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EU refining competitiveness

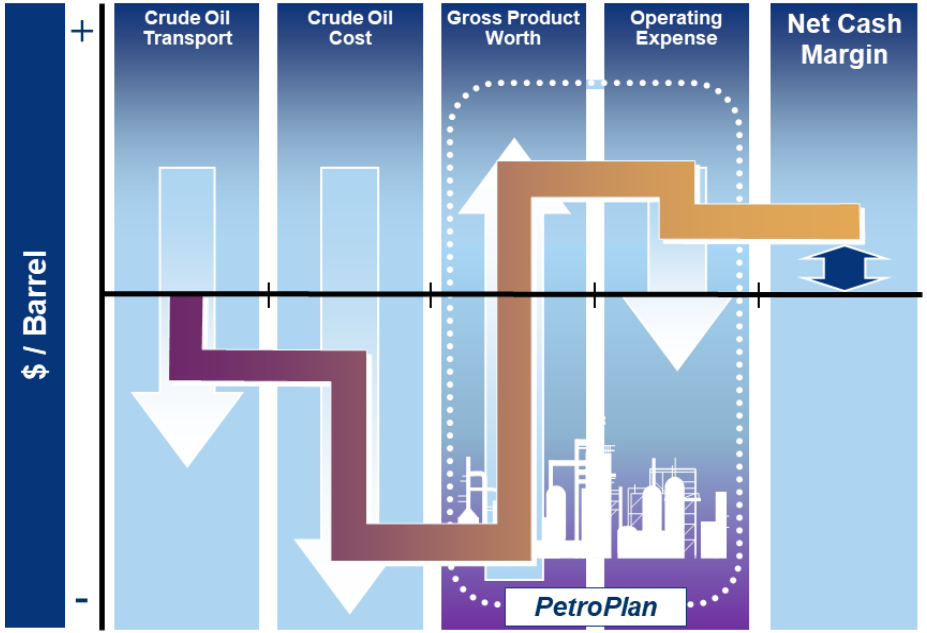
16th CONCAWE Symposium, Brussels

Oct 2026

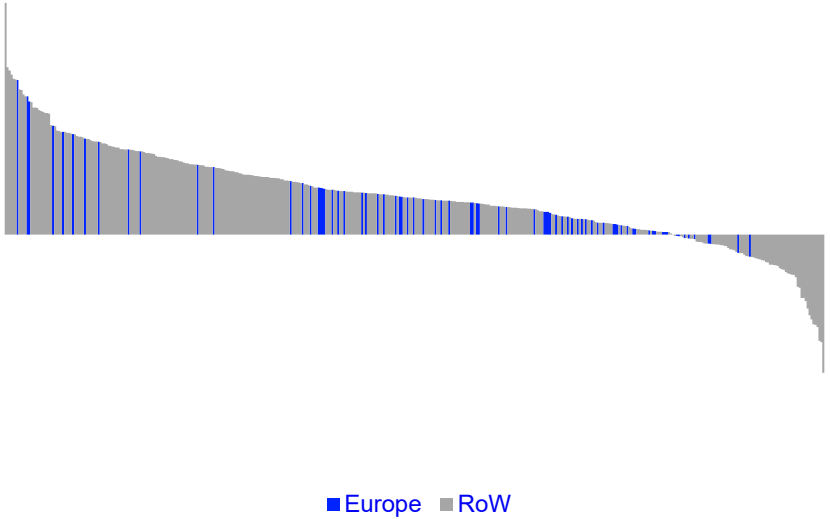


Wood Mackenzie's Net Cash Margin (NCM) methodology captures the critical elements that define refinery competitive performance

European refinery assets are distributed along the integrated NCM profile, but are typically third quartile in a global context.



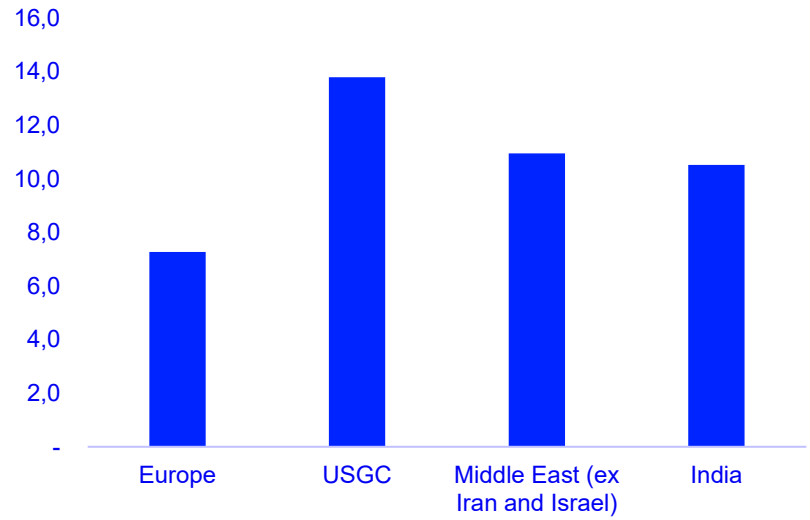
European integrated refinery NCM profile



