
Industrial Lubricants in the new world of Electric Vehicles

**2nd Asian Industrial Lubricants ICIS Conference,
Singapore**

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13th November 2019

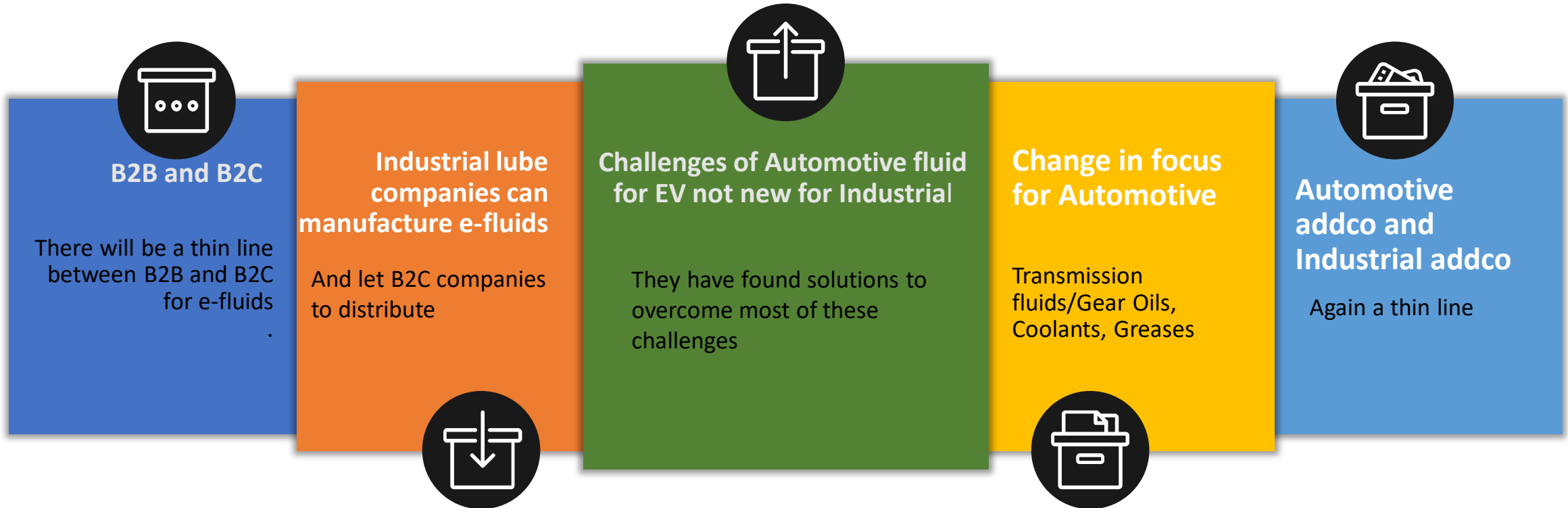


Changing the perspective of EV

Electric Vehicle is not Automotive anymore, it is an Industrial machine moving at high power and speed



Sharing a Thought Process..... why paper on EV is being presented in ICIS Industrial Conference



Data Points

Critical to know that Asia is going to be a growth engine and
ICE to EV transition will take much longer time



3 Asian countries will be in Global Top 5 by 2050....goes to show deeper Motorisation and Industrial activities in this region

