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Base oil industry trends

Growing use of Group II in Asia

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Base oil industry trends

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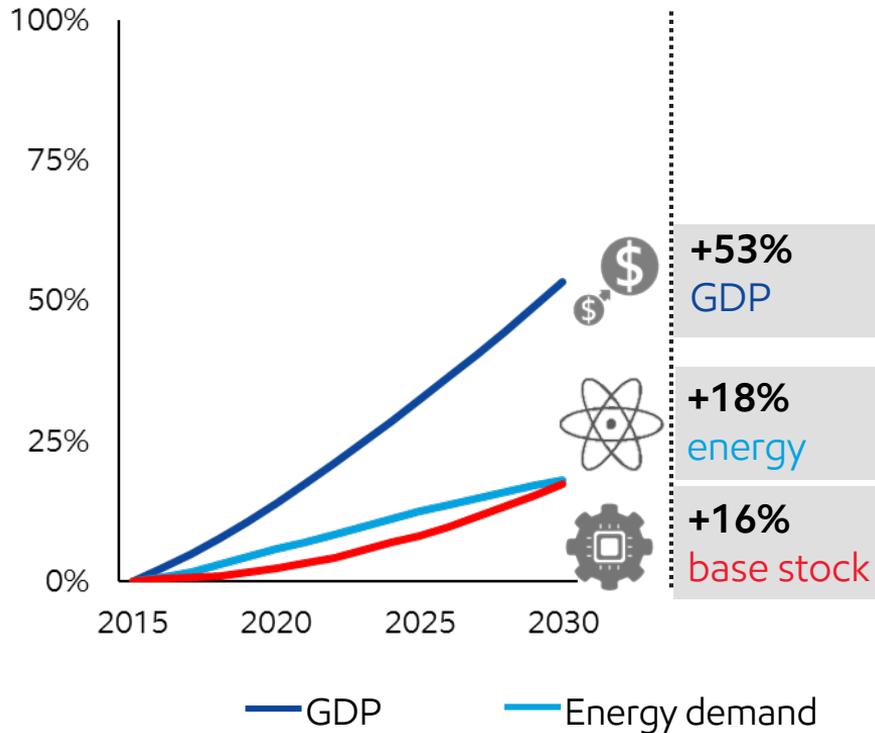
What we'll discuss today:

- Market background and trends
- Base oil design & lubricant performance
- Implications for base oil industry

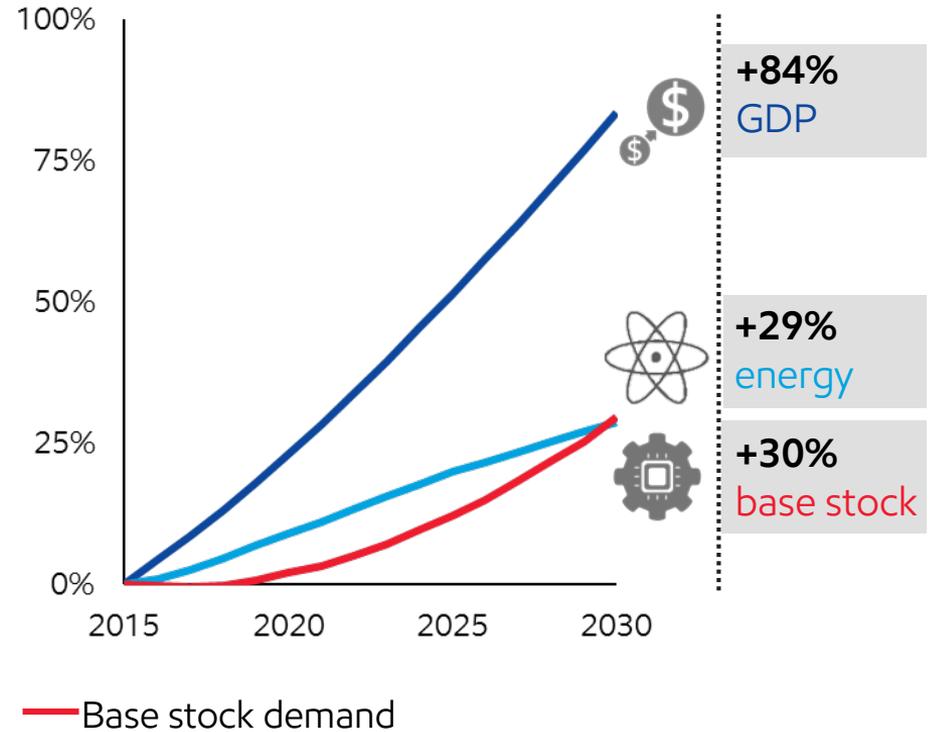


Asia driving global growth

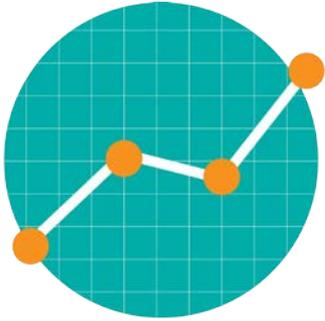
Global growth from 2015*



Asia Growth from 2015*



Macro trends driving future requirements



Market Trends

- Increasing demand for efficiency
- Need to reduce GHG emissions



Industry changes

- Higher fuel economy
- Energy efficiency
- More severe operating conditions
- Longer drain intervals