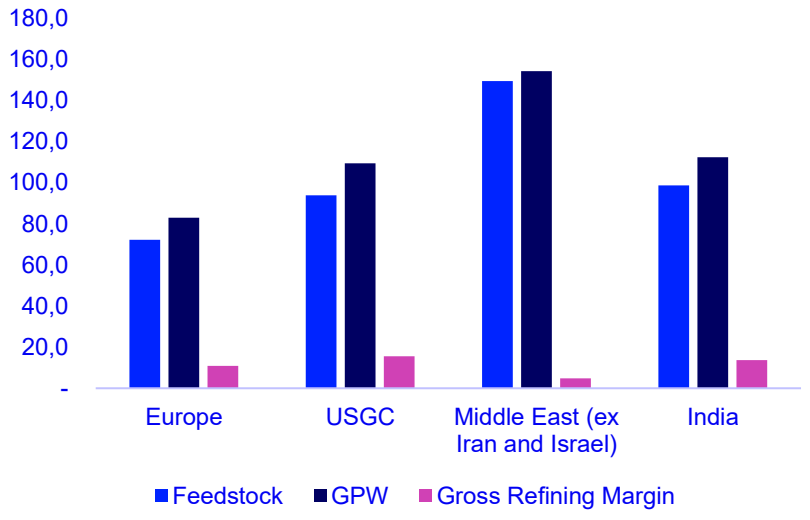
Europe’s low complexity delivers a low gross refining margin

The Middle East’s low aggregate gross refining margin reflects its location disadvantage when exporting both crude and products to long haul markets, as large parcel sizes result in higher netbacks for crude rather than products

Regional complexity comparison

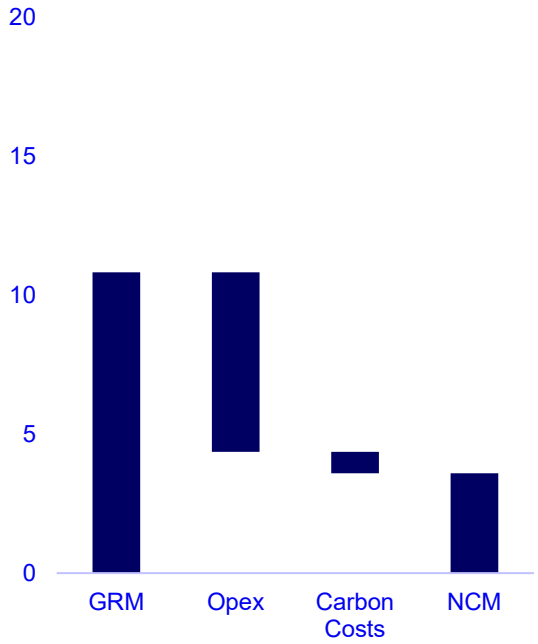


Regional gross margin comparison (US$/bbl)

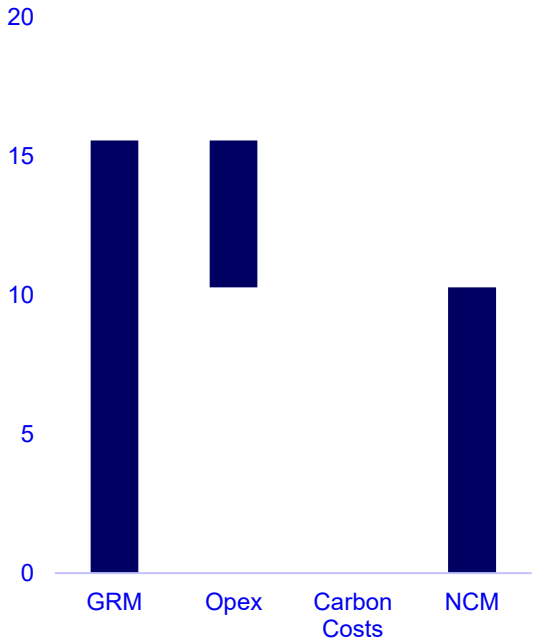


In addition, European refiners suffer high costs of operations and emissions relative to other regions, undermining competitiveness

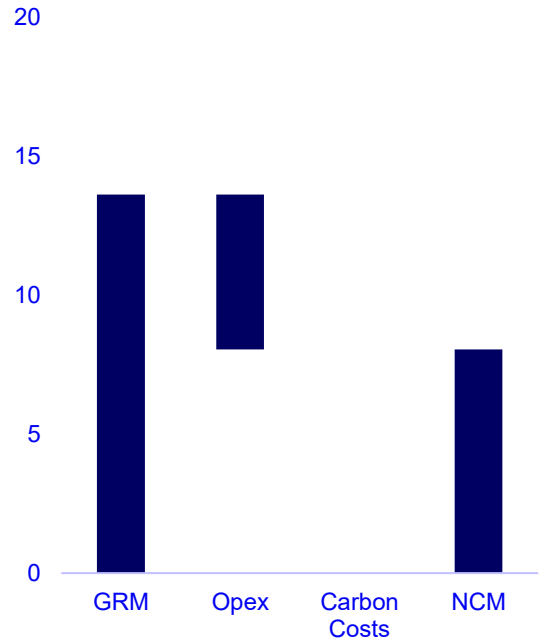
Europe gross to net refining margin (US$/bbl)



