



Energy and Fuel Trends for Transportation

A View to 2040

Baudouin Kelecom
CEPS Workshop
July 2nd

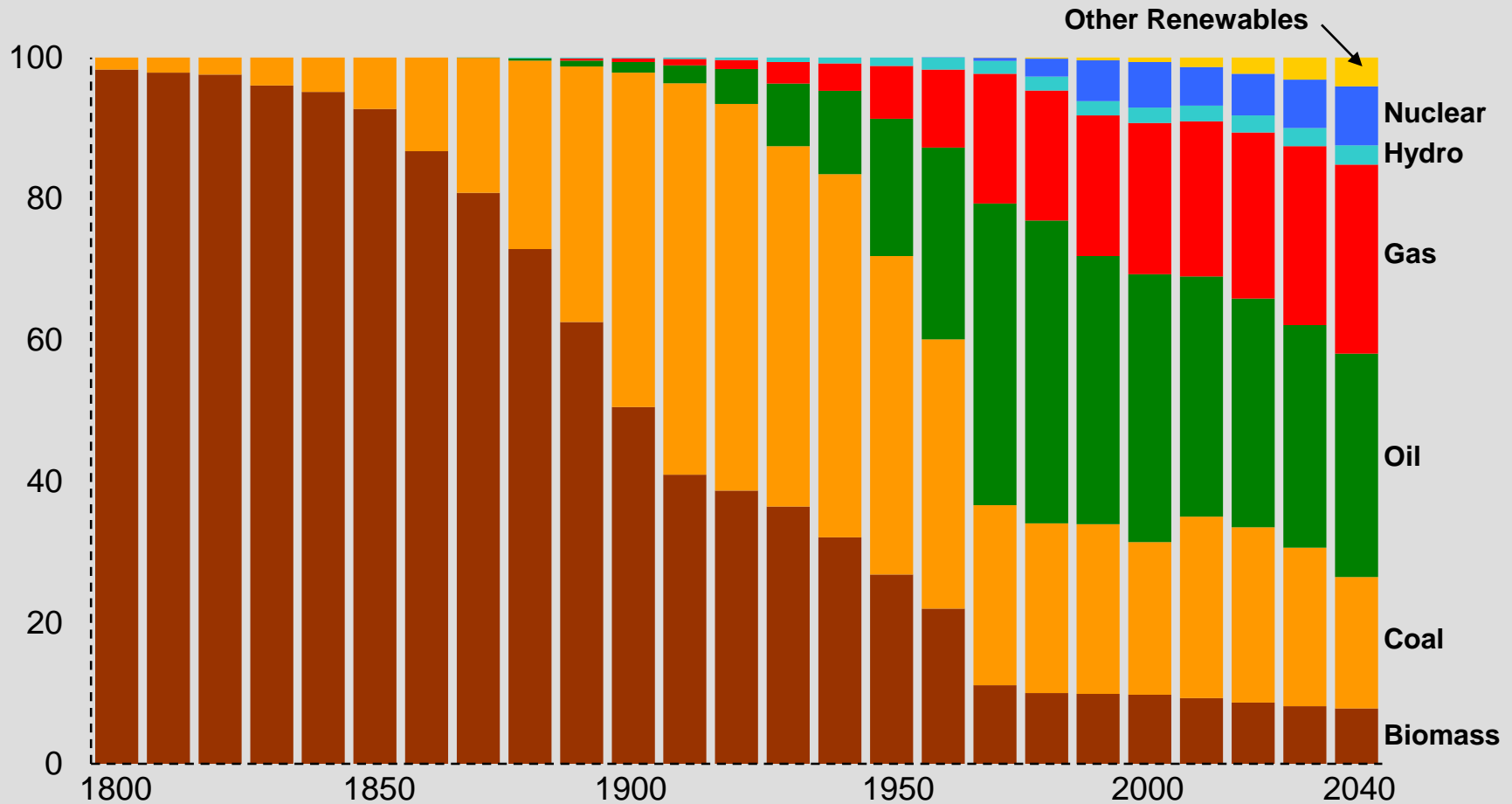
This presentation includes forward-looking statements. Actual future conditions (including economic conditions, energy demand, and energy supply) could differ materially due to changes in technology, the development of new supply sources, political events, demographic changes, and other factors discussed herein and under the heading "Factors Affecting Future Results" in the Investors section of our website at: www.exxonmobil.com. The information provided includes ExxonMobil's internal estimates and forecasts based upon internal data and analyses as well as publically-available information from external sources including the International Energy Agency. This material is not to be used or reproduced without the permission of Exxon Mobil Corporation. All rights reserved.

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Energy Use Evolves Over Time