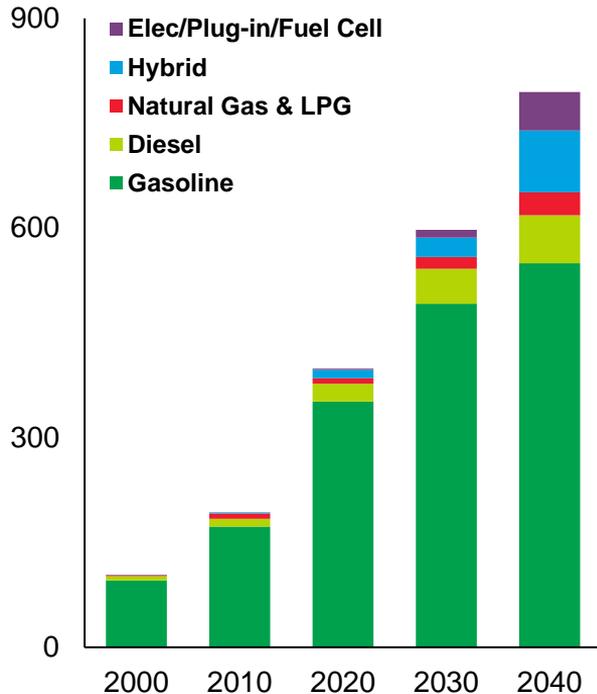
Driving base stock requirements

- Higher performing base stocks

Growing car park with increasing fuel economy needs

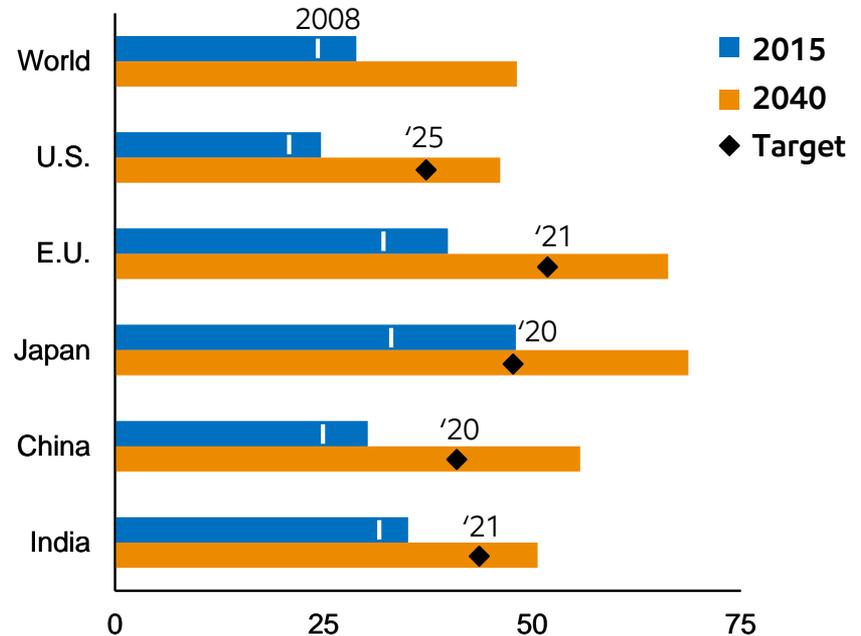
Asia - Light Duty Vehicles*

Million



Average New Car Fuel Economy*

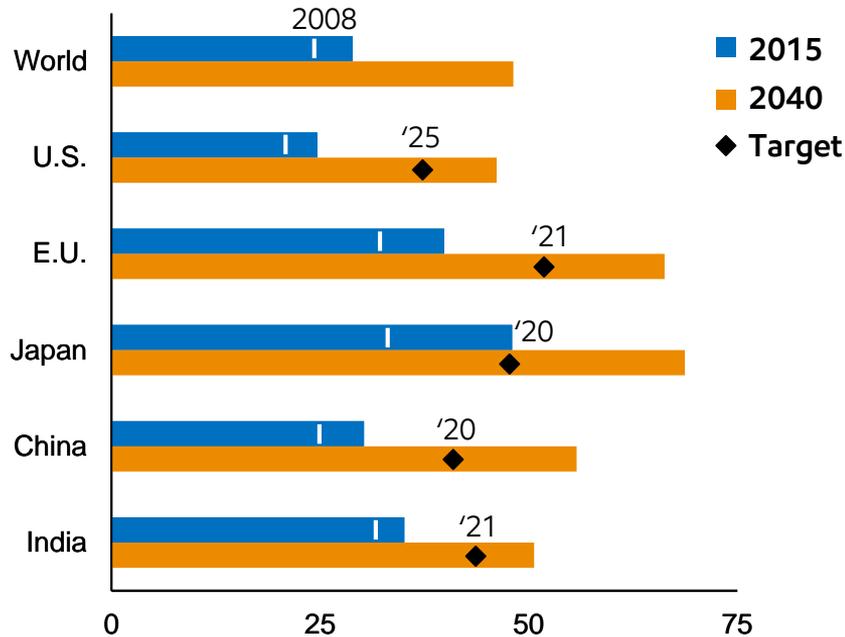