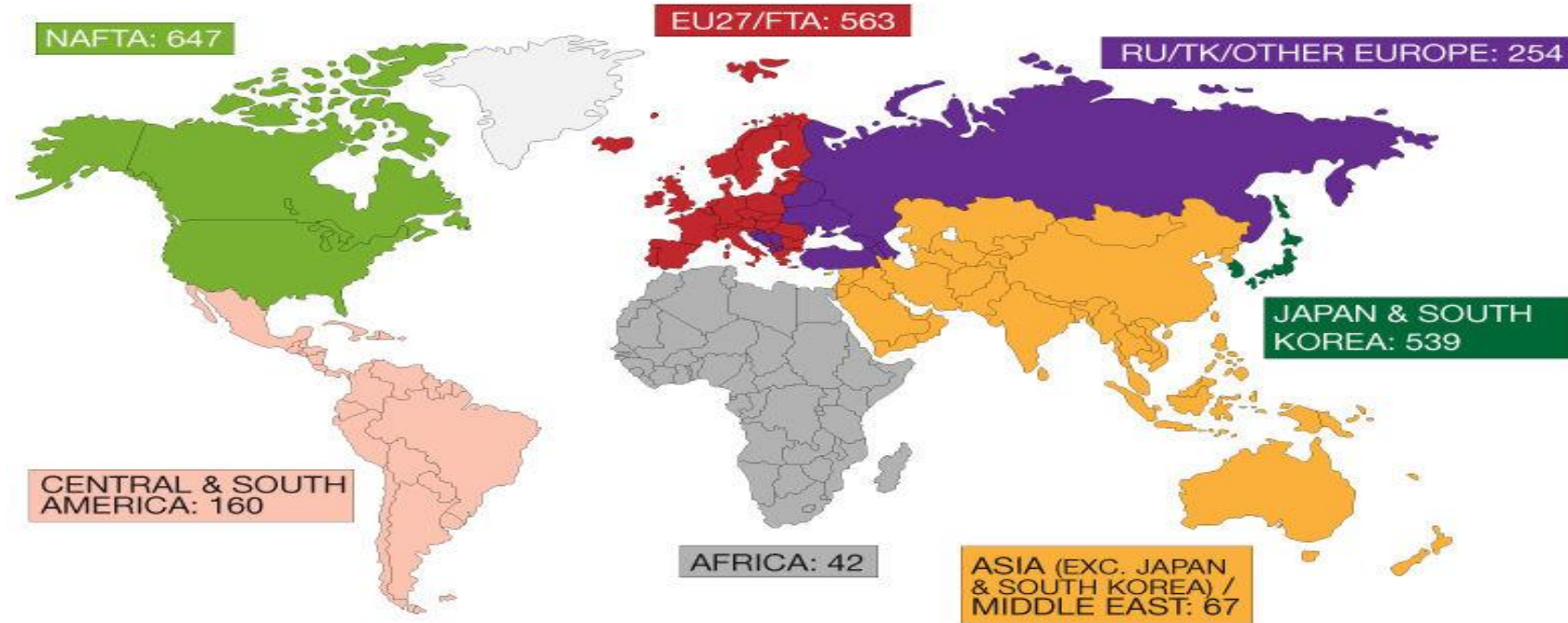
Emerging markets will dominate the world's top 10 economies in 2050 (GDP at PPPs)

	2016	2050	
China	1	1	China
US	2	2	India
India	3	3	US
Japan	4	4	Indonesia
Germany	5	5	Brazil
Russia	6	6	Russia
Brazil	7	7	Mexico
Indonesia	8	8	Japan
UK	9	9	Germany
France	10	10	UK

E7 economies
 G7 economies

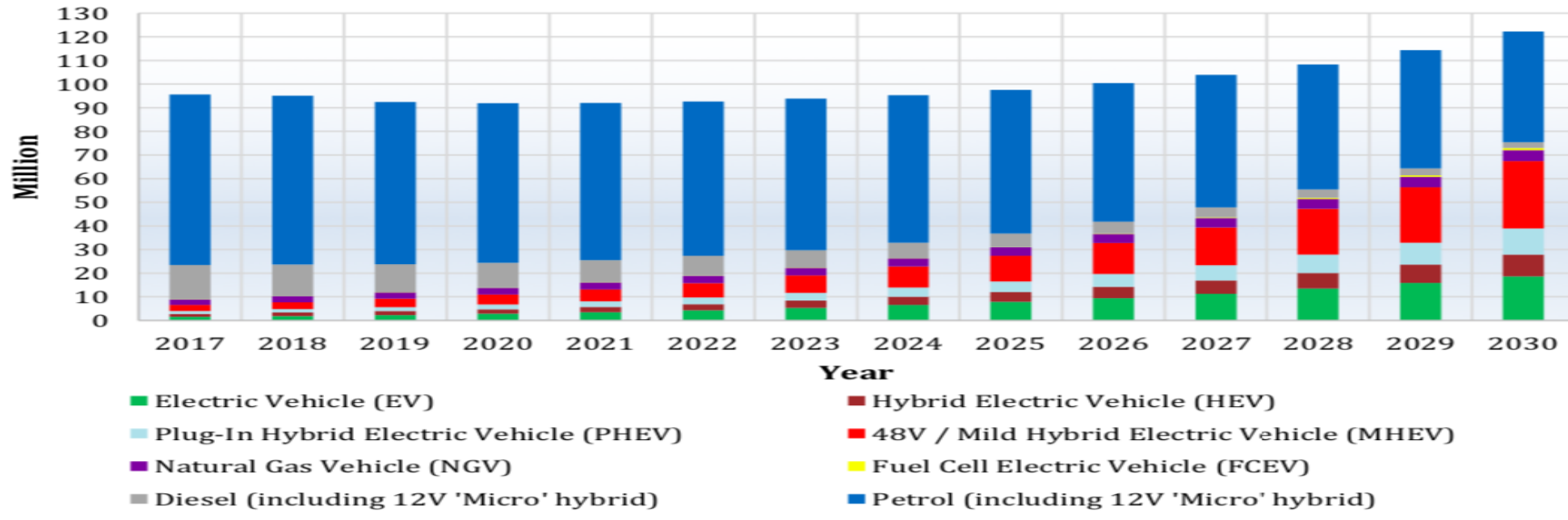
Sources: IMF for 2016 estimates, PwC analysis for projections to 2050