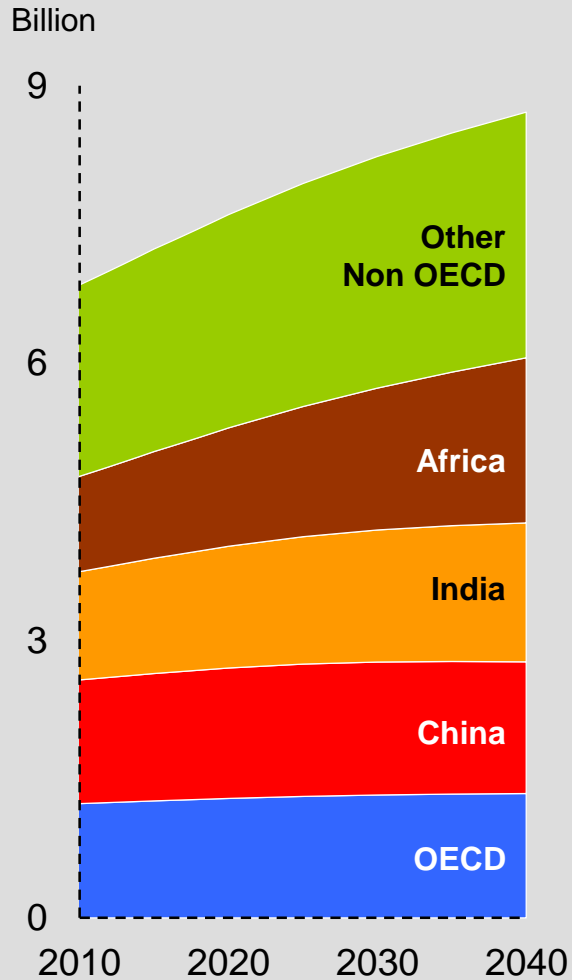
Global Percent Mix of Fuels

Percent

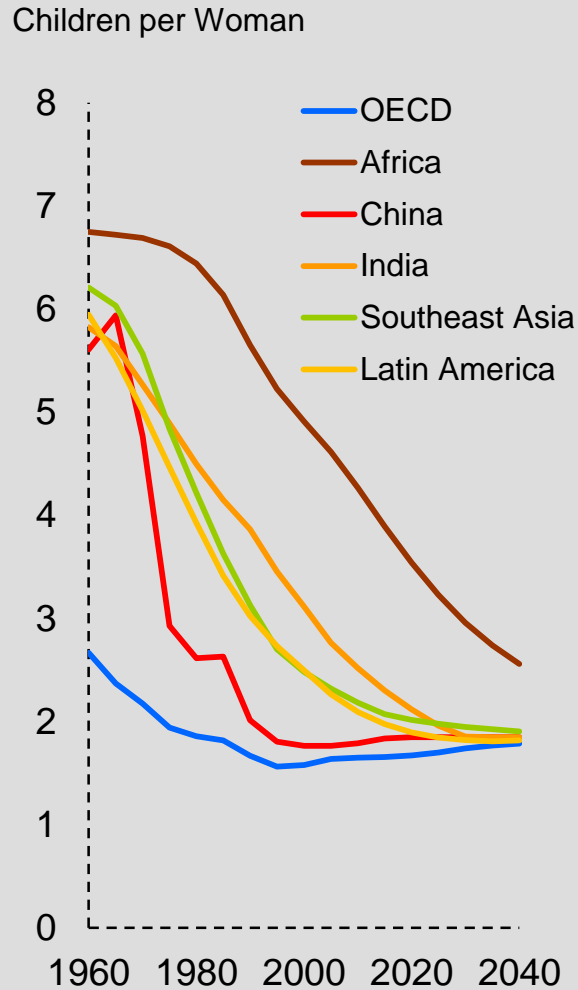


Population Trends Impact Energy Use

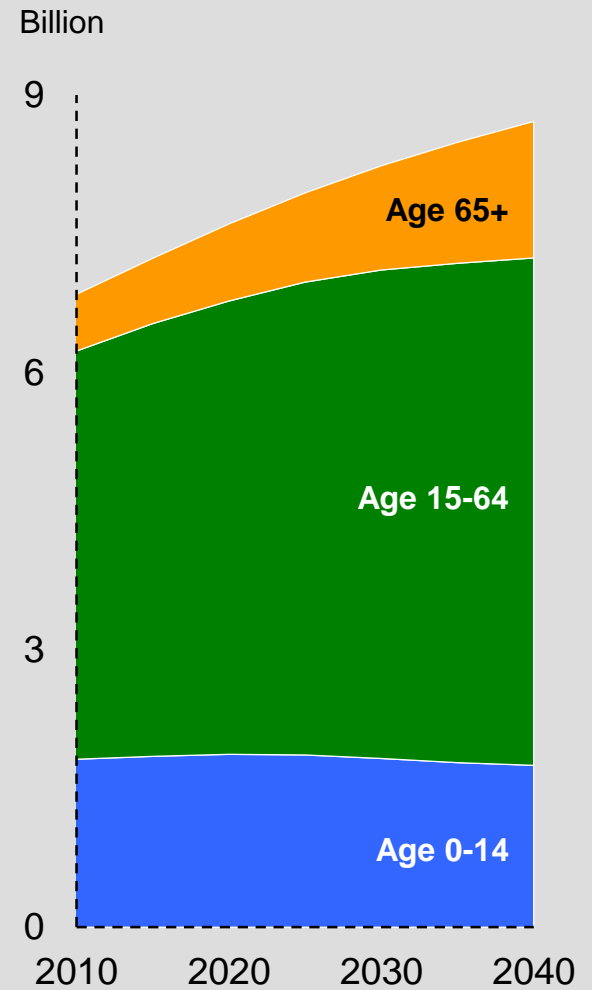
Population



Fertility Rate*



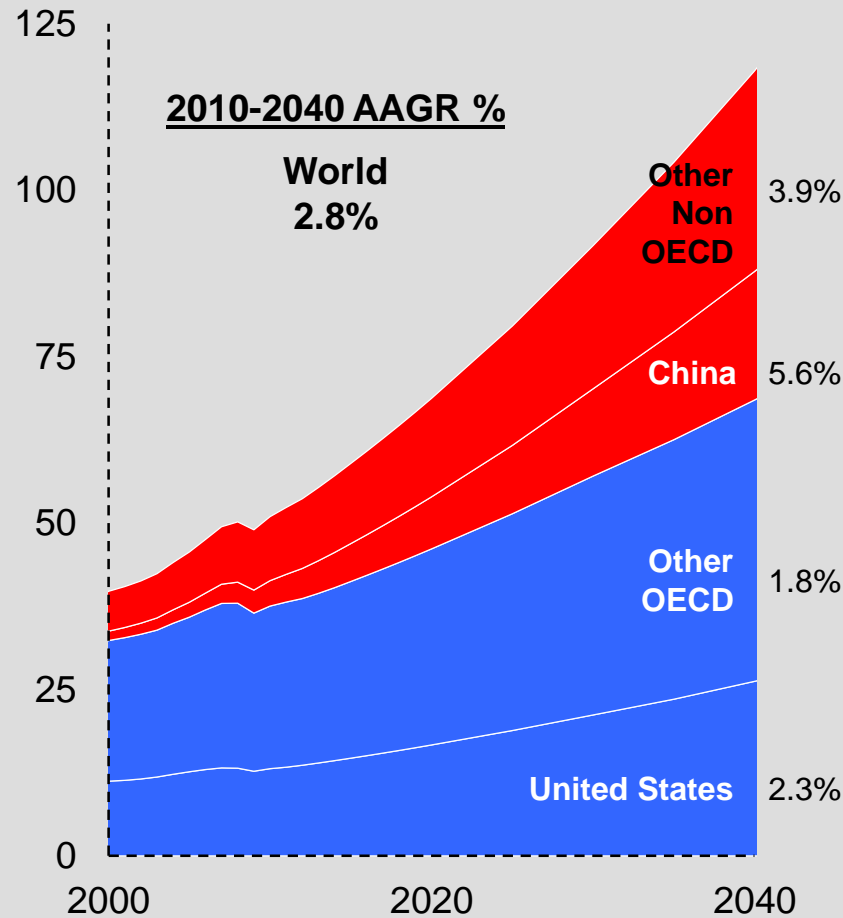
Global Demographics*



Economic Growth Drives Energy Demand

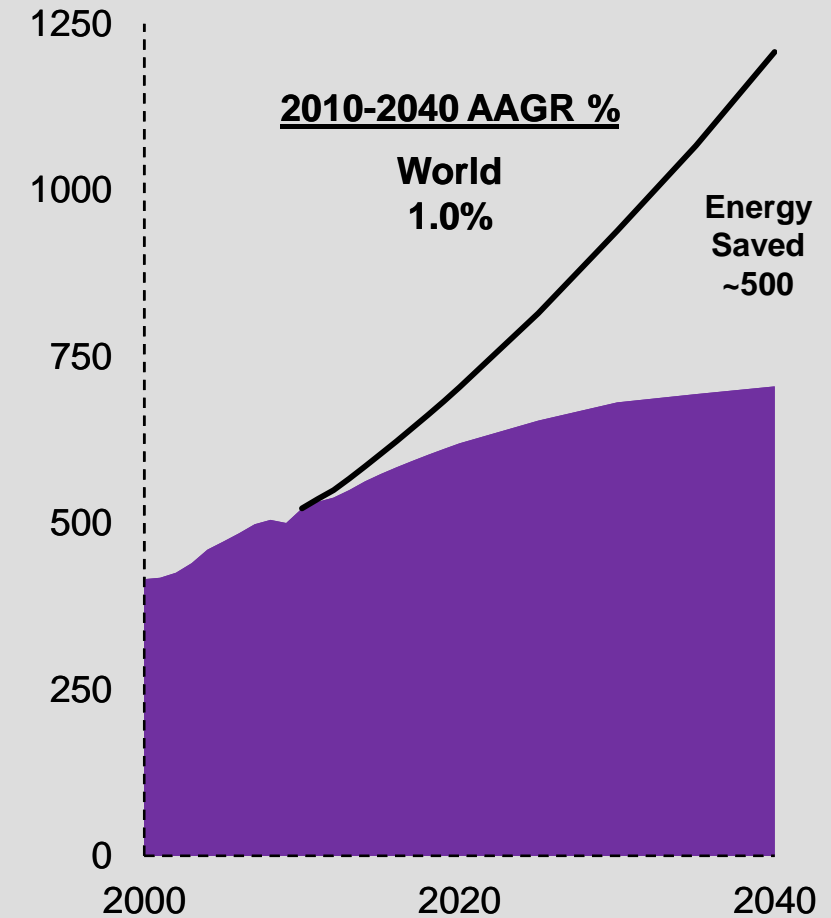
