Making Waves – Disruption from bunkers to barges

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Nexant Corporate Profile

Services	**Market, strategic and environmental consultancy for M&A and intelligence**
Client base	**All major players in the energy sector, governments, financial institutions**

Agenda

- Big waves on the oceans: Global market dynamic
- Wave of change on the horizon: Impact of IMO 2020
- Heavy weather: European market dynamics
- Steadying the ship: Conclusions

26 March: Market trends, Analysis & Insight

10:15 - Current Refined Product and petrochemical Outlook

-Impact on demand for tank storage

-The rise of electric vehicles and impact of crude oil demand

- Supply and demand fundamentals

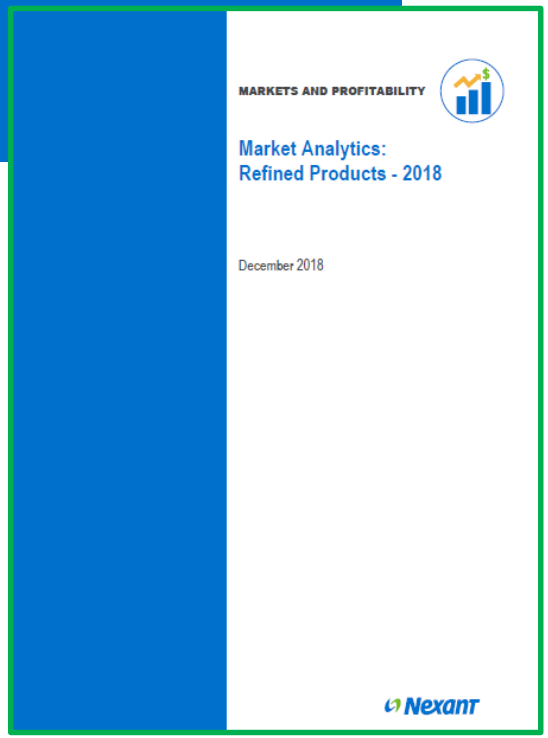
- How long will backwardation last?

- Iranian supply & other geopolitical factors on trade flows

Stephen Harrison, Principal, Nexant, Energy and Chemicals Advisory

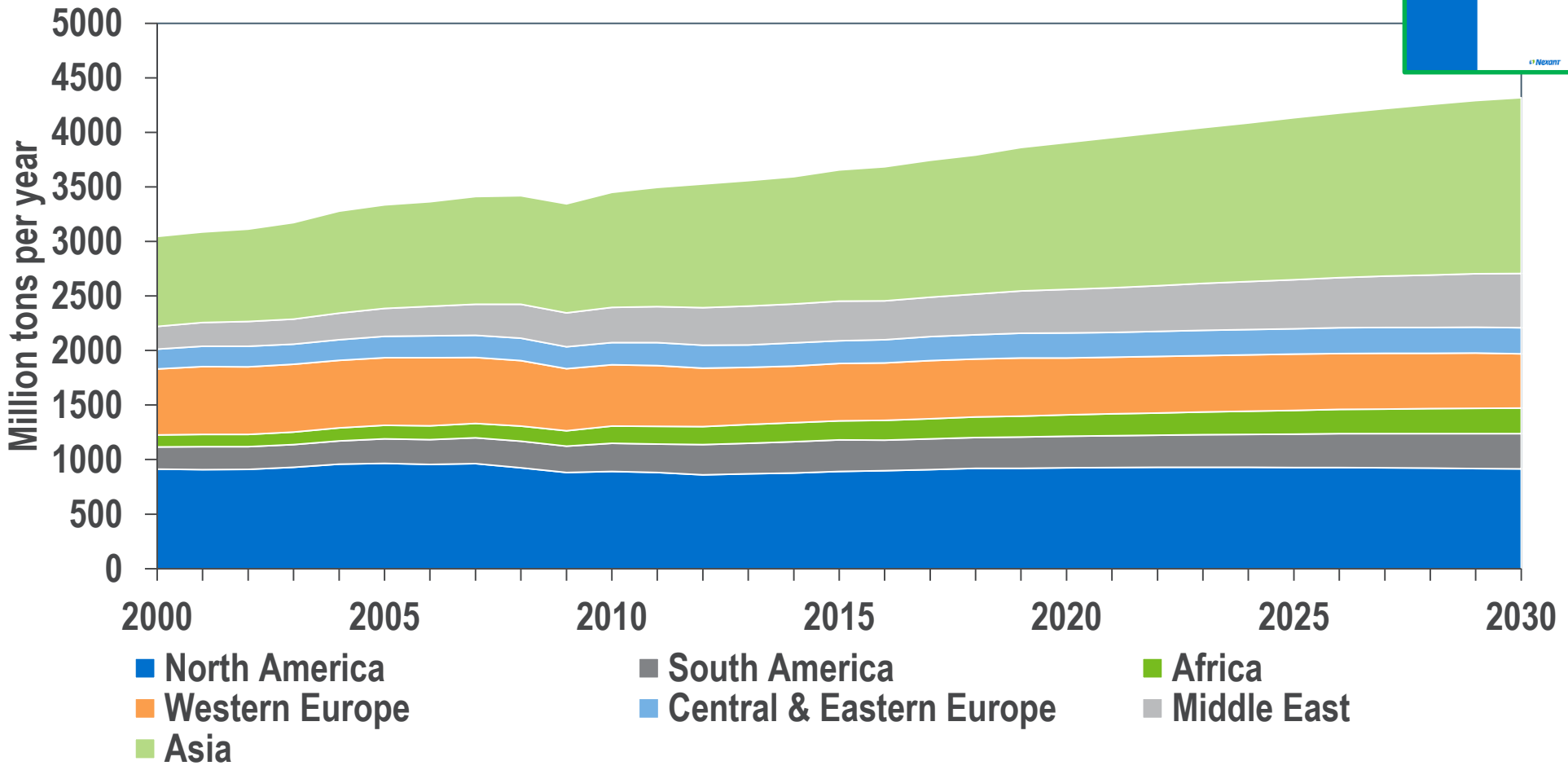
Big waves on the oceans
Global market dynamics

