and Refinery Market Scenarios
- Impacts on Canada

# 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

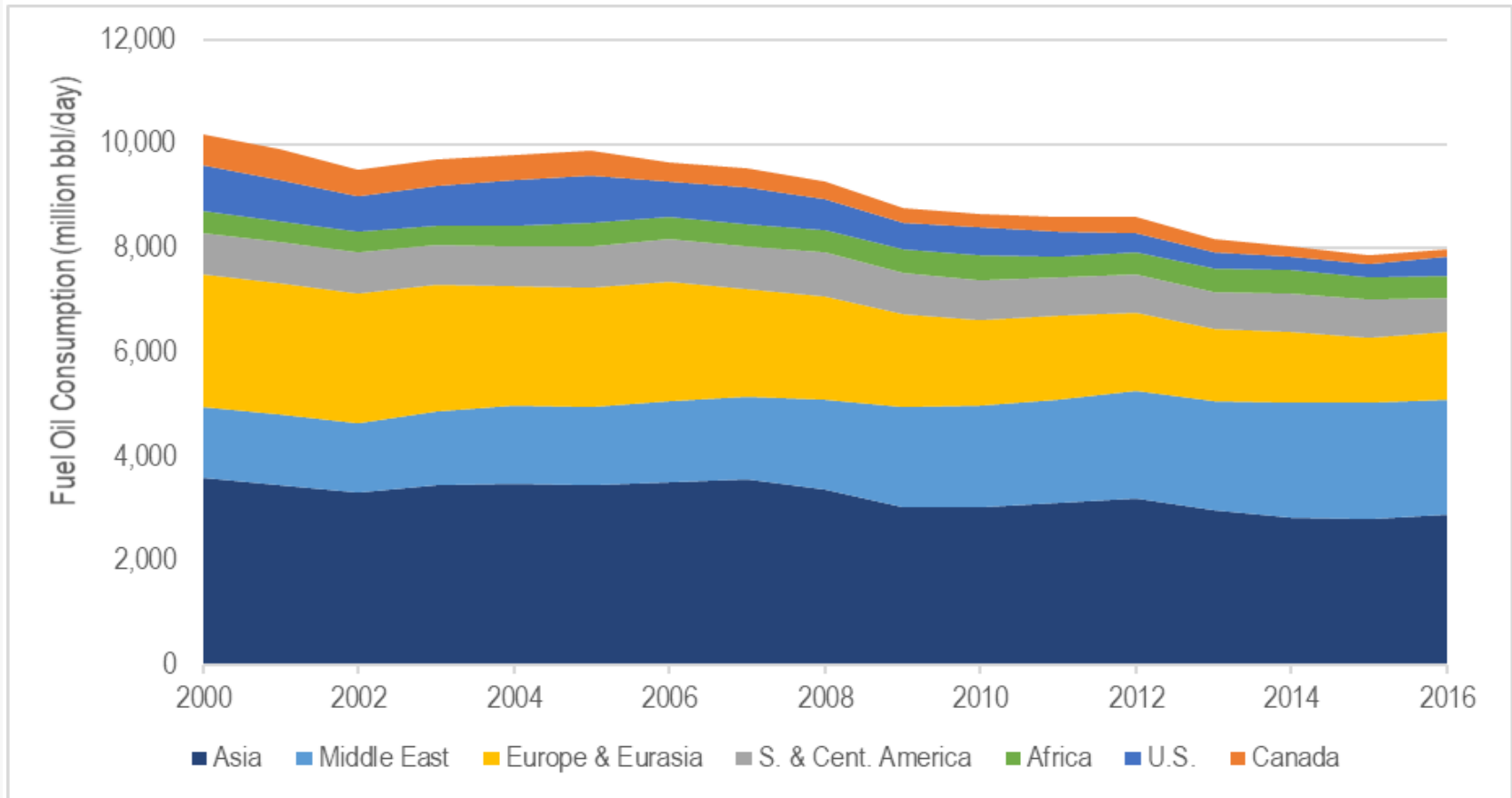
Source: Bloomberg

# Marine Crude Market: Crude Production



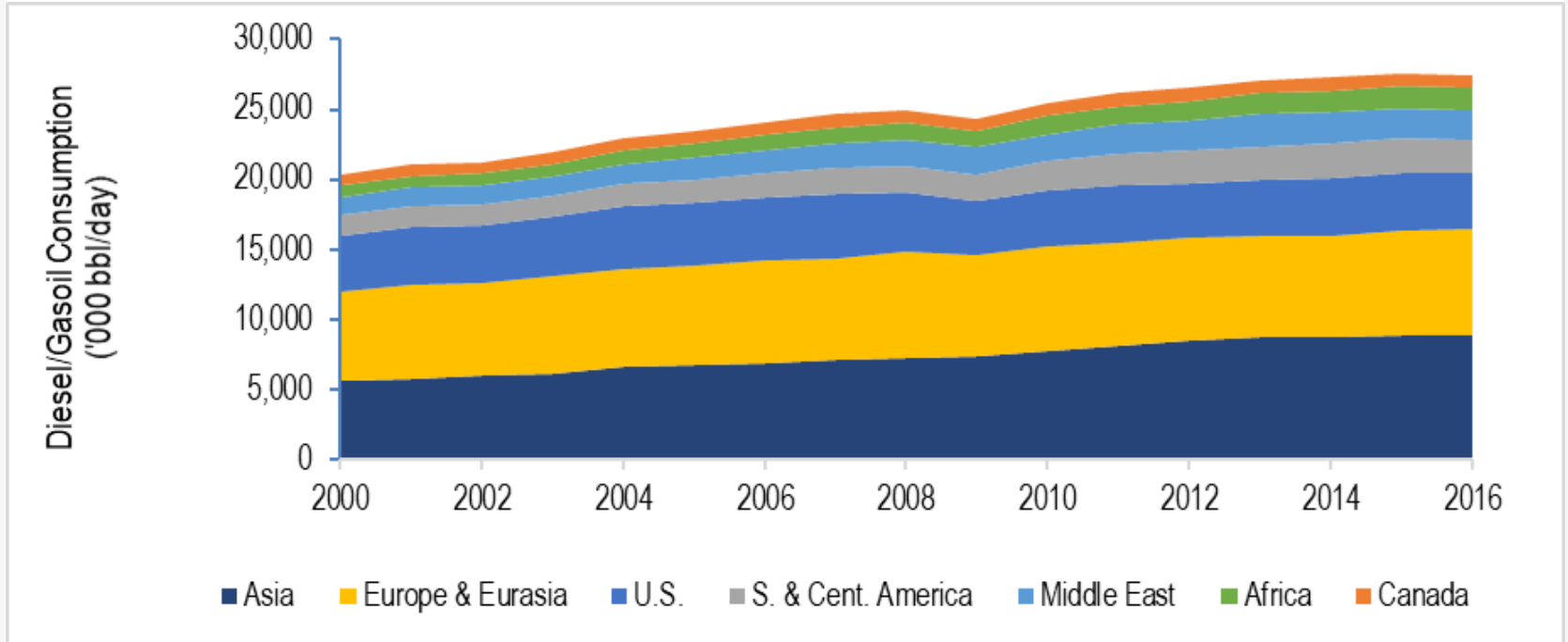
- Oil demand increasing annually by 0.7% past 2040.
- Currently sour and medium sour crudes make up 65% of supply
- Marine bunker fuel accounts for 4% of demand