GDP

Trillion 2005\$



Energy Demand

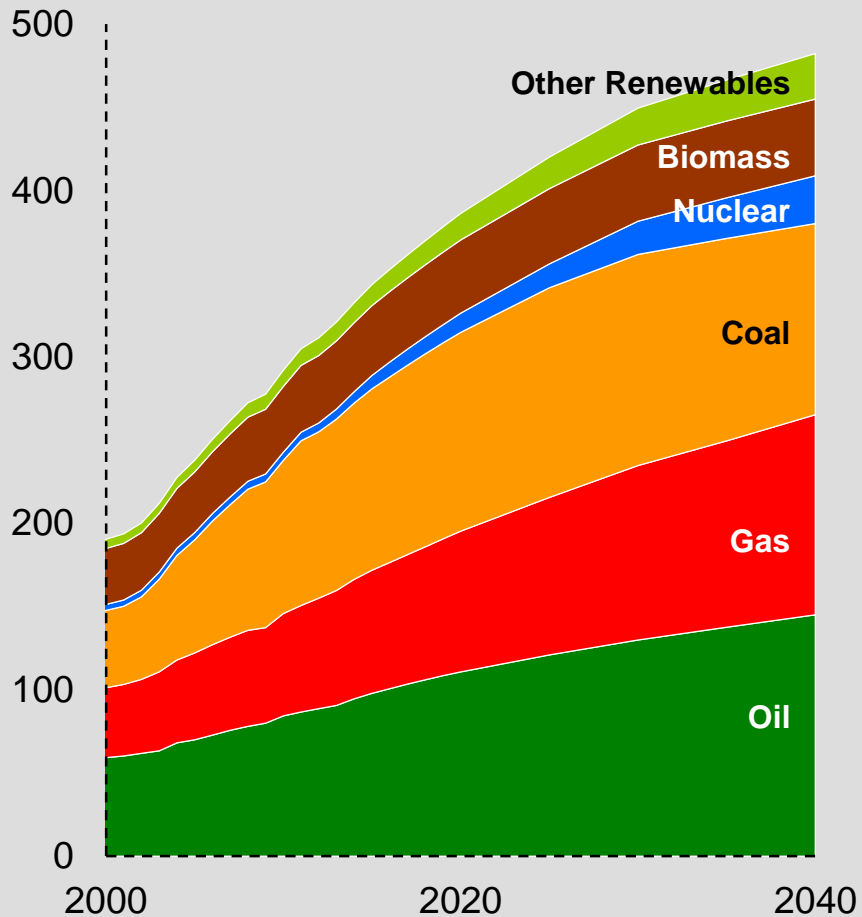
Quadrillion BTUs



Tale of Two Worlds

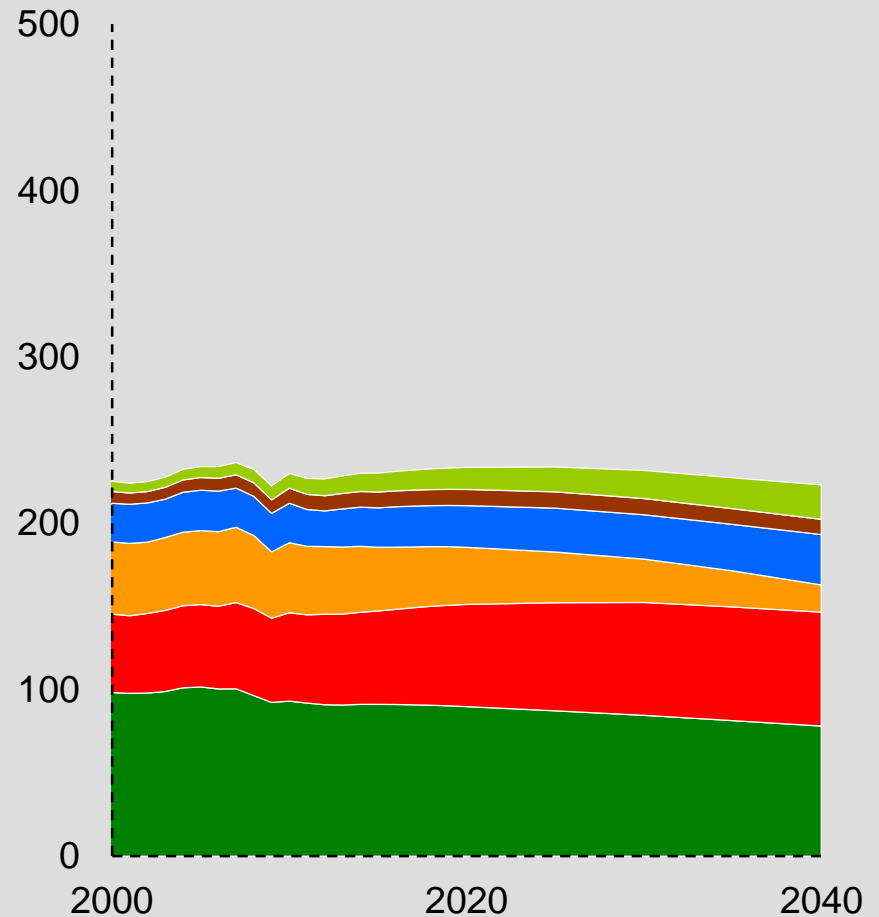
Non OECD

Quadrillion BTUs



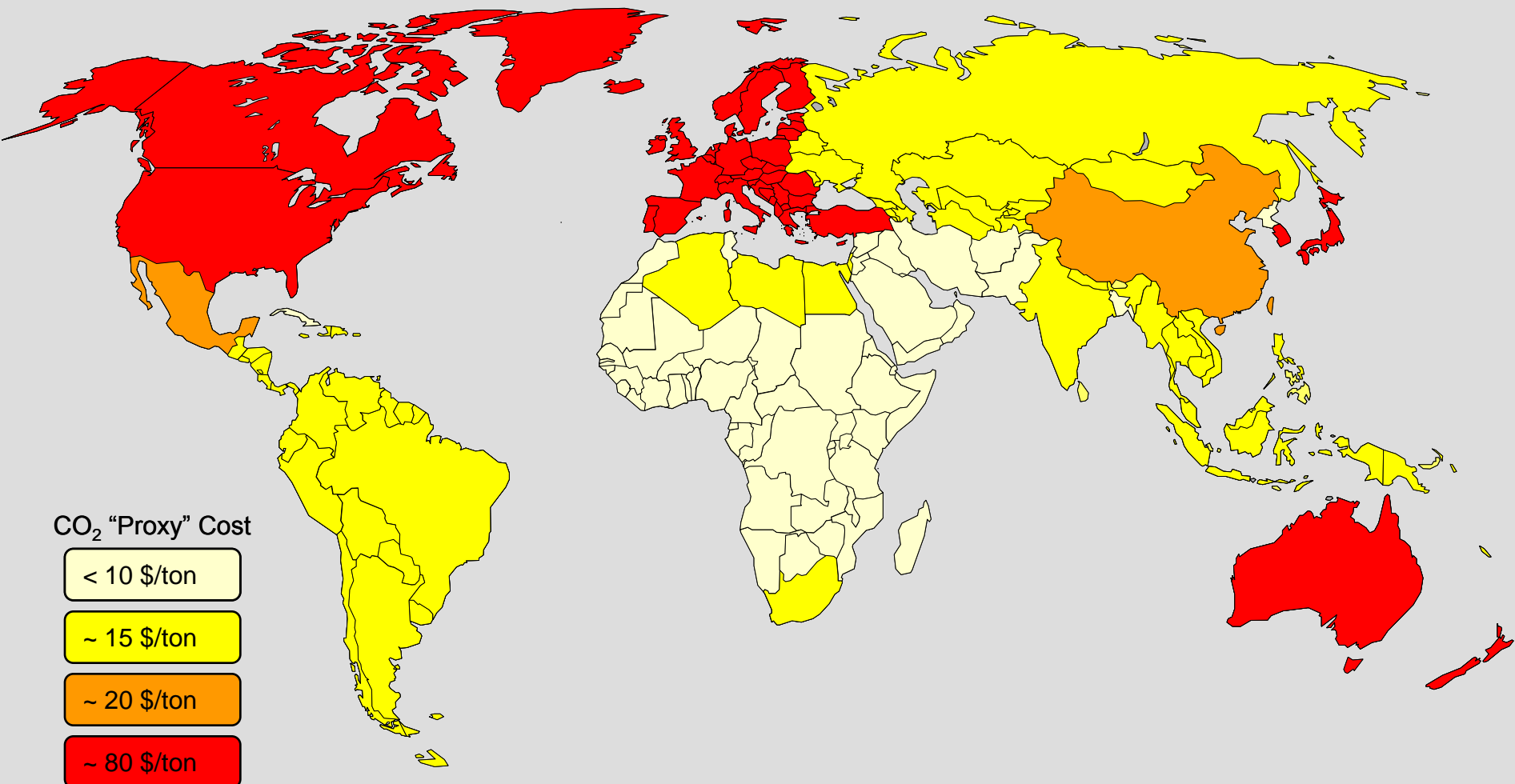
OECD

Quadrillion BTUs



CO₂ Policies

2030



CO₂ "Proxy" Cost

< 10 \$/ton

~ 15 \$/ton

~ 20 \$/ton

