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Framing of Issues on Long Term
Automotive Strategic Planning

EPA Clean Air Act Advisory Committee
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May 29, 2008

Overview

- New regulatory and market environment
- Rapid technology evolution templated on a fixed infrastructure

Purpose here:

- Frame the issues for those not familiar with the playing field
- No answers, only questions
- Things to watch

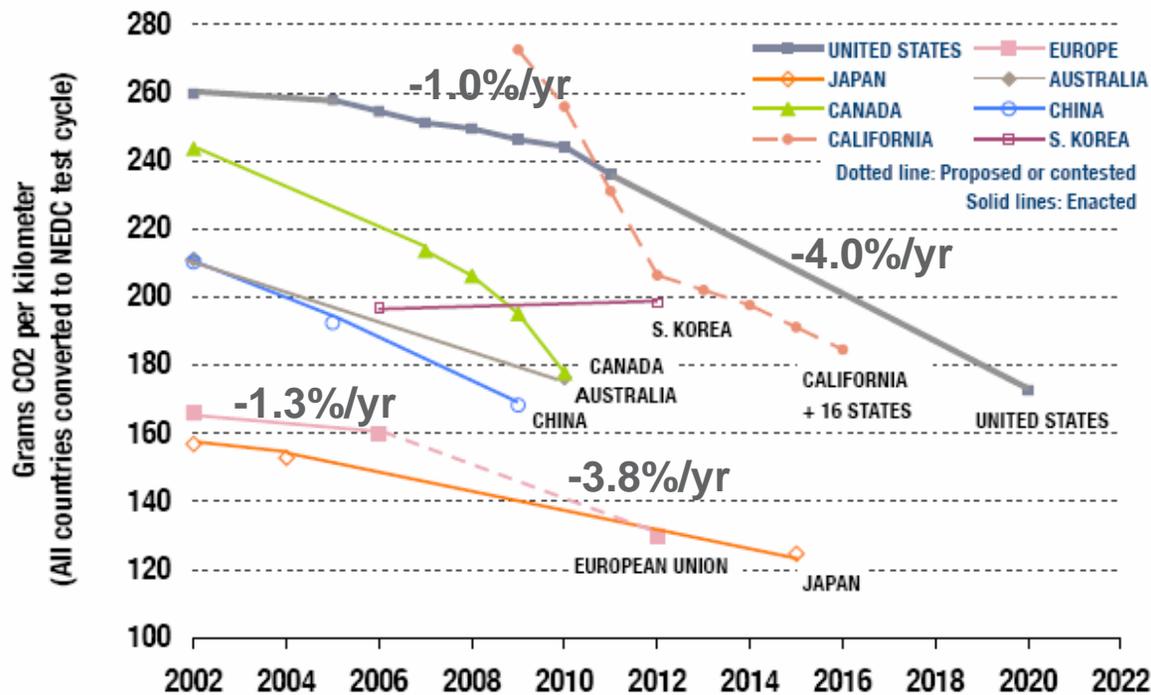
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Regulations and Drivers

Comparison of CO₂ Regulations Across the World.

New regulations in Europe and US will challenge industry.