USGC gross to net refining margin (US$/bbl)



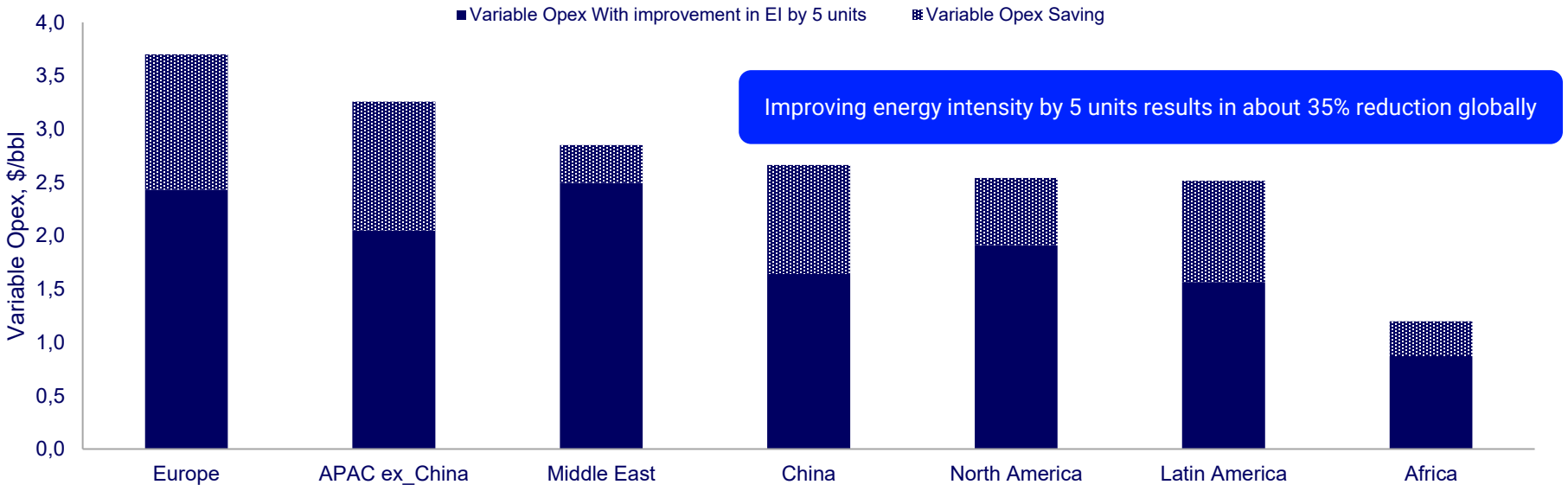
India gross to net refining margin (US$/bbl)



European refiners most value energy efficiency improvements. Average cost saving by improving energy intensity by 5 units is around US$ 0.9/bbl

We have developed an Energy Intensity metric that normalizes energy use for crude throughput and refinery complexity, measured by our Energy Complexity Index (ECI).