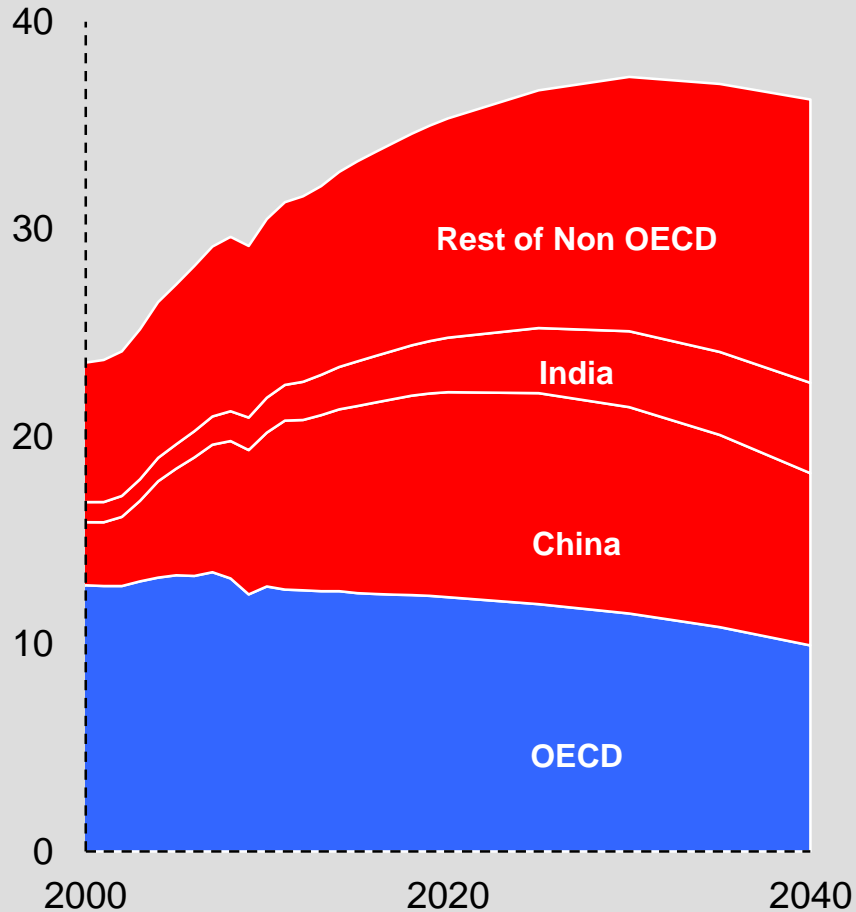
~ 80 \$/ton

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CO₂ Emissions Plateau

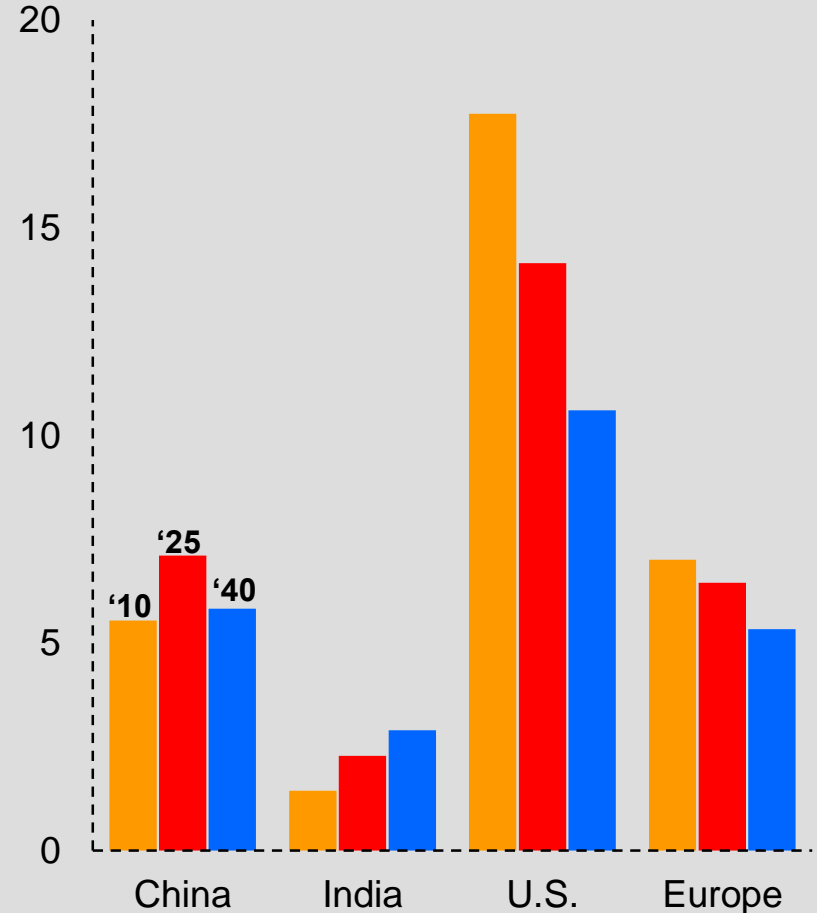
By Region

Billion Tons



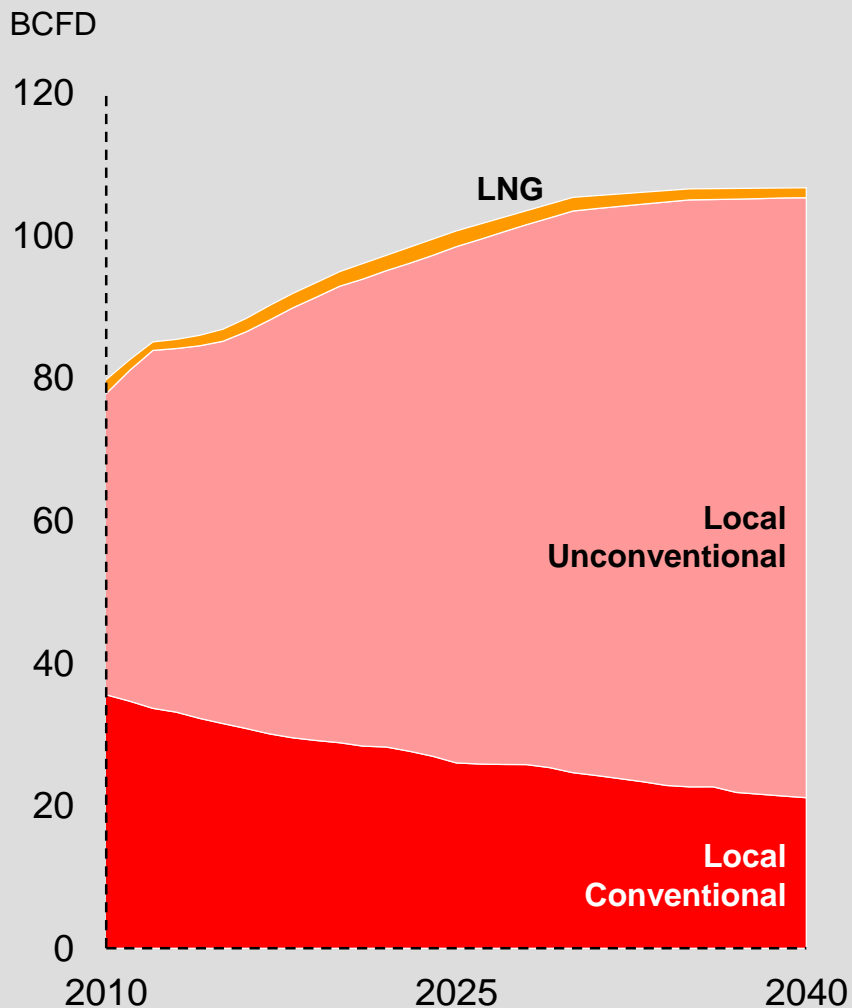
Emissions per Capita

Tons per Person

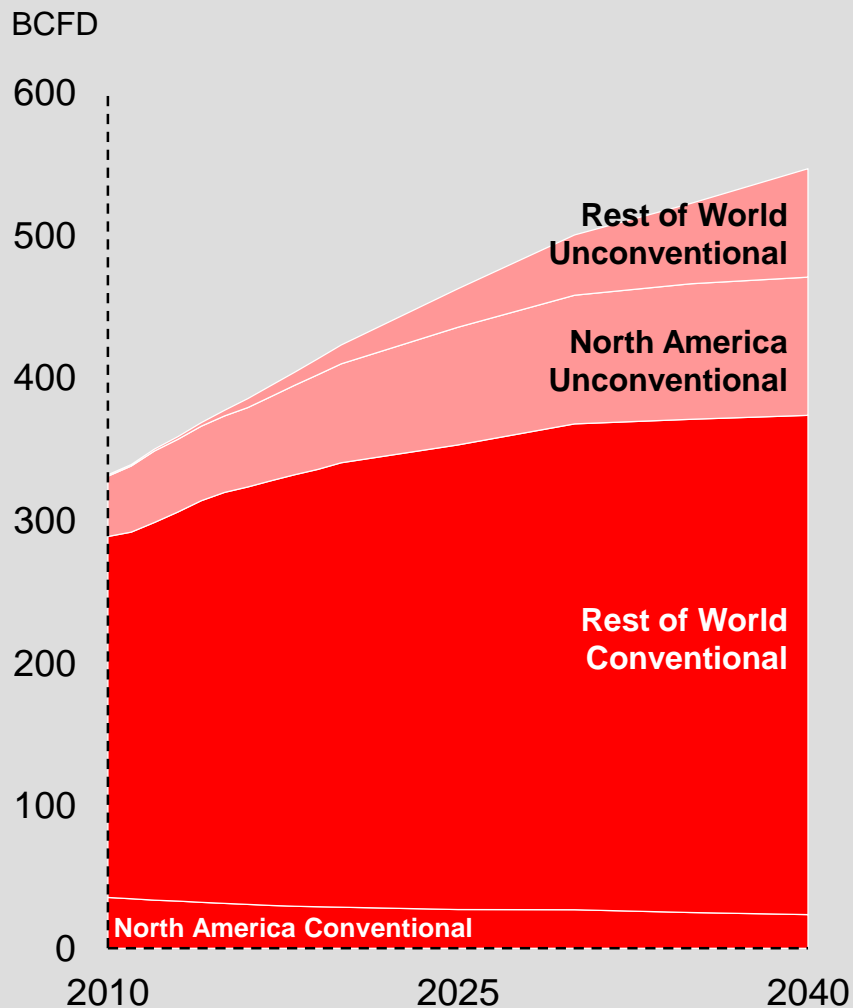


Natural Gas Supply and Demand Shifts

