



# Hybrid Engine Oil: Formulated Solutions for Today's Passenger Car Market

Fabio Araujo | EO Business Manager Latam

XIII Encontro Internacional Com o Mercado - América Do Sul

June, 21 2023

# Content

- Latam Automotive Industry snapshot
- Hybrid Terminology
- Electrification Signposts
- Forecasts
- Lubrizol Field Trials
- Results & Performance Recommendations
- Summary



## Latin America snapshot

- The Latin America economies are very resilient and quickly rebounded from COVID-19 pandemic
- The Latin America automotive industry is among the most important in the world, where Mexico and Brazil lead the way
- Decarbonization is a key topic in both Mexico and Brazil
  - Brazil will most likely adopt the leadership in biofuel combined with an important degree of electrification
  - Mexico will most likely follow the USA due to their important commercial alliance

**Latam has a very dynamic Automotive Industry and there opportunities available now that could help us to move towards a more sustainable future!**

# Latin America Automotive Industry is Significant



**#8**  
Global  
Vehicle  
Producer

**#6**  
Global  
Vehicle  
Parc

**#7**  
New  
Vehicle  
Registration

**4.8**  
Inhabitants  
per  
Vehicle



**#7**  
Global  
Vehicle  
Producer

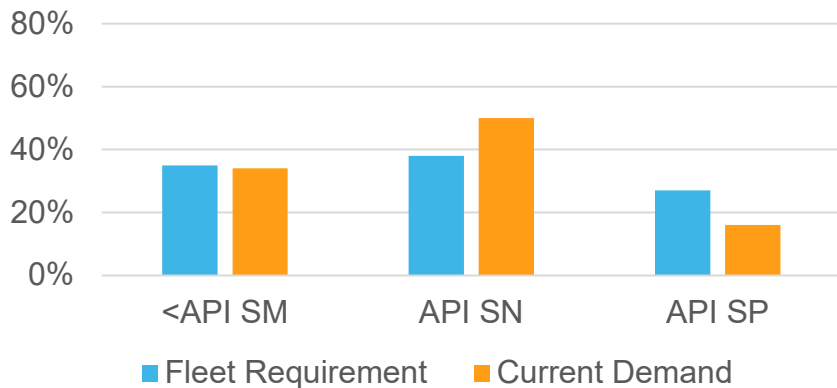
**#8**  
Global  
Vehicle  
Parc

**#14**  
New  
Vehicle  
Registration

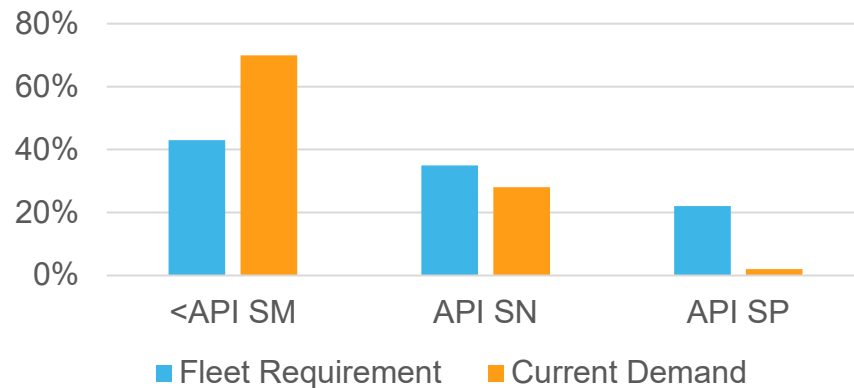
**3.4**  
Inhabitants  
per  
Vehicle

# The lubricant quality in Latam is not fully aligned with the needs of the current fleet

Mexico



Brazil



**There is an urgent need for higher performing lubricants**

# Higher Performing Lubricants and Its Impact



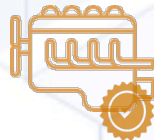
- Excellent anti-wear, friction modifier and additive technologies; high-quality base stocks