Miles per Gallon



Fuel economy needs driving engine trends

Average New Car Fuel Economy*

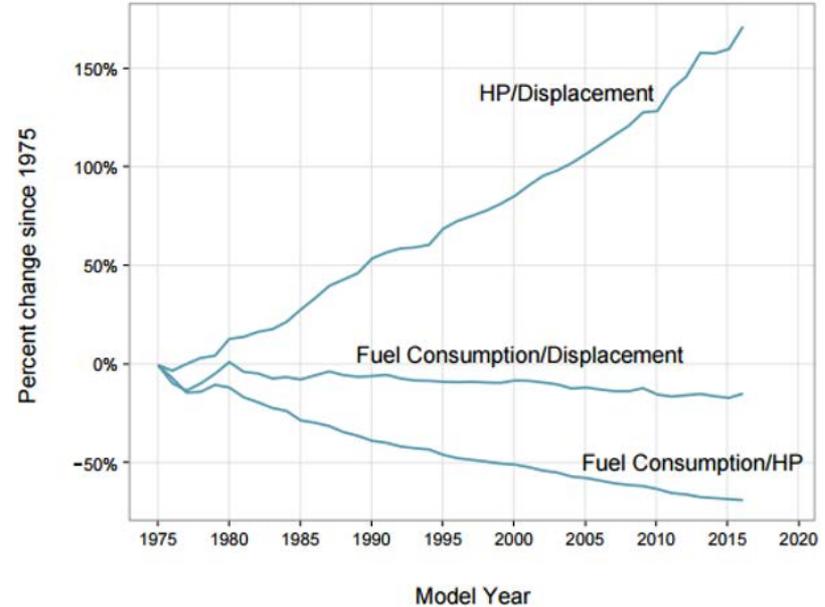
Miles per Gallon



*Source: ExxonMobil's 2017 Energy Outlook

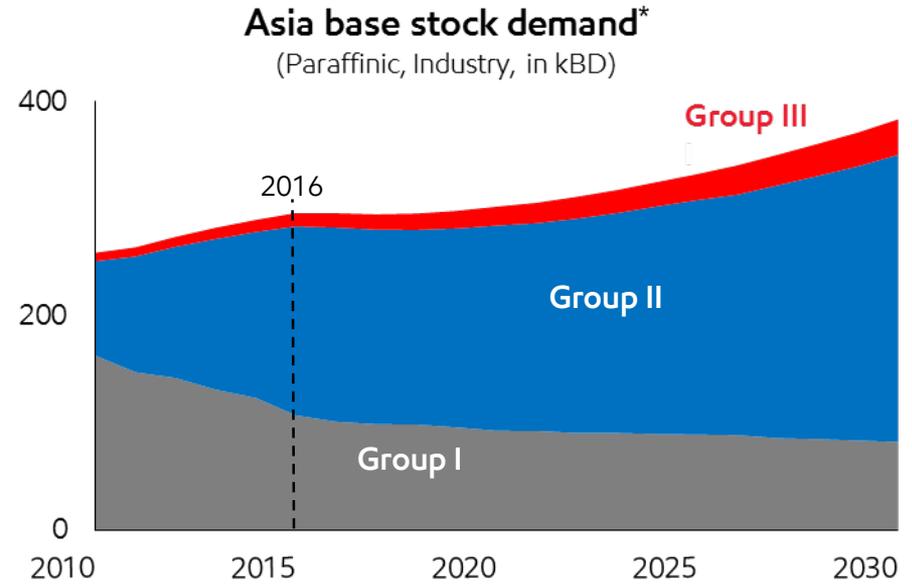
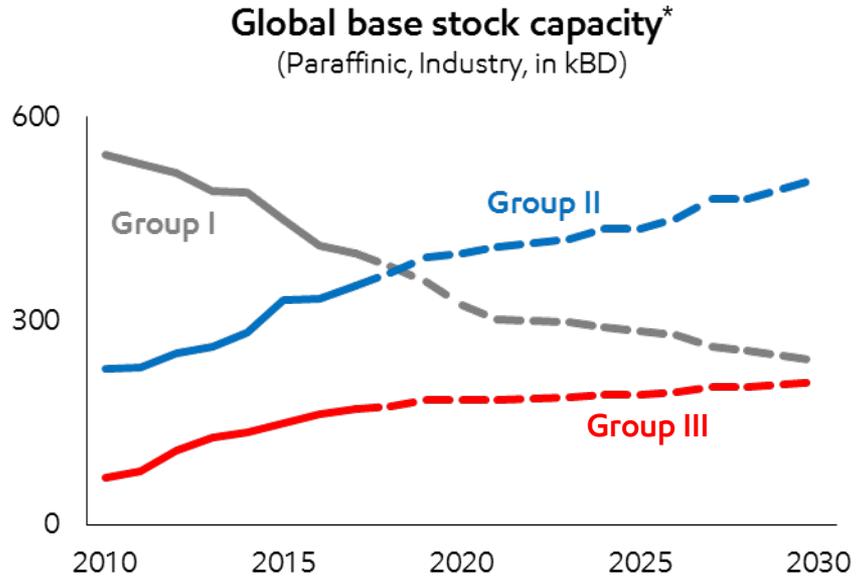