North America Gas Supply

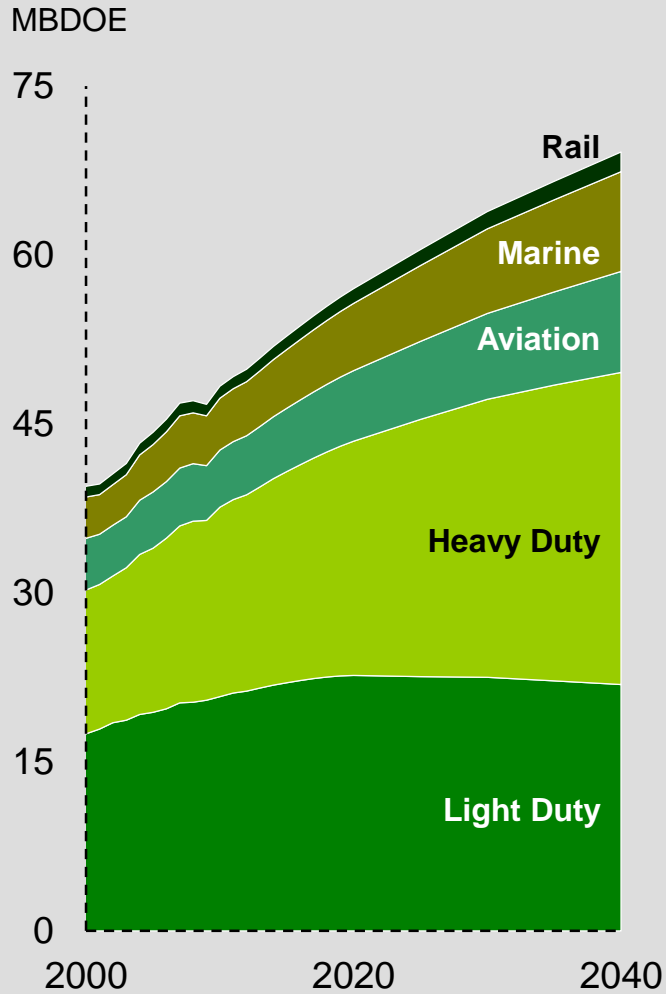


Global Gas Supply

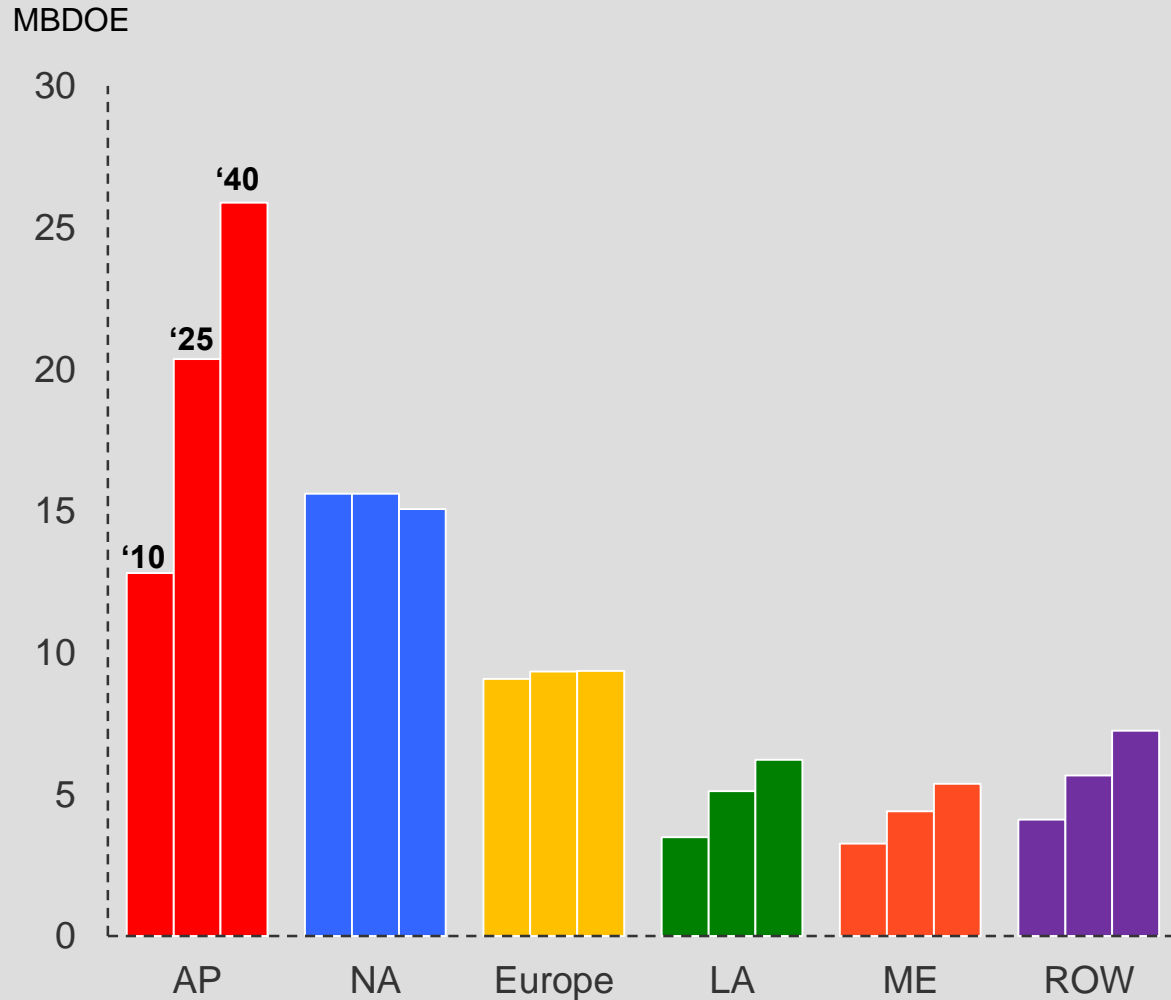


Transportation Demand

Sector Demand

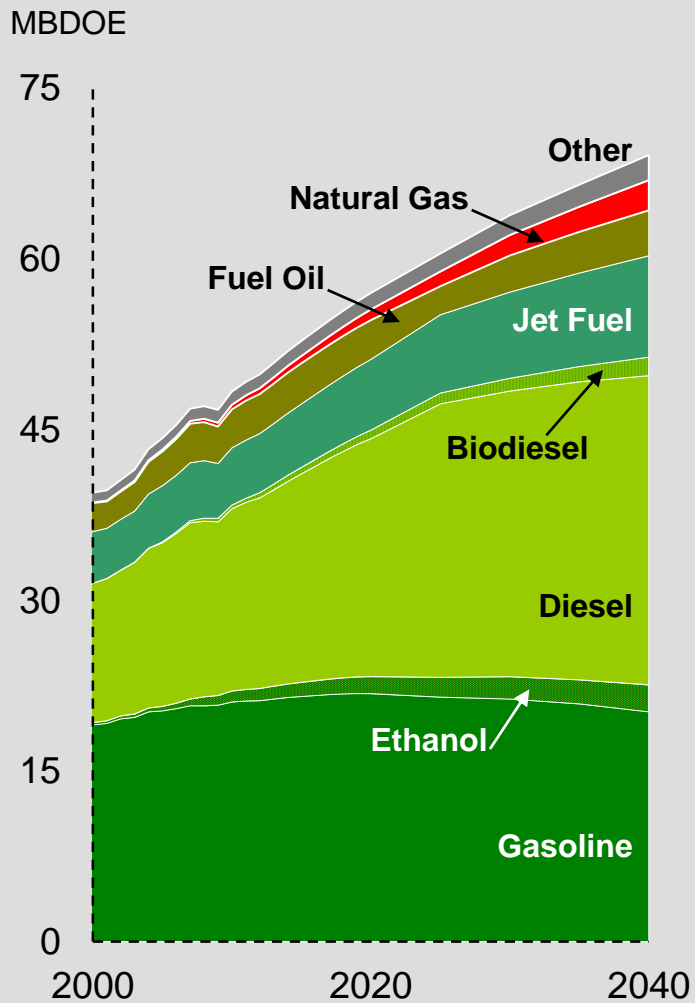


Demand by Region

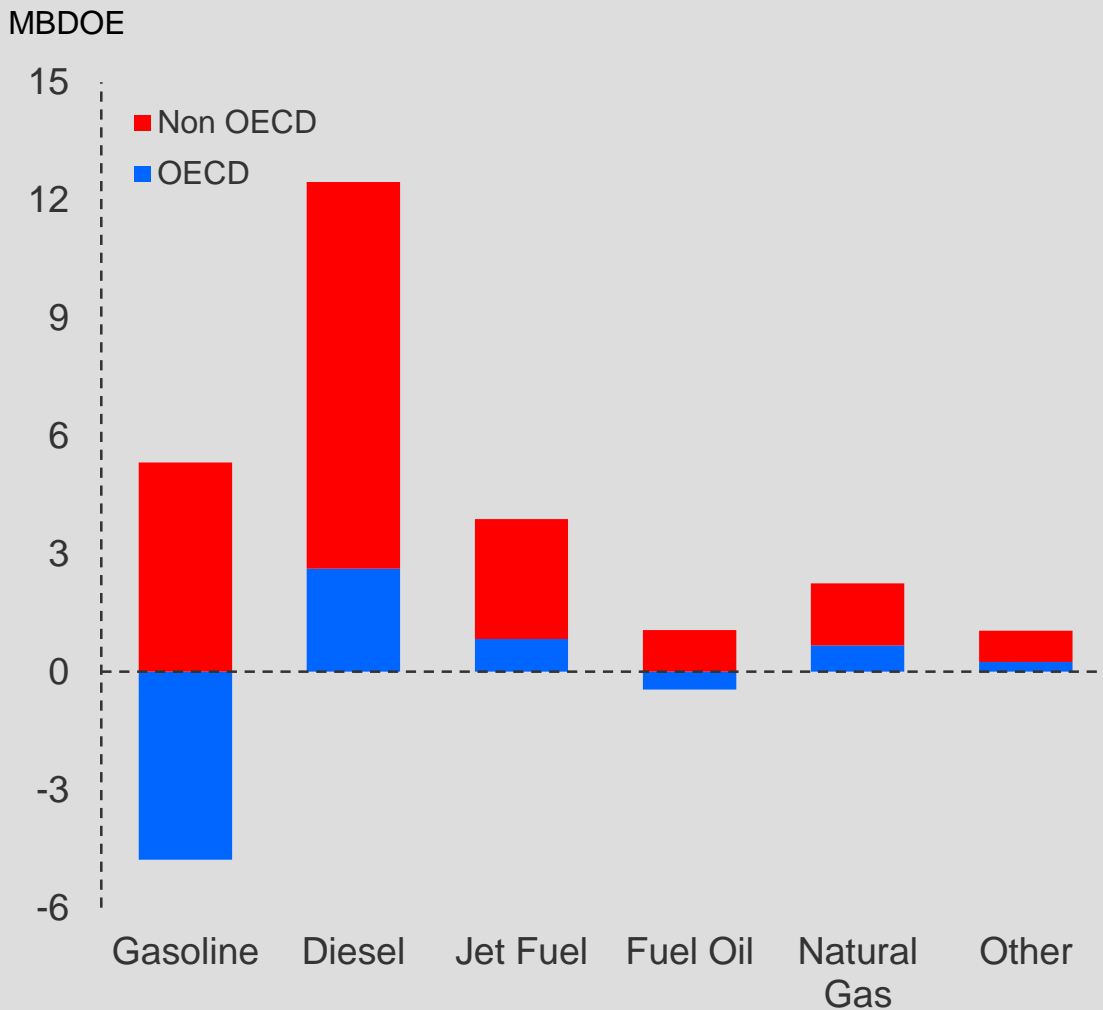


Transportation Fuel Mix

Fuel Demand



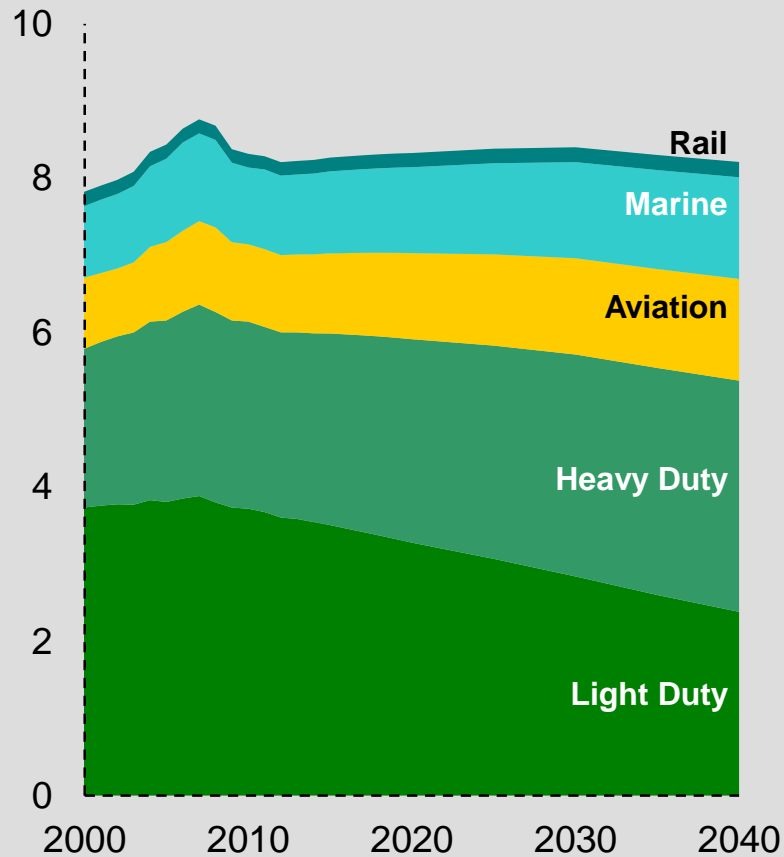