- Advanced detergents and inhibitors against corrosion



- Mid to low ash for filter compatibility



- Low speed pre-ignition protection



There are actions we can take now to move towards a more sustainable future

# Passenger Car Motor Oil (PCMO) | Hybrid Terminology

Internal Combustion  
Engine

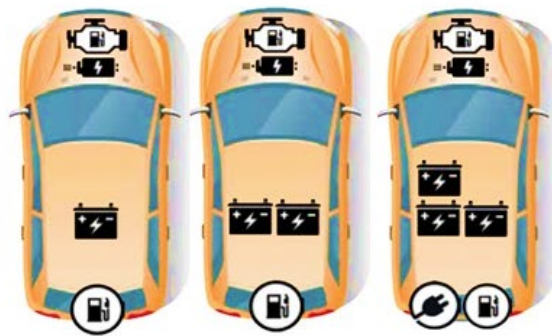
**ICE**



\* Sometimes classified as a mild hybrid

Mild, Full and Plug-in Hybrid  
Electric Vehicles

**HEV & PHEV**



Range Extended, Full Battery  
and Fuel Cell Electric Vehicles

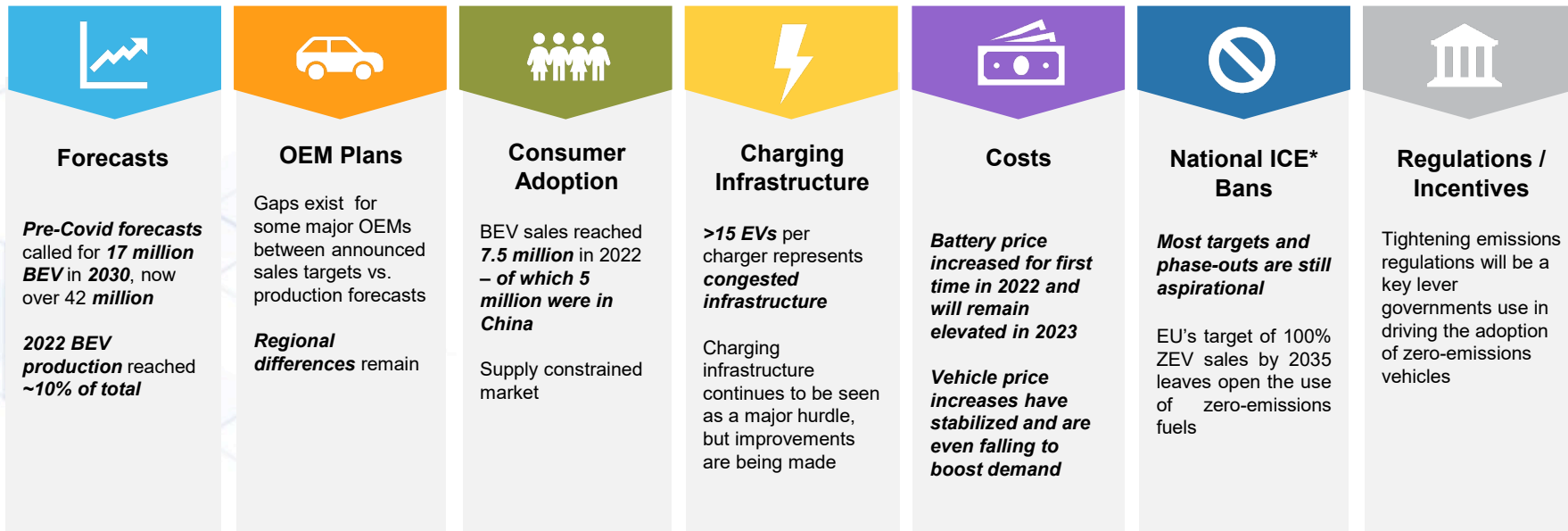
**REEV, BEV, FCEV**



Electrified: Hybrid OR Full Electric

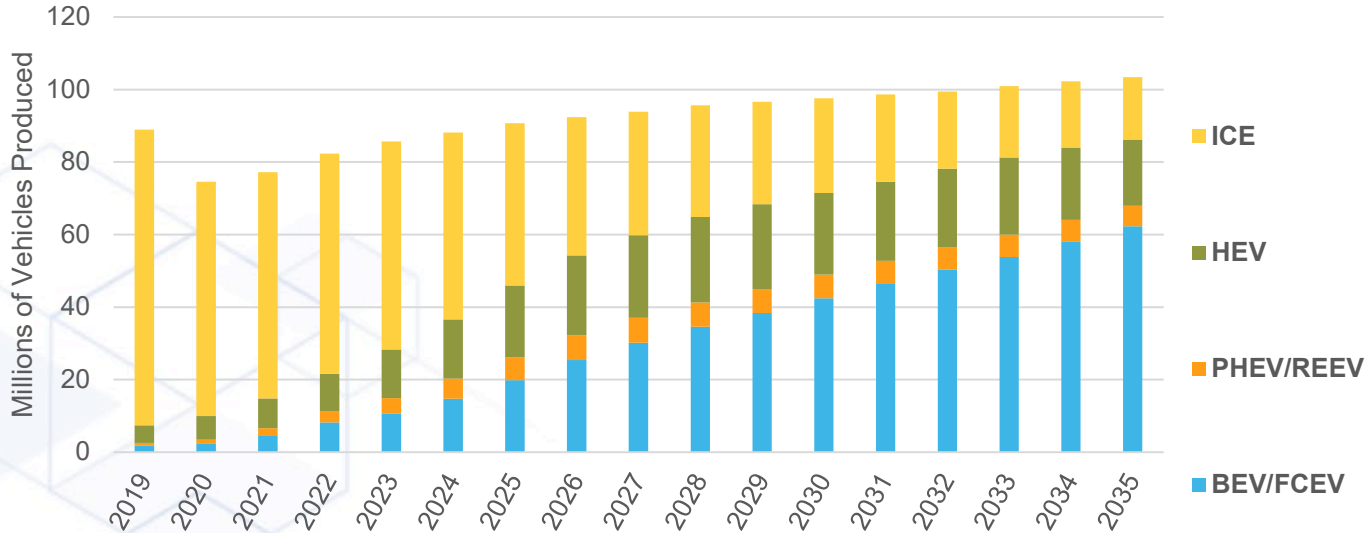
# Vehicle Electrification Signposts

## 7 Key Focus Areas to Watch



# Global Production Forecasts Post-Pandemic

Light Vehicle Powertrain Forecast – May 2023 (Millions)



