Energy and Fuel Trends for Transportation

A View to 2040

Baudouin Kelecom
CEPS Workshop
July 2nd

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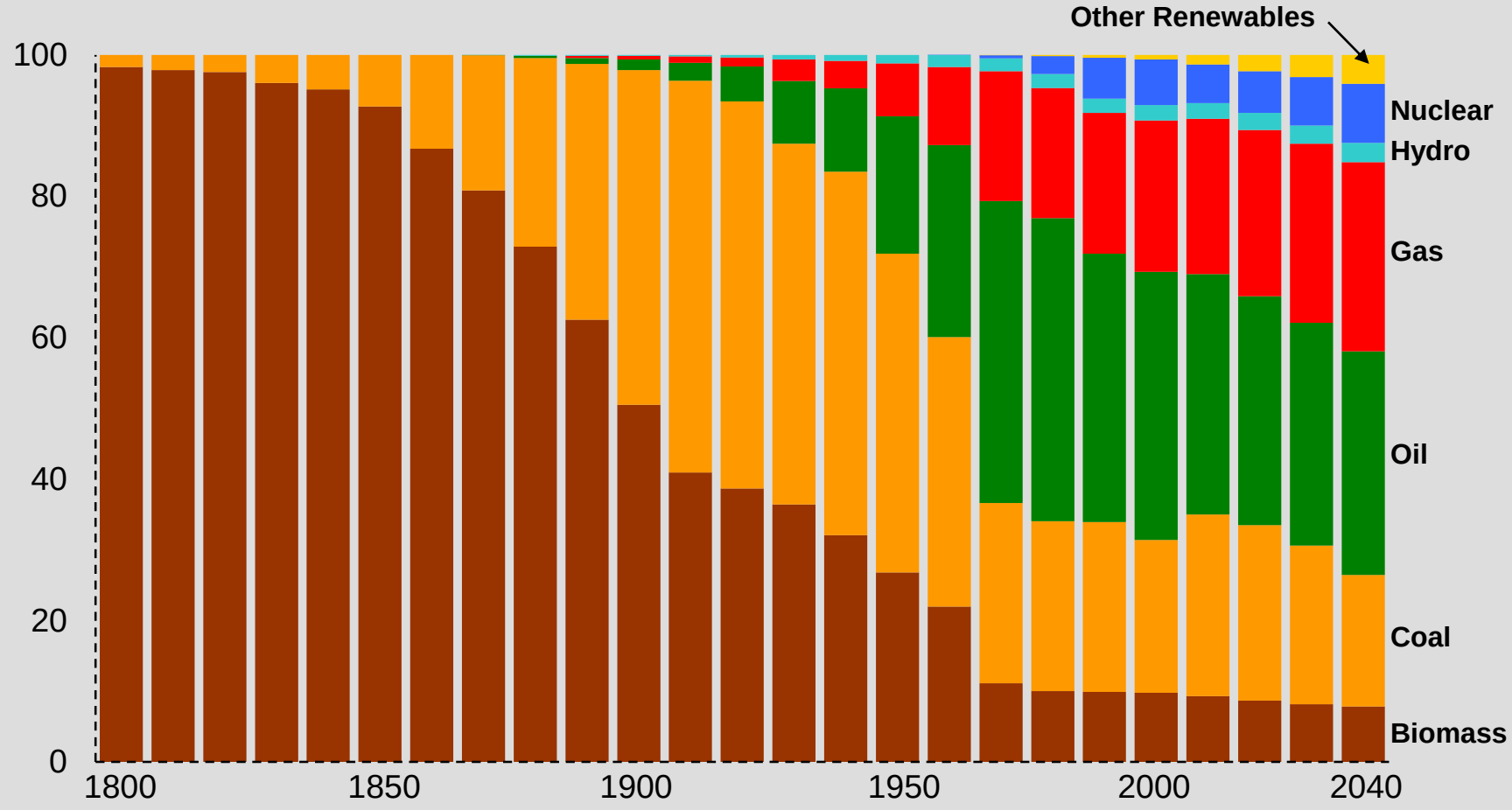
Energy Use Evolves Over Time

Global Percent Mix of Fuels



Source: Smil, Energy Transitions (1800-1960)

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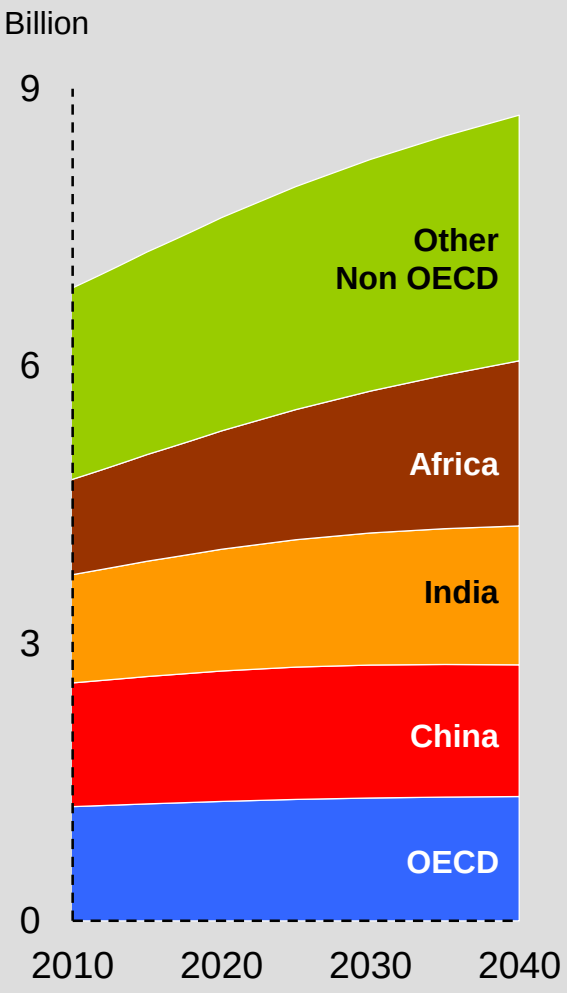
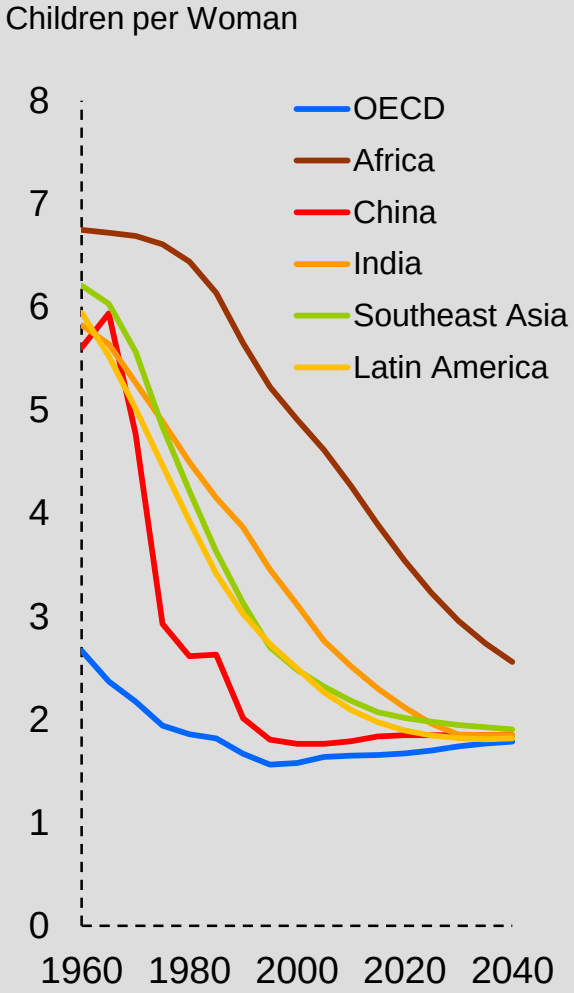
Population Trends Impact Energy Use