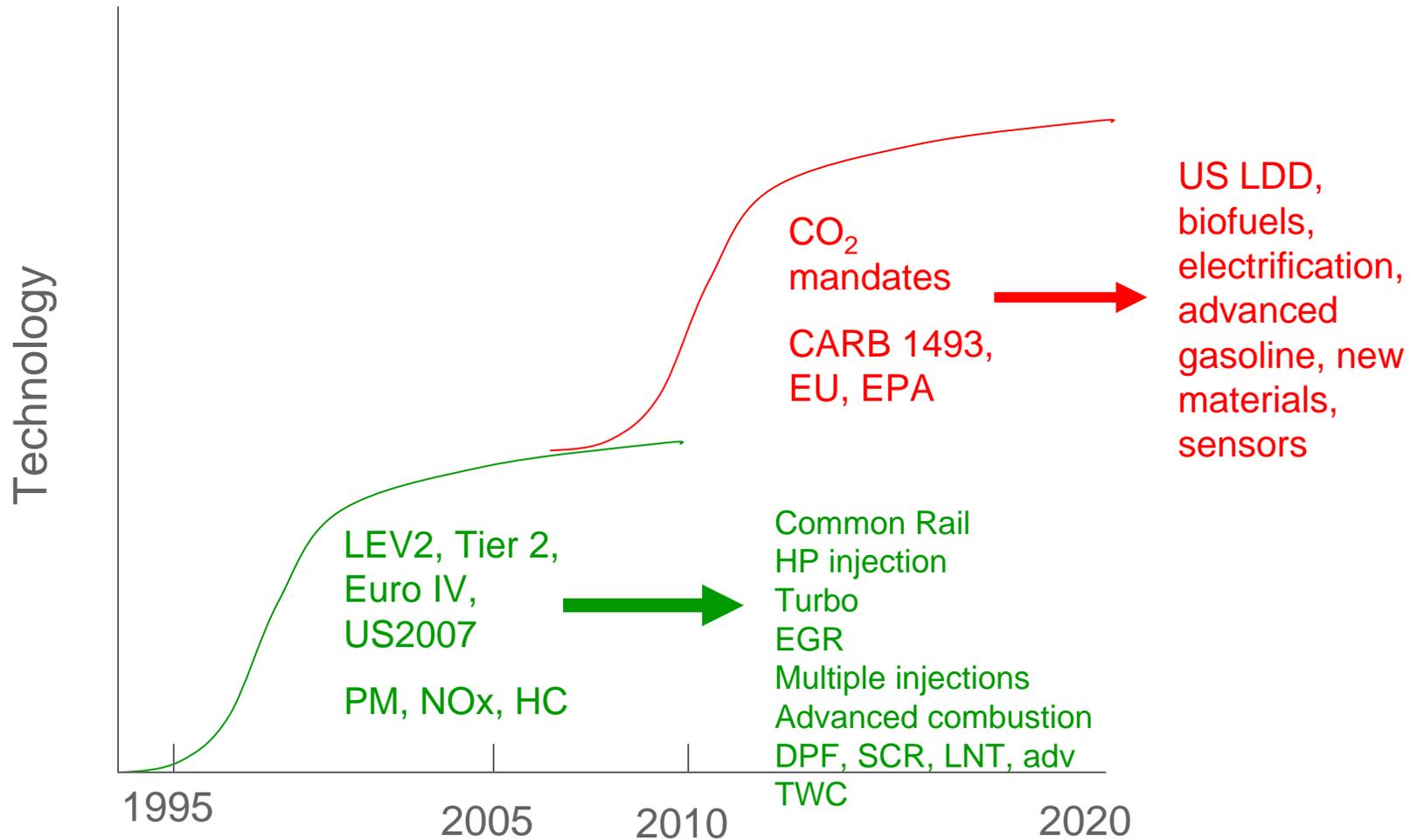
Standardized Comparison of International Fuel Economy and GHG Standards



Source: Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update, International Council on Clean Transportation.

Regulated CO₂ emissions standards normalized to the NEDC test cycle.

We are on the verge of another regulatory-driven technology surge, this time on CO₂