Hybrid vehicle production will overtake ICE-only production by 2029

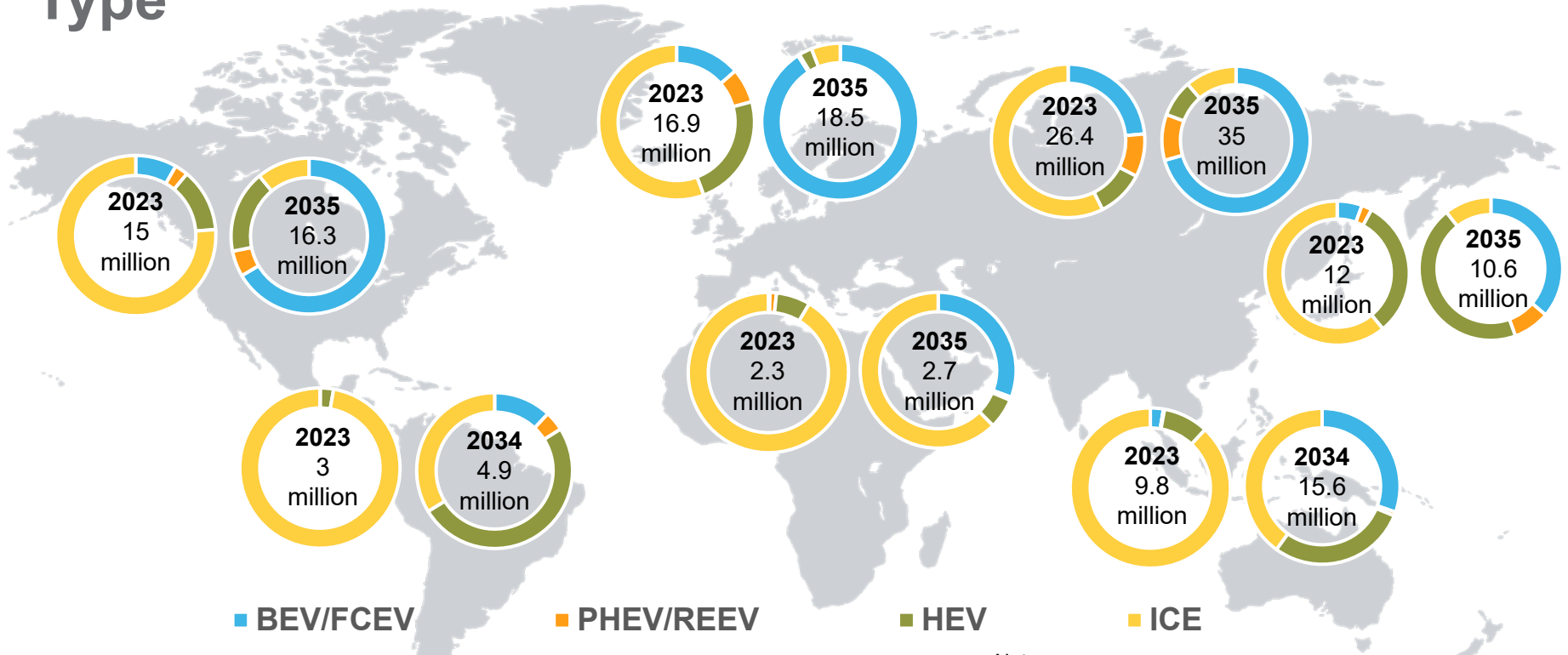
Fully electrified vehicles will not overtake ICE-containing vehicles until ~2032

Electric & plug-in/hybrid vehicle production is dependent on region.

**Hybrids are an important and growing part of the car parc in an electrified future**

Note:  
HEV includes MHEV, FHEV and Series HEV  
ICE includes ICE and ICE S/S

# Light Vehicle Production by Region and Propulsion Type



■ BEV/FCEV

■ PHEV/REEV

■ HEV

■ ICE

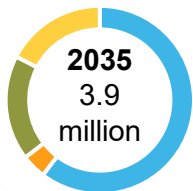
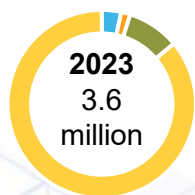
Note:

HEV includes MHEV, FHEV and Series HEV

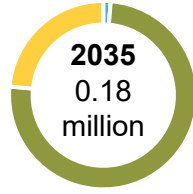
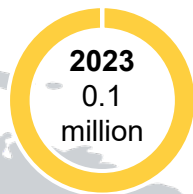
ICE includes ICE and ICE S/S

# Latin America Light Vehicle Production by Propulsion Type

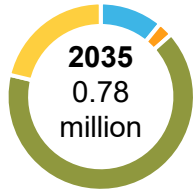
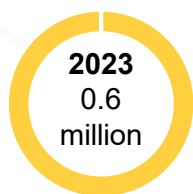
## Mexico



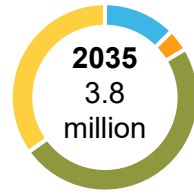
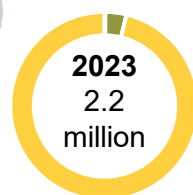
## Colombia and Ecuador