Global Motorisation accounts only for 14% of total population and Expected to grow to 23% by 2035



Most of the growth will come from Asia, followed by ME & Africa

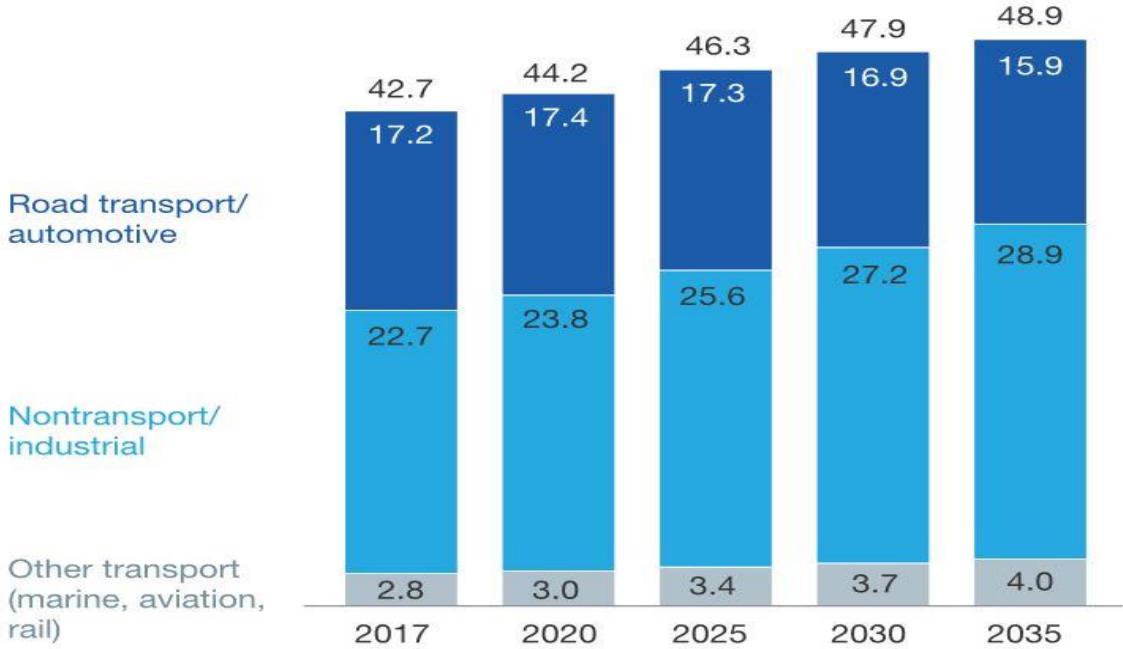
Global Automotive Powertrain Forecast ... By Type 2017-2030 (units million)



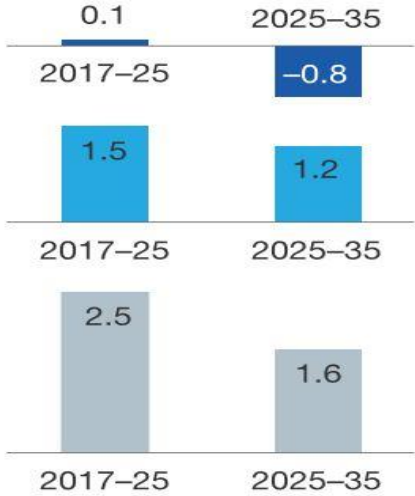
Even with EV penetration going to 30% market share by 2030(in line with EV30@30 scenario), demand for Industrial Lubricants(for Automotive manufacture application) will remain robust. Engine Oil demand will however come down.

