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F+L WEEK

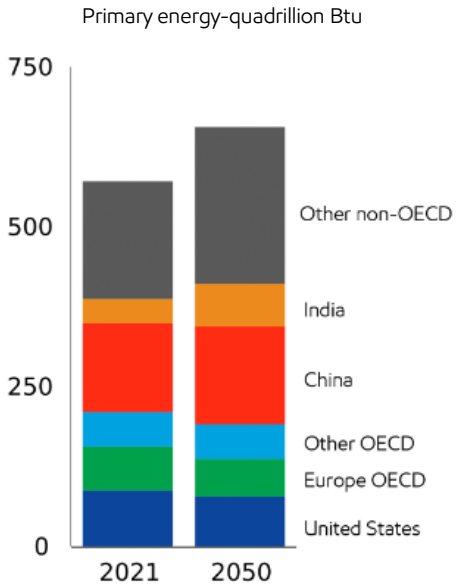
JUNE 14-16, 2023, KUALA LUMPUR, MALAYSIA

The role of synthetic base stocks and lubricants through the energy transition

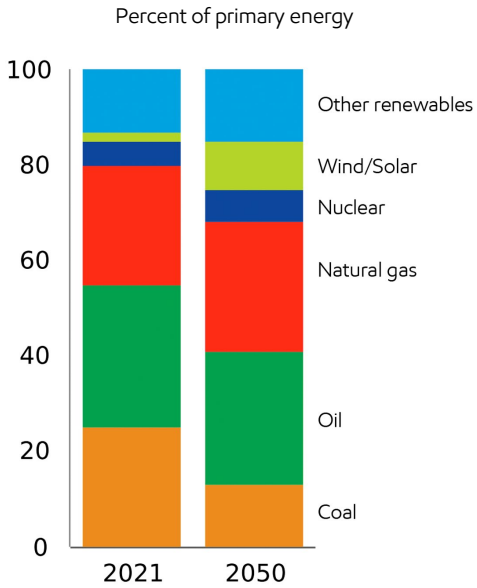
Sarah Horne, Vice President for Synthetic base stocks
ExxonMobil Product Solutions

Global energy demand continues to grow

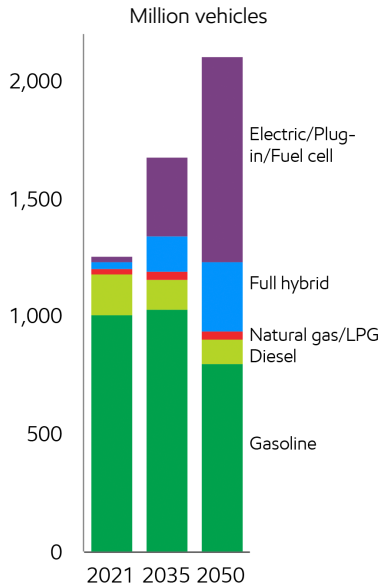
Developing countries lead energy demand



Global energy mix shifts to lower-emission sources



Light-duty EV market share grows

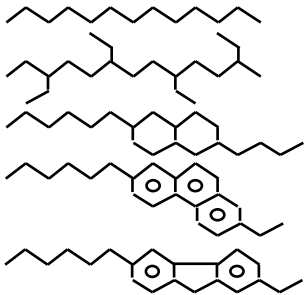


Source: ExxonMobil Energy Outlook, 2022

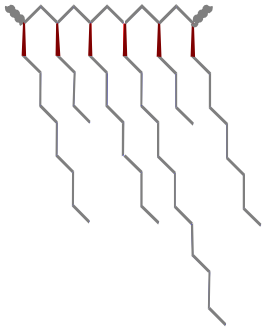
Synthetics deliver increased energy efficiency

Improved energy efficiency supported by a more streamlined molecular design

Mineral oil

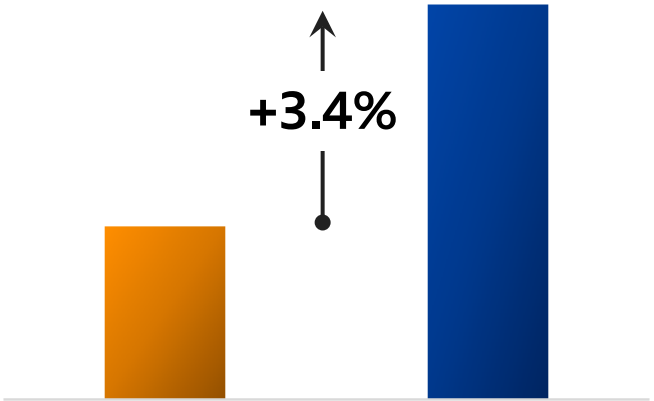


Metallocene PAO



Illustrative purposes only.