## Argentina



## Brazil



■ BEV/FCEV

■ PHEV/REEV

■ HEV

■ ICE

Note:

HEV includes MHEV, FHEV and Series HEV

ICE includes ICE and ICE S/S

# Hybrid Engine Oil Experience & Expertise



## Key Factors

Differences in Hybrid vs. ICE

Evaluate oil performance to meet hardware and market needs

Market Research:  
Value Chain needs



## Field Testing and Oil Surveys

**1.5+**  
Million Miles

7.5k+ subtests



## Locations

North America  
Europe  
China  
Japan



## OEMs

**370+**  
Vehicles

11 unique makes  
4 OEM engagements  
1 Tier 1 engagement

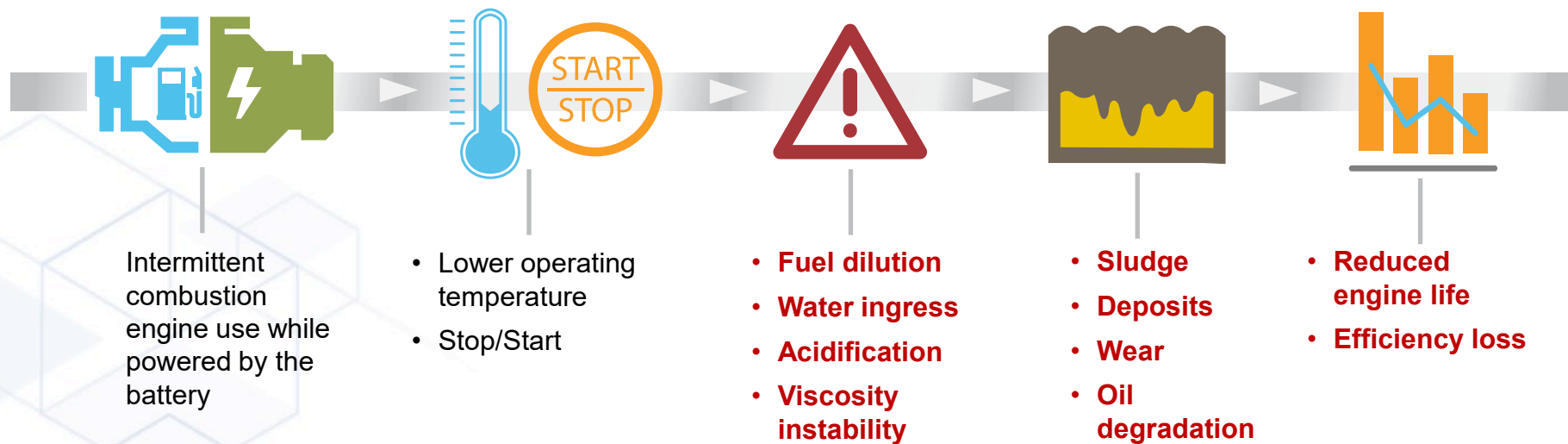


## Engine & Lab Tests

Corrosion  
Sludge  
Deposits  
Emulsion  
Etc.