Lubricant demand by sector

Projected annual lubricant demand by sector,¹ million tons



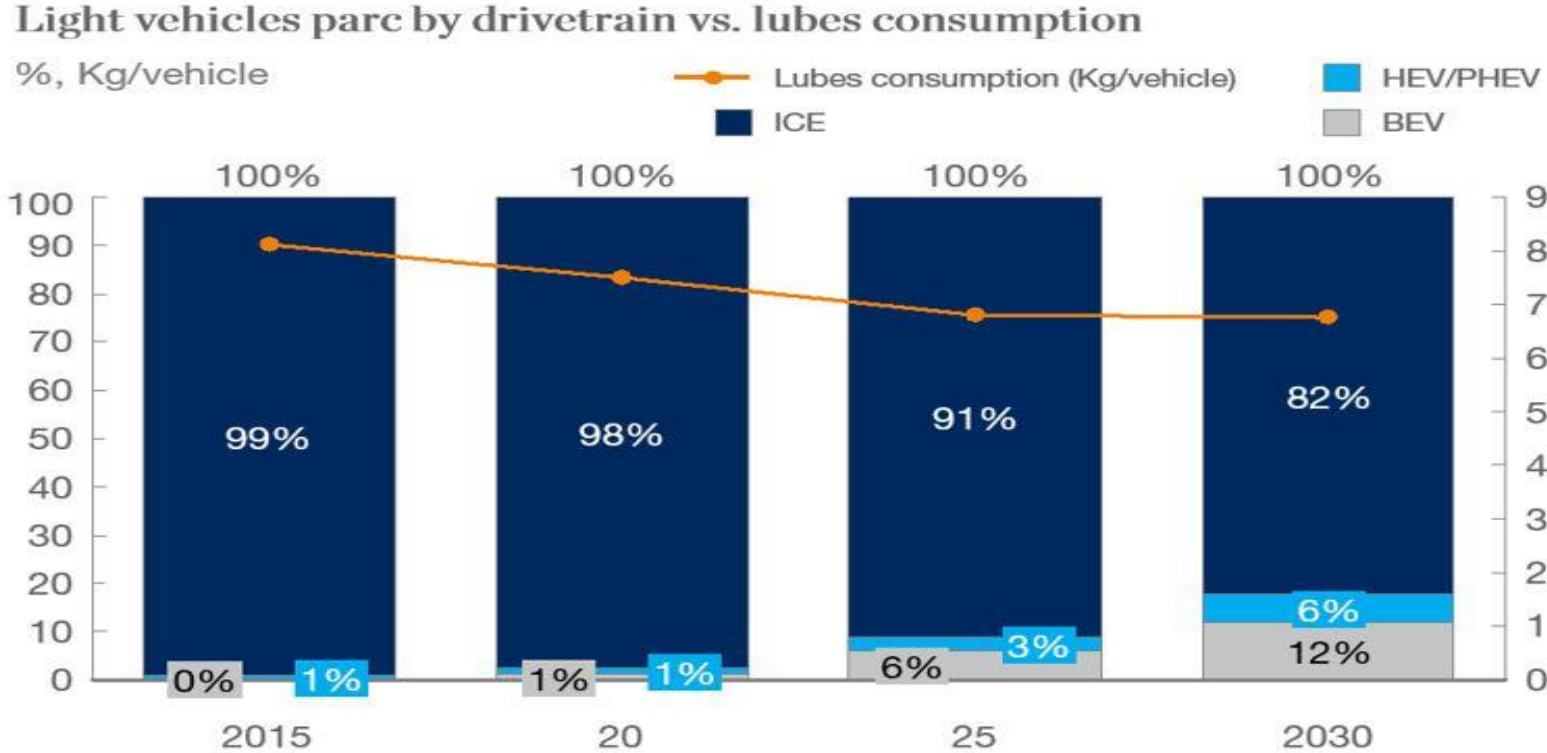
Compound annual growth rate, %



¹Figures may not sum, because of rounding.

McKinsey&Company | Source: Energy Insights by McKinsey; McKinsey analysis

Lubricant consumption for ICE vehicles, hybrid/plug-in hybrid, and battery electric vehicles



SOURCE: McKinsey Energy Insights

Major Applications for Industrial Lubricants and Types of Lubricants...Will continue to dominate in disruptive world



Automotive manufacturer
Machinery
Metals

Types of Industrial Lubricants

- Hydraulic Fluids
- Corrosion Preventives
- Gear Oils
- Soluble Cutting Oils
- Neat Cutting Oils
- Forming Oils
- Quenching Oils
- Compressor Oils
- Honing Oils
- Turbine Oils
- Refrigeration Oils
- Marine, railroad, aviation
- Industrial greases
- Way oils
- Cleaners
- Misc.