# Global Residual Fuel Oil



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

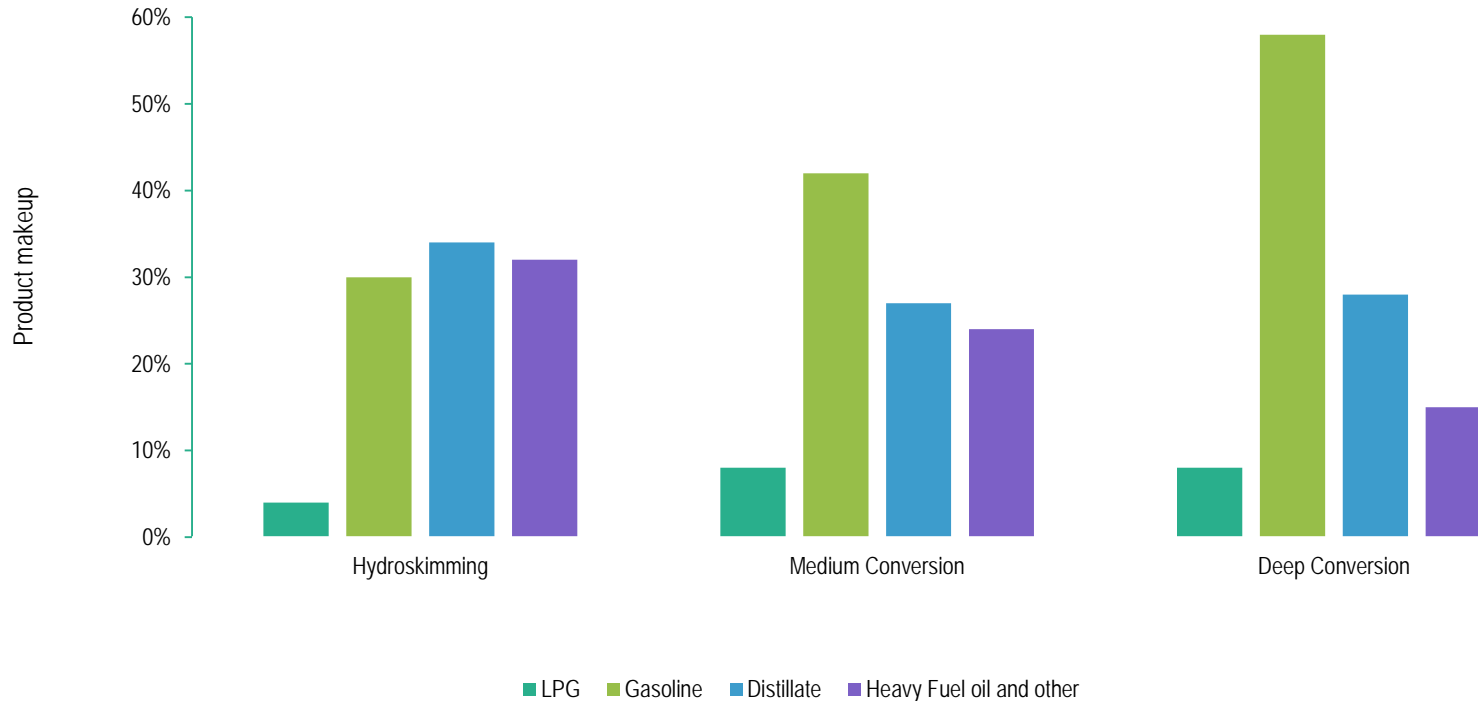
# Middle Distillates Market



- Diesel and Gasoil can replace high Sulphur resid
- Insufficient refining capacity to meet the expected demand for these middle distillates as a substitute for resid.
- More expensive fuels compared to high Sulphur resid

