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Evolução da indústria de lubrificantes: Desafios e Complexidade

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Situation

- Global automotive lubricant industry are changing to meet tighter emission regulations and higher performance needs **pushing, engine and lubricant technology to a higher level**
- Fuel economy which has been solely the key driver for decades are now expanding to a broader **TCO (total cost of ownership concept). Extended service and Durability** became critical
- Time lag for implementing new environmental regulations are becoming shorter and emerging markets may adopt more recent emission standards within 3-5 years timeframe **increasing the demand for low ash oils.**

Complication

- To meet fuel economy and durability standards OEMs are forced to add new engine technologies and hardware changes **increasing lubricant formulation complexity.**
- Most of **consumers are not familiar with complexity and work that goes into developing engine oils globally** to meet the new standards and at some regions they are still very price sensitive.

Implication

- If the industry does succeed in properly educate market players and end-users on how new engine technology and regulation standards impacts fuels, lubricant and the additive requirements the value of **high performance lubricants will never be perceived by the market**



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Emission legislation is a key driver for engine and lubricant technology

- High performance level lubricants enable engine technology to a great extent.
- Emerging markets adopting Euro VI type emission standards will increase the demand for low ash oils.

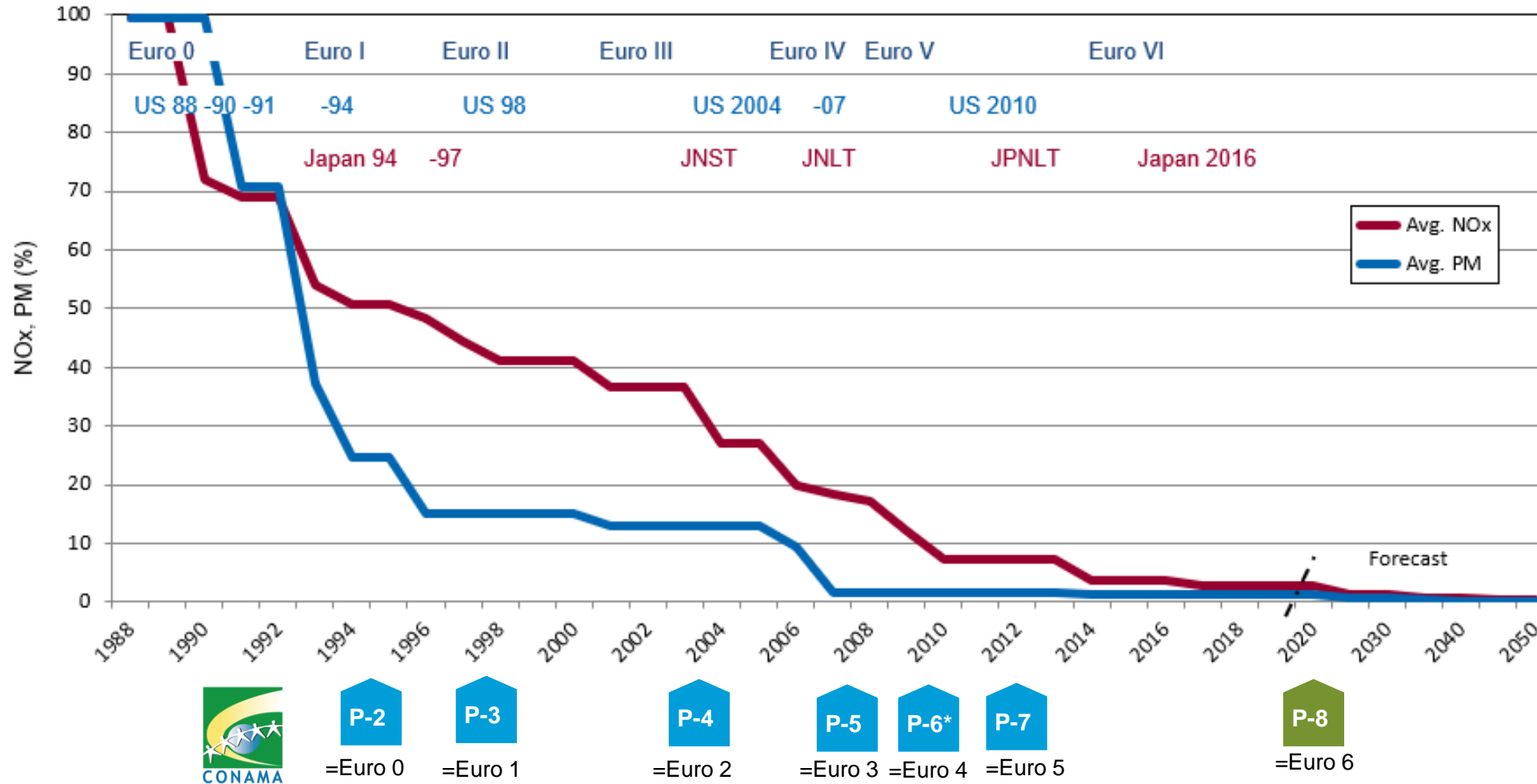


HD OEMs have always met emission standards



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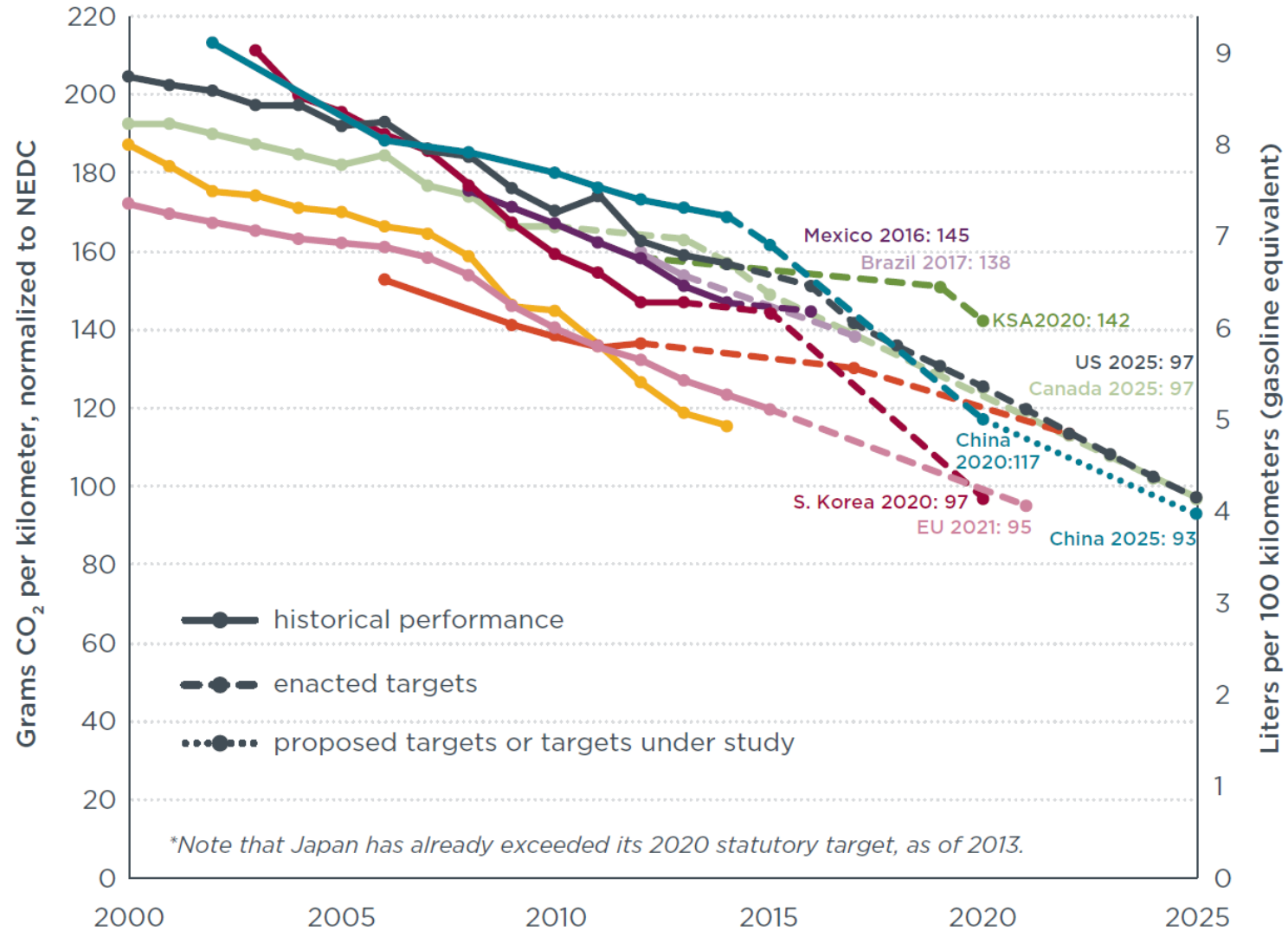
Average EU, US and Japan emission standards



Over the last 30 years NOx and PM emission standards have been tightened by ~98%.
For the coming 30 years NOx and PM emission standards will be further tightened.

Improved fuel economy and reduced GHG

A global phenomenon



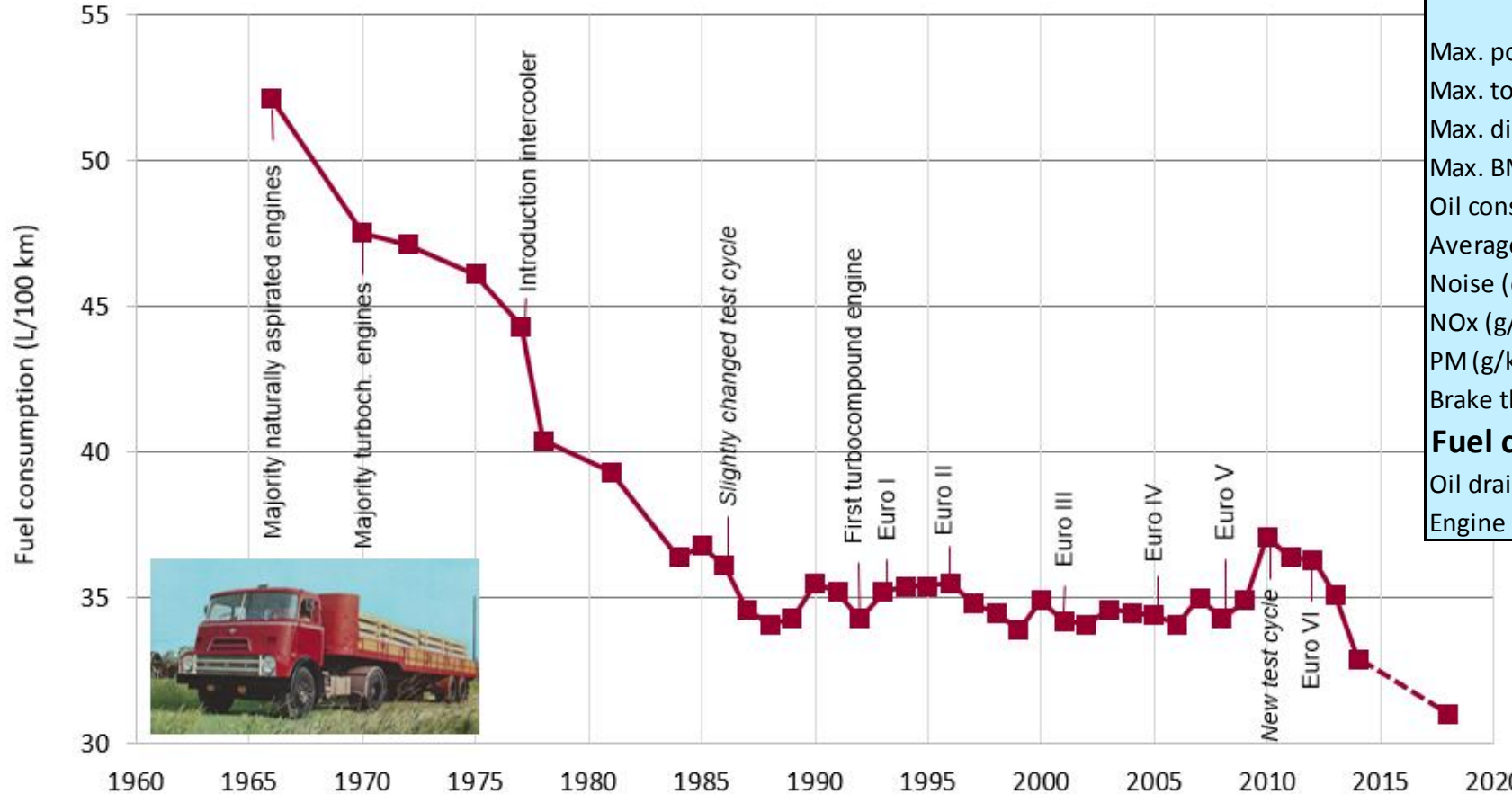
Source: International Council on Clean Transportation, June 2016 Update: <http://www.theicct.org/co2-from-new-cars-eu-2015>

Achievements over the last half century



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Truck and engine characteristics



	1965		2019
Max. power (hp):	350	↔	750
Max. torque (Nm):	1245	↔	3550
Max. displacement (L):	14.2	↔	16.1
Max. BMEP (bar):	11.0	↔	27.7
Oil consumption (g/kWh):	0.2	↔	0.05
Average speed (km/h):	53	↔	78
Noise (dB(A)):	91	↔	77
NOx (g/kWh):	>14.4	↔	0.46
PM (g/kWh):	>1.1	↔	0.01
Brake thermal eff. (%)	34	↔	47
Fuel cons. (L/100 km):	52	↔	32
Oil drain interval (km):	5,000	↔	150,000
Engine life time (km):	600,000	↔	1,600,000



Source: lastauto omnibus

Performance and durability of heavy-duty trucks and engines have improved substantially. Engine lubricants have enabled many improvements.