Engine trends**



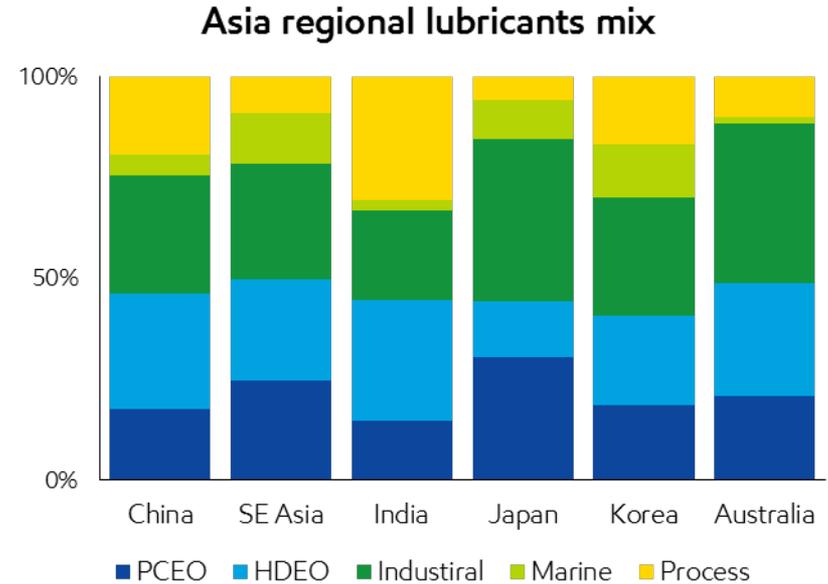
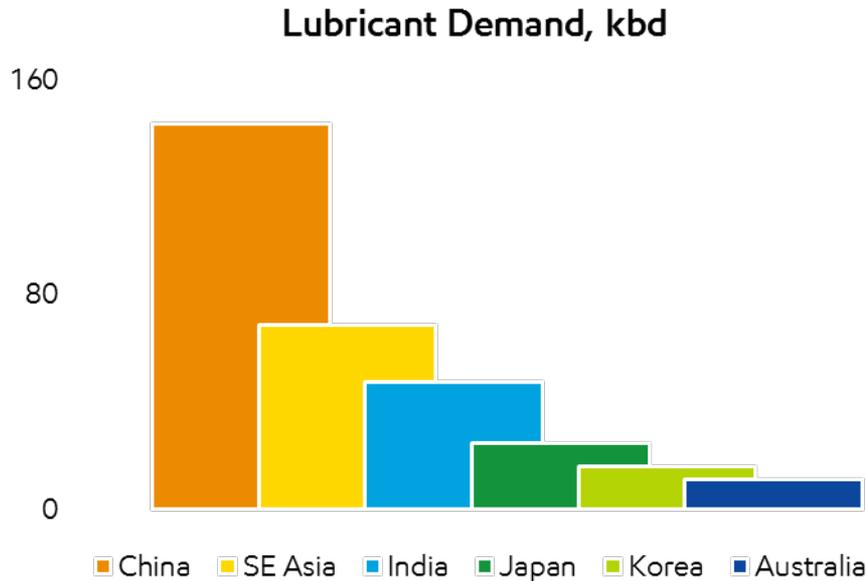
**Source: Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2016; US EPA, Nov. 2016