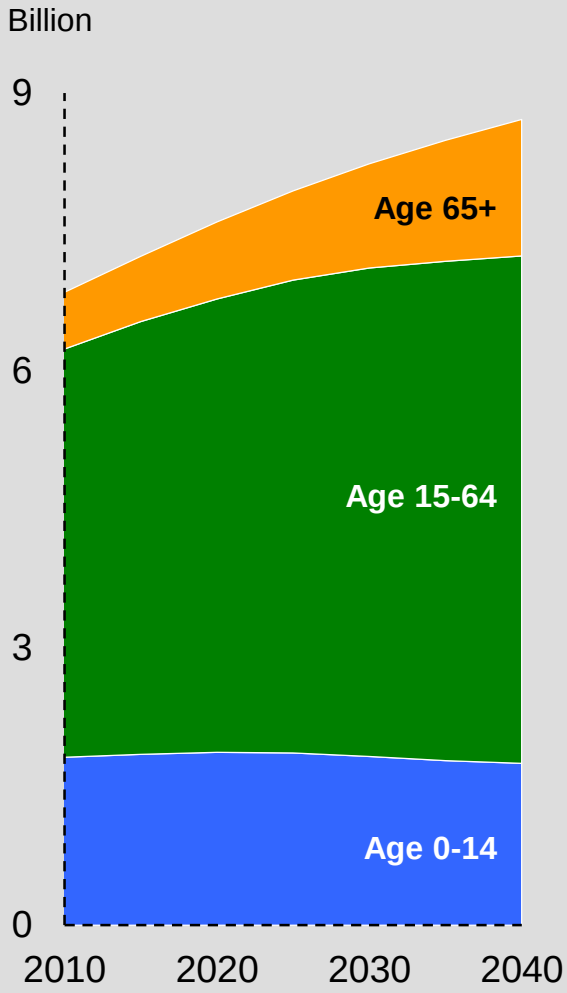
Population



Fertility Rate*



Global Demographics*



ExxonMobil 2013 Outlook for Energy

** Source: World Bank & United Nations*

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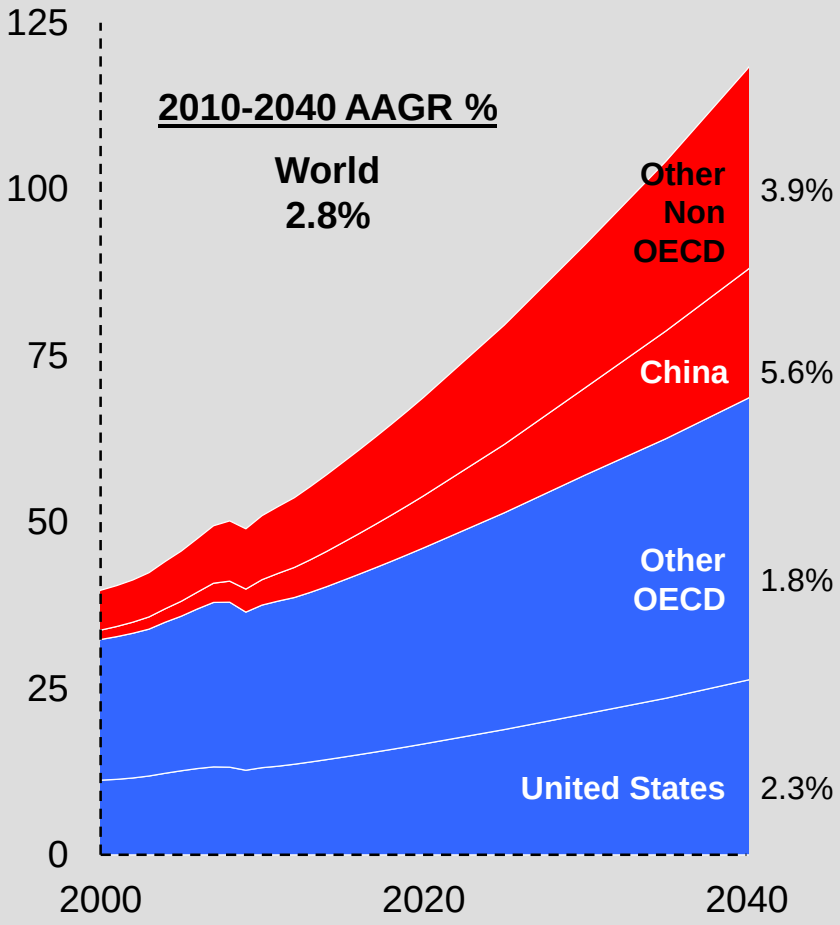
Economic Growth Drives Energy Demand