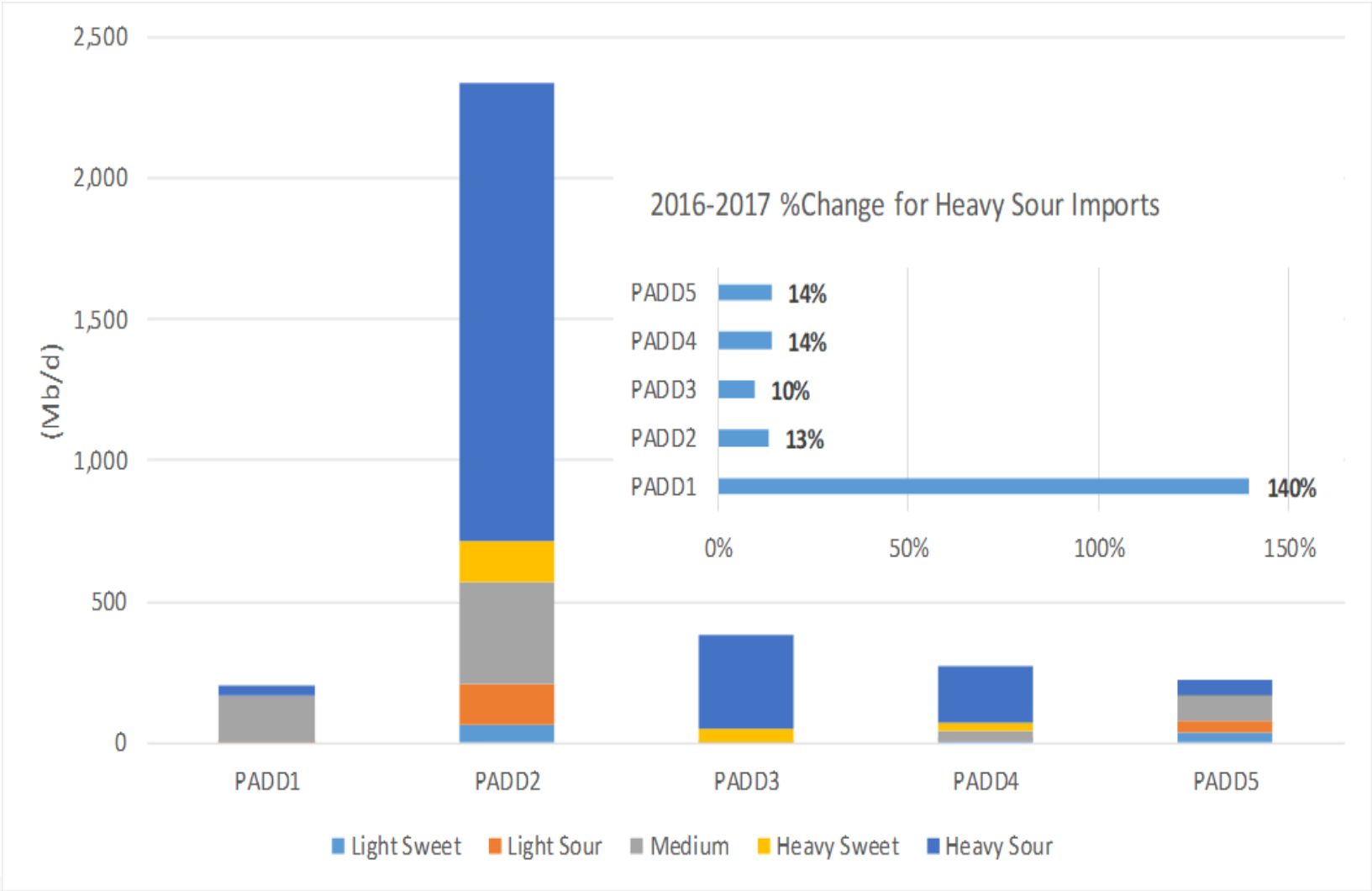


# Refinery Market

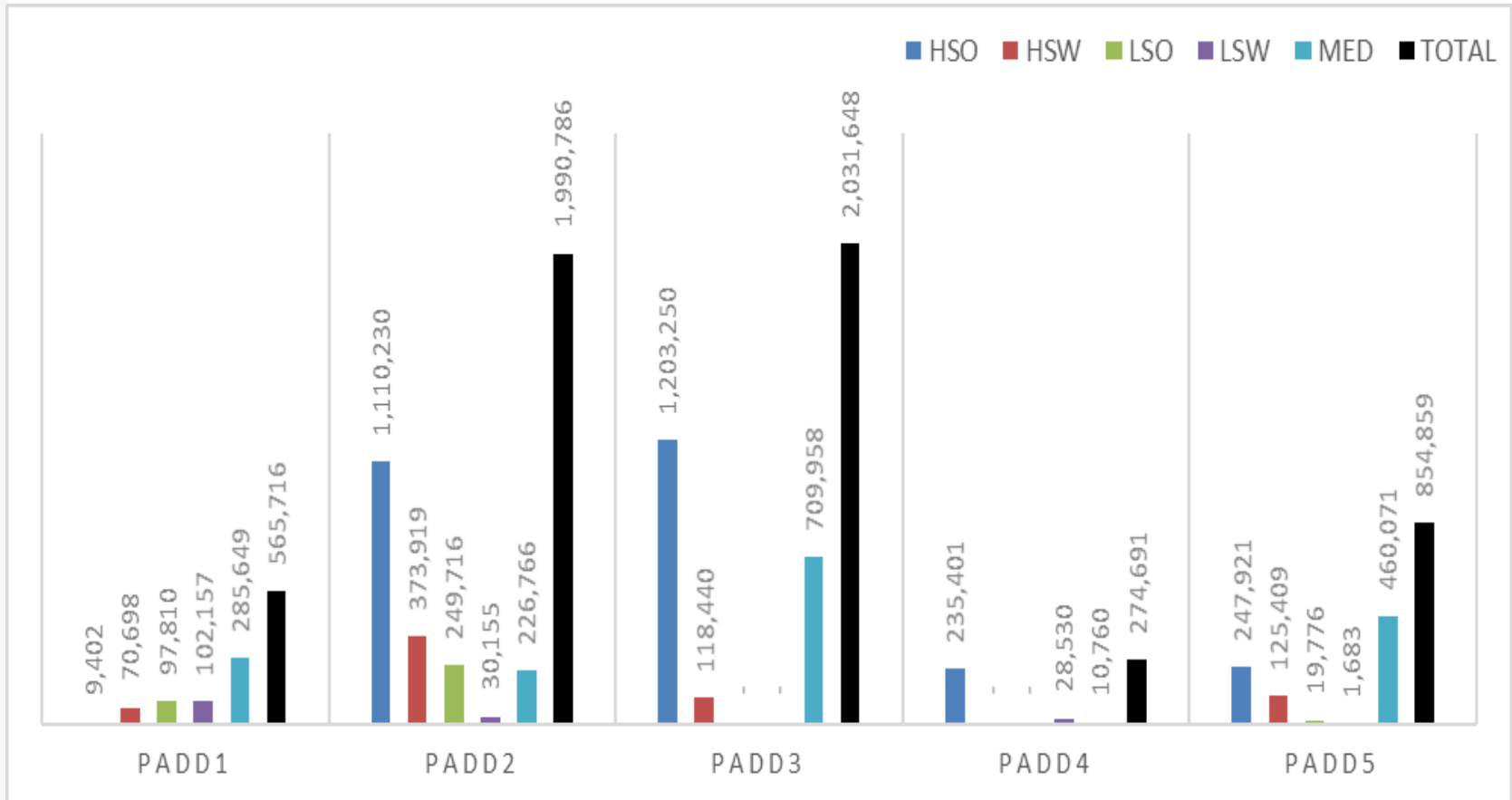


- Complexity of refinery determines the product yield. More complex refineries yield higher value products
- Simpler refineries will now have a smaller market for high Sulphur resid.
- High Sulphur resid market = power generation = coal equivalency

