Base oil industry trends
Growing use of Group II in Asia

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Growing use of Group II in Asia

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:
- GDP: +16%
- Energy demand: +53%
- Base stock demand: +18%

Asia Growth from 2015:
- GDP: +84%
- Energy demand: +29%
- Base stock demand: +30%

* ExxonMobil’s 2017 Energy Outlook, and assessment of publicly available information
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

*Source: ExxonMobil's 2017 Energy Outlook
Fuel economy needs driving engine trends

Average New Car Fuel Economy*
Miles per Gallon

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*Source: ExxonMobil's 2017 Energy Outlook

Engine trends**

Growing use of Group II

Global base stock capacity*
(Paraffinic, Industry, in kBD)

Asia base stock demand*
(Paraffinic, Industry, in kBD)

*Source: ExxonMobil assessment of publicly available information
Diverse lubricant demand in Asia

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

*Lubricant Demand, kbd*

*Source: ExxonMobil assessment of publicly available information*
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

*Source: ExxonMobil assessment of publicly available information*
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

- Diluent Oil
- Passenger Car EO
- Heavy Duty EO
- Marine
- Industrial
- Fuel Economy
- OEM Requirements
- Changing TBN and Fuels
- Evolving Performance
- Oil Life
- Low Temp
- Solvency
- Ox. Capability
- LN
- Volatility
- HN
- Stability
- Emission/Composition Constraints
- GII/GIII
- GI

Source: EM assessment of publically available information.
Continued Group II growth addresses Asia’s specific needs

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

*Source: ExxonMobil assessment of publicly available information"
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.
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.
In today’s constantly changing industry landscape the base stock business will inevitably need to adjust and address new challenges. ExxonMobil believes companies with …

Addressing evolving customer needs

- 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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