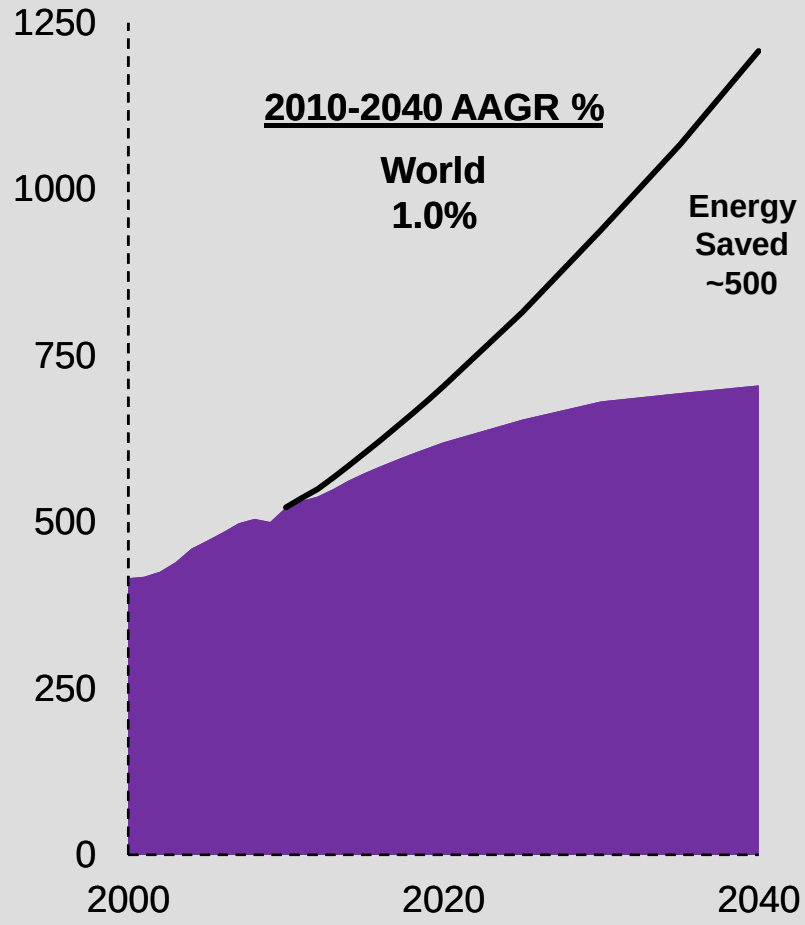
GDP

Trillion 2005$



Energy Demand

Quadrillion BTUs



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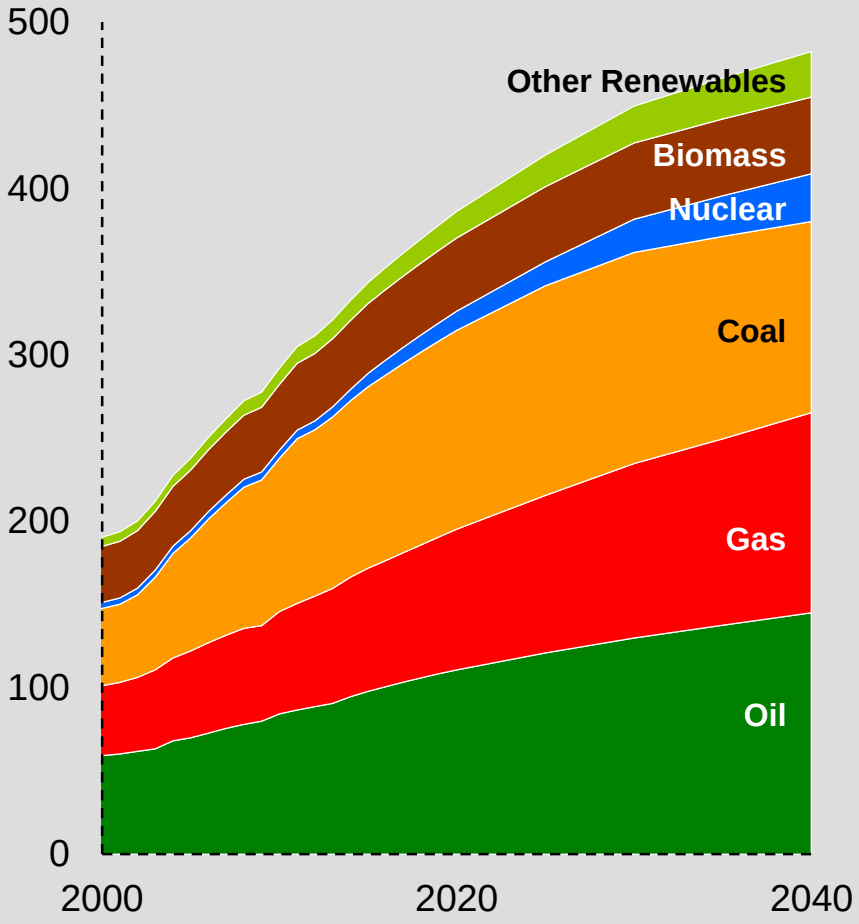
Tale of Two Worlds