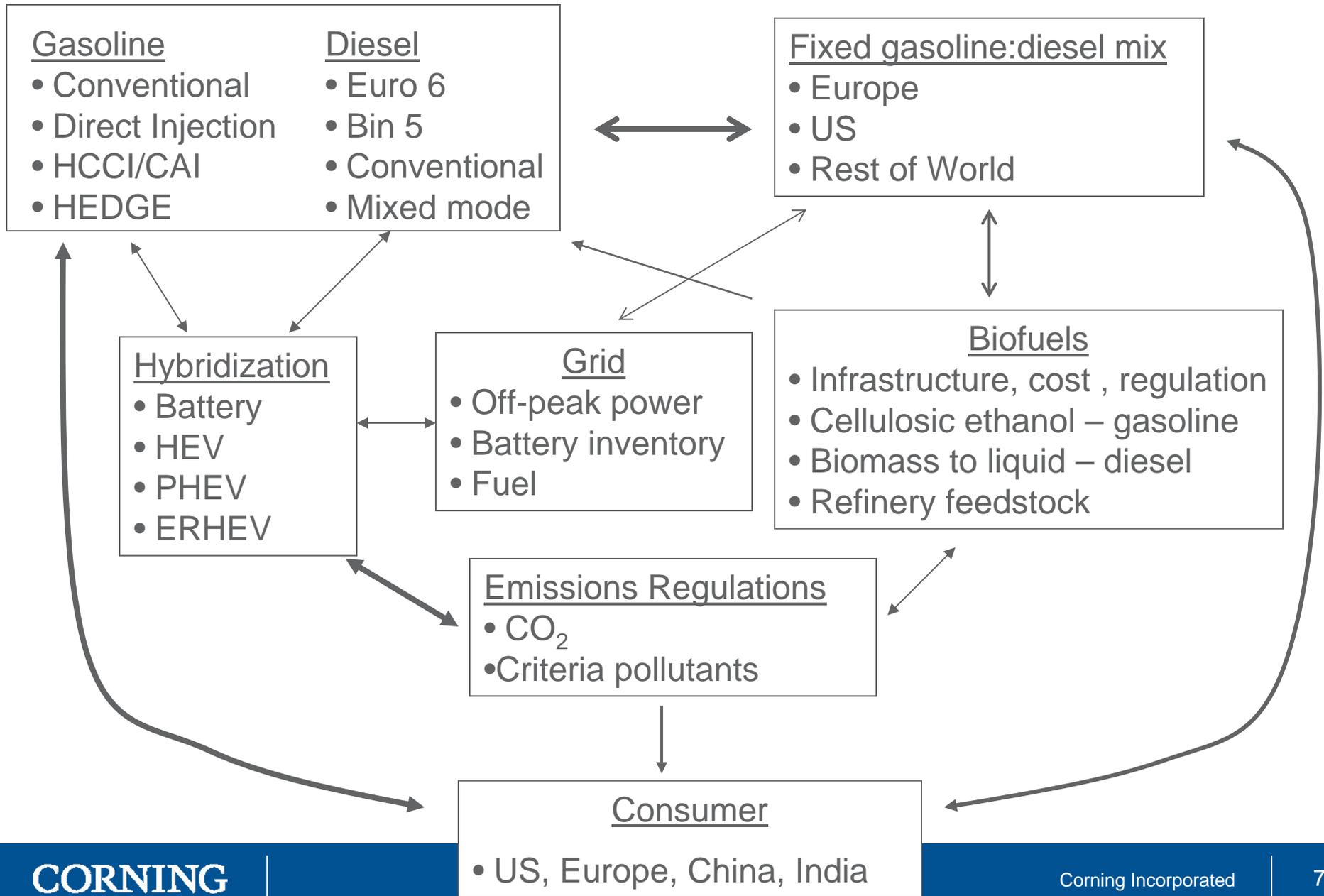


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The Frame

Powertrain

Fuels



Developments to Watch

- Powertrain developments
 - Technology
 - Gasoline engine technologies
 - Diesel efficiency advancements and cost reduction
 - Customer acceptance of diesel
- Refinery
 - Diesel:gasoline mix
 - Retrofit catalysts
- Hybridization
 - Battery technology

Developments to Watch

- Biofuels
 - 2nd and 3rd generation progress
 - Cost
 - Life cycle analyses
- Grid
 - Battery inventory management
 - Off-cycle charging behavior
- Regulations
 - CO2
 - CARB
- CONSUMER
 - Drive patterns, fuel prices