Source: Nexant Market Analysis Refined Products – 2018



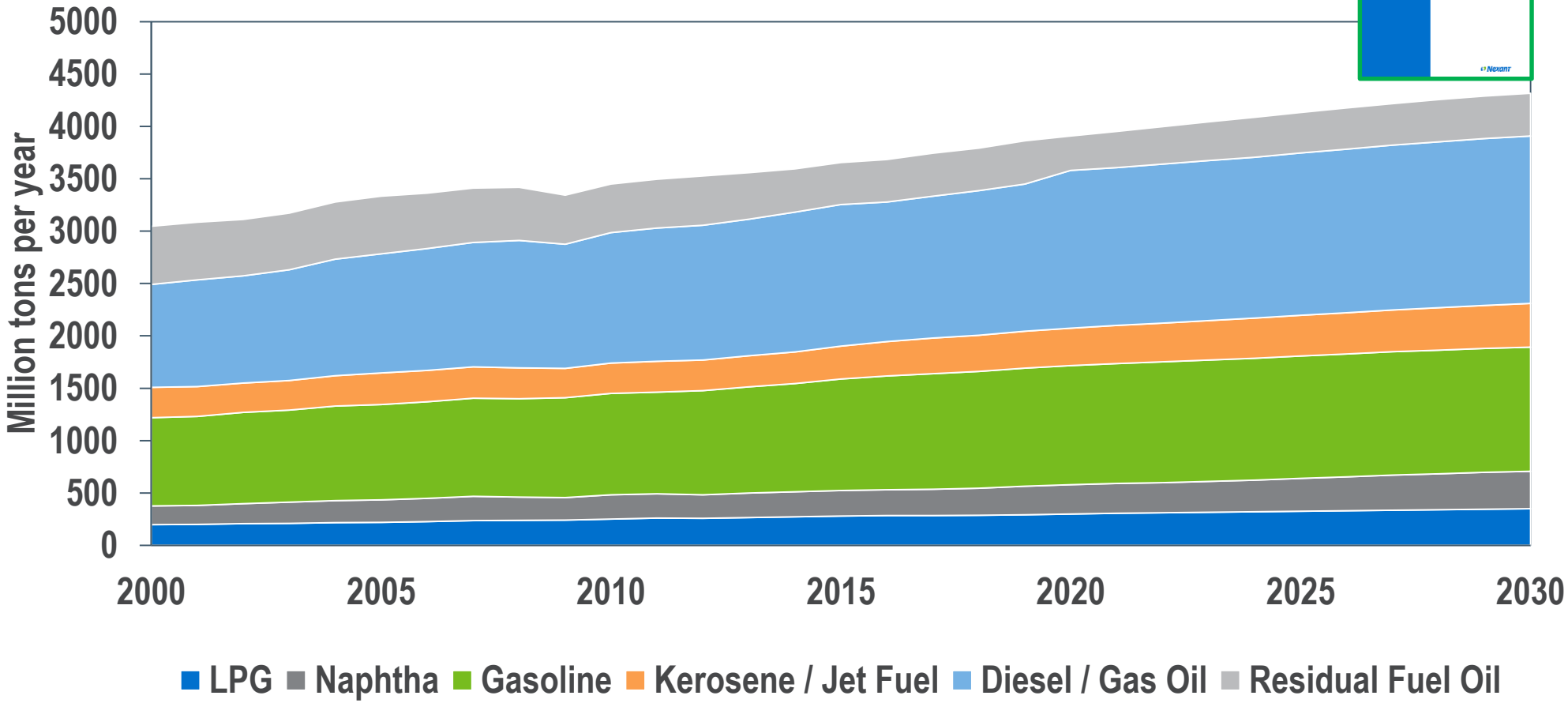
Demand growth in Africa, Middle East and Asia, with North America and Asia remaining the two largest consumers in 2030

Global Refined Product Demand, 2010-2030
(million tons)



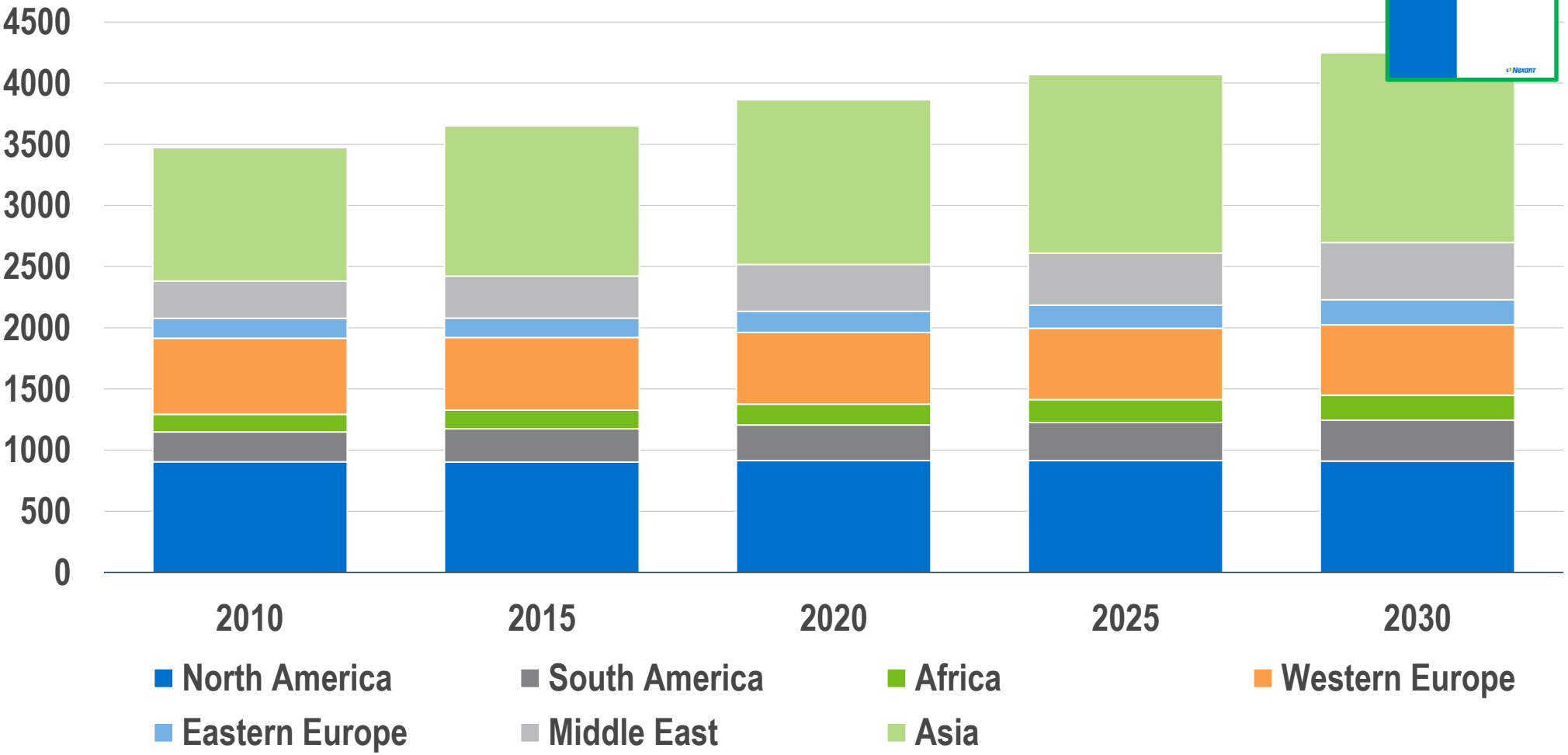
Main growth driver is petrochemicals. Diesel/Gas oil demand will increase in 2020 at the expense of Residual Fuel Oil