Growth in Demand from 2010 to 2040



EU 27 Transportation Demand

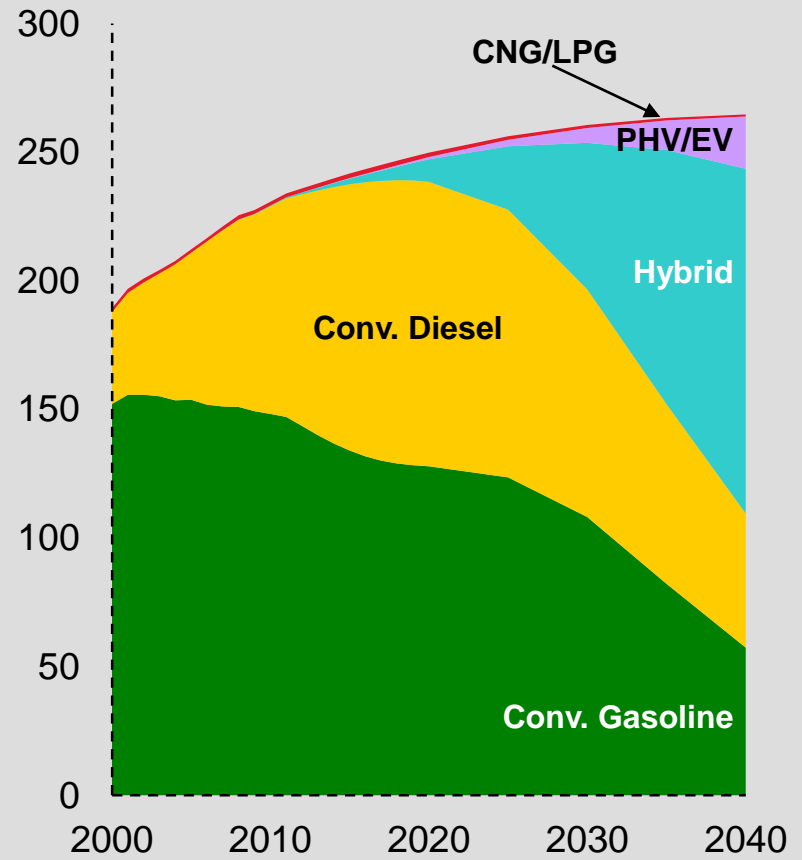
Transportation

MBDOE



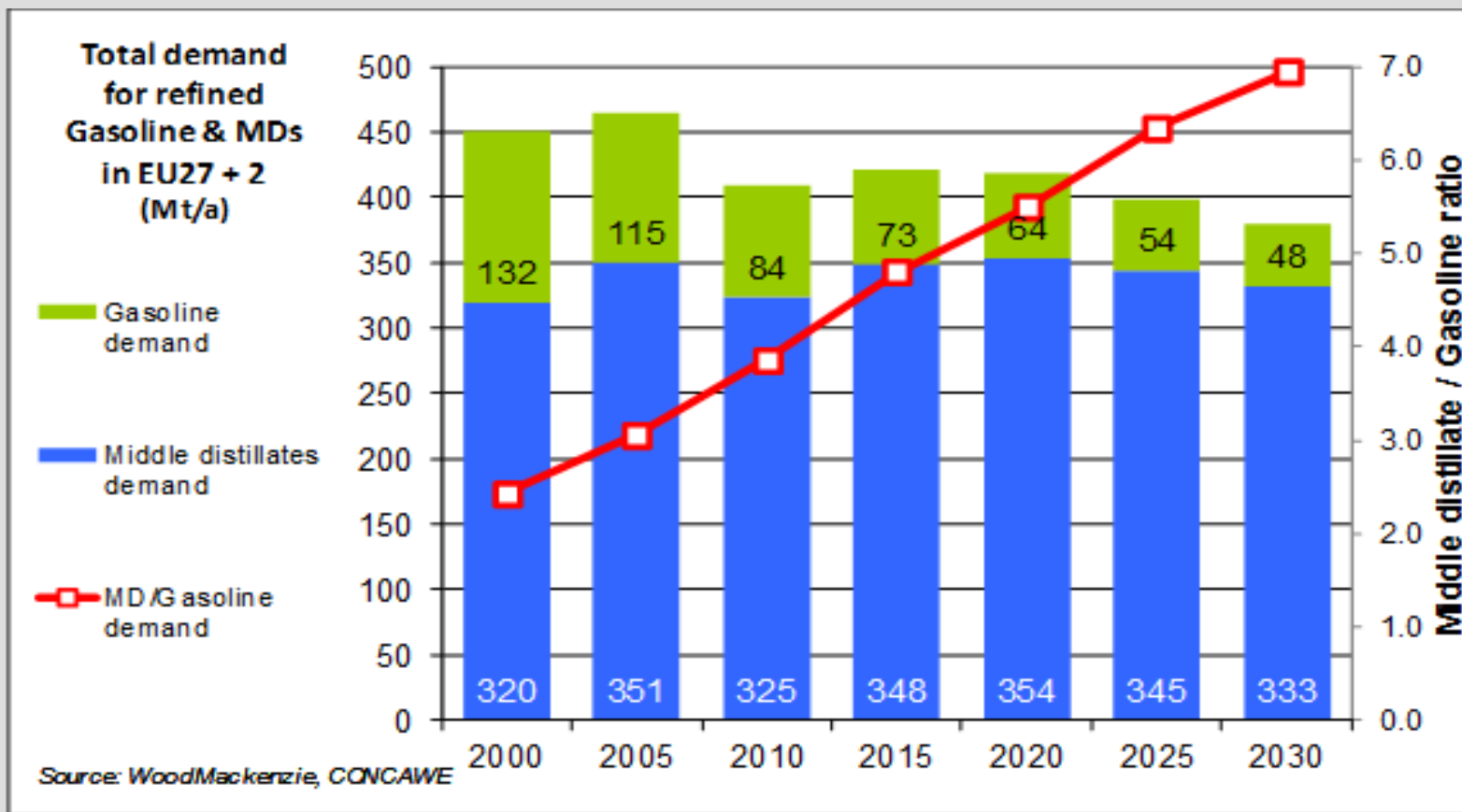
Light Duty Vehicle Fleet

Million Cars

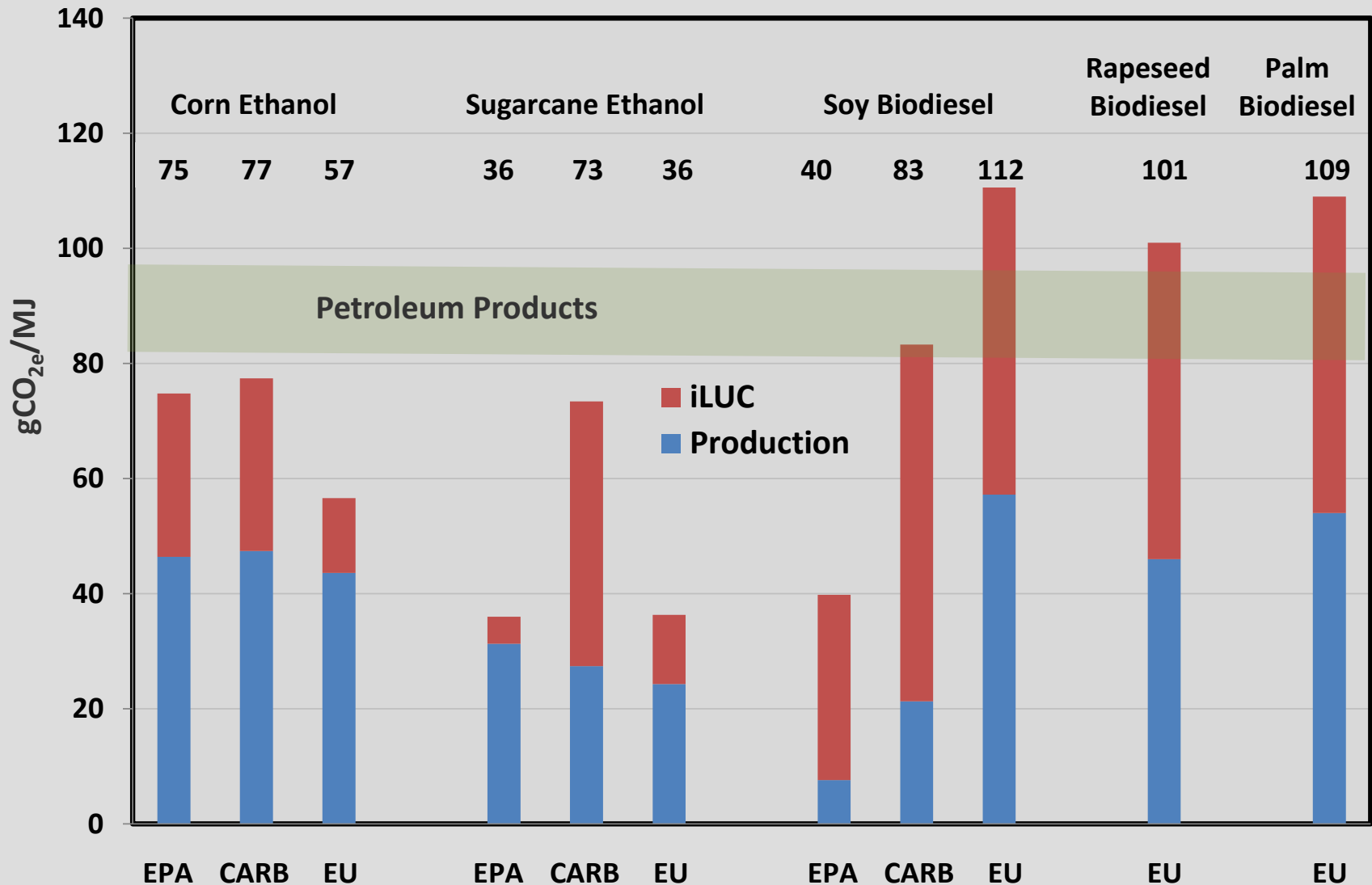


Dieselisation of EU demand

Evolution of the middle distillate / gasoline demand ratio for refined products only