**Conclusions supported by field trial miles equivalent to circling the earth 60 times**

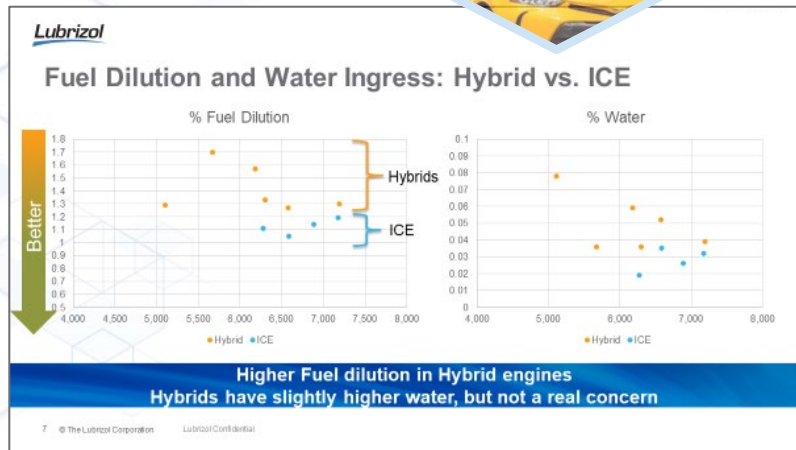
# Hybrid Vehicles and Engine Oils: Key Areas of Focus



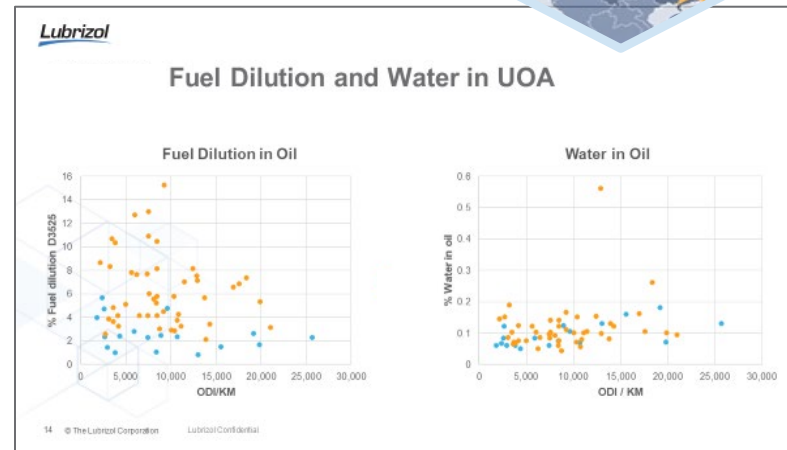
**Because of the lower operating temperature of hybrid engines, fuel content in the oil that would otherwise be burned off, can cause damage to the engine**

# Field Trials Validated Fuel Dilution is Greatest Concern

Multiple Locations, US  
Focus: Nevada, US



Multiple Locations, China



# Products Tested and Proven Performance

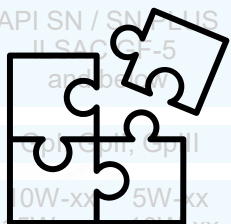
| Legacy API / ILSAC                        | Current API/ILSAC                      | North American OEM             | “Flagship Synthetic”                      | ACEA Low SAPS                       |
|---|--|--------------------------------|---|-------------------------------------|
| API SN/SN PLUS<br>ILSAC GF-5<br>and below | API SP<br>ILSAC GF-6A/B                | ILSAC GF-6A<br>GM dexos1 Gen 3 | ACEA C2/5<br>ILSAC GF-6A<br>OEMs          | ACEA Cx<br>OEMs                     |
| GpI, GpII, GpIII                          | GpII, GpIII                            | GpIII                          | GpIII                                     | GpIII                               |
| 10W-xx 5W-xx<br>15W-xx 10W-xx<br>20W-xx   | 0W-xx 5W-xx<br>10W-xx 15W-xx<br>20W-xx | 0W-20<br>5W-20/30              | 0W-20<br>5W-30                            | 0W-xx<br>5W-30                      |
| 6 API tests                               | 8 API tests                            | 7 API tests<br>6 GM tests      | 7 API tests<br>7 ACEA tests<br>+OEM tests | 7 ACEA tests<br>+OEM-specific tests |



**Premium oils have passed a higher number of tests which are often more challenging. This validates durability and engine protection → indicate hybrid performance.**