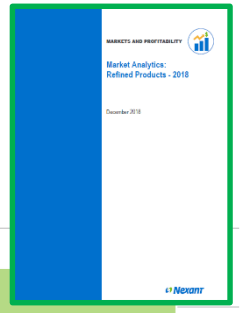
Global Refined Product Demand, 2010-2030
(million tons)



Supply from Asia will continue to grow at circa 1.3% per year for coming decades, highest growth in Africa & Middle East

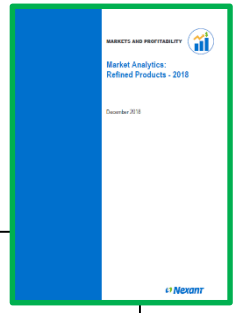
Global Refining Supply, 2010-2030
(million tons)

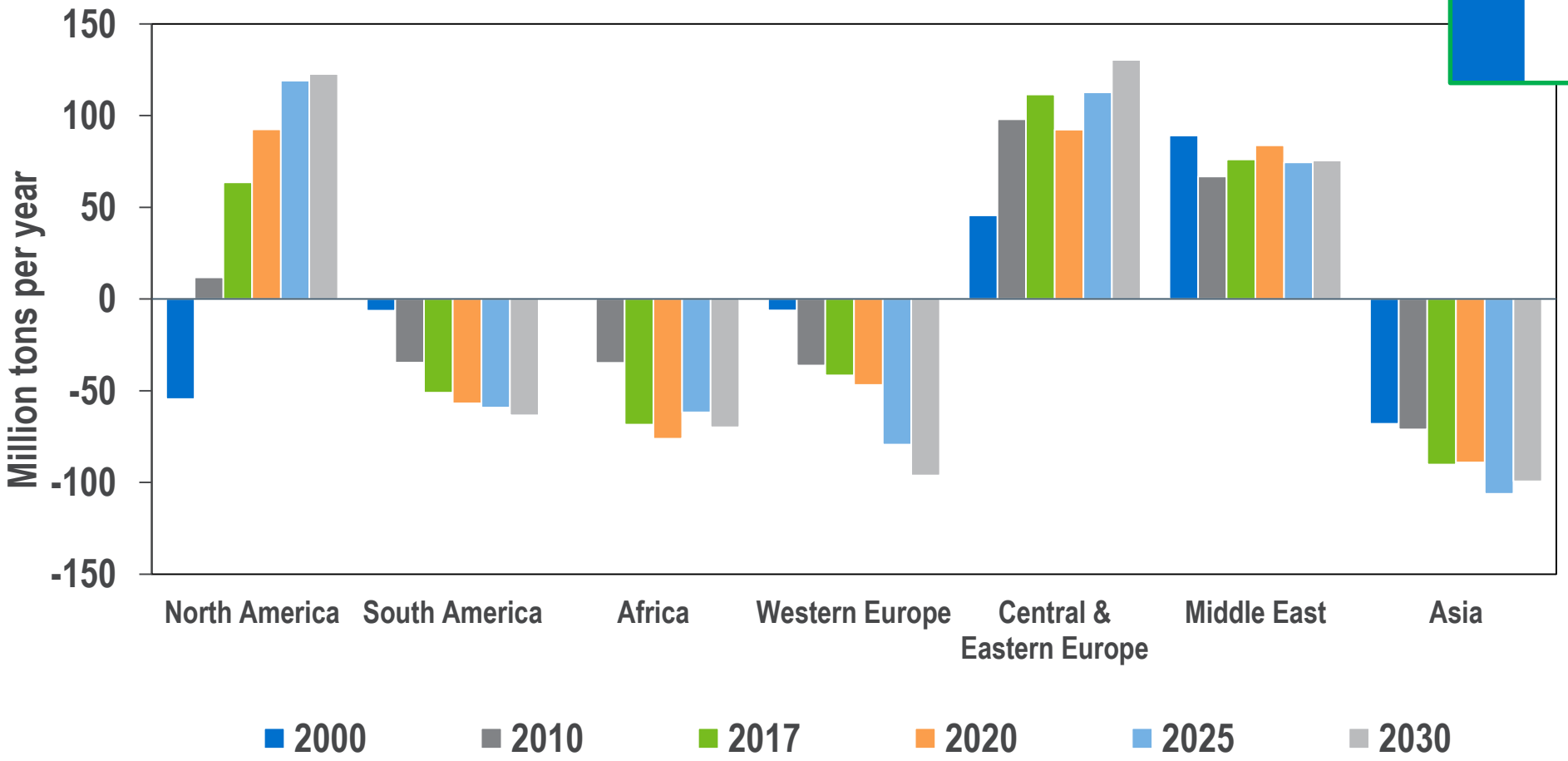




Asia is set to remain the world's major importer, but Western Europe is catching up