Growing use of Group II



Diverse lubricant demand in Asia

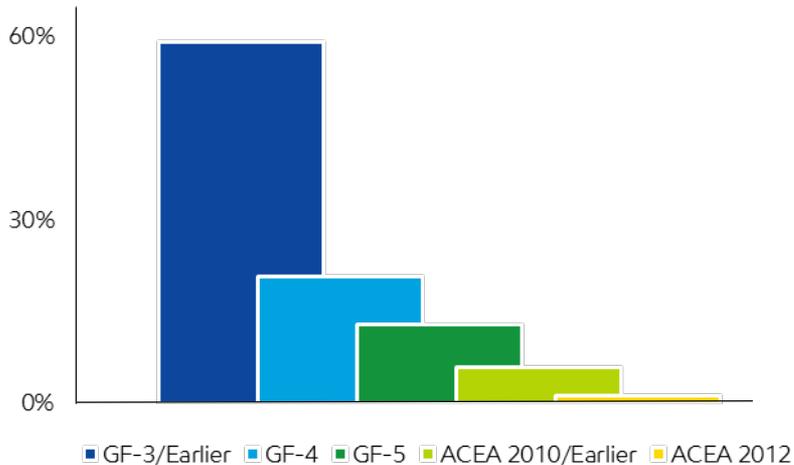
- Extensive geography with China, SEA and India leading in volume
- Varied product mix profiles across the region



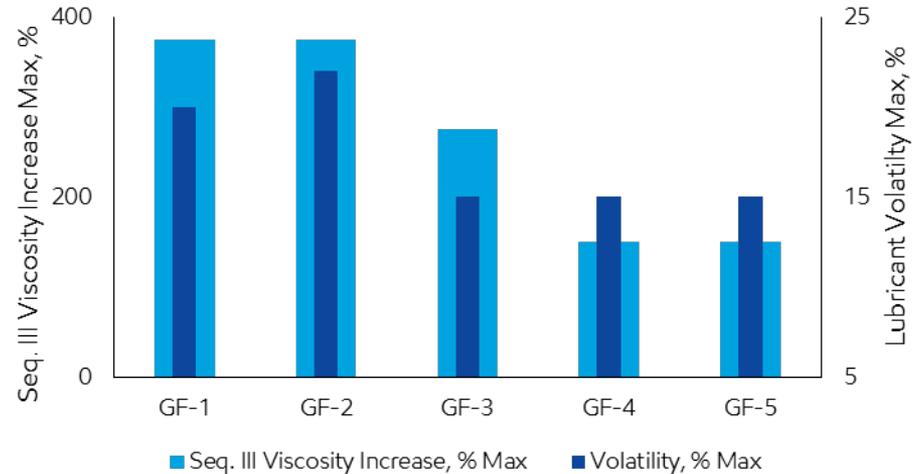
Extensive range of lubricant performance requirements

- AP engine lubricants requirements a mix of ILSAC and ACEA specifications
- Older performance categories predominate, with transition towards newer specifications
- Diverse requirements call for a mix of base stock supply to region

PCMO

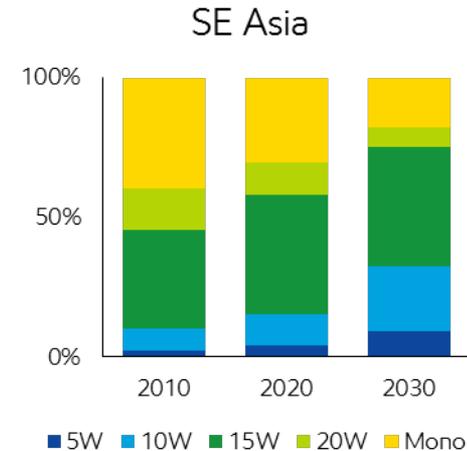
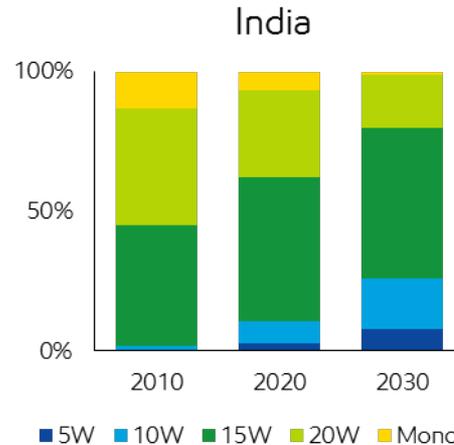
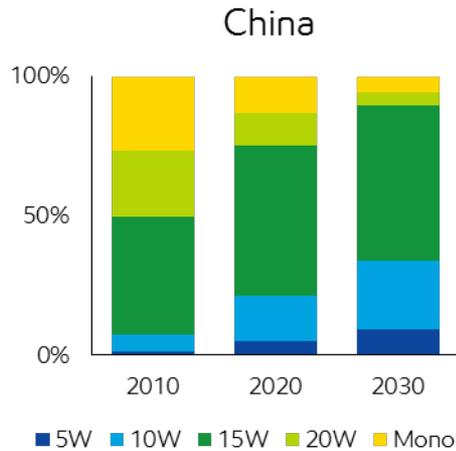