# PADD 2 is Important



# How CERI Analyzed the Impact

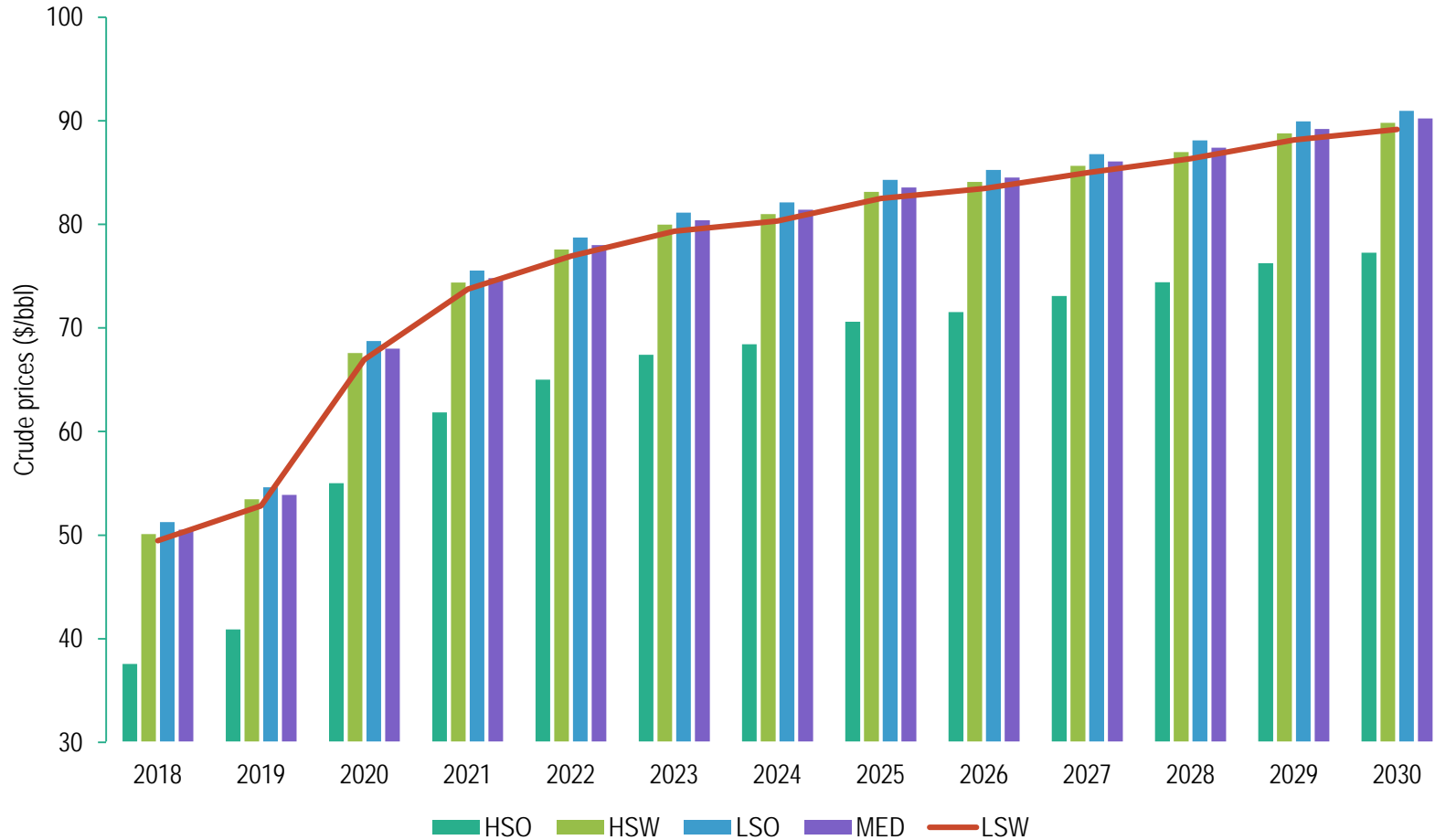


- Refinery model by PADD to assess refinery margins and crude feedstocks
- Most high sulfur oil processed in PADDs 2 and 3
- PADD 4 has highest percentage of simple refinery configurations.