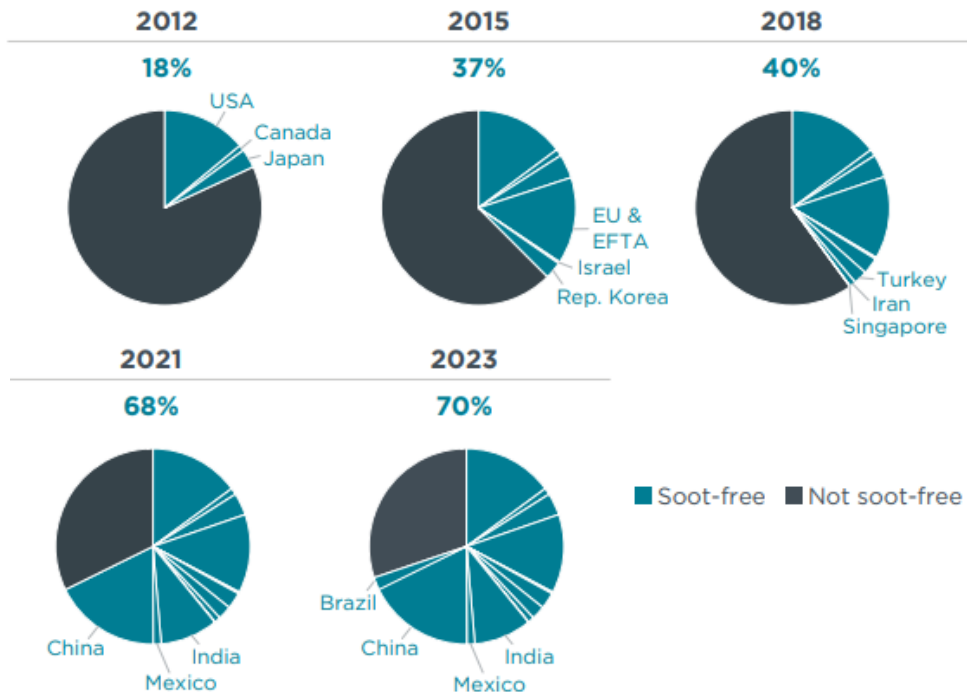
Proconve 8

Euro VI equivalent for Brazil



Current PROCONVE **P7** (introduced in 2012) emission standards for light-duty vehicles are loosely based on both US and EU regulations, with a number of differences in the limit values and testing requirements;

The adoption of **P8** (equivalent to **Euro VI**) in Brazil follows similar developments in other major vehicle markets, notably India, China and Mexico. After these standards take effect, an estimated **70% of new HDVs with diesel engines worldwide will meet Euro VI-equivalent** standards;



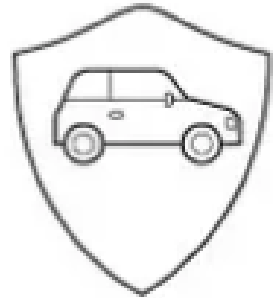
- New vehicle type >> **Jan 2022** / All new vehicle sales >> **Jan 2023**
- Domestically produced & imported vehicles;
- Specify max limits for exhaust gas emissions, particulates and noise;
- Requirements for durability, on-board diagnostic systems and in-use testing;
- Expected to lead to the universal application of DPF
- Should **reduce PM emissions by 90% vs P-7**

Rota 2030

Commitments



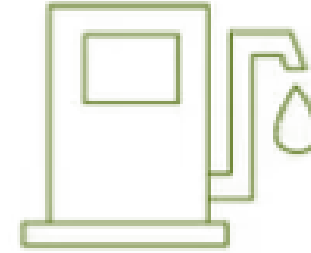
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Vehicle
Safety



R&D
incentive



Energy
Efficiency

v v

Phase I: end of 2022
need to improve by **11%**

v v

leading to new models &
EV introduction



Source: ICCT

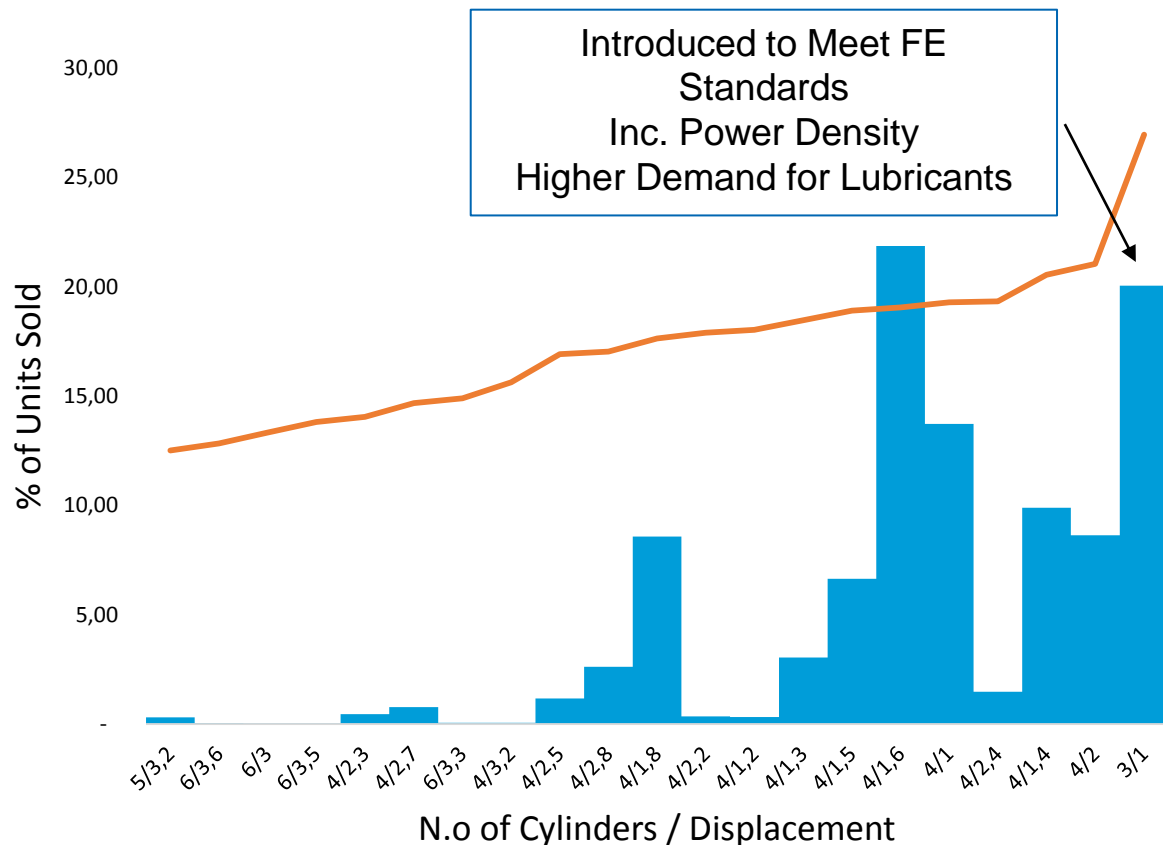
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Engine Changes