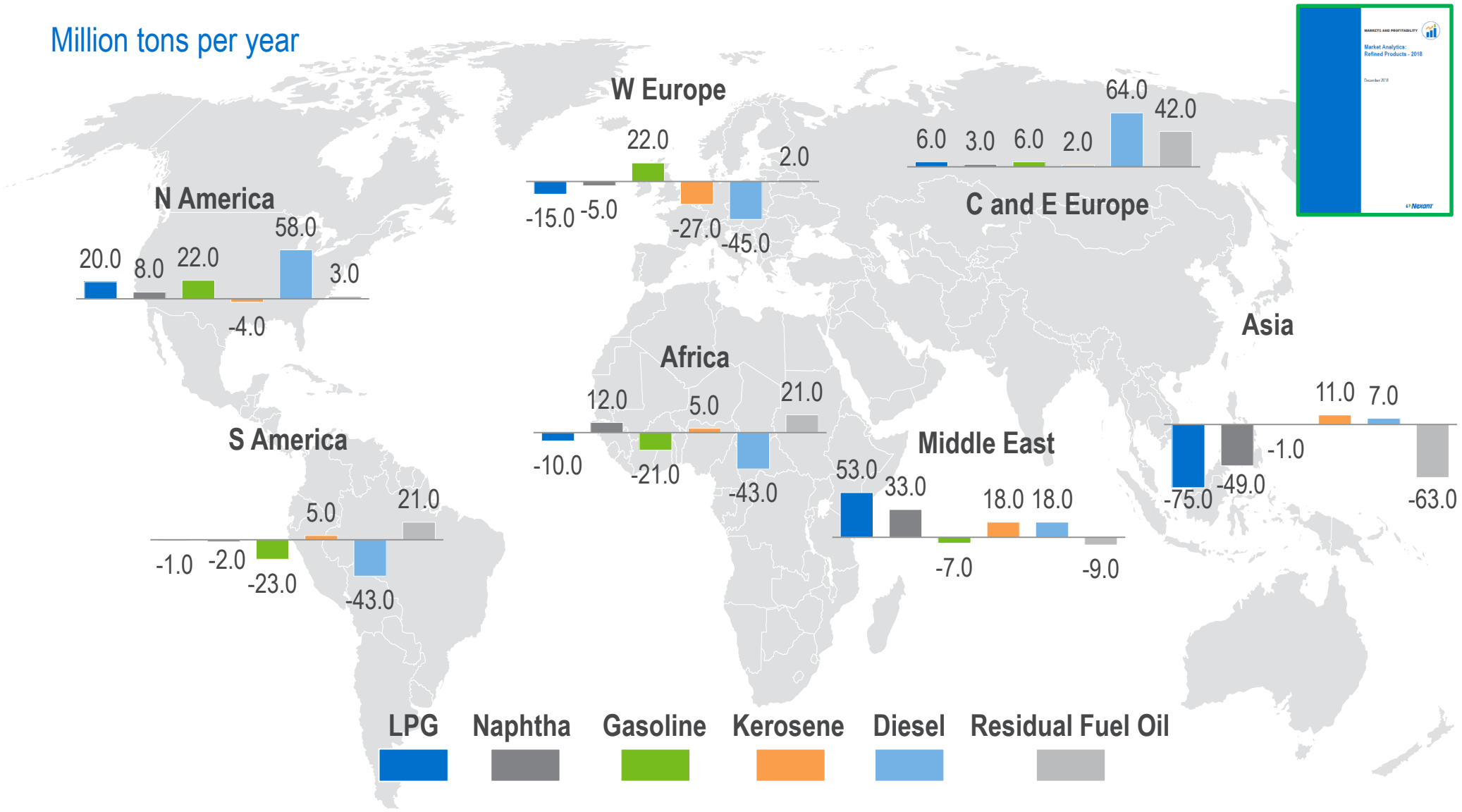
World Refining Trade, 2010-2030
(million tons)





Into the longer term – product specific trade dynamics in 2035

Million tons per year



Product specific trade dynamics will influence the tanks and terminals storage sector in a number of ways

DRIVERS OF INDIVIDUAL USES OF OIL STORAGE TERMINALS

USAGE	DRIVERS						
	Import flows (1)	Export Flows (1)	Trading Activity	Contango/ Backwardation	Product Quality Variation	Compulsory Stock Regulations	Bunker Market
Structural Trade Imports Exports	✓	✓					
Spot Trade			✓				
Contango				✓			
Break-bulk	✓						
Build-bulk		✓					
Product Blending	✓				✓		✓
Strategic Stocks						✓	
Bunkering							✓

(1) Both hinterland and regional flows

Wave of change on the horizon: Impact of IMO 2020

Nexant Analysis

MARPOL: making waves - regulations closing in, impact uncertain

- HSFO (3.5 percent sulphur) nominally unsuitable for use, theoretically eliminating major global consumer of the product
- LSFO (1 percent sulphur) also in theory pushed out, although refiners are more likely to be able to produce LSFO within range of new specifications.
- Given role of bunkering in Asian demand (Singapore), potential erosion of export options for refiners.
- Alternative fuel options become more feasible.

The options for the Shipping Industry…

Option	Pros	Cons	Potential Impact
Use conventional lower sulphur fuels (VLSFO, MGO)	No investment cost Readily available product Established logistical infrastructure	Higher fuel cost	Lower HSFO demand Higher VLSFO/MGO demand
Invest in exhaust gas scrubbing technology to continue burning HSFO	Lower fuel costs Readily available product Ability to retrofit existing vessels	Capital investment required Added operational complexity Chemical handling	Continued role for HSFO
Invest in LNG as marine fuel	Likely lower fuel costs Easier compliance with NOx specifications	Capital investment required Fuel not readily available Limited logistical infrastructure Retrofitting more problematic	Reduced FO demand
Non-compliance to continue HSFO use	No investment required	Dependent on enforcement, financial penalties, with potential further penalties with repeated infringement	Continued role for HSFO