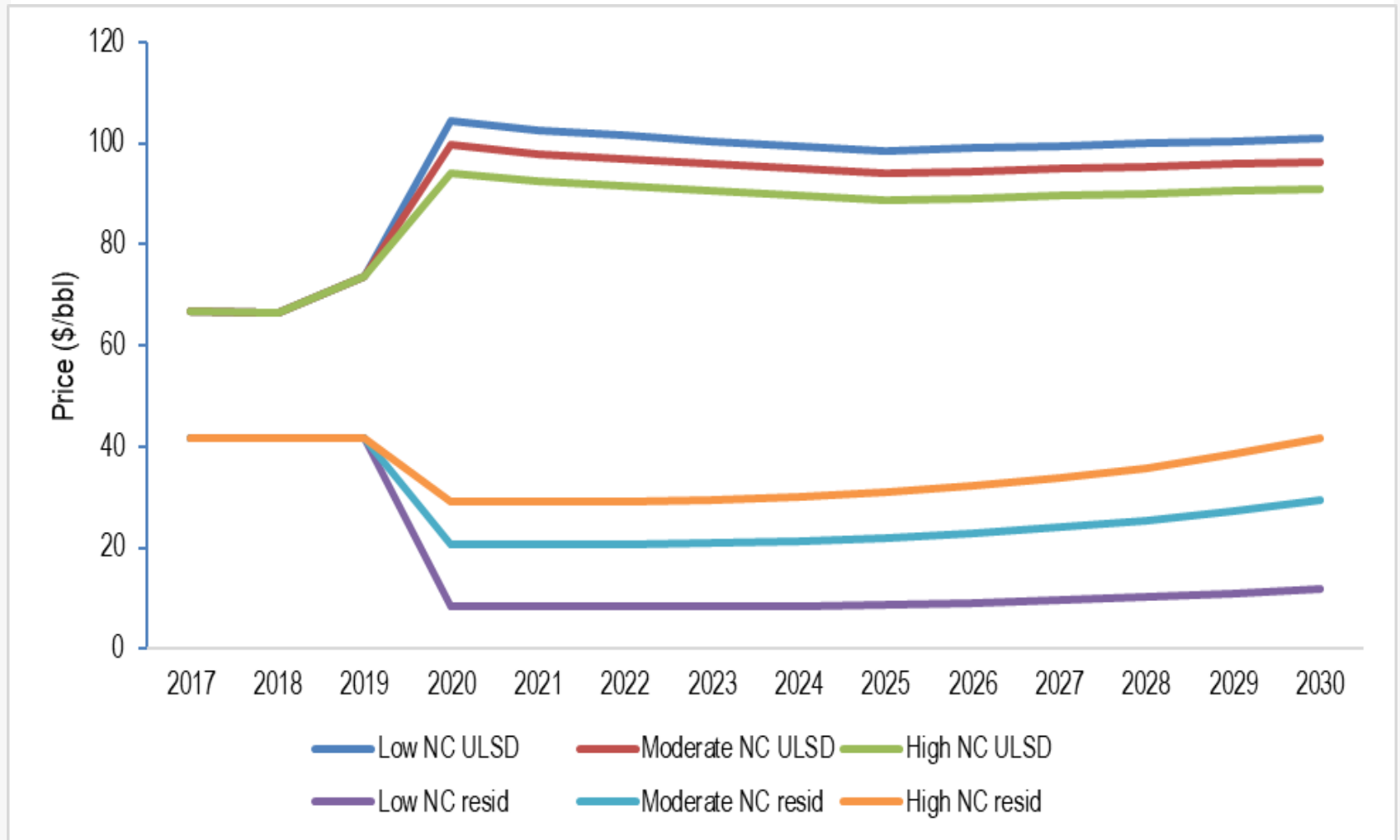
# Market Responses

- Refineries invest to further refine and desulphurize heavy sour crude
- Marine industry looks to replace high Sulphur residual fuel oil with:
  - Middle distillates
  - Low Sulphur resid
  - Scrubbers
  - LNG
- Shipper non-compliance
  - enforcement by host countries
  - Current compliance rates above 85%
- Upgrading by producers?