- Downsizing trend pushing need for higher performance oils
- Industry standard specification getting shorter & tests getting longer



Downsizing



- **Smaller displacement, higher power density engines**
- **3 cylinders engines rapidly growing in Brazil and LA** → “*nouvelle vague*” (new wave) has started in Europe to reduce fuel consumption and GHG emissions
- **20% of new cars in Brazil have 3 cylinders or turbo/direct injection**
- **Smaller engines = higher load factors**



Changing performance demands on fuels, lubricants, and additives

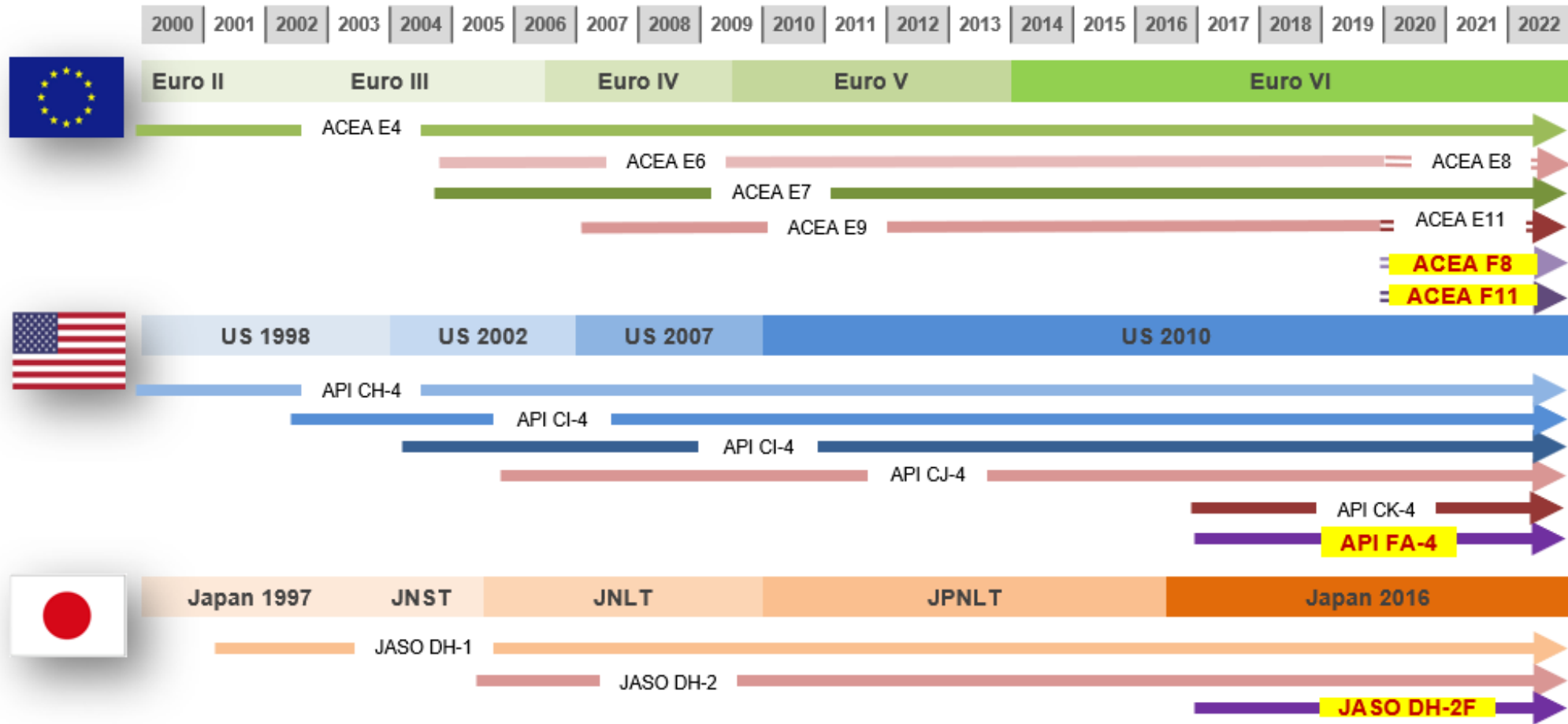


Lubricant industry has responded to FE specs



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US, Japan have and EU will launch fuel economy lubricant grades

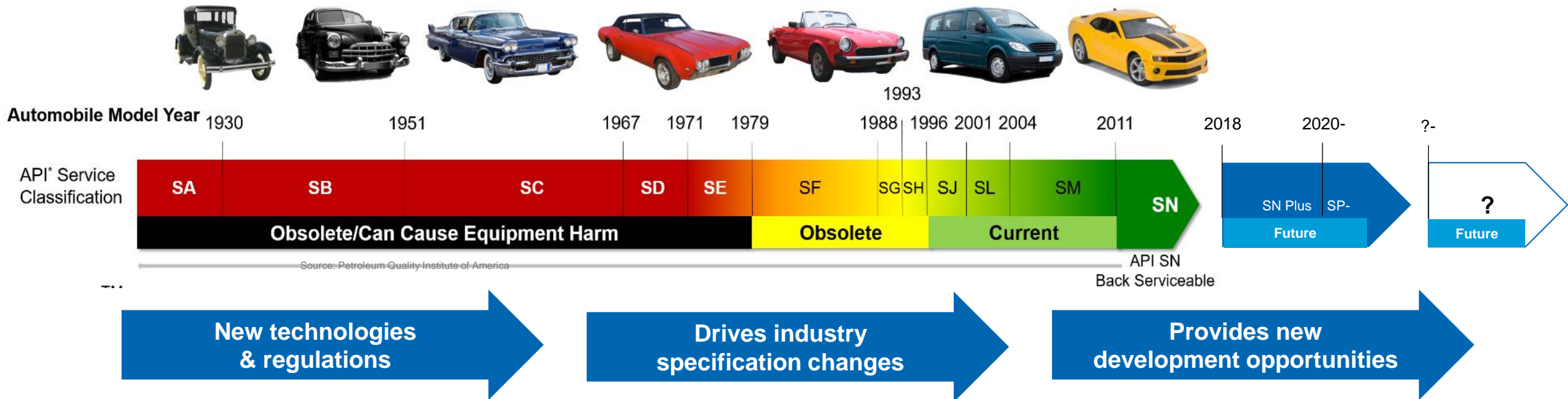


ACEA will launch fuel economy lubricant grades similar to US and Japan.