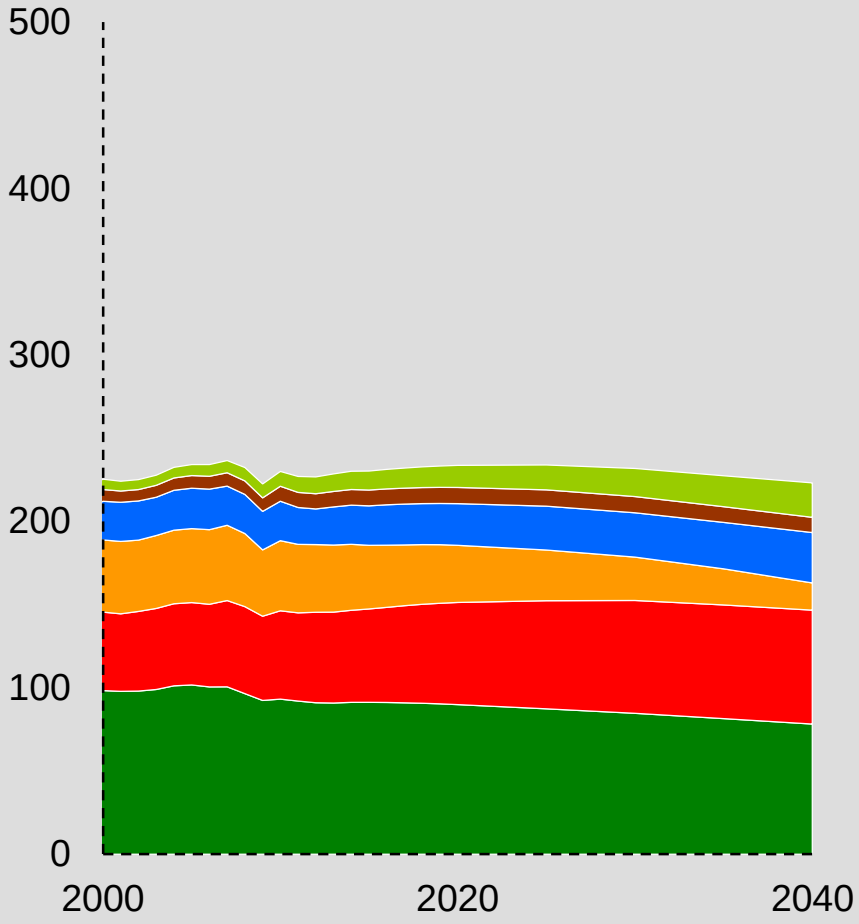
Non OECD

Quadrillion BTUs



OECD

Quadrillion BTUs



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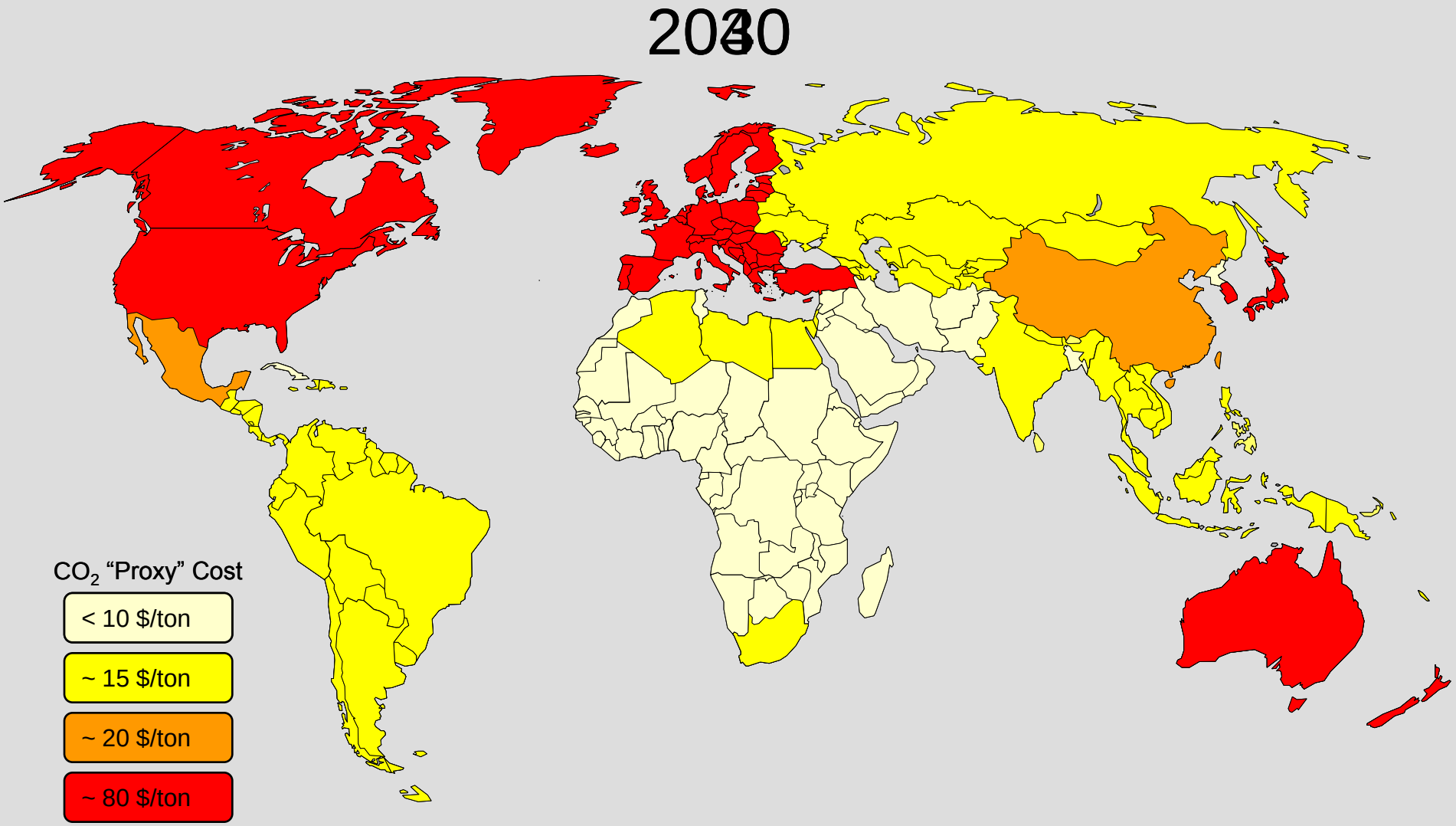
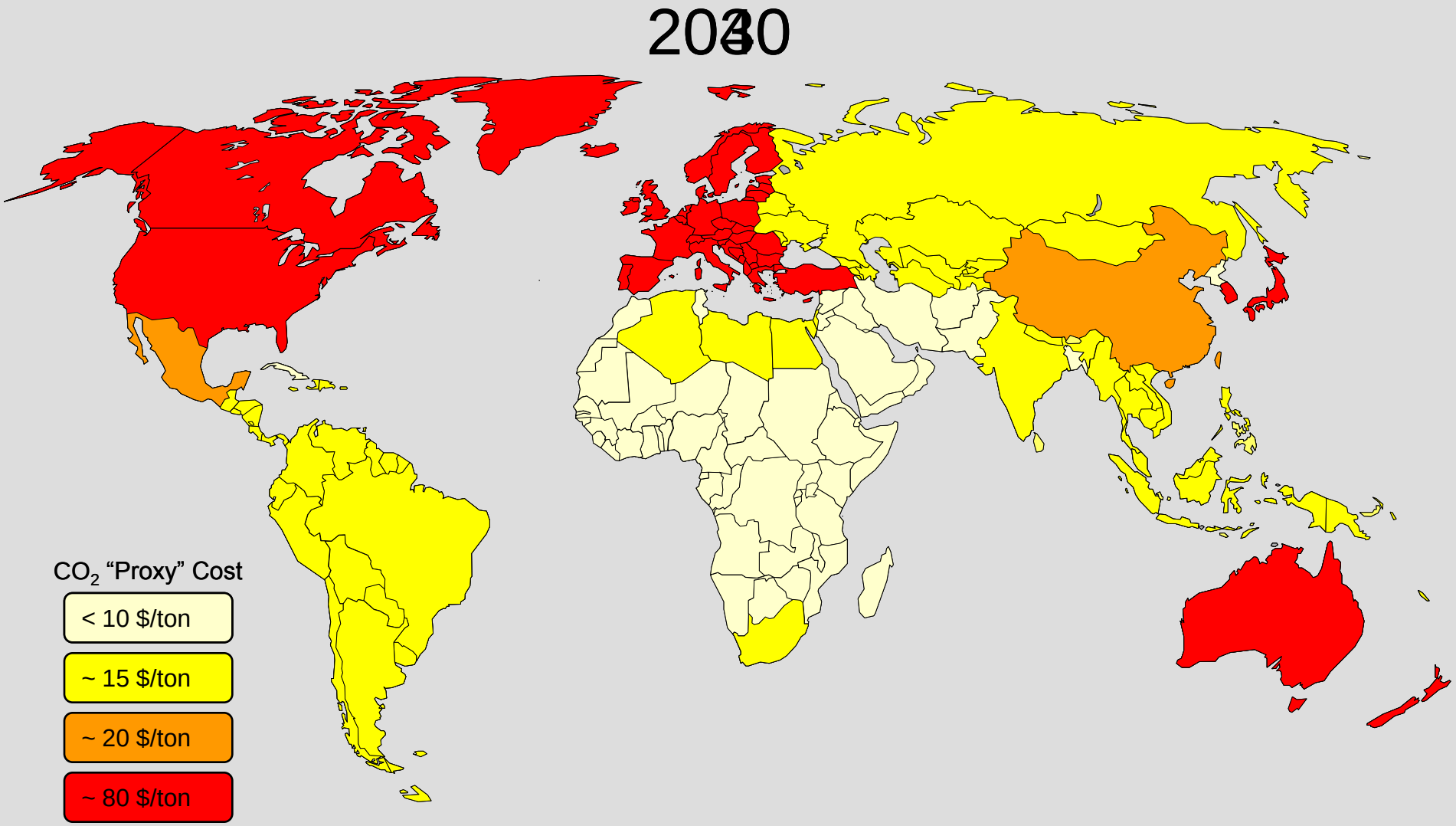
CO_2 Policies