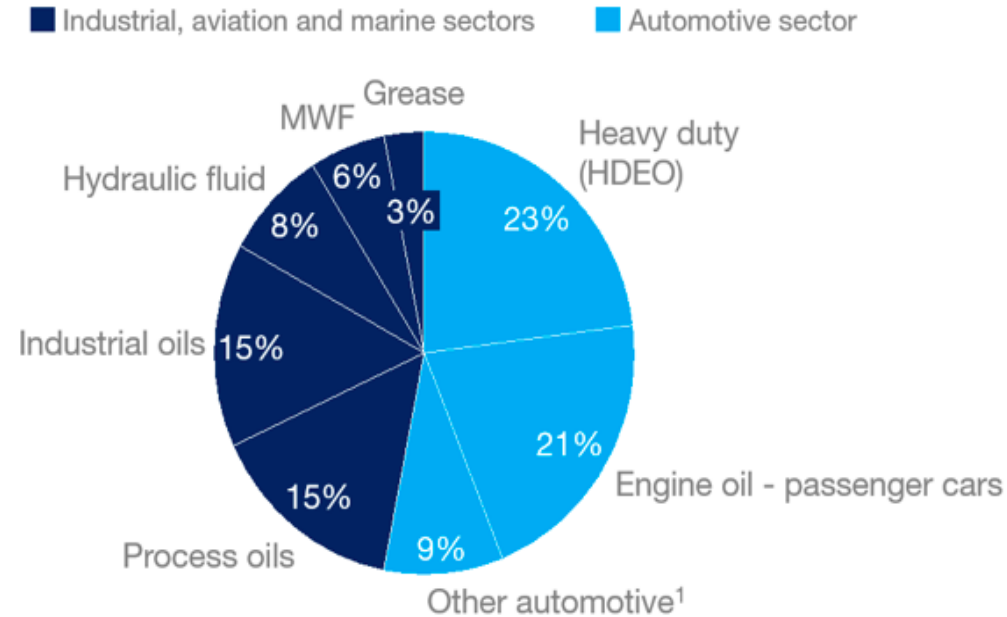


Rail, Marine, Aviation
Mining
Compressors



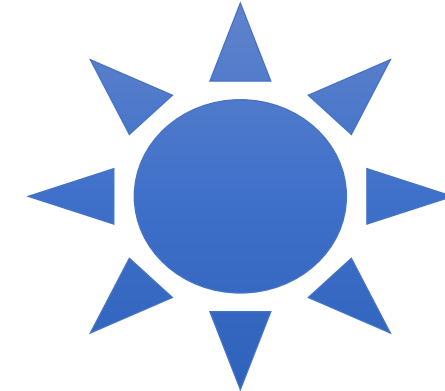
Lubricants Demand by 2030 will undergo change due to ICE to EV transition of 15%(best case) to 25%(worst case) of total vehicle parc

Lubricants demand by end-use segment, 2015



¹ Gear oil, transmission fluid, wheel bearing, and chassis grease

2030 will have different mix?*



New opportunities for Industrial Lubricant Manufacturers for FF and SF of EV

SOURCE: Kline

* Still too early to calculate lubricant mix by 2030, due to lack of clarity of Govt. Policies and journey of Hybrid v/s EV v/s more efficient ICE over next decade

An opportunity for Industrial
Lubricant Players to create a
metastory like 'Intel Inside'