Likelihood is that all scenarios will play a role

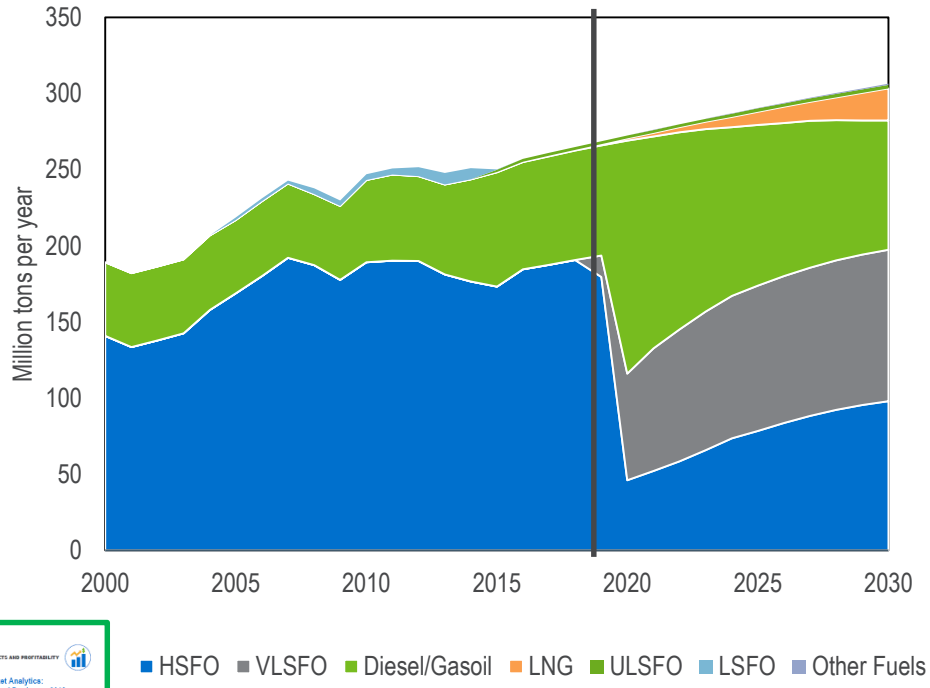
The options for the Refining & Storage Industry…

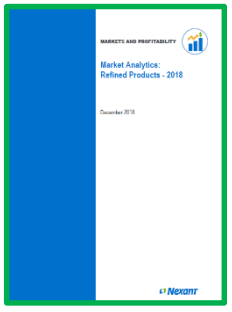
Option	Pros	Cons	Potential Impact
Maintain HSFO production	No investment cost Allow markets time to develop	Uncertain demand and price Lower refinery margins/competitiveness	Stable HSFO output
Blend to produce LSFO	Little/no initial investment cost Allow markets time to develop	Increased crude oil costs Increased blending costs Uncertain demand and price	Shift HSFO to VLSFO
Desulphurize to produce LSFO	Independent of other refinery units Reduces FO diluent requirement	High capital cost Uncertain demand and price	Shift HSFO to VLSFO
Yield investments (residue upgrading)	Obtain more higher value light products, reduce FO yield	Extensive refinery modifications required High capital cost	Less HSFO, more distillates (including MGO)

Large effect on simple Mediterranean refineries, closures possible…
Tank and terminal storage operations will need to adjust accordingly

Nexant sees a major increase in MGO demand before ships invest to take advantage of HSFO price spread

Bunker Fuel Demand – Global





A number of potential outcomes, but Nexant expects

- HSFO demand plummets, as low levels of ships expected to have scrubbers by 2020.
- HSFO is mainly displaced by VLSFO and MGO
  - VLSFO demand continues to increase.
  - MGO demand doubles in the short term making up refinery VLSFO shortfall
  - LNG sees limited use in longer term due to infrastructure and capex investment limitations.
  - Ship owners will exploit HSFO price spread by installing scrubbers, which may pay back within two years. Technological choices may be critical as open loop systems present risks.

Can refiners and related storage networks afford to change crude diet and wait out HSFO demand drop or should they invest now?

Heavy weather:
European market dynamics

Nexant Analysis

European structural diesel imbalance will be made worse by IMO 2020 and additional longer term dynamics exist

European Diesel Deficit of 50 million tons in 2020 and demand for diesel in Europe continues to increase over and beyond our forecast period to 2030.

Longer term uncertainties and potential drivers of change for Western Tank and Terminal operations.

Reduced demand for profitable gasoline exports to Africa and North America

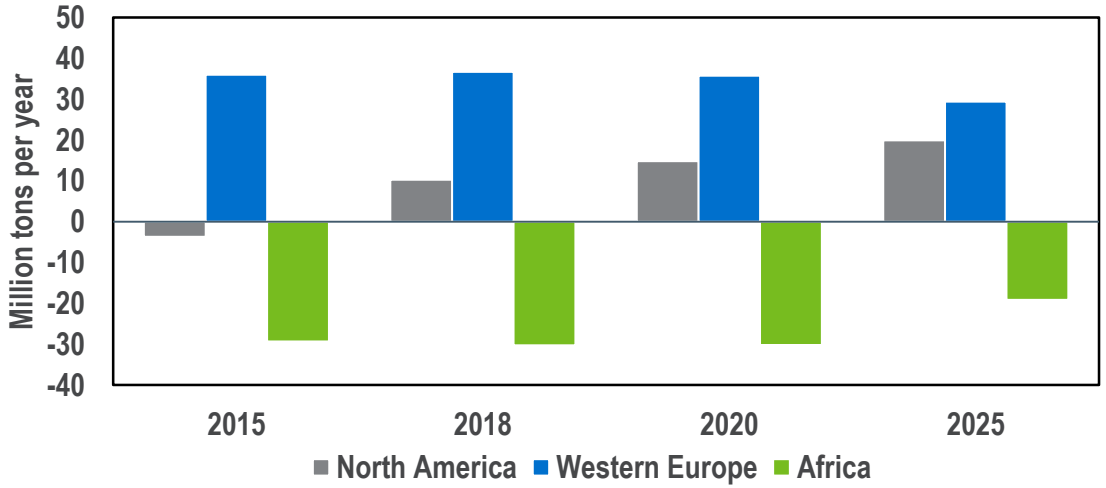
Long term shift away from diesel and gasoline transport fuel to electric vehicles

Domestic economic weakness and regulatory uncertainty

European tank & terminal operators should be aware of longer term changes in demand to the global trade in gasoline

European refiners profitable gasoline production threatened in the medium term by reduced trade to key African and North American markets