Variable Opex and savings with EI reduction, $/bbl

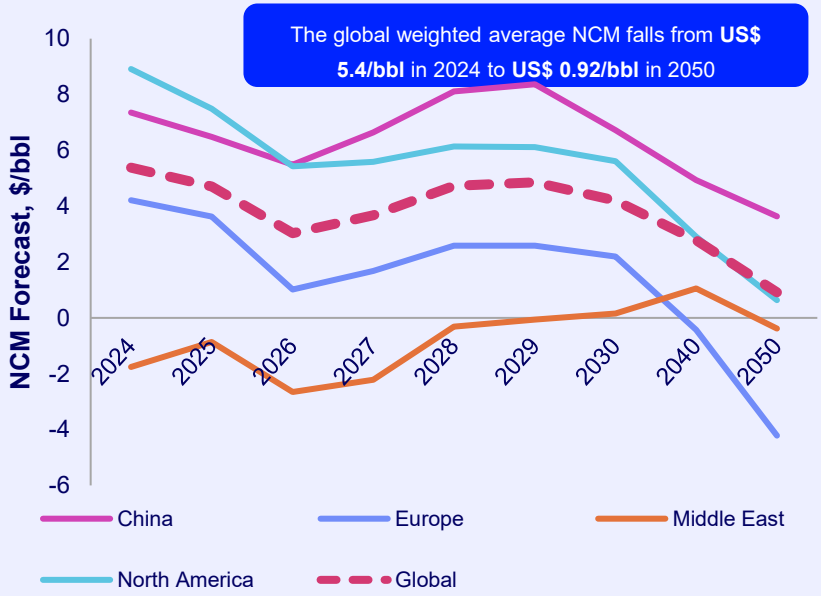


Source: Refinery Evaluation Model (REM), PetroPlan

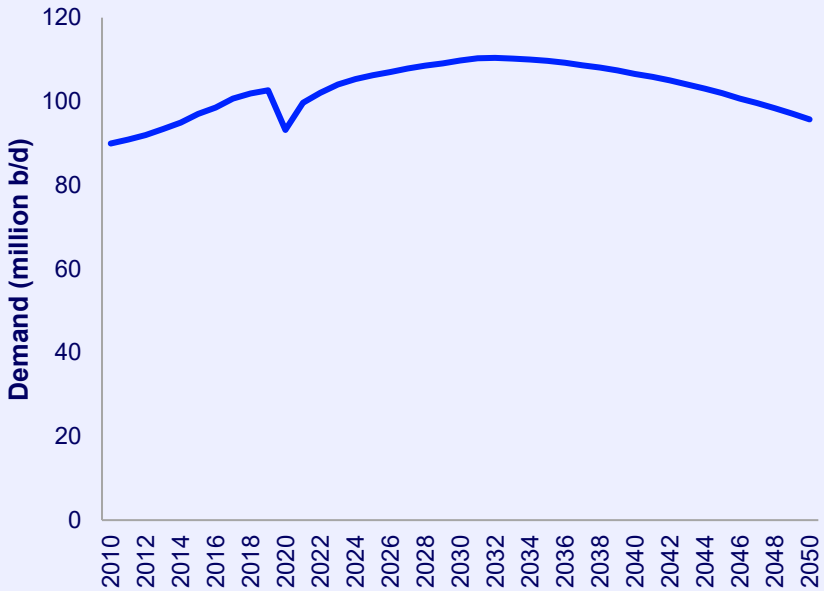
Survivability becomes a challenge for many refiners, as margins fall after global oil demand peaks in the early 2030s

European refiners are challenged by falling regional demand and their weak global competitive position. The CBAM does not provide sufficient protection to avoid Europe's accelerated refinery rationalization once global oil demand has peaked.

Regional Weighted Average NCM forecast, $/bbl



Global Oil Product Demand, Million b/d



Source: Refinery Evaluation Model

Note: Above chart represents refinery-only based NCM and no margin contribution from chemical integration

Based on our global REM refinery NCM forecast, our closure threat methodology captures several commercial and policy aspects in the refining industry

After the initial screening of over 425 refinery assets to create a shortlist of sites at risk in a 2035 post-investment margin environment, the risk of closure is ranked using several categories

1st filter screening

- 425 assets screened
- 2035 refinery margin with chemicals and biofuels assessed
- Asset is 3rd or 4th quartile globally AND
- Asset is 3rd or 4th quartile in its region

2nd filter screening

- Integrated 2035 NCM is less than - 0.5 US$/bbl (including impact of projects currently under development)
- Sites which could be at risk despite strong margin also considered at analysts' judgement

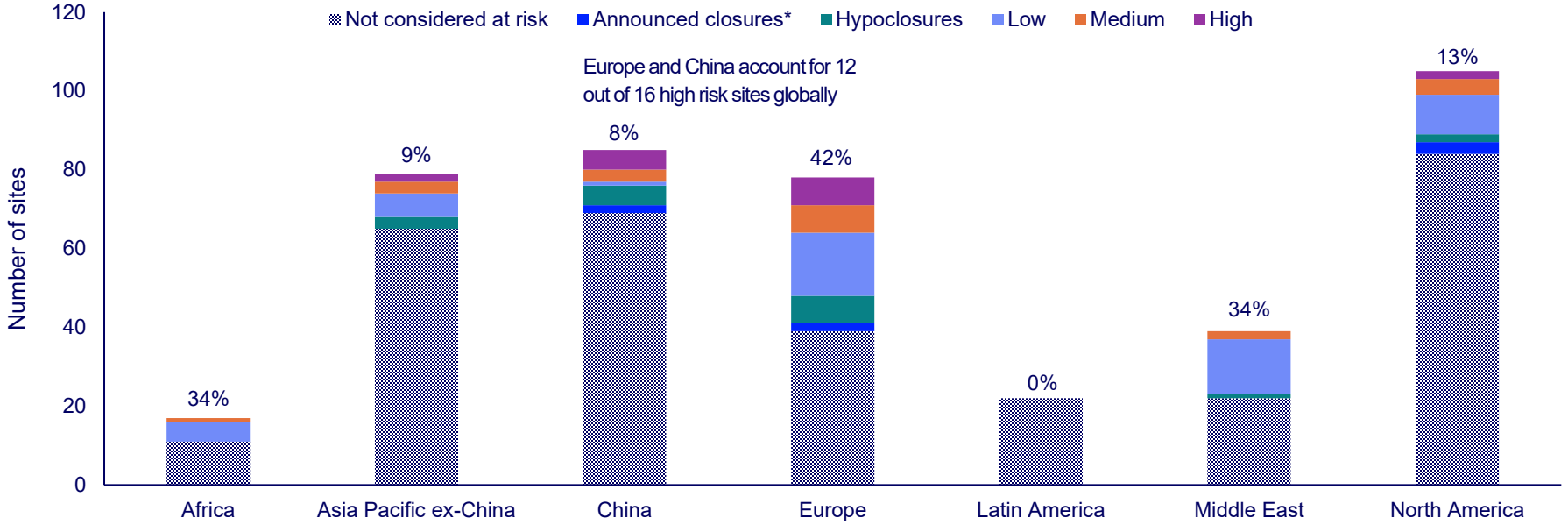
Risk level ranking

- Risk of closure based on scores from the following categories:
  - 2035 estimated integrated NCM (w/o carbon impact)
  - 2035 Emissions total cost quartile
  - Petrochemical closure risk
  - Environmental investment outlook
  - Strategic value
  - Ownership

Our shortlist flags 88 sites, representing 18% of global refining capacity with a cumulative 15.4 million b/d at risk of closure.