Trend – Shorter Category Life



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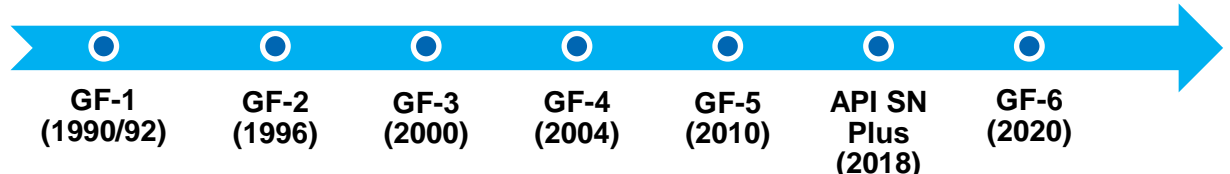
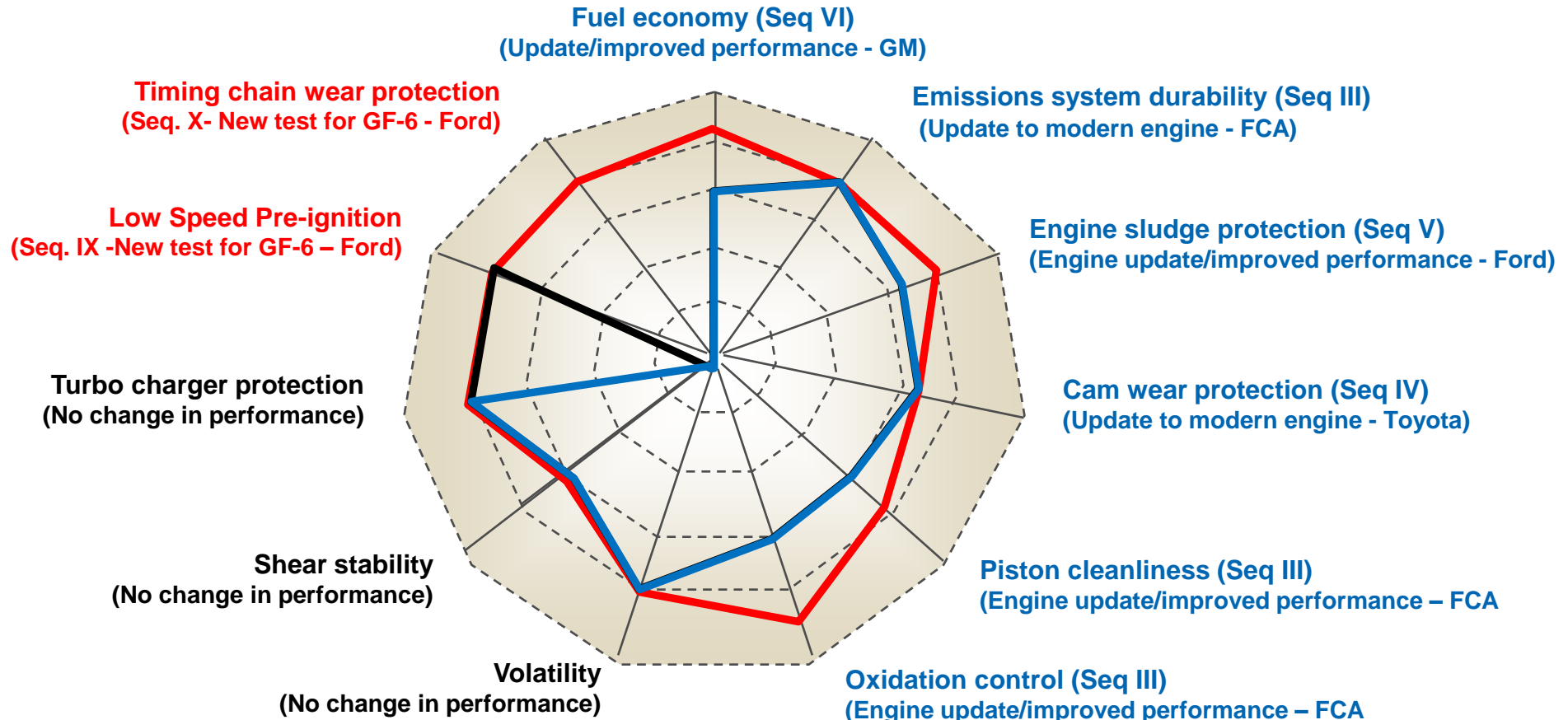
Driver – Rapid advancements in engine design

ILSAC Engine Oil test methods



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GF-5 → API SN Plus → GF-6

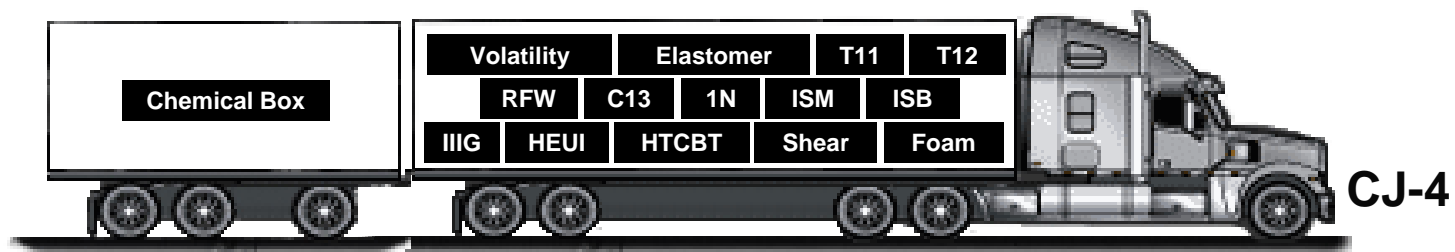
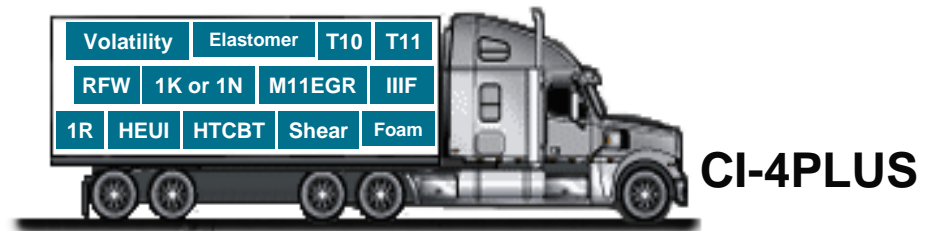
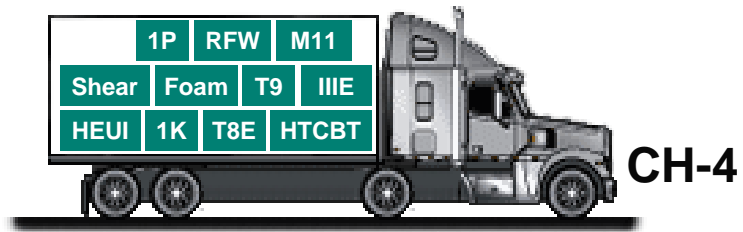