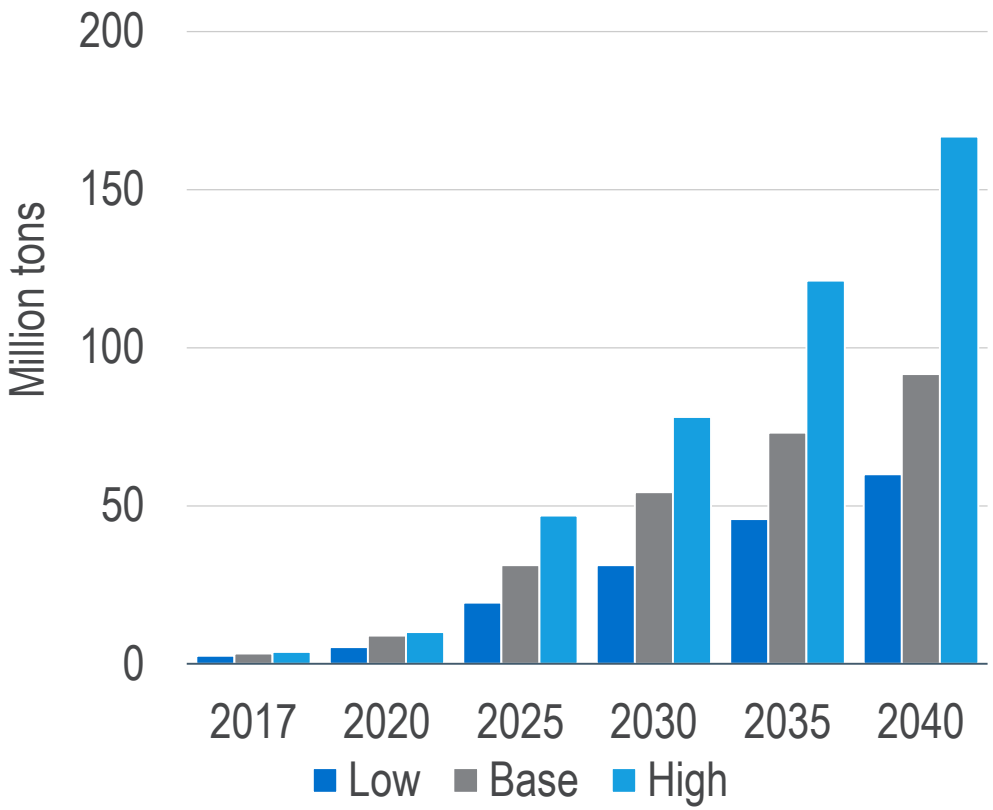
Net trade in gasoline for North America, Africa, and Western Europe



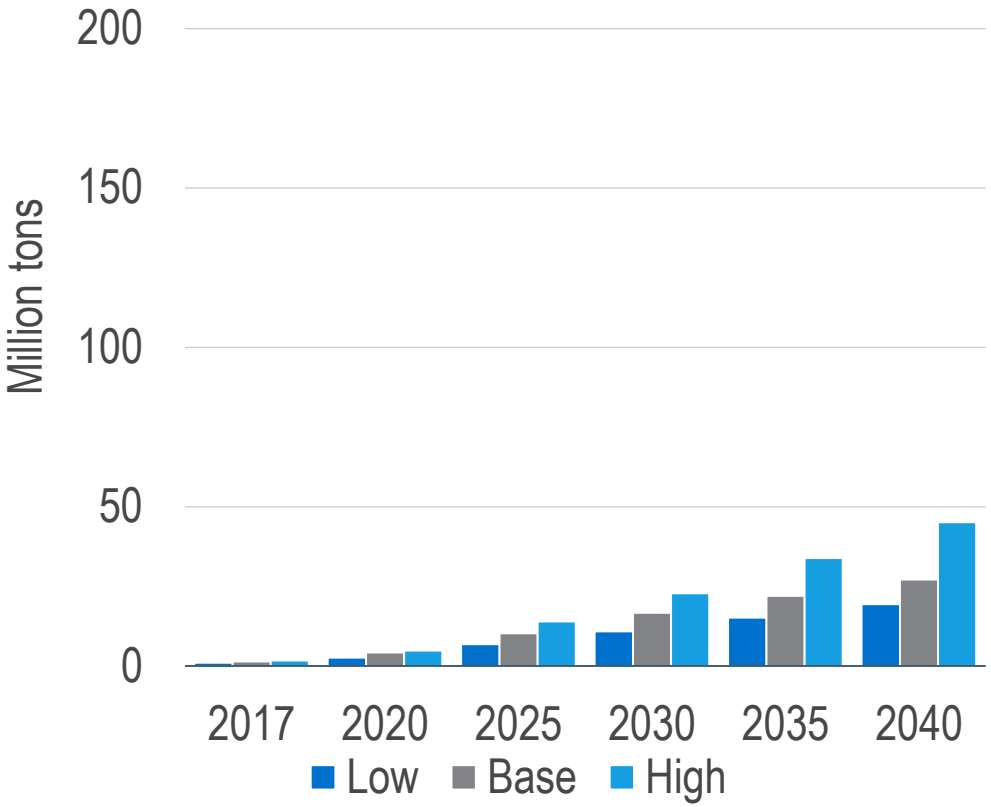
Western European refiners will need to improve competitive position to account for lost revenue from key gasoline exports

Gasoline will bear brunt of EV replacement, growth concentrated in Asia and USA, where passenger diesel use is limited

Gasoline displacement – Global



Diesel displacement – Global



European transport regulations are expected to have a lower impact in the medium term

Diesel and also gasoline consumption under pressure from decisions taken by European authorities at a local, regional and national level

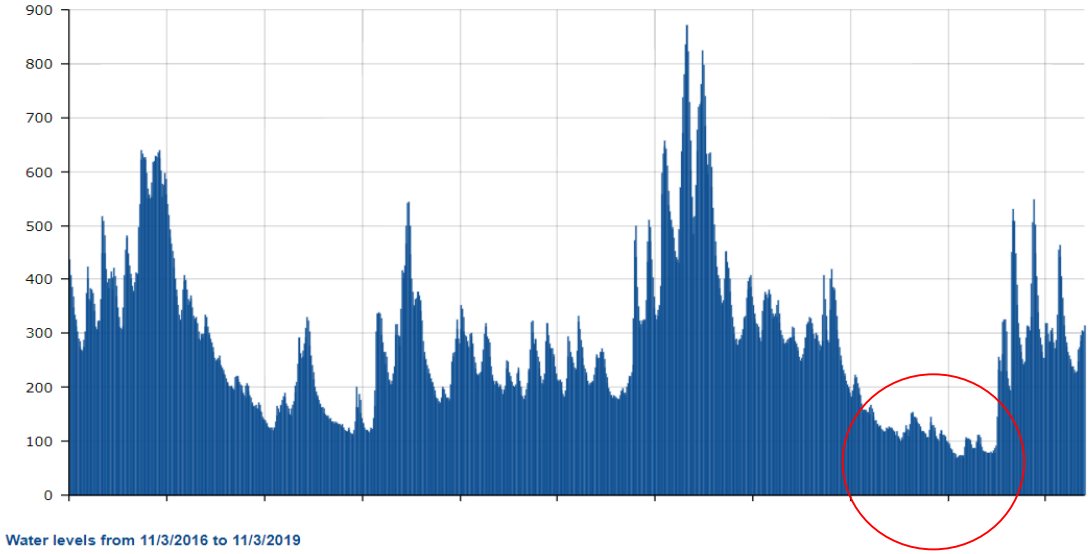
Nexant does not expect the backlash against diesel to lead to a significant drop in diesel demand until beyond 2030, primarily due to its continued use in road haulage and marine transport.