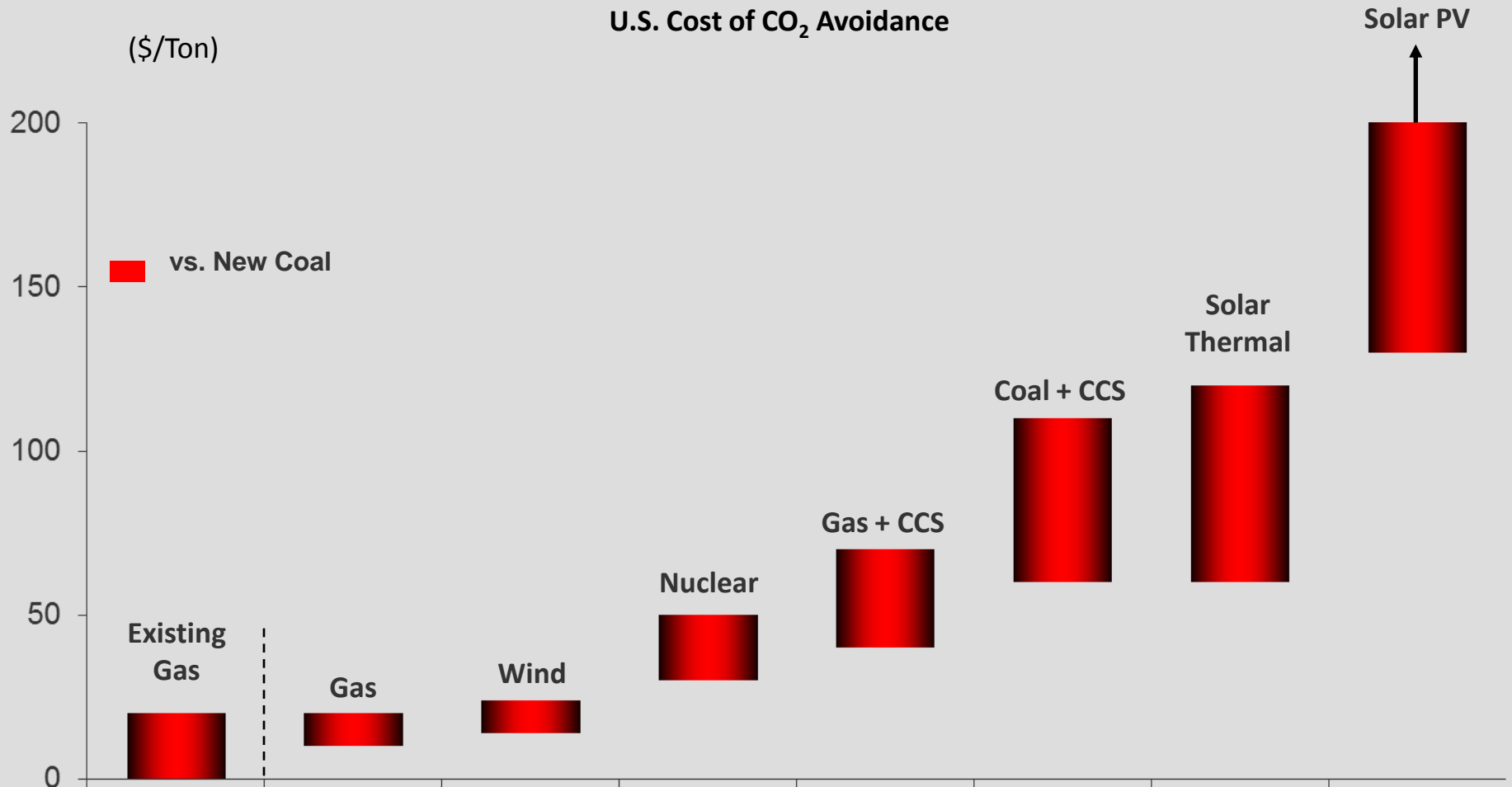
Biofuel Life-Cycle Analysis Comparison



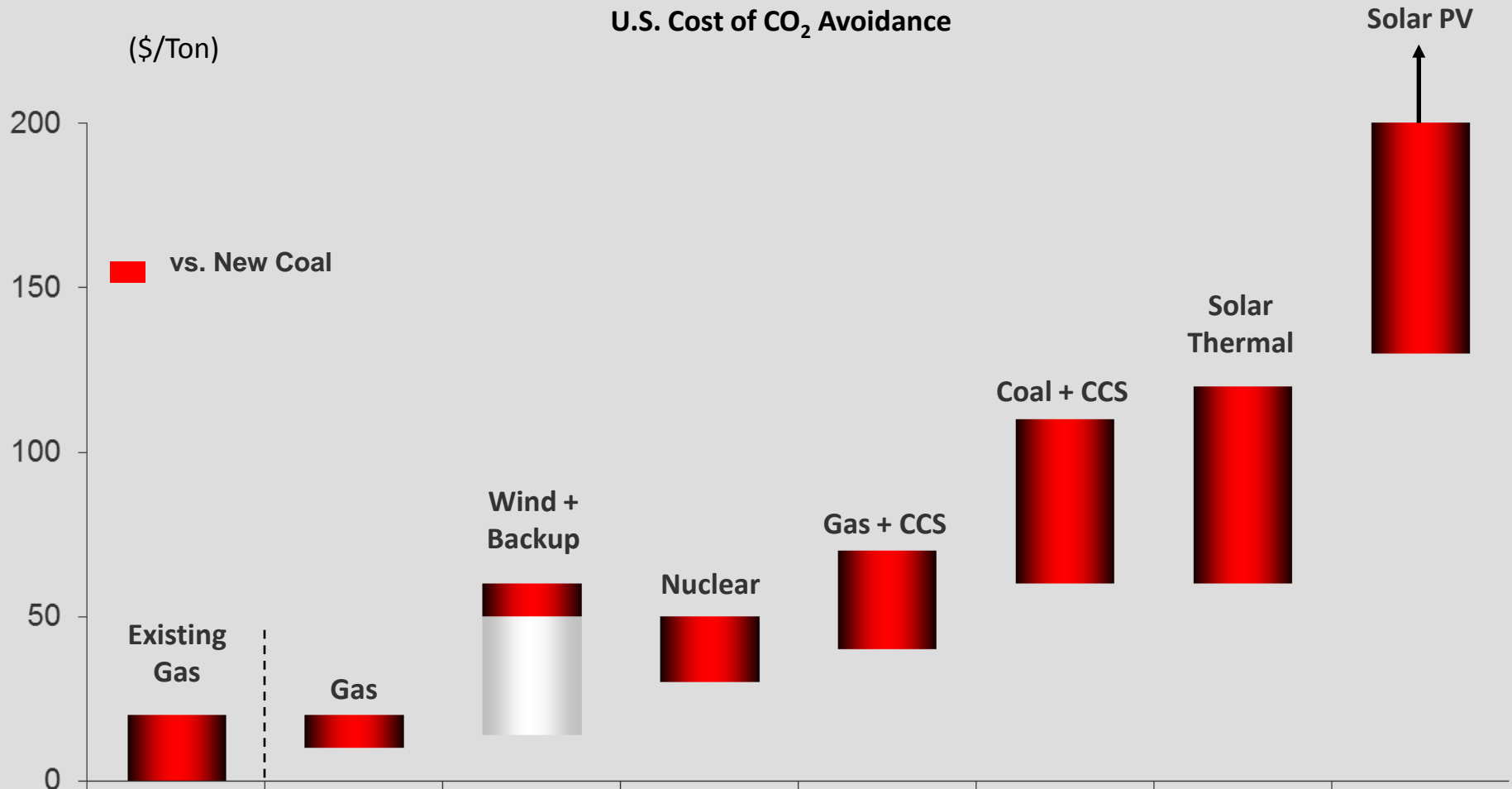
EPA= US Environmental Protection Agency; CARB= California Air Resources Board; EU= European Commission Proposal