Base stock quality drivers

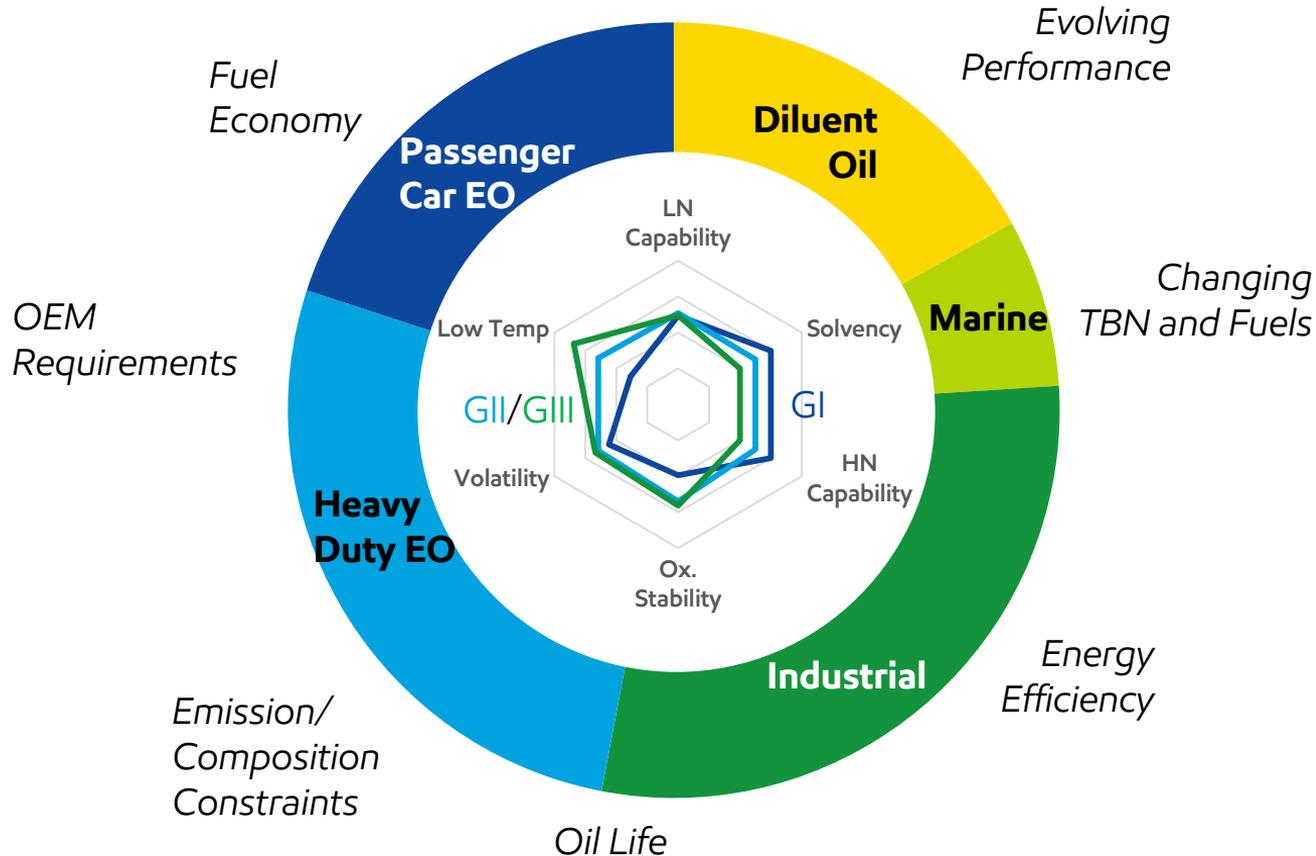


Multiple viscosity grades required to meet HDEO needs

- Diversity in viscosity grades within the region
- Increasing penetration of multi-grade, 15W & 10W lubricants, driven by fuel economy
- Diversity of base stock quality and supply needed