Macro trends lead to rocky waters

European markets facing uncertain economic growth due to local and global political uncertainties

The German slow down may have also been impacted by the Rhine, as levels hit record lows impacting both petrochemicals and wider industry

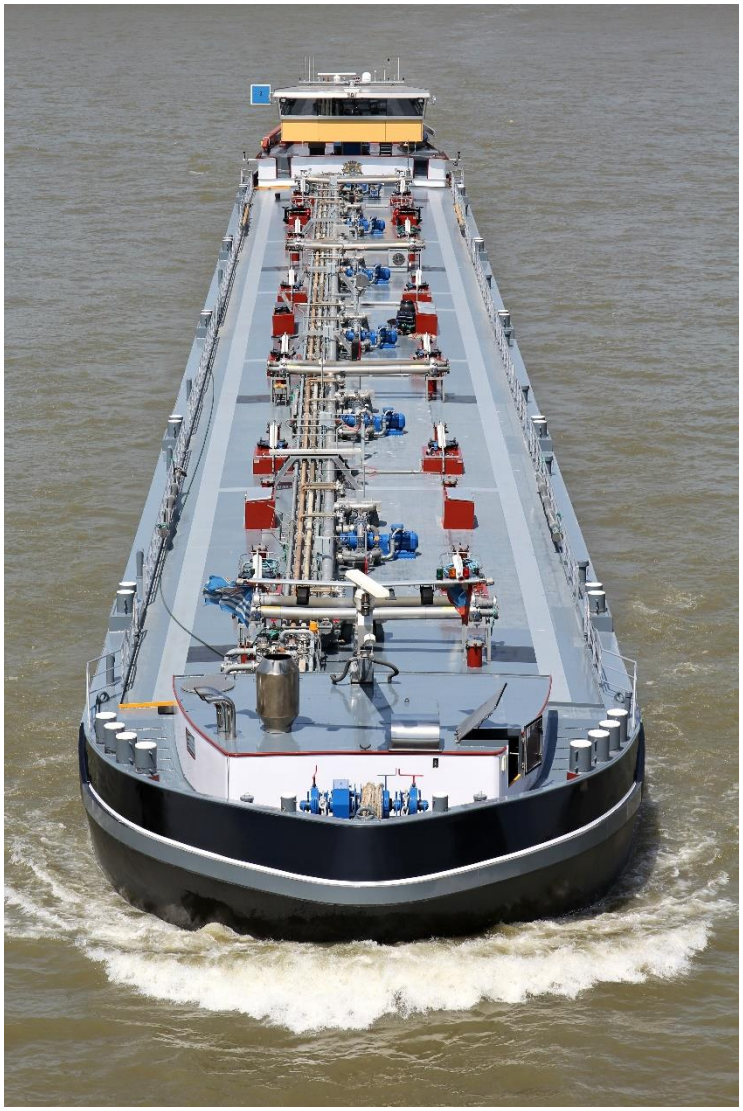
Environmental policy and mood changes may further boost the argument for electric vehicles



Rhine River levels in Cologne 2016 to 2019 (source Interrijn Group)

Uncertainty in refined product storage markets expected to continue through 2019 although M&A activity continues in Europe

An uncertain geopolitical climate and continued oversupply have continued to weigh on oil prices although storage backwardation continues



Asset sales continue, with storage carve-outs increasing

Western European refined product supply has seen a gradual decline of approximately one percent on average since 2000, primarily in a wave of closures from 2009 to 2015.

Increasing divestments of midstream assets provide opportunity for tank and terminal operators to grow and for refiners to employ new investment capital in core operations to improve competitive position.

Timely investment can improve tanks and terminals operational competitiveness and ensure sustained market relevance

Digitalisation can provides opportunities to improve cost effectiveness without substantial capex investment

Moves to improve product balance by upgrading middle distillate capacity will allow European refineries and terminal operators to take advantage of regional diesel imbalance, and reduce fuel oil production in line with the substantial fall in demand from 2020.

Steadying the ship: Conclusions

Conclusions

- Asia continues to see strong supply growth although this will primarily be to meet rising domestic demand.
- In the longer term electrification and bio-fuels are expected to increasingly impact fuel markets, and ICE efficiency improvements will also play a major role.
- MARPOL IMO 2020 decision will have a large impact on pricing and likely to have a positive impact on demand for MGO and negative impacts on fuel oil.
- Western Europe will continue to see diesel demand higher than regional supply, which will be further impacted by changes in the marine bunkering market.
- Western European refiners face challenges in the short to medium term as gasoline demand in Africa and North America reduces on new capacity.
- Western Europe is also exposed to uncertain global economies, trade barriers, and environmental policy shifts – timely investment will secure a healthy future.

Nexant carries out market, technical & environmental advisory and due diligence services to all those involved in the international tanks & terminals industry. Please contact sbharrison@nexant.com for further information.