Rosefield DAA
Adding Value

New opportunities for Industrial Manufacturers

.....EV needs high performance fluids and greases



Gear Oils to lubricate differentials,
Chassis and wheels



Coolants for the battery

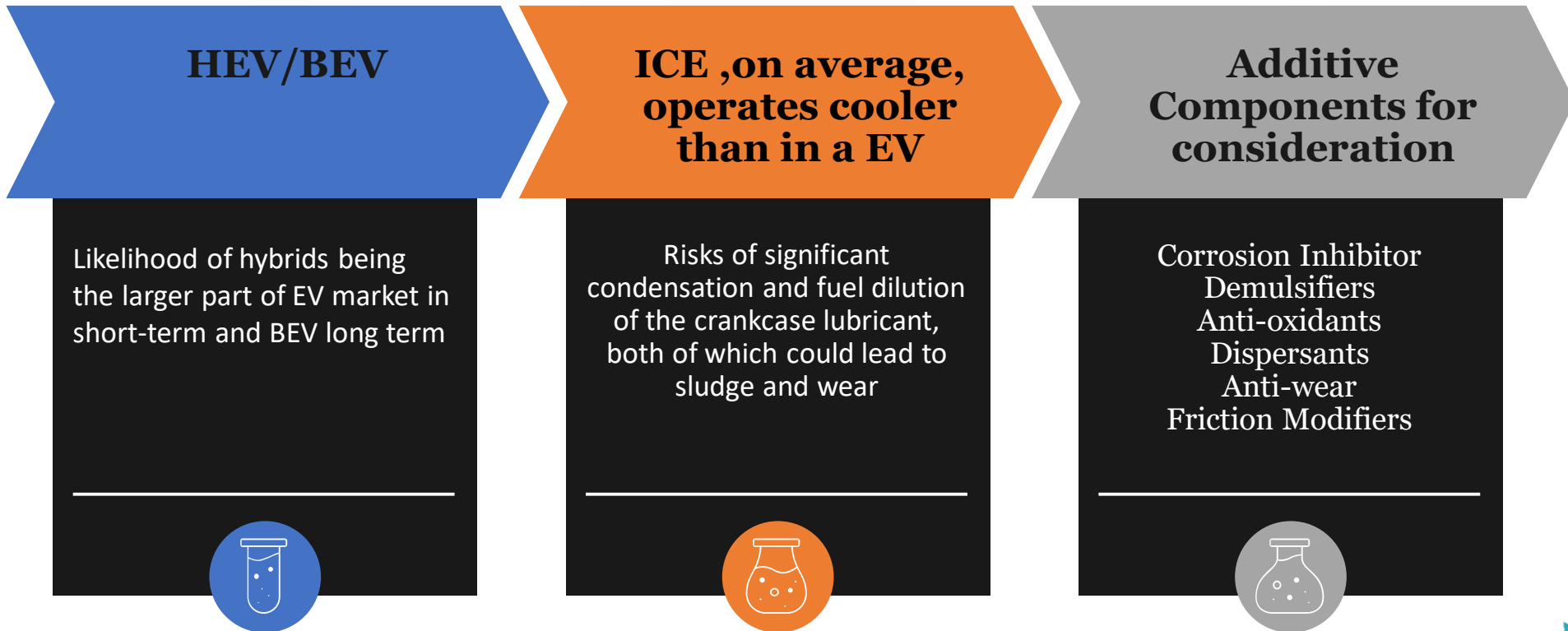


Brake Fluids



Grease for EV

HEV/ BEVs and challenges for e-fluids

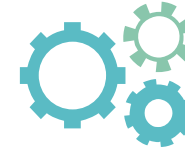


e-DCT or e-ATF and e-axle - Challenges and solutions by e-fluid formulators

Excellent oxidation and sludge control



Should have appropriate Frictional properties



These fluids will also get hotter than conventional axle fluids

Should have low electrical conductivity



e-DCT or e-ATF and e-axle Challenges and solutions



Need to have higher VI, leading to Synthetic base fluids

Should protect against copper corrosion



Industrial has all the experience and expertise

Greases...clearly a critical product among e-fluids and Industrial grease makers have already addressed some of the challenges

To be contd...

- The technical challenges for greases will be electrical, thermal and energy-saving
- If current industrial EM greases are considered as a starting point for automotive applications, the voltage issue has already been addressed and the formulating challenge is around the different mechanical environment of the EM
- Industrial EM greases are often based on polyurea or lithium complex thickeners, due to their higher mechanical stability, which ensures the grease stays in the bearings and doesn't migrate to the windings.

Greases...Some of the challenges in EV are different from Industrial applications and need to be addressed

contd...

- Electric motors for automotive applications will operate at higher rotational speeds than most industrial applications, leading to higher shear and higher temperatures in the bearings.
- The viscosity of the base fluid will have to be low to reduce energy losses due to friction or drag in all parts of the drivetrain but high enough to maintain an oil film under all anticipated operating conditions.
- All these factors drive formulators towards synthetic and lower-viscosity base fluids.
- Stop-start operation is likely to be more prevalent in EVs than in most industrial applications

References

EV Lubricant Technology...LubesNGreases

International Organization of Motor Vehicle Manufacturers

International Energy Agency – Global EV Outlook

<http://www.mckinseyenergyinsights.com/insights/impact-of-electric-vehicles-on-lubricants-demand/>

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