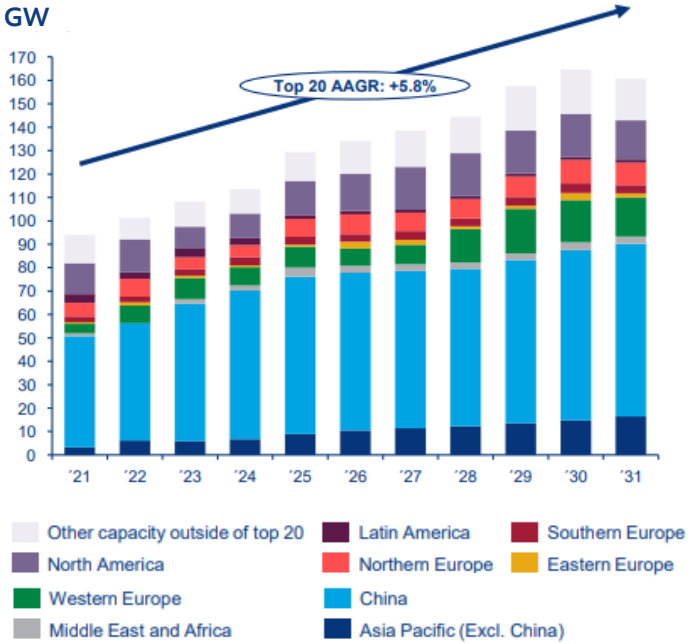
Energy efficiency bench test[1]



[1] Disclaimer: Efficiency determined using a proprietary worm gear rig, comparing this synthetic gear oil to a commercially available mineral oil of the same viscosity. Efficiency improvements will vary based on operating conditions and application. Data generated by ExxonMobil