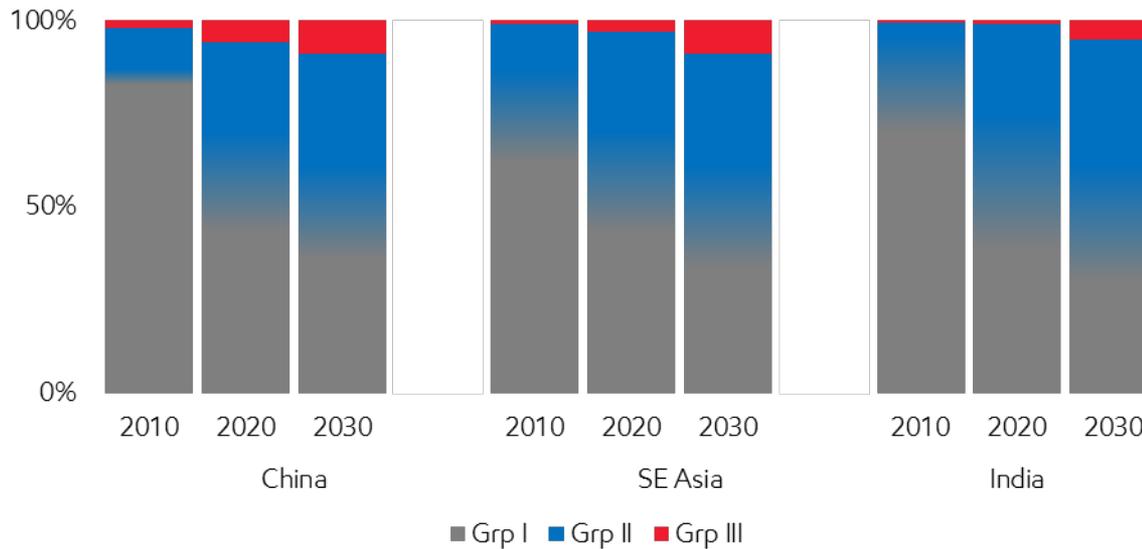


Diversity of lubricant needs drive base stock design



Continued Group II growth addresses Asia's specific needs

- Diverse requirements within the region
- Base stock supply, quality and capability paramount



Group II enables cost efficient formulations

Reliable supply of high quality Group II promotes technology programs resulting in an increase of cost-efficient solutions for a wider range of lubricant applications



0W
(high perf)

0W



5W

10W



15W

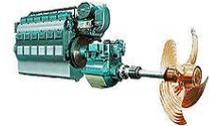
Lo-Vis Ind



Hydraulic

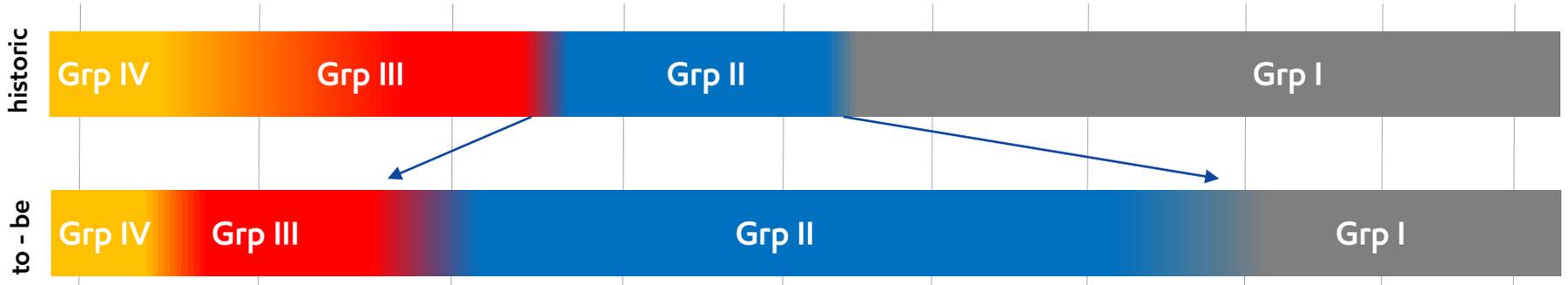


Gear



Marine

Hi-Vis Ind



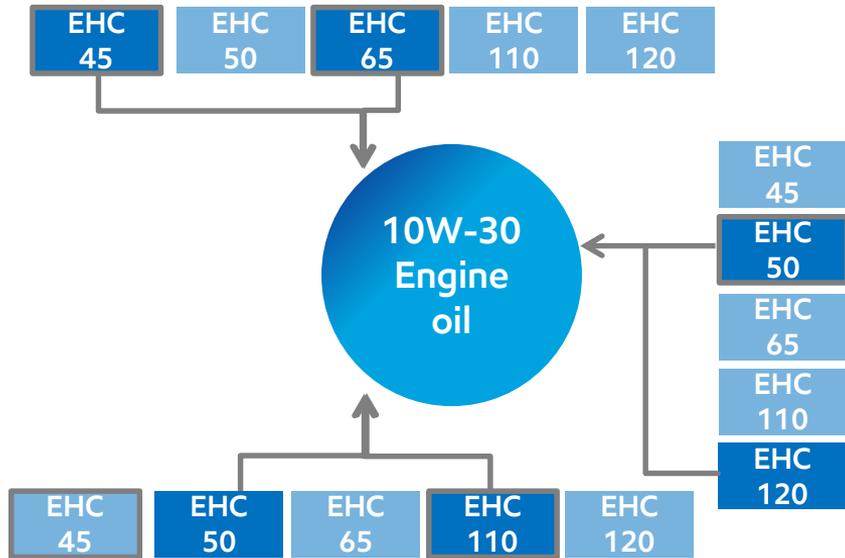
Key implications for the industry

- Respond to scale of AP growth
- Satisfy individual markets with diverse needs
- Address diversity and value chain complexity
- Enable cost effective blending through superior base stock design and performance
- Ensure availability of affordable, reliable supply