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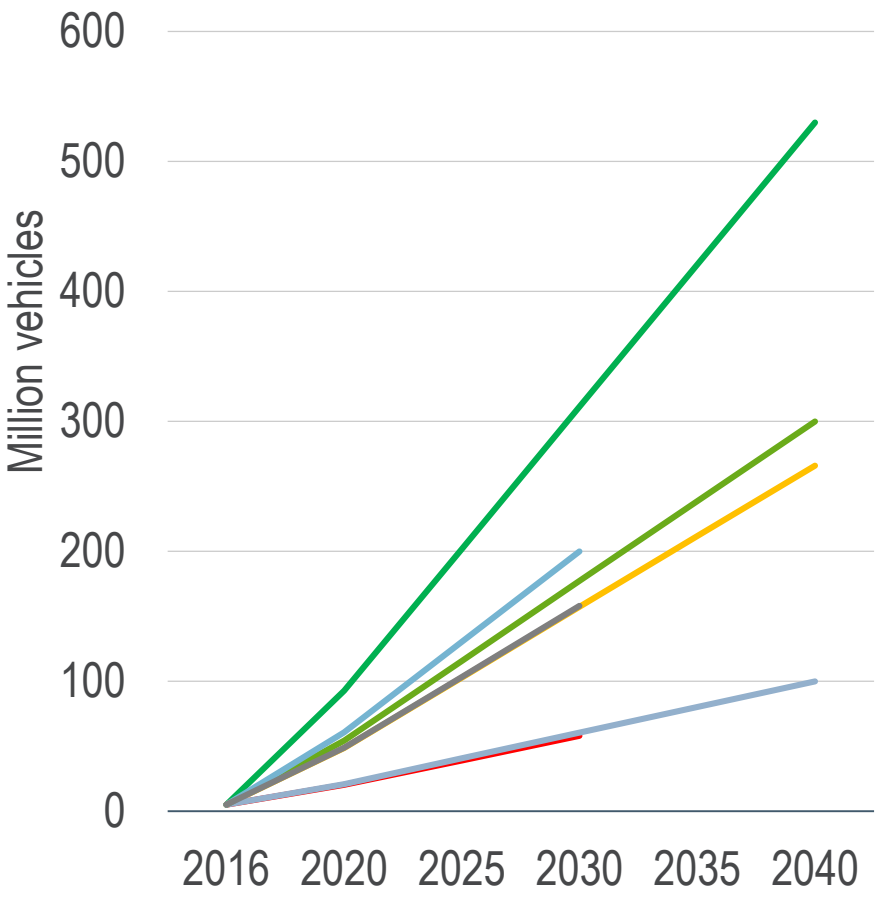
The future of electrification is subject to a high degree of uncertainty

Selected EV projections (2017)



According to various data sources, projections for 2040 range from five percent to 30 percent of passenger car fleet.

Uncertainty due to multiple interdependent market drivers

- Policy support
- Vehicle technology
- Battery technology
- Charging infrastructure
- Power availability
- Manufacturing capacity
- Raw materials
- Intangibles - sustainability/"feel good factor"

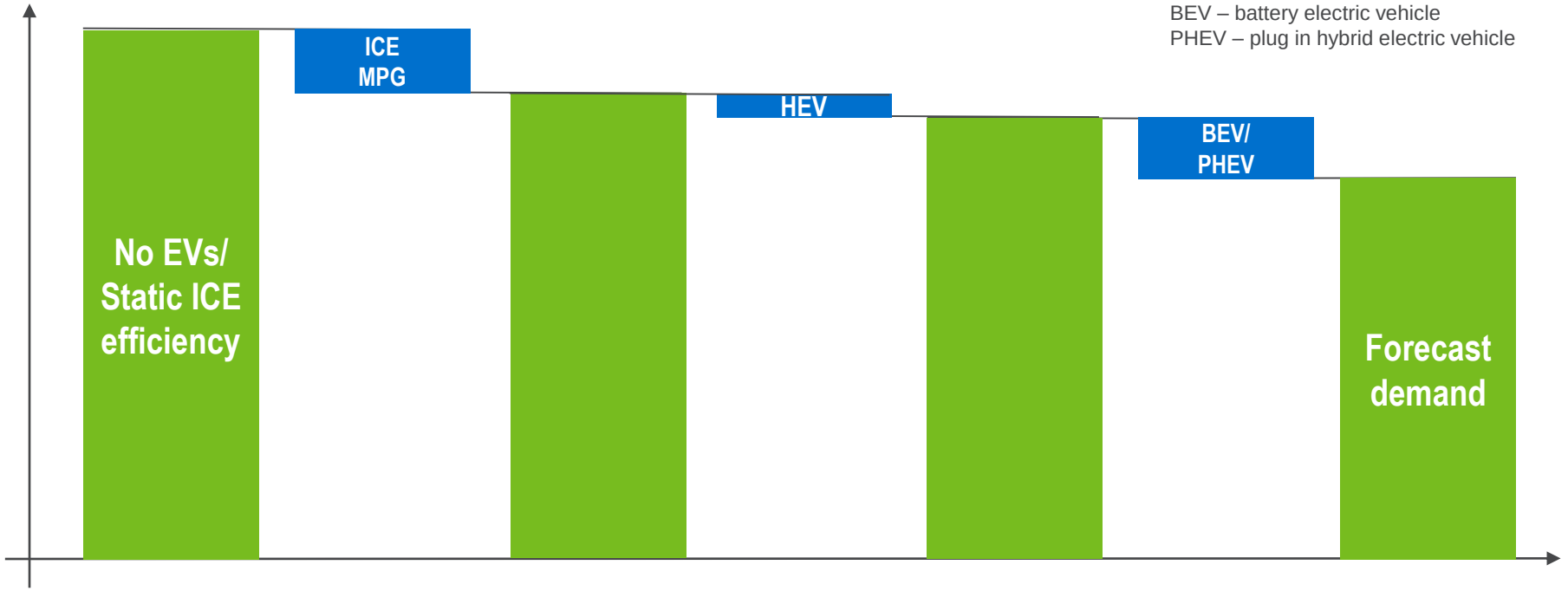
Nexant expects that:

- Cost and range progress on battery technology continue at similar rates to recent years
- Most short term gov't EV targets are met on schedule
- Longer term, not all plans are achieved
- Limited growth in commercial sector
- Some growth of two-wheel EV use outside China
- Lead markets see EV share of 15-20 percent of passenger cars in 2040.
- Laggard markets see five percent share.

Increases in efficiency will lead to a drop in global demand of a similar magnitude to EV impact

Gasoline demand – Global (2040) Nexant base case

ICE MPG – Internal combustion engine efficiencies leading to more "miles per gallon" or km per litre
HEV – hybrid electric vehicle
BEV – battery electric vehicle
PHEV – plug in hybrid electric vehicle



- Nexant sees a reduction in gasoline use of 25 million tons in Western Europe between 2017 and 2040, of which 15 million is due to electric cars and the remainder efficiency improvements.
- The majority of global diesel displacement is in Europe, with greater volumes of diesel than gasoline forecast to be displaced in this market.