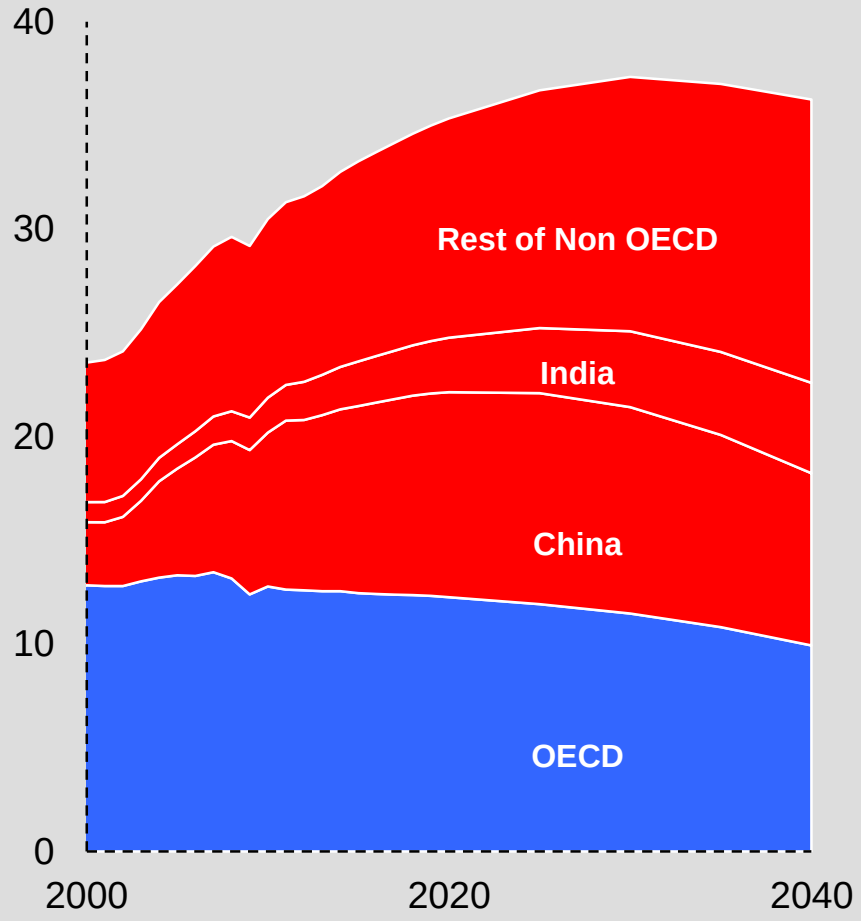
CO_2 Policies



CO_2 Emissions Plateau

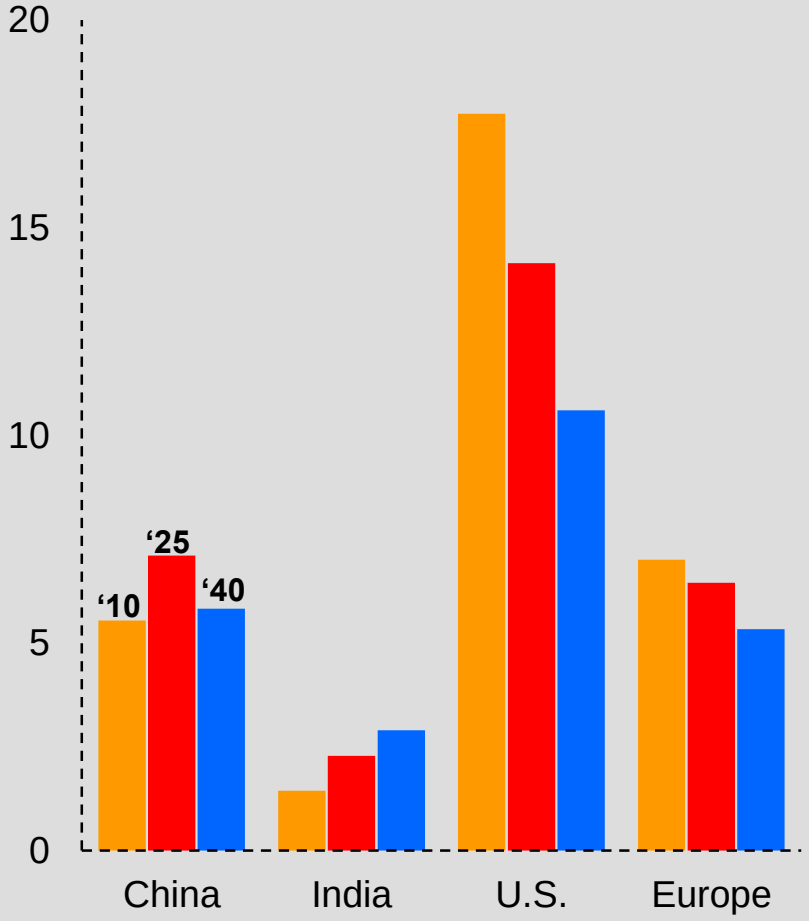
By Region

Billion Tons



Emissions per Capita

Tons per Person



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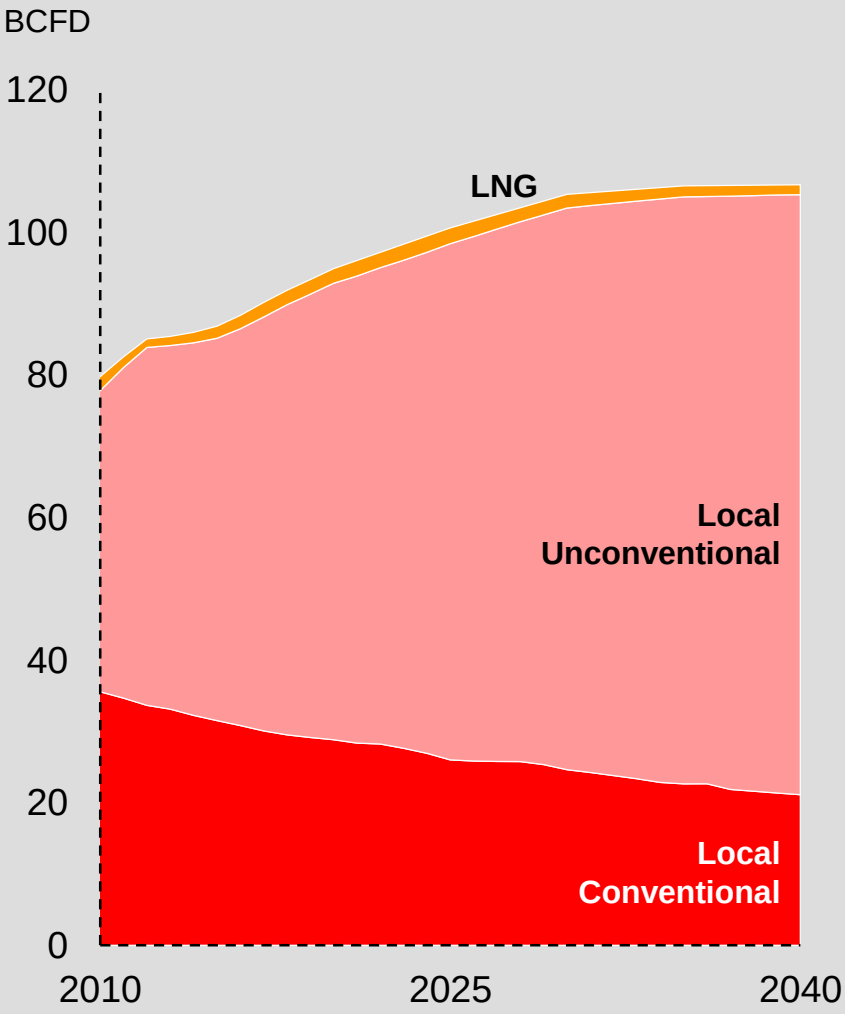
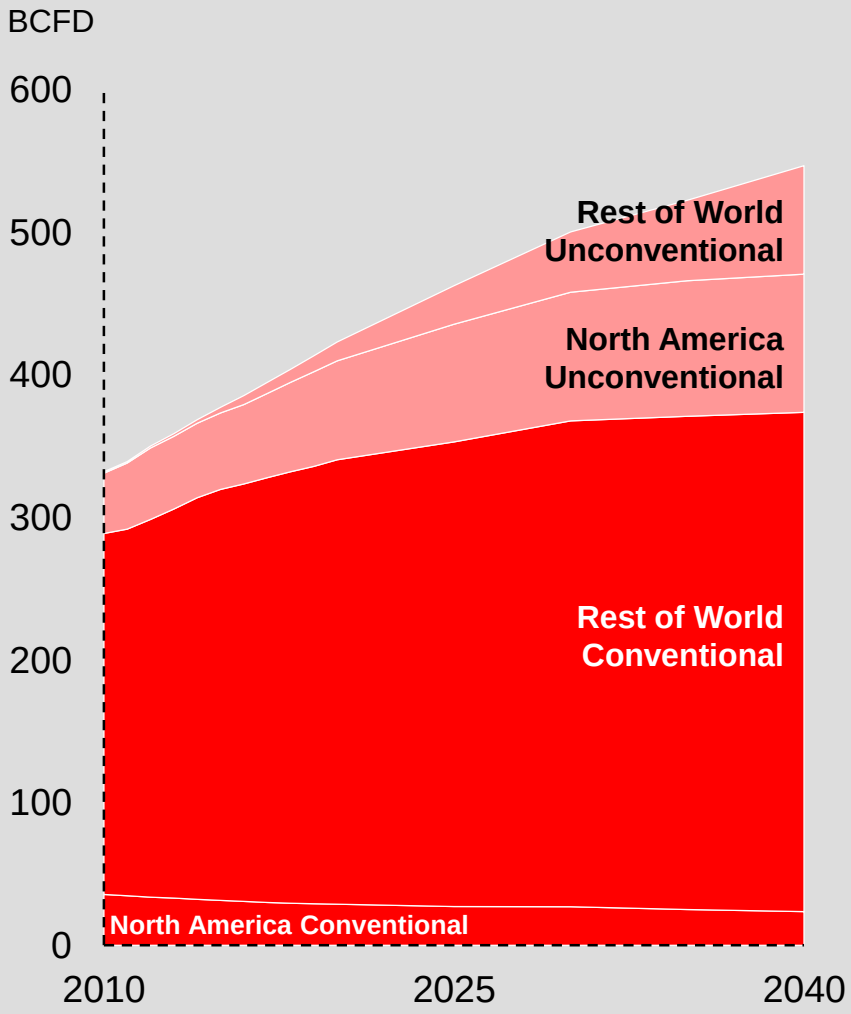
Natural Gas Supply and Demand Shifts