https://www.oronite.com/products/api_snplus.asp

API HD 4-Stroke Cycle Test Load Evolution



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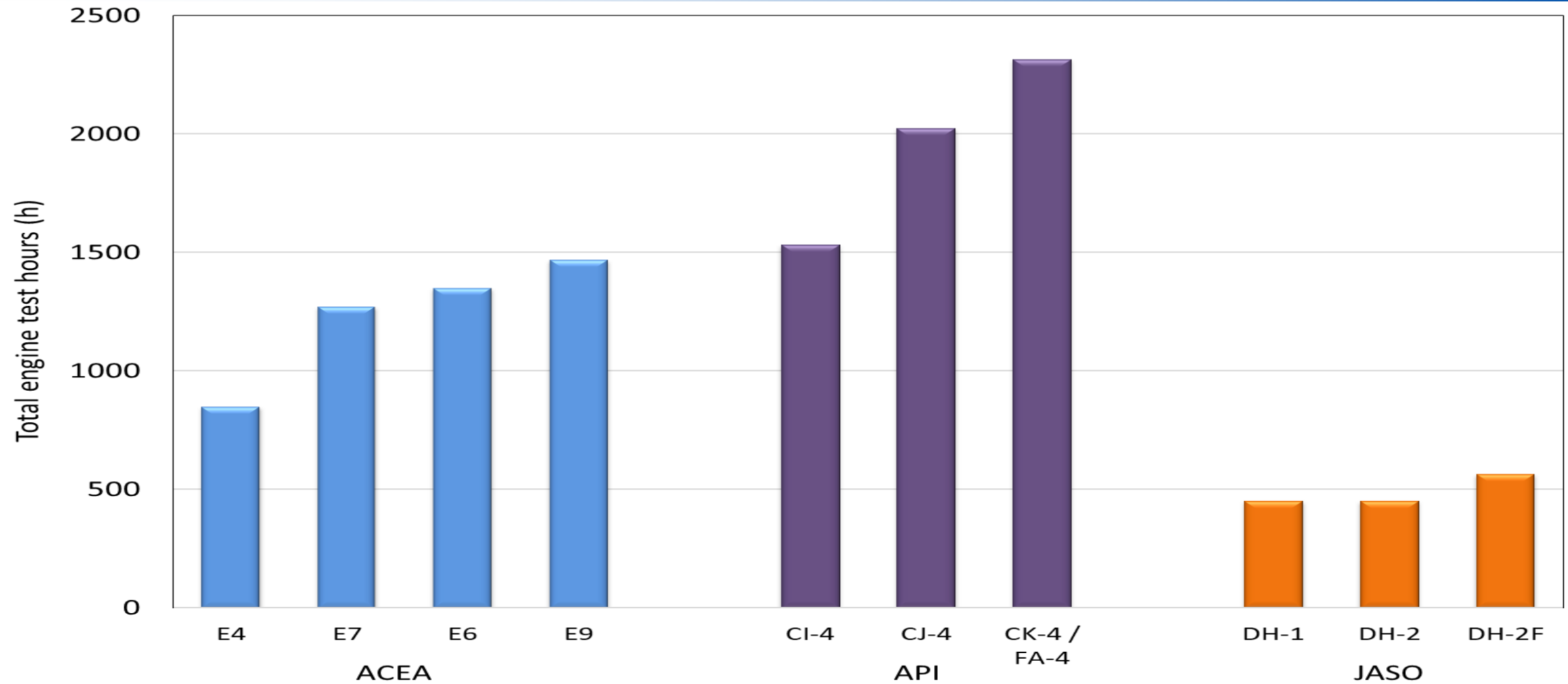


Sum of engine test length is increasing

Fulfillment of all requirements when single tests are run



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Sum of engine test hours of all requirements increases over time and differs among the regions.

Fleet Profile

- More OEM players in Latin America Market influencing number of different specification lubricant industry has to meet



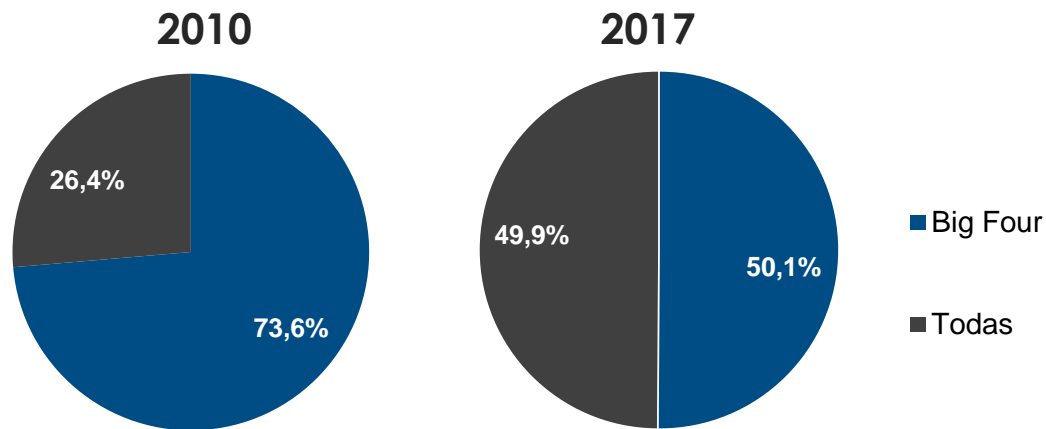
Change in Fleet Profile – Brazil example



