The European refinery of the future

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Our integrated approach allows us to spot trends and forecast future dynamics before anyone else.
The European refining industry has been undergoing a period of consolidation with a 2.1 million b/d net capacity reduction since 2000. The immediate need for further capacity reduction has subsided.

Europe* refinery throughputs and utilisation

Source: Wood Mackenzie

*Europe = EU28 plus Albania, Bosnia & Herzegovina, Iceland, Macedonia, Montenegro, Norway, Serbia, Switzerland, Turkey
European oil demand is in decline. Downside risks to transport fuel demand are evident, but petchem feedstock demand is robust.
Regional crude production is in long-term decline and getting heavier

Europe oil production forecast, million b/d

- Extra Heavy
- Heavy
- Medium
- Light
- Extra Light

Source: Wood Mackenzie Oil Supply Tool
Successful refineries maximise value-add, while minimising feedstock and operating costs

Net Cash Margin (EBITDA) = Gross Margin, $/bbl – Cash Operating Expenses, $/bbl

* Configuration effect is synonymous with Refinery Gross Product Worth (GPW)
European refiners face some challenges competing with refineries in other regions

Average regional refinery complexity, 2015

Regional gas spot prices

Average regional refinery crude cost 2015, $/bbl

Average regional refinery OPEX 2015, $/bbl

Source: Wood Mackenzie

Source: Argus Media, Datastream, NYMEX, Wood Mackenzie

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Competitive pressure from refiners in other regions will continue from existing and new build assets

European refiners will continue to invest to remain competitive

Source: Wood Mackenzie Refinery Evaluation Model
The carbon price is expected to rise under ETS IV, increasing costs for European refineries

The cost burden will not be evenly distributed

- Oversupply of emissions allowances to be resolved in the 2020s – Market Stability Reserve, linear supply reduction and allowance cancellation
- The tightening market coincides with rising fuel switching costs in power
- Average carbon price across Phase IV €30/tCO₂
- Proportion of allowances to be purchased (at auction) by the refining sector will rise from Phase III to Phase IV to Phase V
- Least efficient refiners faced with high carbon costs while operators in competing regions avoid similar liabilities

Source: Thomson Datastream (actual) & Wood Mackenzie (forecast)
Petrochemicals integration can provide higher margins and increase yield flexibility.

Indicative margin uplift from petrochemicals integration

Refinery margin  Ethylene cracker  BTX operation  FCC propylene  Logistics/OPEX  Integrated site margin

$/bl of crude input

Source: Wood Mackenzie
How does a European refinery evolve to become the refinery of the future?

It becomes a highly efficient, world scale industrial complex, able to adapt to a changing market environment.

Maximising value-add...

- Deep conversion
- Petchems integration
- Specialty products
- Power generation
- Effective trading operations/market integration
- Feedstock and yield flexibility

...and controlling costs, while ensuring compliance

- Automation & digitalisation
- Energy efficiency
- Low emissions
- Efficient logistics
- High product quality, renewables
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