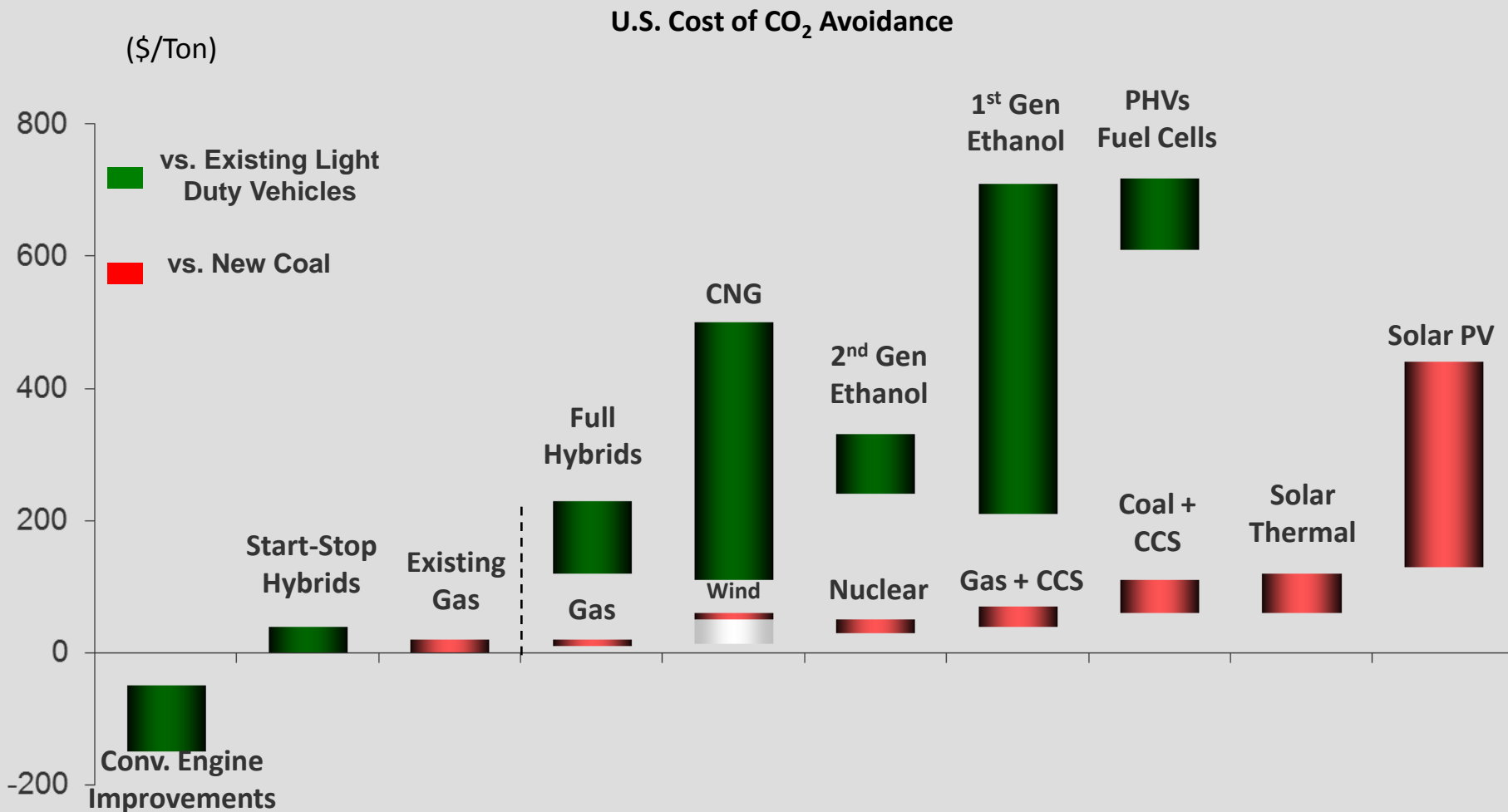
Mitigation Options and Costs



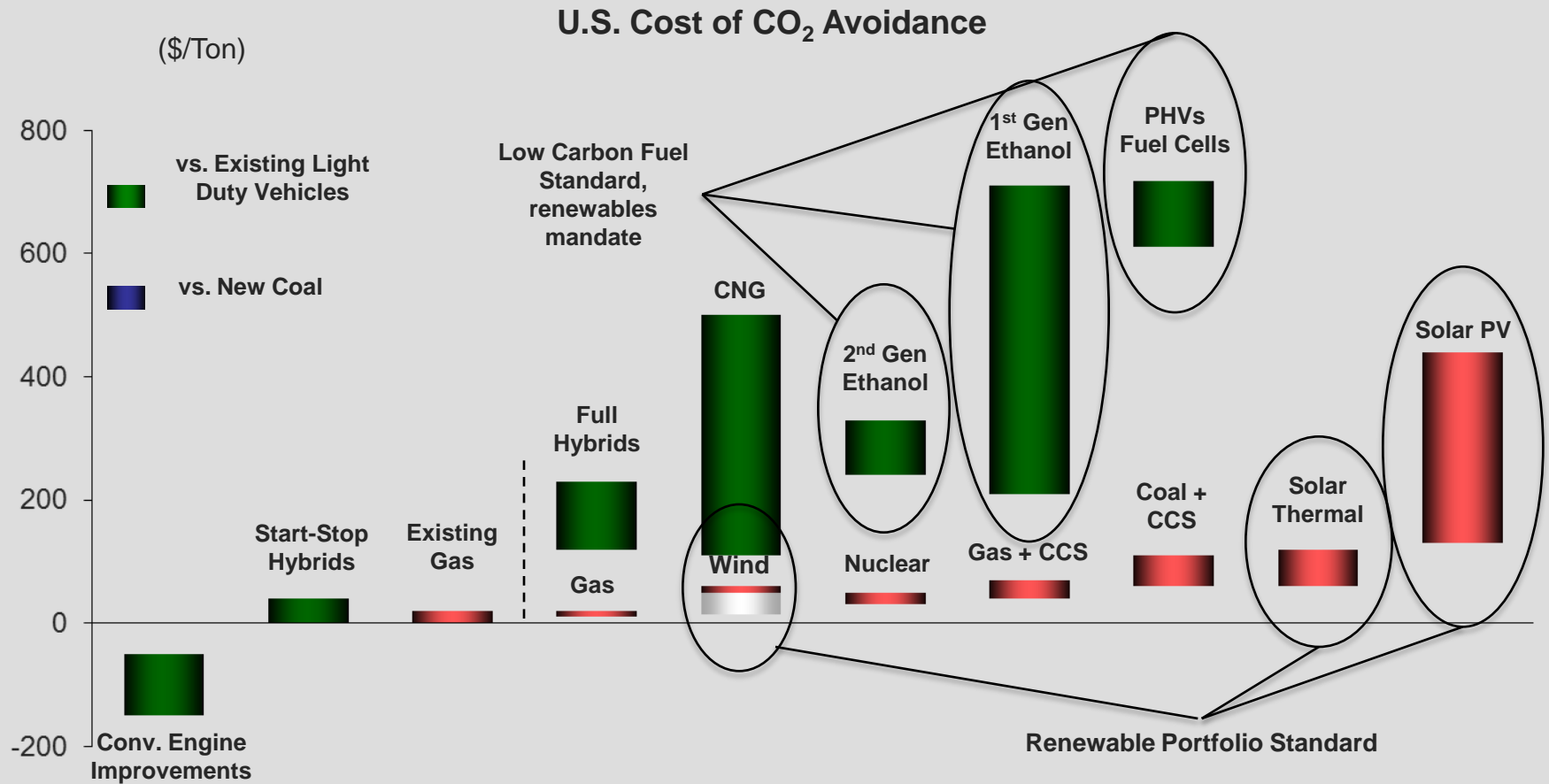
Mitigation Options and Costs



Mitigation Options and Costs

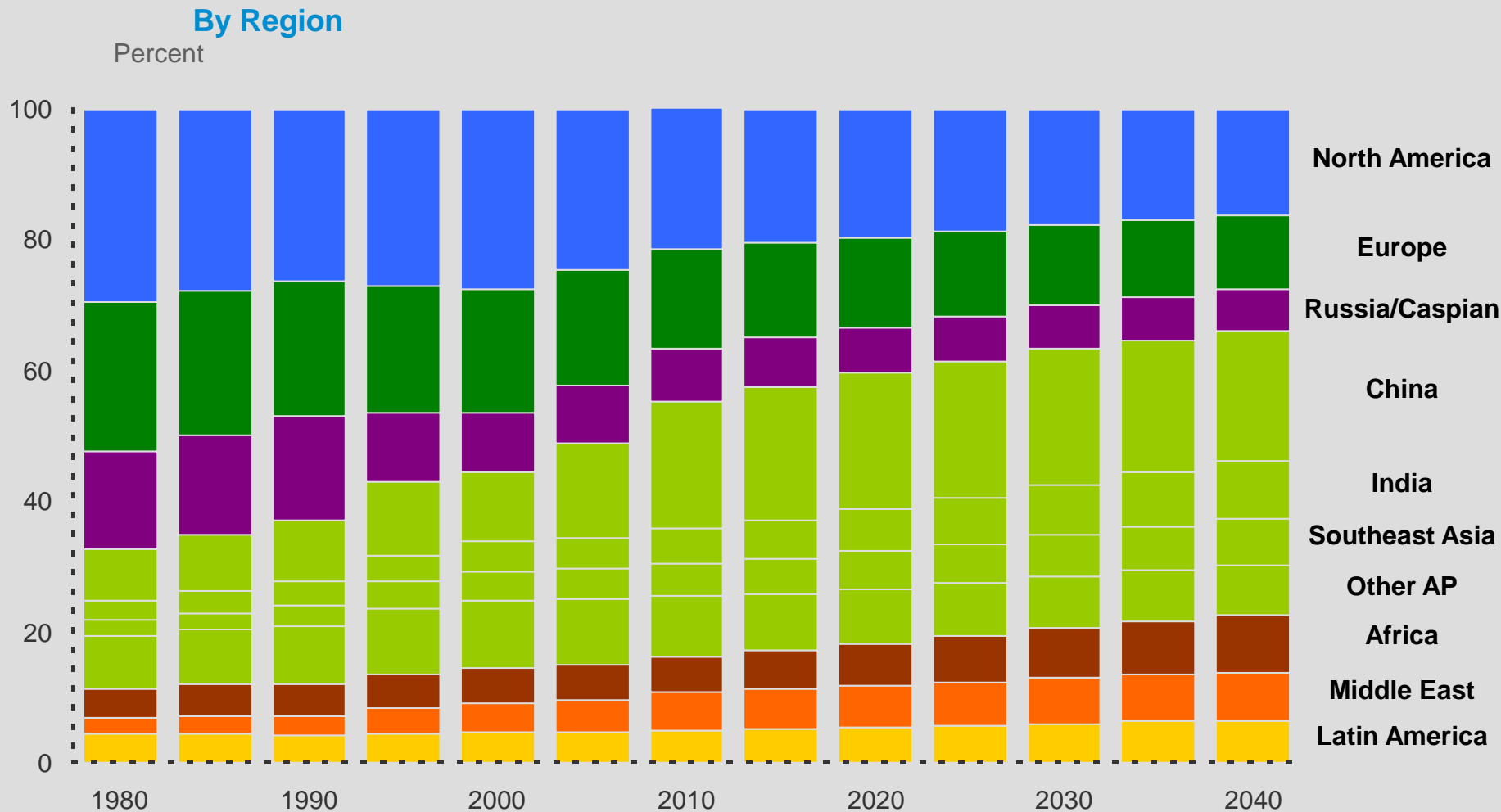


Regulatory Policies Drive High-Cost Mitigation



Source: JEC (2007), CARB (March 2009), EIA AEO; wind analysis based on IHS-CERA

Regional Energy Trends Evolve



Policies implications summary

- Policies that select technology winners or losers will fail to promote long-term viable solutions.
 - Uneconomic mandates, harm the economy, promote unviable technologies.
 - Wells-to-wheels analysis, land use/resource needs, cost-effectiveness are critical.
- Given the technical maturity, scale, cost of alternatives, and lower-cost efficiency potential in conventional vehicles, liquid petroleum fuels will remain the primary transportation fuels in the foreseeable future.
- Many technologies are available for reducing petroleum demand or GHG emissions from transport.
 - Conventional vehicle improvement is more feasible and economically attractive than the second tranche of technology—hybrids, advanced diesels, and LNG/CNG.
 - The third tranche of technologies—PHEV, EV, fuel cells, advanced biofuels—require further development and cost-reduction to be commercially viable at a large scale.
 - An engine with diesel-like efficiency operating on gasoline-range fuel would offer substantive WTW (Wells to Wheels) benefits
- Transport fuel changes are not the most cost-effective GHG emission reduction path; actions in other sectors (e.g., power generation) are more cost effective than transport options.

Summary

- All economic energy sources should be pursued towards 2040
- They need to compete on costs on a level playing field.
- Science, WTW cost/benefit analyses should inform legislative initiatives
- iLUC is a significant factor for biofuels GHG and needs to be taken into account.
- Cost effective biofuels can play a useful role in supplying transportation energy
- World fuels and especially European fuels are moving towards diesel.
- When countries legislate GHG, economy-wide, predictable GHG costs shape business plans and investments
- Market prices including CO₂ costs allocate resources most efficiently to help ensure reliable, affordable energy

Policy developments for transport GHG reduction: EUROPIA's priorities

europia

representing
the european
petroleum
industry

POLICY RECOMMENDATIONS

Policy measures focused on reducing CO₂ emissions should be based on realistic and attainable objectives and should be at the lowest cost to society.

A framework for consistent CO₂ abatement cost across the entire economy is essential.

EUROPIA proposes the following key parameters for EU transportation policies and legislation:

1. Maintain the economic and social value of cost-effective mobility through realistic objectives and attainable standards
2. Promote a framework for consistent and predictable CO₂ abatement cost across the entire economy to minimize costs to society, enable proper investment/divestment planning, facilitate progressive technology introduction
3. Avoid direct or indirect technology mandates or prescriptions, and facilitate research and development of competing technologies
4. Recognise that energy efficiency improvements are the most cost-efficient opportunity to reduce Well-to-Wheel CO₂ emissions for all transportation segments
5. Ensure consistent application of energy taxation levels to all energy products (oil, coal, gas, biomass, electricity) based on the energy content and potentially the CO₂ emitted when the product is consumed at a level consistent with the ETS CO₂ market price (Emission Trading System)
6. Assess thoroughly the continued viability of EU refining and associated distribution and marketing infrastructure as part of EU industrial competitiveness

Advanced Powertrains and Alternative Fuels