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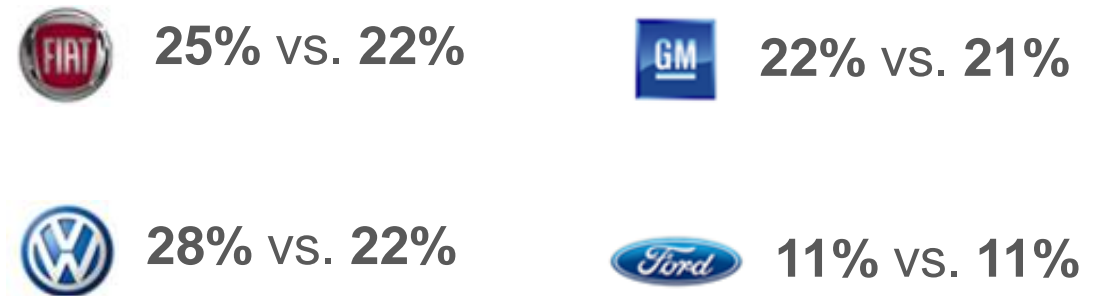
Diversity of OEMs

“Big 4” loosing Supremacy in Car Sales

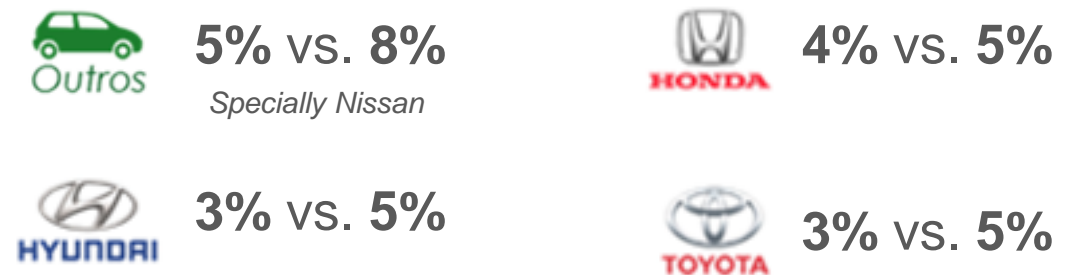


Source: Anfavea

%Fleet 2010 vs. 2017



Projection for 2020



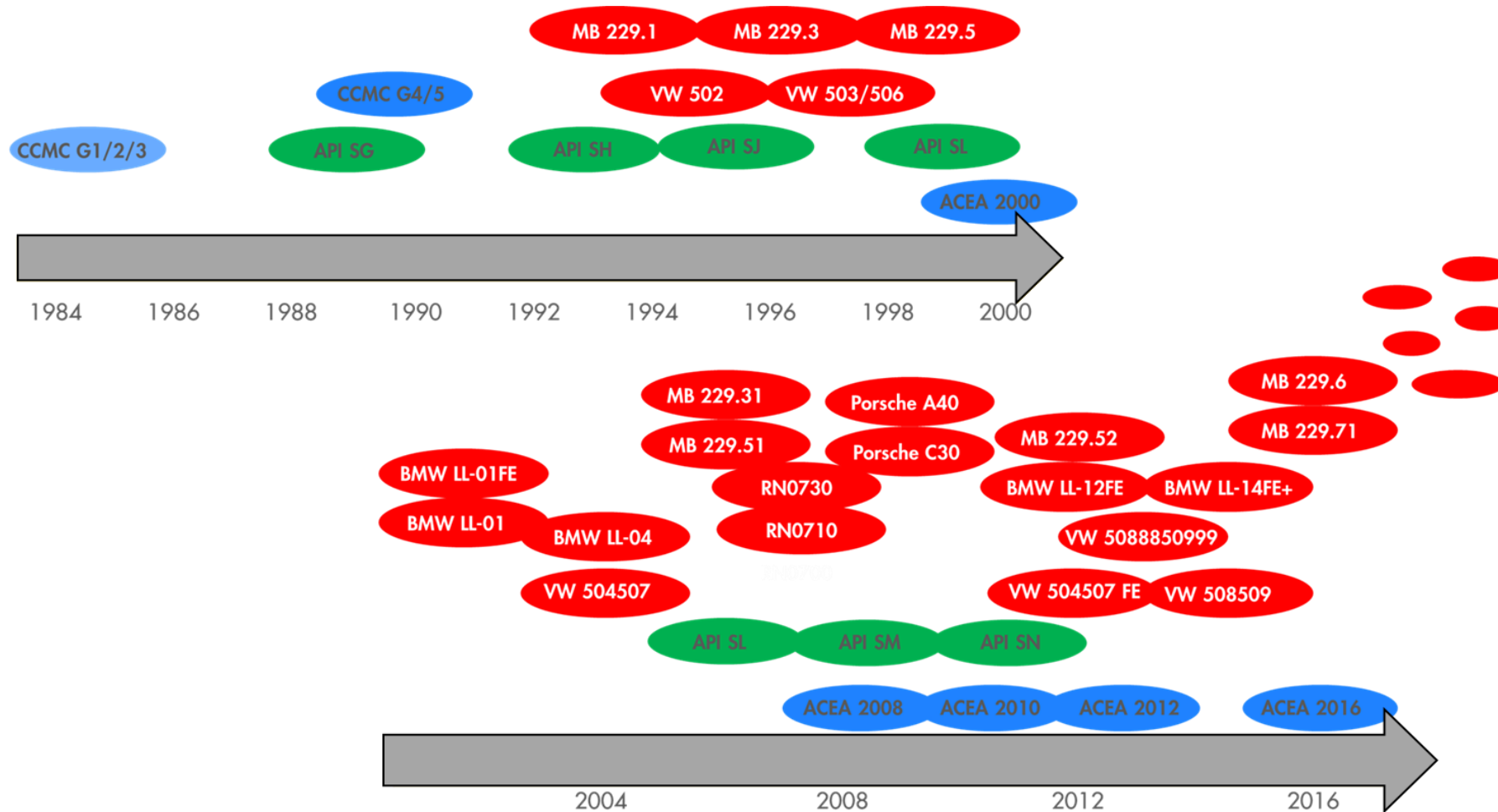
More diverse fleet = more different specs to meet

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Development industry specifications - PCMO