North America Gas Supply



Global Gas Supply



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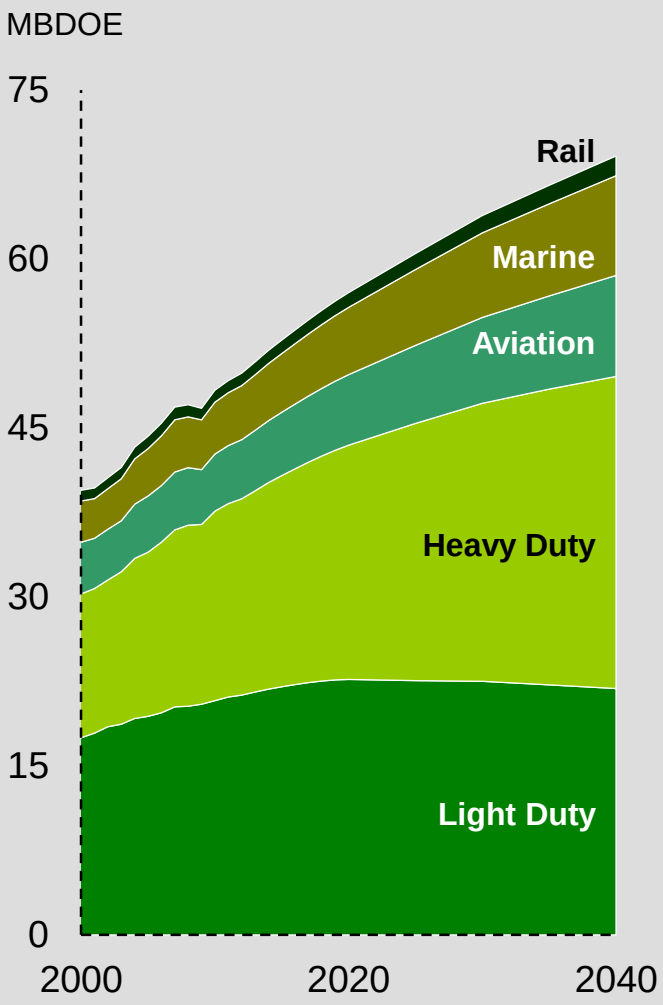
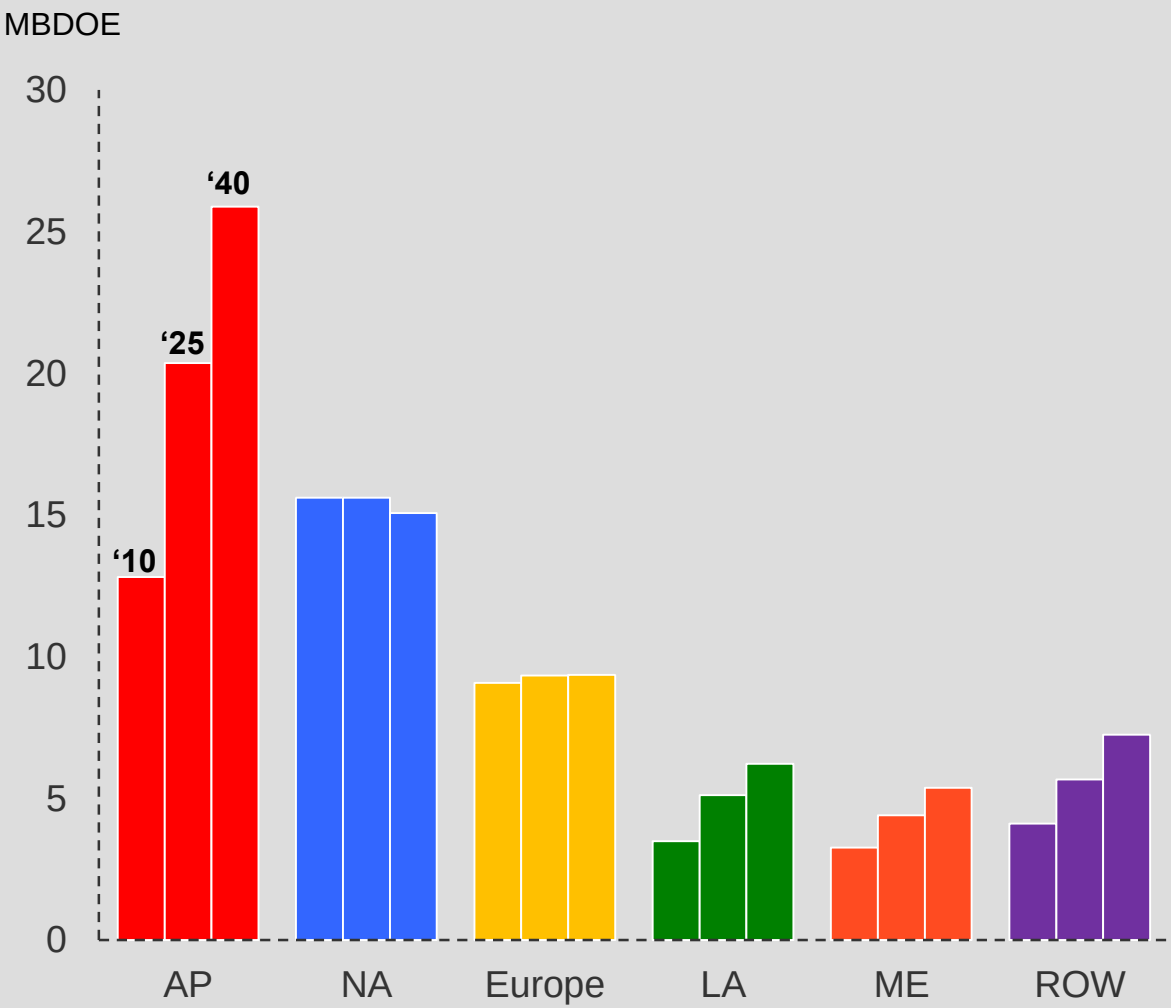
Transportation Demand