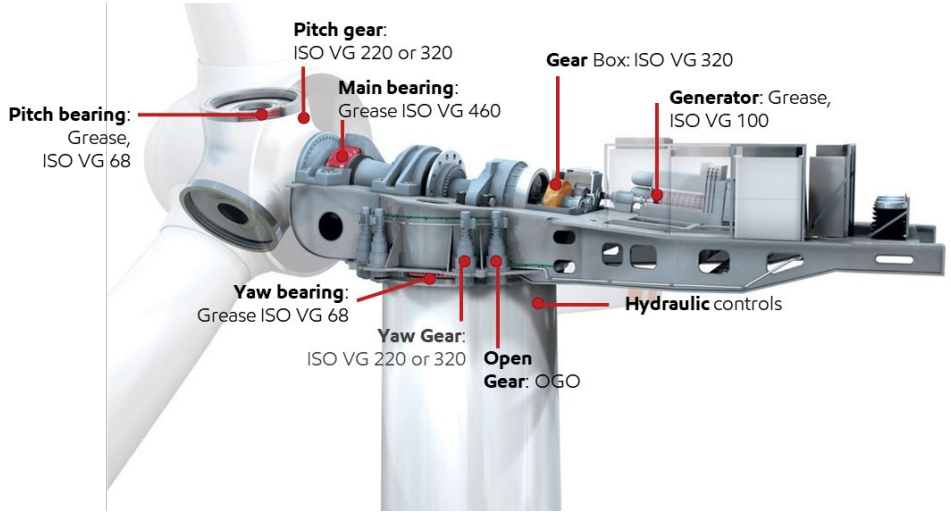
Strong growth in renewable energy

Top 20 regional wind markets: '21-'31



Source: "Global wind power market outlook update: Q2 2022," woodmac.com

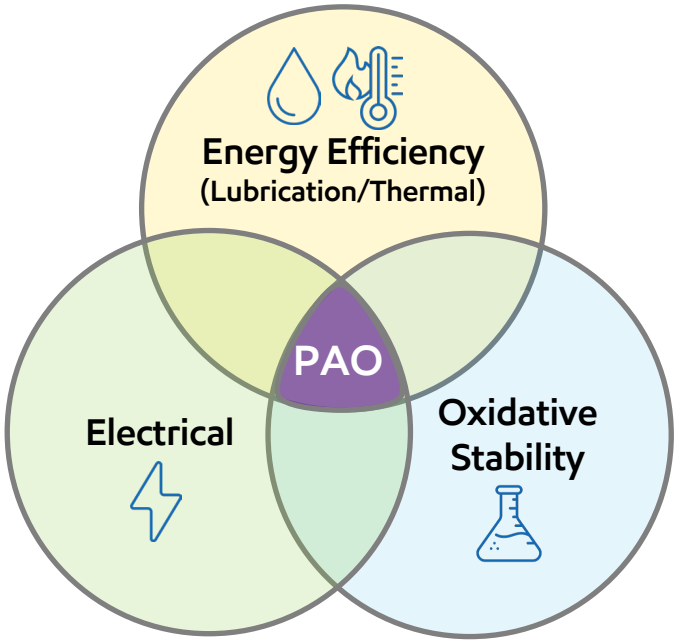
Where and how wind turbines are lubricated



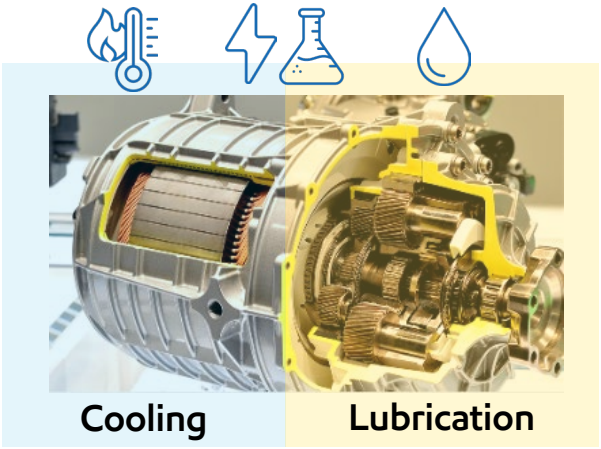
Source: ExxonMobil (mobil.com)

EVs demand energy efficient solutions

e-Fluids require multi-functionality



e-Axels and e-Motors driving to single fluid



Synthetic fluids provide improved energy efficiency using a single fluid through:

- lower temperature
- better lubrication
- system simplification

ExxonMobil

Solution provider: Synthetic PAOs

Industrial gear oil

Up to **3.4%** improved efficiency[1]

Wind turbine lubricants

Better **energy efficiency**, improved oil drain intervals

Grease

~13% Coefficient of friction reduction comparing synthetic vs. mineral based greases[3]

Electric vehicle fluids

Enhanced lubrication up to **0.8%** energy savings and lowers system temperature[4]

Engine oil

+ 0.5% on VW PV1811 Fuel economy test[2]

Automotive gear oil

1% Fuel Efficiency benefit[6]

Data center immersion fluids

Lower energy and water consumption by effective heat transfer

Readily or inherently biodegradable options

76.4% Biodegradability in 28 days (OECD301B) for Esterex™ NP 343[5]

[1]Efficiency determined using a proprietary worm gear rig, comparing this synthetic gear oil to a commercially available mineral oil of the same viscosity. Efficiency improvements will vary based on operating conditions and application. [2]0.5% fuel economy improvement reported comparing PV1811 results obtained on 0W-20 candidates blended with Grp III+ base stock vs. a candidate containing 25% SpectraSyn MaX 3.5 and the balance being the same Grp III+ used in the comparative candidate. [3]CoF measurements based on ASTM D5707 method run on ISO VG 460 NLGI #1 grease candidates prepared with either mineral base stock or with PAO. [4]Based on WLTC efficiency gains vs Gr III reference fluid @ -7°C. [5]Single sample or two sample average determination. [6]Fuel efficiency of 75W-85 grade synthetic-based gear fluid measured in field test compared to 80W-90 grade commercially available reference fluid.

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Ask us how synthetic base stocks and lubricants can help during the energy transition

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