3 million b/d of hypothetical and announced closures are excluded from this analysis

Number of sites at risk per region



* Announced closures includes bio-site conversion

% region's refining capacity at risk

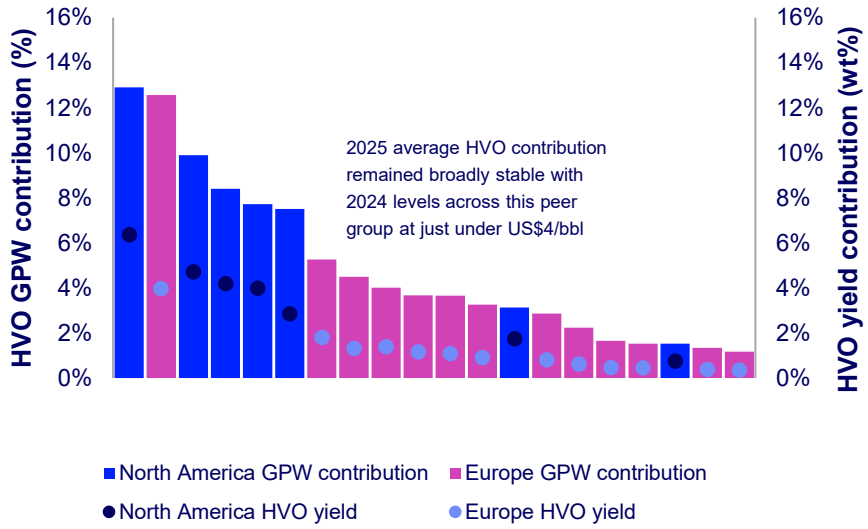
Note I: information about market dynamics in Appendix section
Note II: our analysis does not include Russian or Caspian assets

Source: Wood Mackenzie, REM, Product Market Services

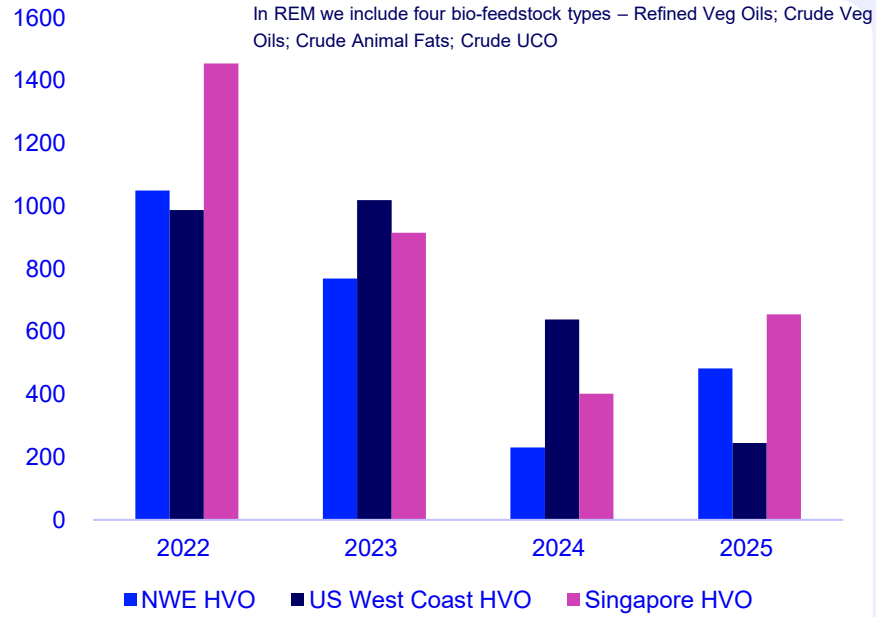
Renewable fuel (HVO) adds significantly to overall refinery margins

Sustainable Aviation Fuel (SAF) continued to deliver the highest renewable fuel margins globally

2025 Atlantic Basin HVO GPW contribution and yields



Historic global benchmark HVO Net Cash Margins



Source: Wood Mackenzie

Wood Mackenzie's new bio-transformation investment index evaluates the likelihood of a 2035 HEFA (HVO/SAF) revamp of fossil refining units

Sites at risk of closure are assessed based on their maximum fossil hydrogen availability and hydroprocessing capacities to calculate a maximum 2035 HEFA EBITDA, which is assessed against recent refining EBITDAs to judge transformation likelihood

Step 1: screening

- 106 sites assessed based on hypothetical closures (18) and the refinery closure shortlist (88)
- Low HEFA demand regions were excluded, Africa and Middle East, leaving 83 sites in our HEFA transformation analysis

Step 2: HEFA production potential

- Determine maximum hydroprocessing capacity available for HEFA revamp:
- Determine maximum fossil hydrogen availability from Steam Methane Reforming (SMR) units at each site (*hydrogen is an essential HEFA reactant*)
- Calculate maximum HVO and/or SAF production volumes from existing refinery units