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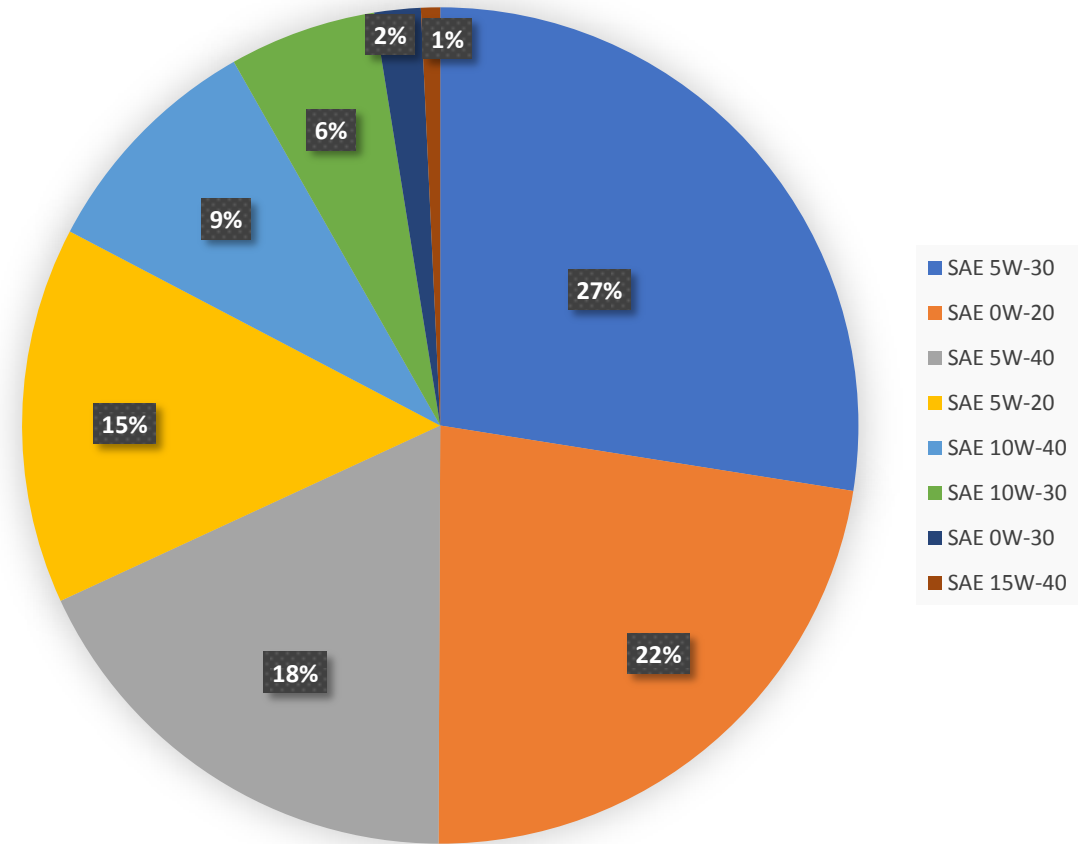
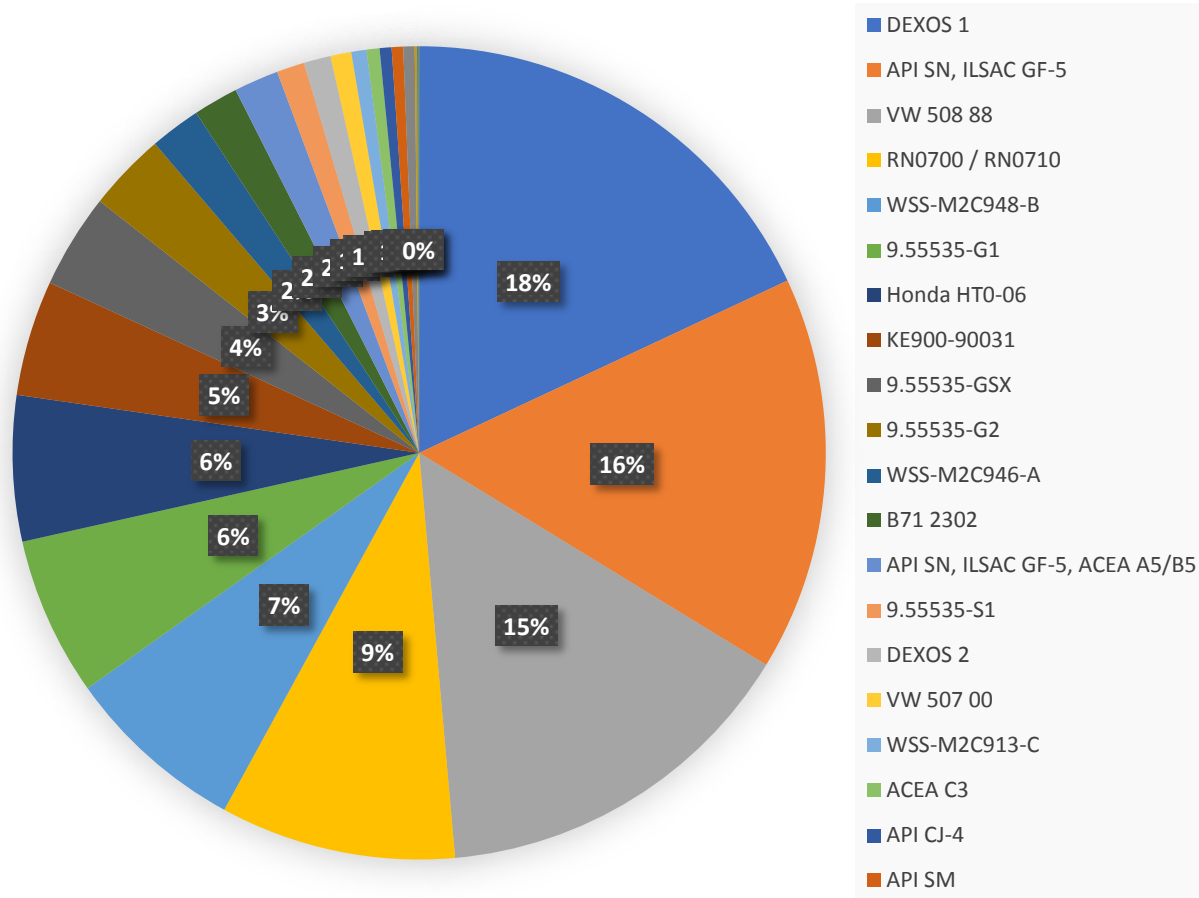
PC OEM Recommendation Brazil

Not Long Ago 15W-40 API



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35 Combinations Spec - Visgrade



Conclusions



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- In 2 to 3 years time, when India, China, Mexico and Brazil have adopted Euro VI type emission standards, demand for low ash oils will increase substantially;
- Trend is more severe piston cleanliness, oxidation stability, and fuel economy requirements, and less severe soot handling requirements;
- On top, OEMs demand for longer oil drain intervals in smaller engines;
- Delay in implementing new specs in LA (vs EU and US) is reducing due to fleet renovation & global OEM platforms;
- Current industry engine test portfolio is not dedicated for development of next generation lubricants;
- Industry lubricant specifications need adjustment to allow development of high performance lubricants meeting fuel economy, cleanliness and ODI requirements;
- Lubricant industry delivers products meeting the requirements in time but final consumer is not adopting new technologies at the same pace.





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Thank you