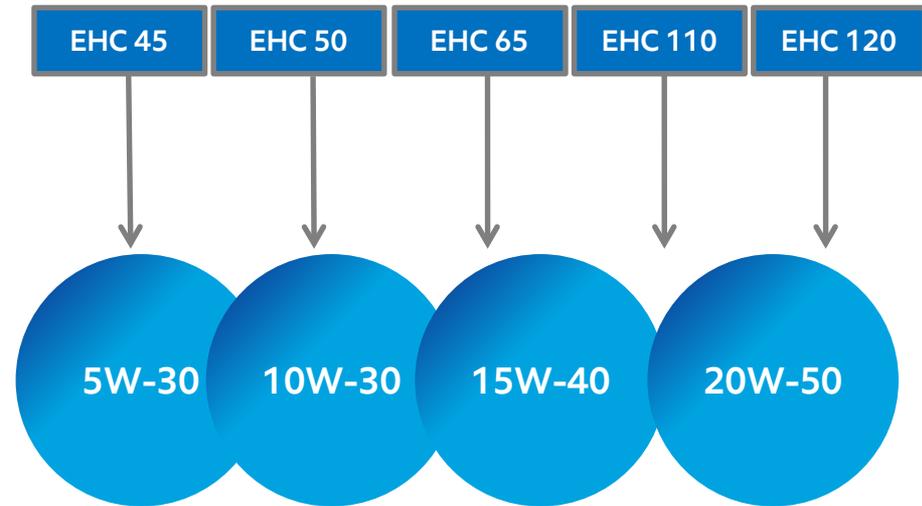
A global slate delivers value

Technical Substitutability is demonstrated by intra-slate base stock interchange



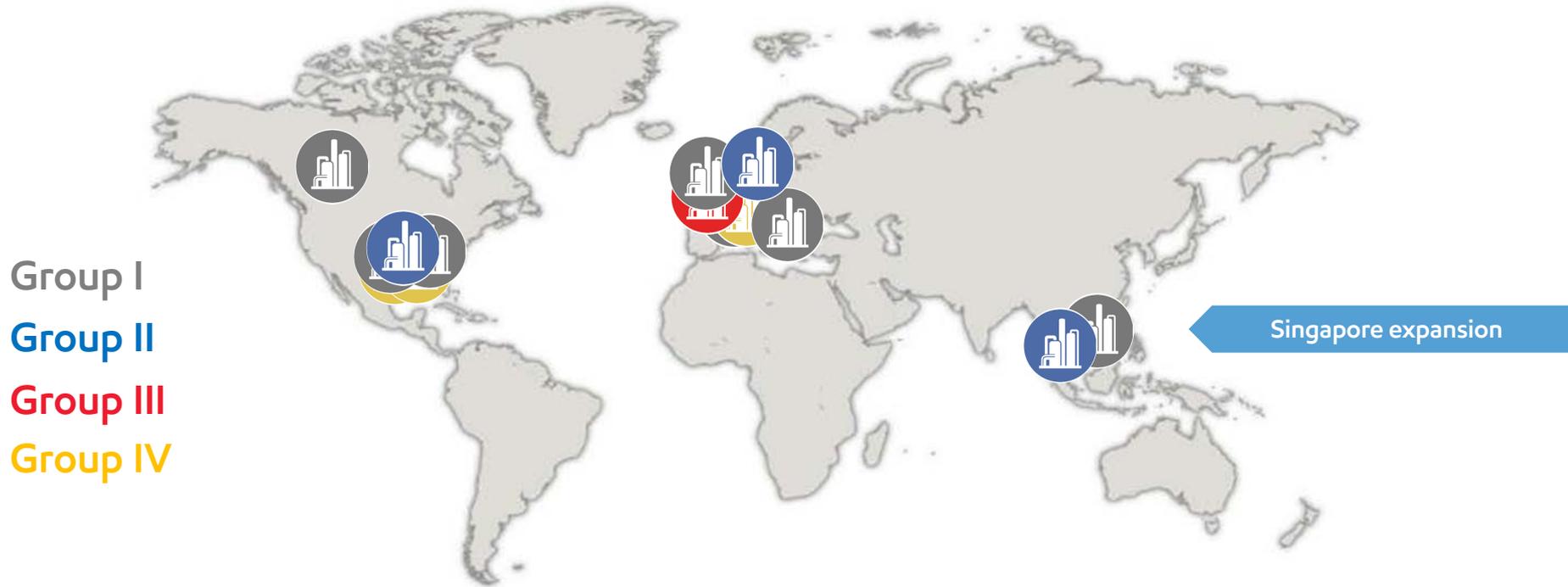
- Same product, different base stock mixes
- No extra engine testing

... and derives its largest value in enabling viscosity grade read across



- Different products, different base stock mixes
- Reduced engine test costs

Global investments demonstrate long term commitment



Rotterdam and Singapore investments ensure globally consistent quality and reliable supply of EHC™ Group II base stocks

Addressing evolving customer needs

In today's constantly changing industry landscape the base stock business will inevitably need to adjust and address new challenges. ExxonMobil believes **companies with ...**



Deep knowledge and expertise
across the full value chain



Strong global footprint and
investment capability



Access to advantaged technology
and marketing

... will have the means to be successful in the short term and the long term.

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