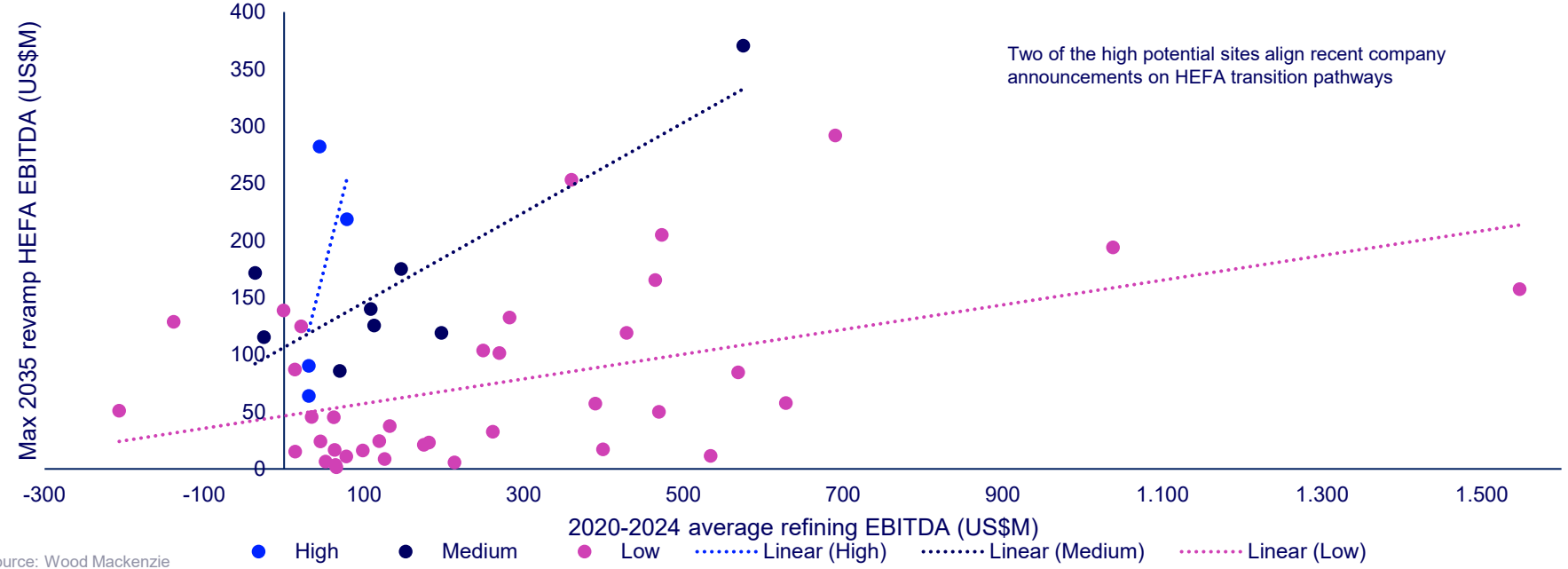
Step 3: HEFA Investment Index

- 50 sites with capabilities for significant HEFA production were assessed
- Calculated an index based on maximum potential 2035 HEFA EBITDA versus last 5-year average refining EBITDA
- A higher index score indicates a high value gain for a site transforming from its current fossil production to HEFA in 2035
- Adjust scorings based on a site's location, domestic HEFA demand, and ownership/strategic value

Complex hydroprocessing, coastally located, European refineries with poor historic refining margins rank highest in 2035 HEFA transformation attractiveness

Sites with government ownerships, inland locations, or low domestic demand forecasts have been downgraded on their 2035 HEFA index score – as their strategic value and difficulty in securing bio-feedstocks will lower their viability for a HEFA transformation