Sector Demand



Demand by Region



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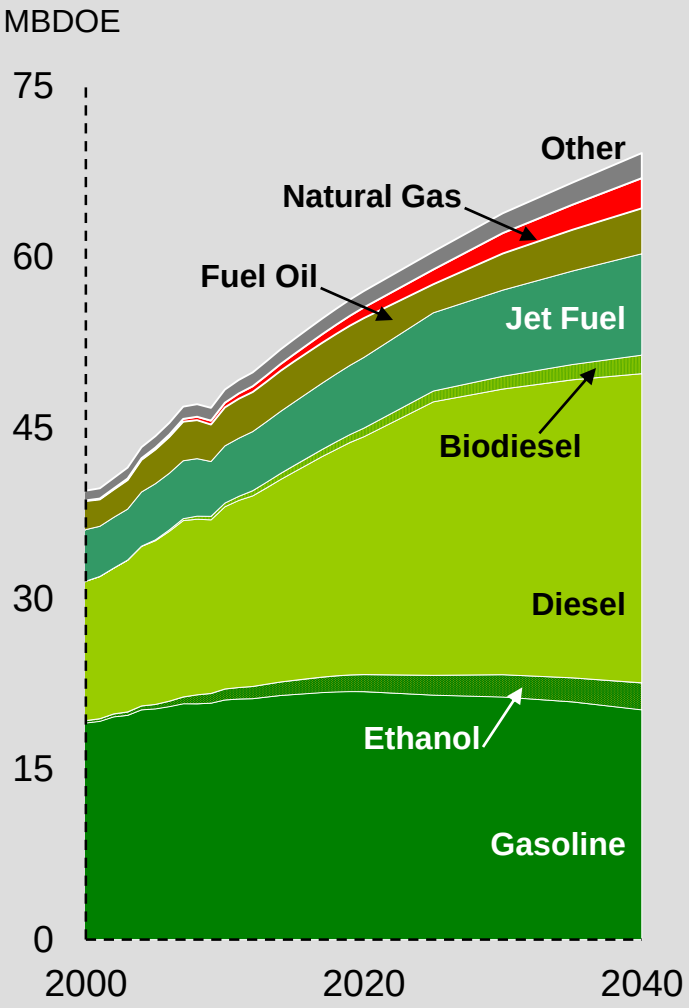
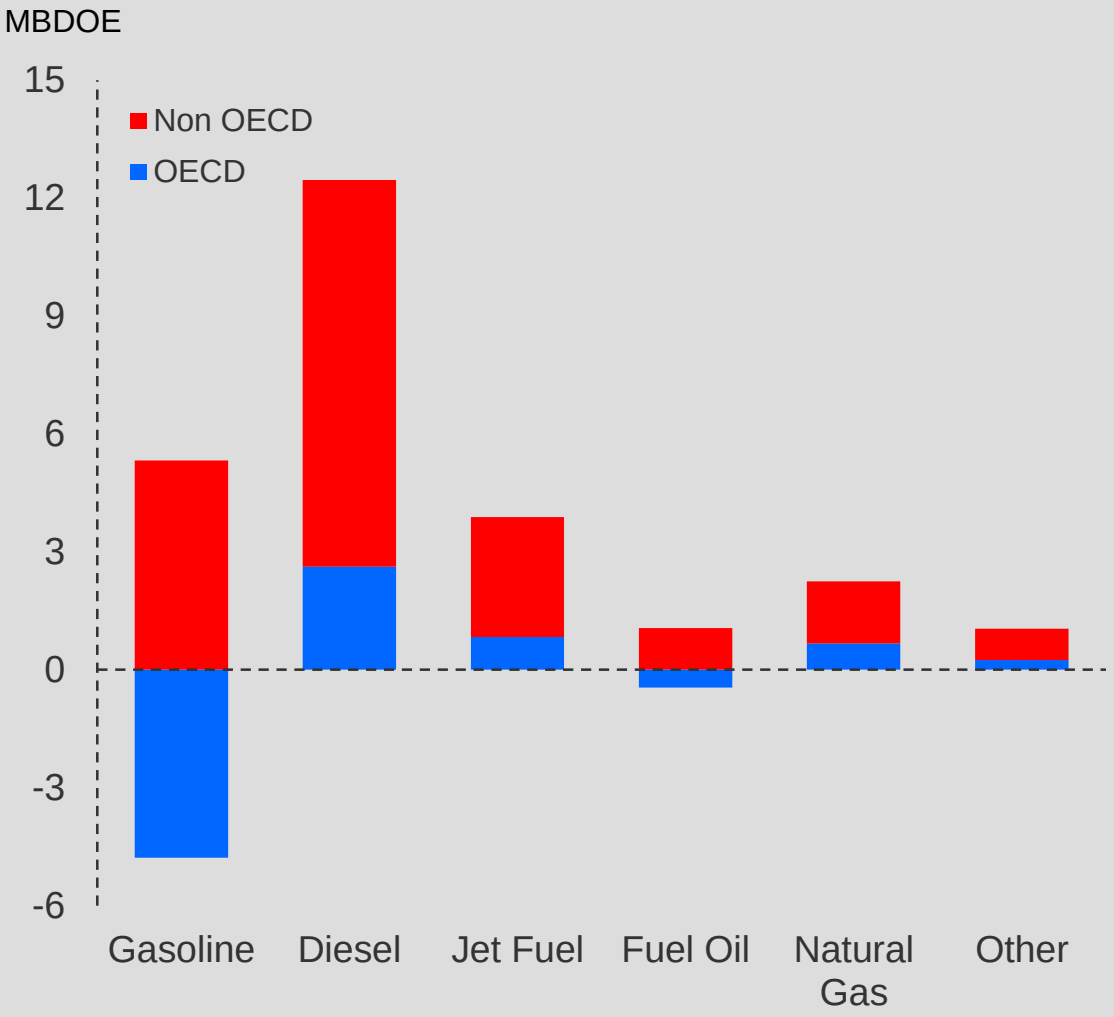
Transportation Fuel Mix