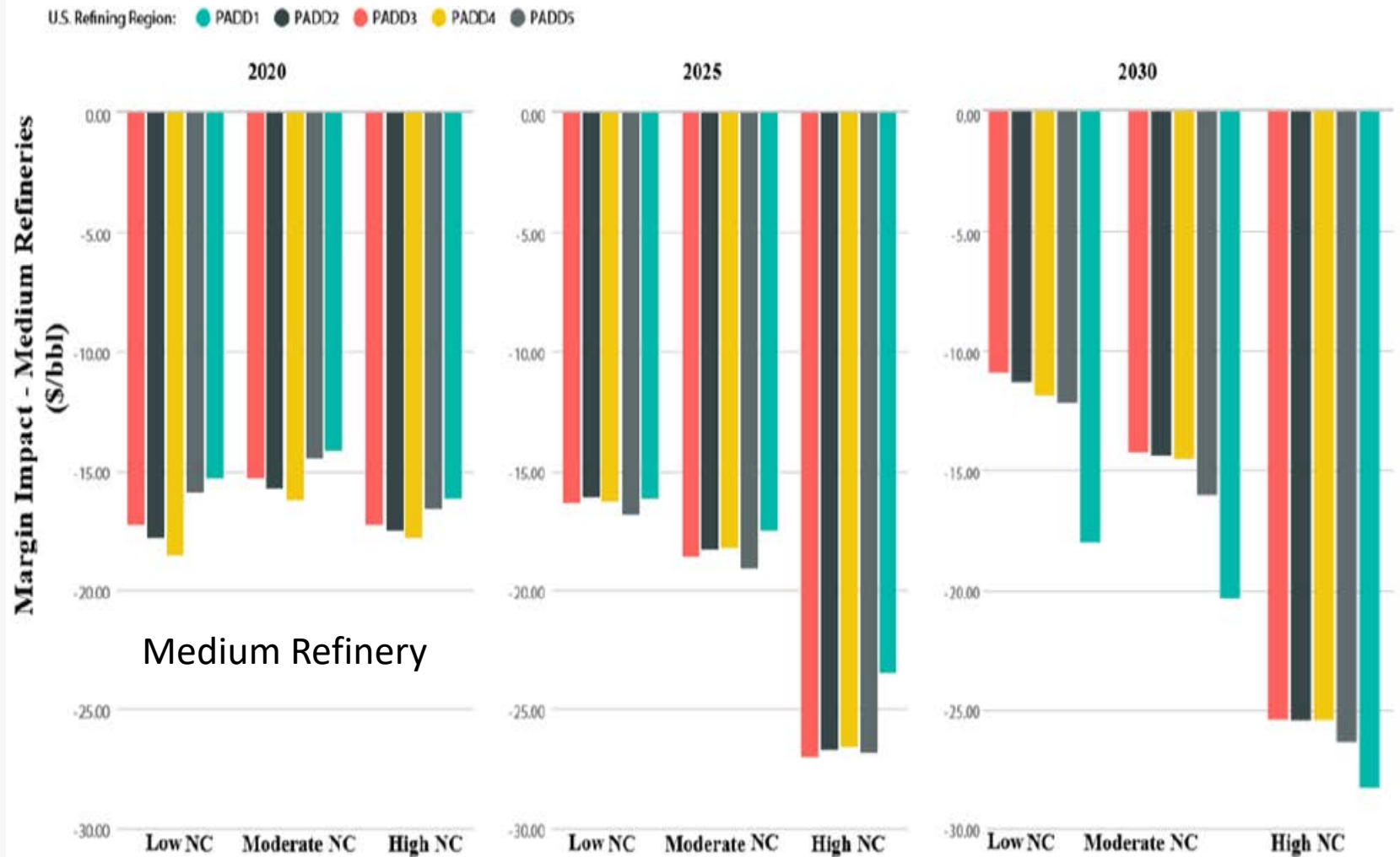
# Crude Price Projections



# Diesel and Residual Oil Price Projections

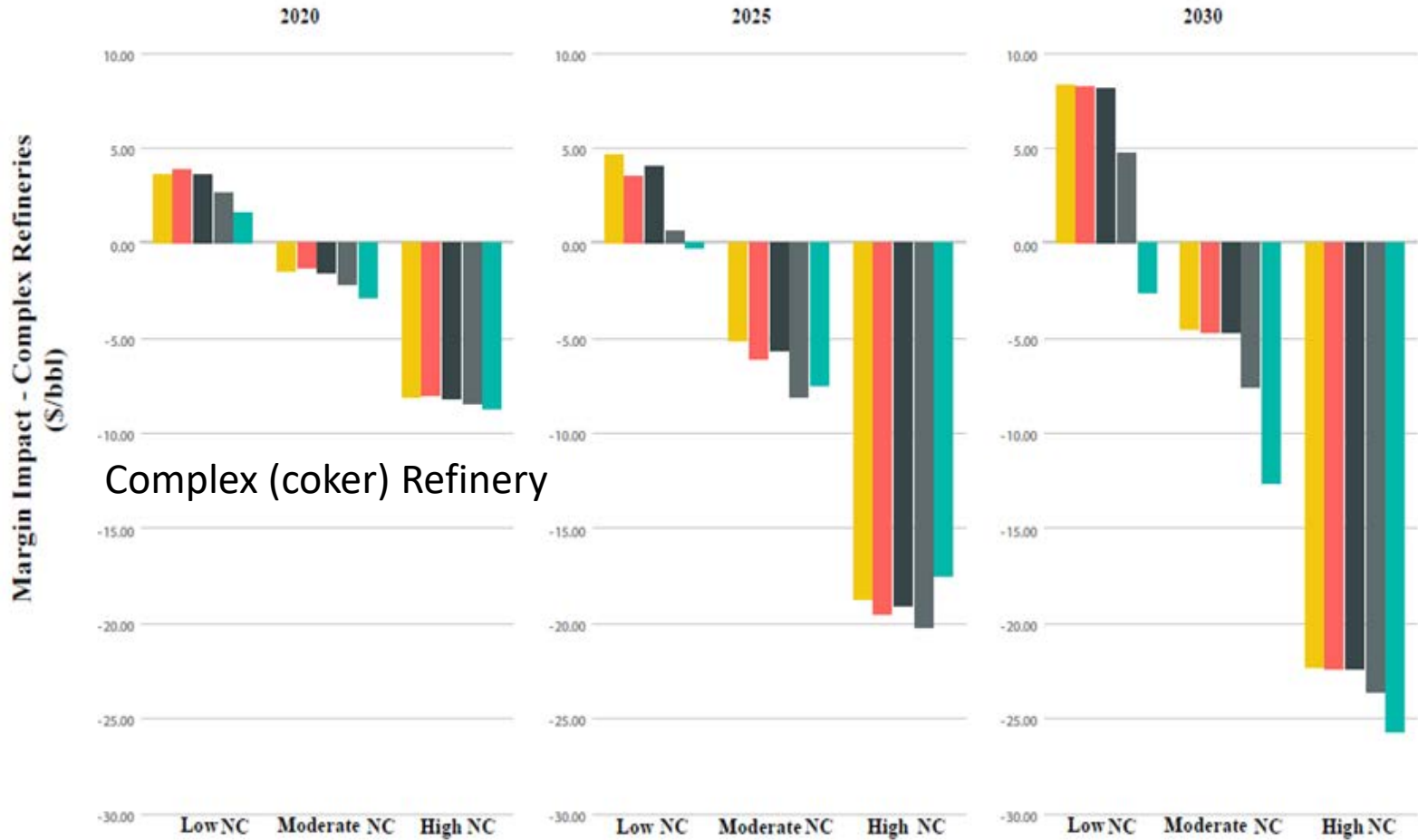


# Refinery Margin Differentials due to Sulphur Regulation



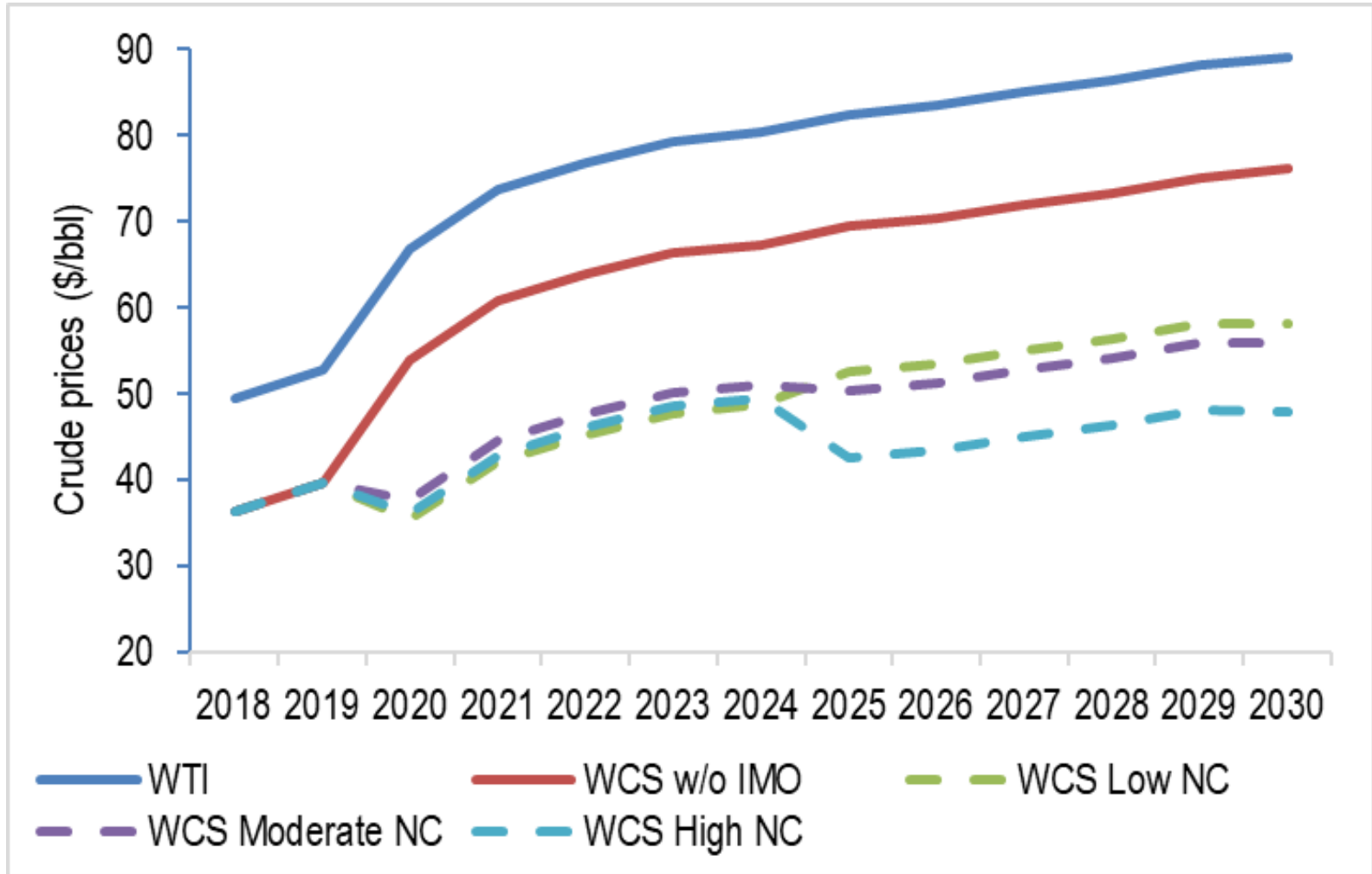
# Refinery Margin Differentials due to Sulphur Regulation

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






# WCS/WTI Price Differentials



## Conclusions

- Price differential will grow with the introduction of the IMO Sulphur regulation.
- Approximately 500,000 bbls of oil sands production at risk of becoming unprofitable (SOR >3)
- Increased differential improves the business case for domestic upgrading – in particular asphaltenes
- Look for options to move heavy sour crude away from PADD 4 (which we have assumed has a major influence on the price for Canadian Heavy Sour crude)

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