2035 HEFA investment index breakdown: 2035 HEFA EBITDA vs historic refining EBITDA

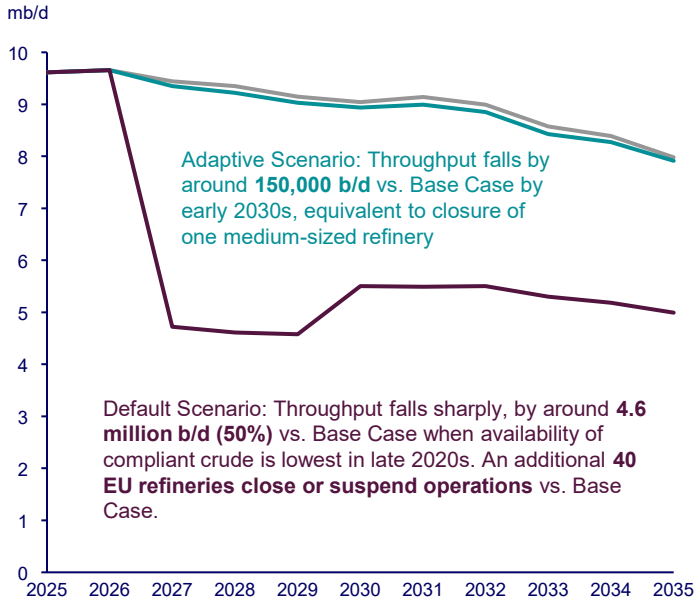


Source: Wood Mackenzie

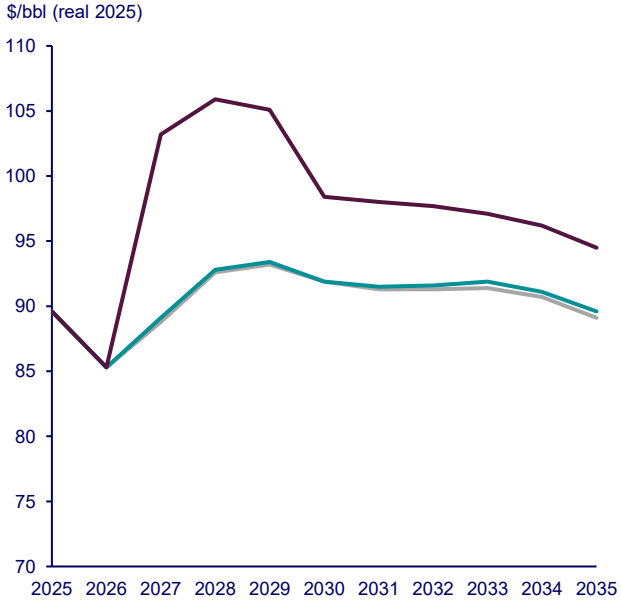
EU's Methane Reduction (MR) targets could force EU refinery throughput reduction, so raising the risk of accelerated refinery closures, supporting higher European fuels prices

Lack of MR-compliant crude limits EU refinery throughput. The "Adaptive Scenario" permits greater flexibility as exports from Norway, US, Canada, UK, Qatar and Nigeria deemed compliant. Refined product trade does not suffer same restriction.

EU Refinery Crude Oil Throughput



NW Europe Diesel 10 ppm price (pre-war scenario)



Base Case Adaptive Scenario Default Scenario

Source: Wood Mackenzie Refinery Supply Model

Note: Base Case price outlook is from late 2025

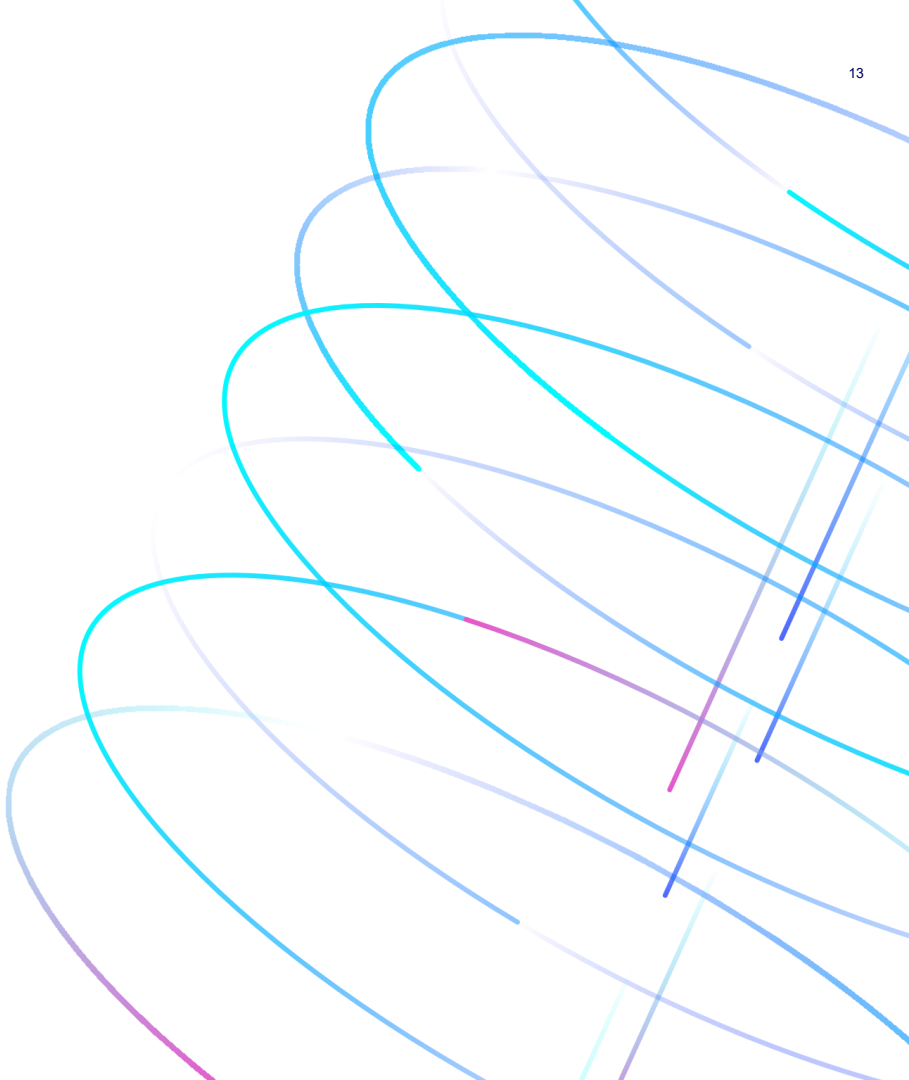
Key takeaways

01 EU MR legislation is an existential threat to EU refining's viability if poorly implemented

02 European integrated refinery petrochemical sites are globally competitive.

03 European refiners suffer from high energy and emissions costs, so are at the highest risk of future closure.

04 European refineries with poor historic margins rank highest in HEFA transformation



Q&A

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Appendix

We use our LP Simulator, PetroPlan, output to calculate Energy Intensity

Energy coefficient of Process unit represents the energy consumption per unit throughput ('000 ton)