# Products Tested and Proven Performance

| Legacy API / ILSAC                        | Current API/ILSAC       | North American OEM             | <b>“Flagship Synthetic”</b>               | ACEA Low SAPS                       |
|---|-------------------------|--------------------------------|---|-------------------------------------|
| API SN / SN PLUS<br>ILSAC GF-5<br>api sbc | API SP<br>ILSAC GF-6A/B | ILSAC GF-6A<br>GM dexos1 Gen 3 | ACEA C2/5<br>ILSAC GF-6A<br>OEMs          | ACEA Cx<br>OEMs                     |
| 0W-xx 5W-xx<br>15W-xx 10W-xx<br>20W-xx    | 10W-xx 15W-xx<br>20W-xx | 0W-20<br>5W-20/30              | GpIII<br><br>0W-20<br>5W-30               | GpIII<br><br>0W-xx<br>5W-30         |
| 6 API tests                               | 8 API tests             | 7 API tests<br>6 GM tests      | 7 API tests<br>7 ACEA tests<br>+OEM tests | 7 ACEA tests<br>+OEM-specific tests |



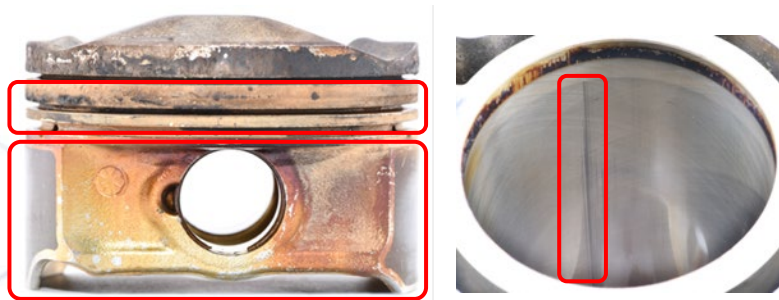
ACEA Durability  
ILSAC Fuel efficiency



Premium oils have passed a higher number of tests which are often more challenging. This validates durability and engine protection → indicate hybrid performance.

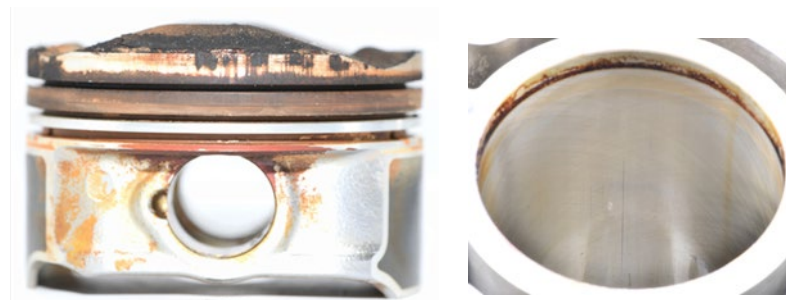
# Impact of Lubricant Quality in Hybrid Engines

## API SP



North American lubricants (API/ILSAC) had acceptable performance on used oil analysis, however under tear down inspection → significant piston wear, ring sticking and obvious scratch on cylinder liner

## ACEA C



European lubricants (ACEA C) performed better in the used oil analyses and under tear down inspection → exceptional deposit control and wear protection

**Due to the different operating conditions, hybrids require more robust lubricant formulations**

## Summary

- Latin America automotive industry is very active and significant, however there is an urgent need to improve the quality of lubricants sold in the market
- There will be growth in the region and electrification will play an important role
- Lubrizol's extensive research provides evidence that hybrid technology will benefit from premium oils
- Constituents across the value chain are seeking protection against the extreme conditions of hybrid vehicles, and they place great value on fuel economy retention
- To maximize your position in the hybrid market, you need to match hardware and value chain demands

**As technology continues to evolve so will Lubrizol...Can you say the same?**

Your trusted source for industry news, trends, and market and consumer insights that help move your business forward with confidence. Log on and learn about the lubrication and fuel challenges of today's and tomorrow's advanced hardware.



**lubrizoladditives360.com**