Units	Throughput Barrels	Throughput Tonnes	Unit Energy Consumption (A)	Energy Coefficient (C)	Energy factors (D)
CDU	565820.0	77563.0	51433.6	663.1	1.0
VDU	245023.0	37687.0	13747.9	364.8	0.6
COKER	89120.0	14706.0	7717.4	524.8	1.2
DHCUN	53768.0	8316.0	10817.9	1300.9	2.0
CFHT	133136.0	19587.0	15512.3	792.0	1.2
FCC ZSM	119143.0		24669.7	1438.6	2.5
FCCNHT	29444.0		2942.5	849.2	1.3
DHT	221862.0		32855.4	1093.3	1.6
NHT	129950.0		14402.9	932.8	1.4
C5C6Isom	42856.0		13076.3	2823.0	4.3
CCR	110000.0	13254.0	16183.0	1221.0	3.3
ALKY	52075.0	4825.0	11446.6	2372.4	3.6
LPGRecoC3=	74684.0	6465.0	5362.9	829.5	1.3
GASIFSyngas	0.0	3734.0	3465.2	928.0	3.3
Auxiliary Units			124291.2		
Total			**347924.8**		**28.6**

Unit energy consumption is the total of fuel, steam, power and FCC cokeburn in MMBTU/day

Energy factor: represents the ratio of energy coefficient of a unit to energy coefficient of crude unit

Total energy consumption of a site (B)

Energy Intensity of a site (F) = (Total energy consumption, B)/ (CDU T'put X ECI (E))

EI = (347924.8)/(565.82 X 28.6) =21.5

Energy complexity index (ECI) of a site (E)= sum of energy factors of all units

We assess six key variables to determine the threat of closure for each asset in our shortlist

Criteria	What we looked at	Weighting	Scoring unit	Scoring system			
Net Cash Margin 2035	Forecast NCMs in 2035 including investments and petrochemicals. Carbon costs excluded	35	Rank	**1** 1st quartile	**2** 2nd quartile	**3** 3rd quartile	**4** 4th quartile
Emissions total cost quartile	Maximum liable site emissions cost in 2035 excluding free allowances (scope 1& 2 emissions only)	25	Rank	**0** 1	**1** 2	**2** 3	**3** 4
Petrochemical closure risk	Impact of steam cracker closures on integrated refinery site net cash margin	10	No risk/ High/ Medium/ Low	**0** No cracker/no risk	**1** Low risk	**2** Medium risk	**3** High risk
Environmental investments	Major CCUS, biofuels, or green hydrogen investments to improve energy efficiency to reduce carbon footprint of the site or the liquid fuel	10	Rank	**0** - No regional 2035 CO_2 $, or - Regional 2035 CO_2 $ and carbon capture project with accessible storage by 2035	**1** Regional 2035 CO_2 $ with either: - Carbon capture project by 2035, or - Has other low-carbon projects by 2035	**2** Regional 2035 CO_2 $ with: no carbon capture projects and no other low-carbon projects by 2035	
Strategic value	Changes in net trade position if site closes / strategic value for owner	10	High/ Medium/ Low	**0** High	**1** Medium	**2** Low	
Ownership	Evaluates assets' non-commercial factors for continued operations (NOC / Independent / JV / IOC)	10	Type	**0** National Oil Company (NOC)	**1** Independent (IND) or Joint-Venture (JV)	**2** International Oil Company (IOC)	

A higher score indicates a higher risk of closure across all criteria.
The Excel deliverable allows clients to analyse the outcome based on their own assumptions and weightings.

The following methodology was used to index the attractiveness of a 2035 HEFA biotransformation for a refinery

Determine maximum fossil hydrogen production

- A refinery's maximum hydrogen production capacity via Steam Methane Reforming (SMR) was determined by selecting the higher of two operating scenarios:
  1. Fossil hydrogen production required when all refinery units operating at 100% utilisation; versus
  2. Minimum hydrogen to run any hydrocracking unit at 50% utilisation from SMR hydrogen only

Determine maximum HEFA capacity limits

- Refinery maximum hydroprocessing capacity for HVO and SAF production was determined by:
  1. **HVO**: maximum conversion-adjusted-capacity of all distillate hydrotreating and mild-hydrocracking units on site
  2. **SAF**: maximum conversion-adjusted-capacity of all full conversion hydrocracking units on site

Determine maximum HEFA production volumes

- Maximum HVO and SAF production volumes are constrained by either the availability of SMR hydrogen or by the capacity of the hydroprocessing units. Production volumes also vary for HVO and SAF based on yield-conversions and hydrogen requirements. We do not consider import or alternative sources of hydrogen (e.g. reformer or electrolyser hydrogen).

Calculate 2035 HEFA investment index

- Final assessment calculates a 2035 HEFA investment index – an index that compares the 2035 EBITDA potential from HEFA biofuels production against historic refining EBITDAs – assessing the attractiveness of a 2035 HEFA biotransformation from 1 (high) to -1 (low).

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