Fuel Demand



Growth in Demand from 2010 to 2040



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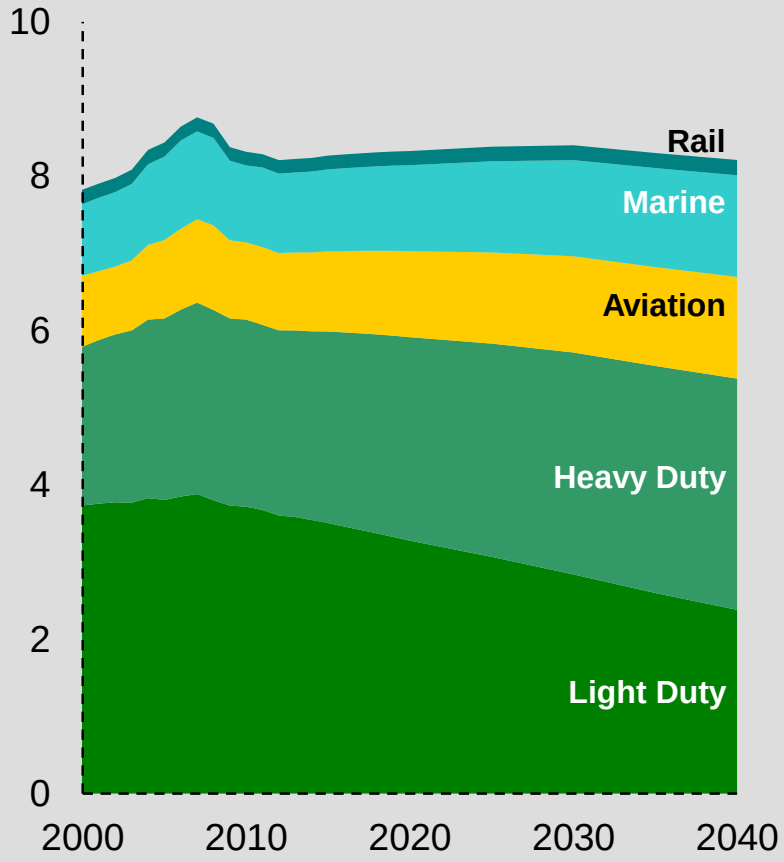
EU 27 Transportation Demand

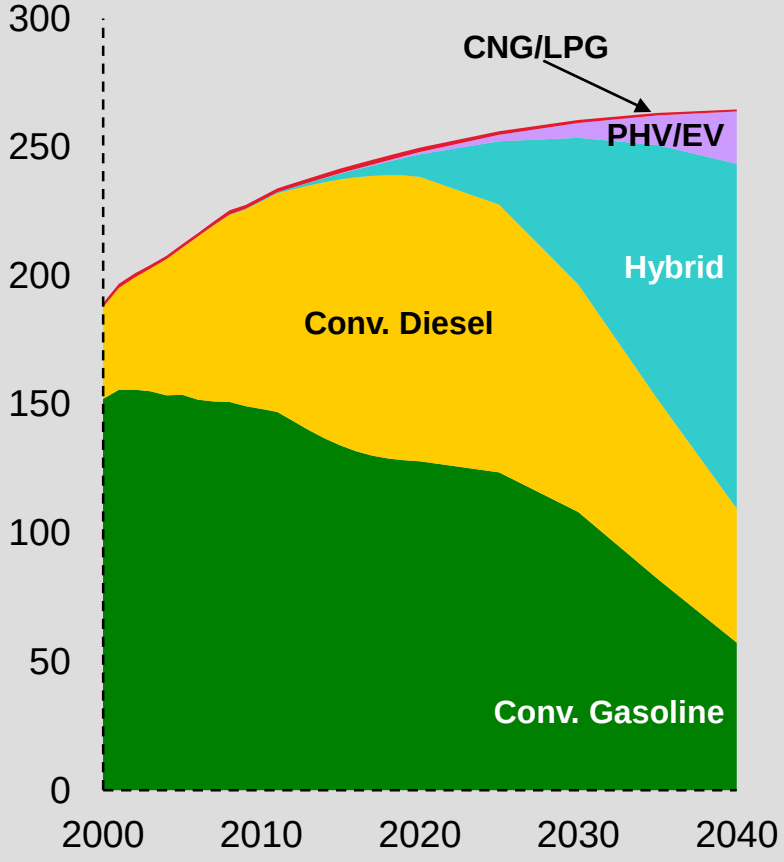
Transportation

MBDOE



Light Duty Vehicle Fleet

Million Cars



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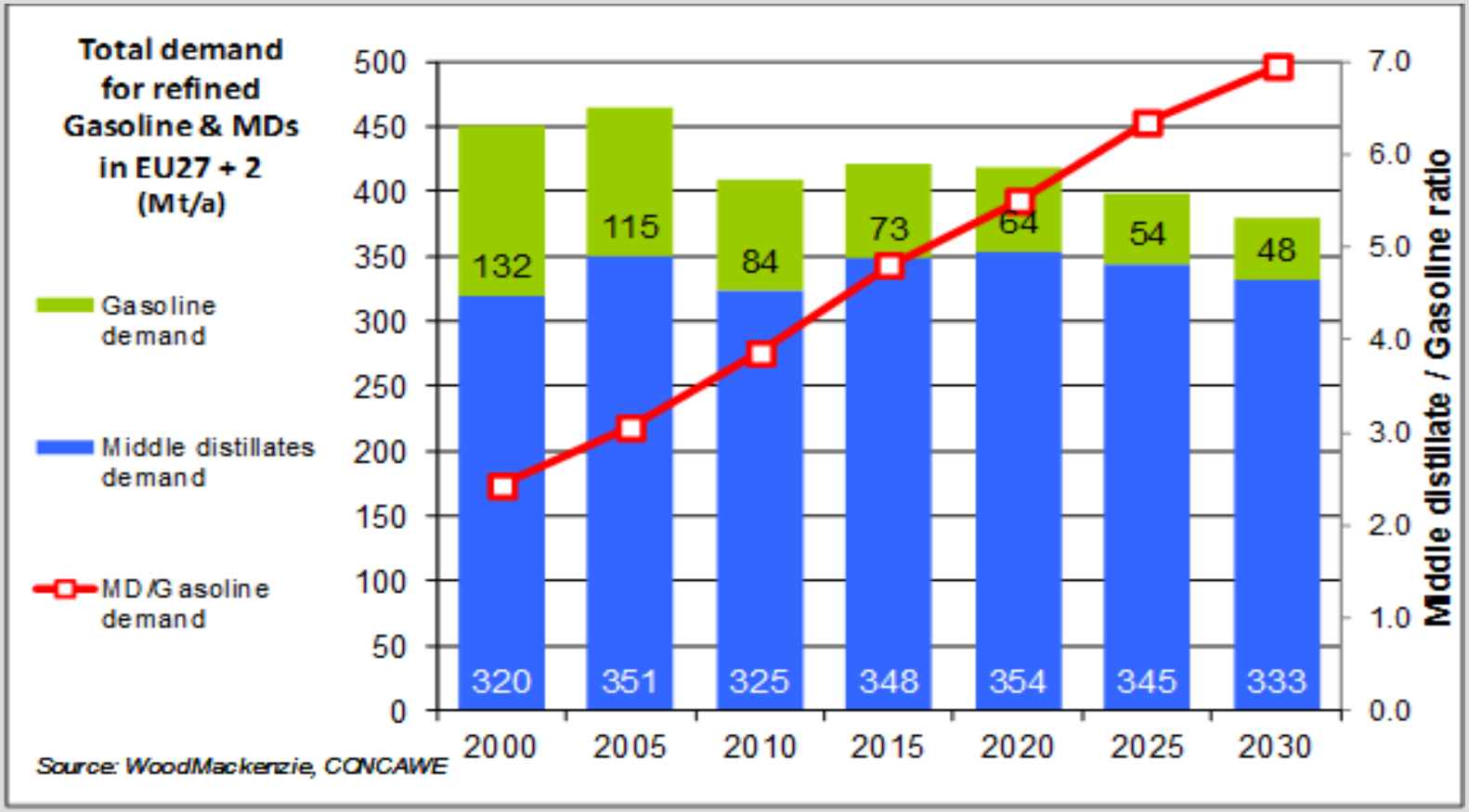
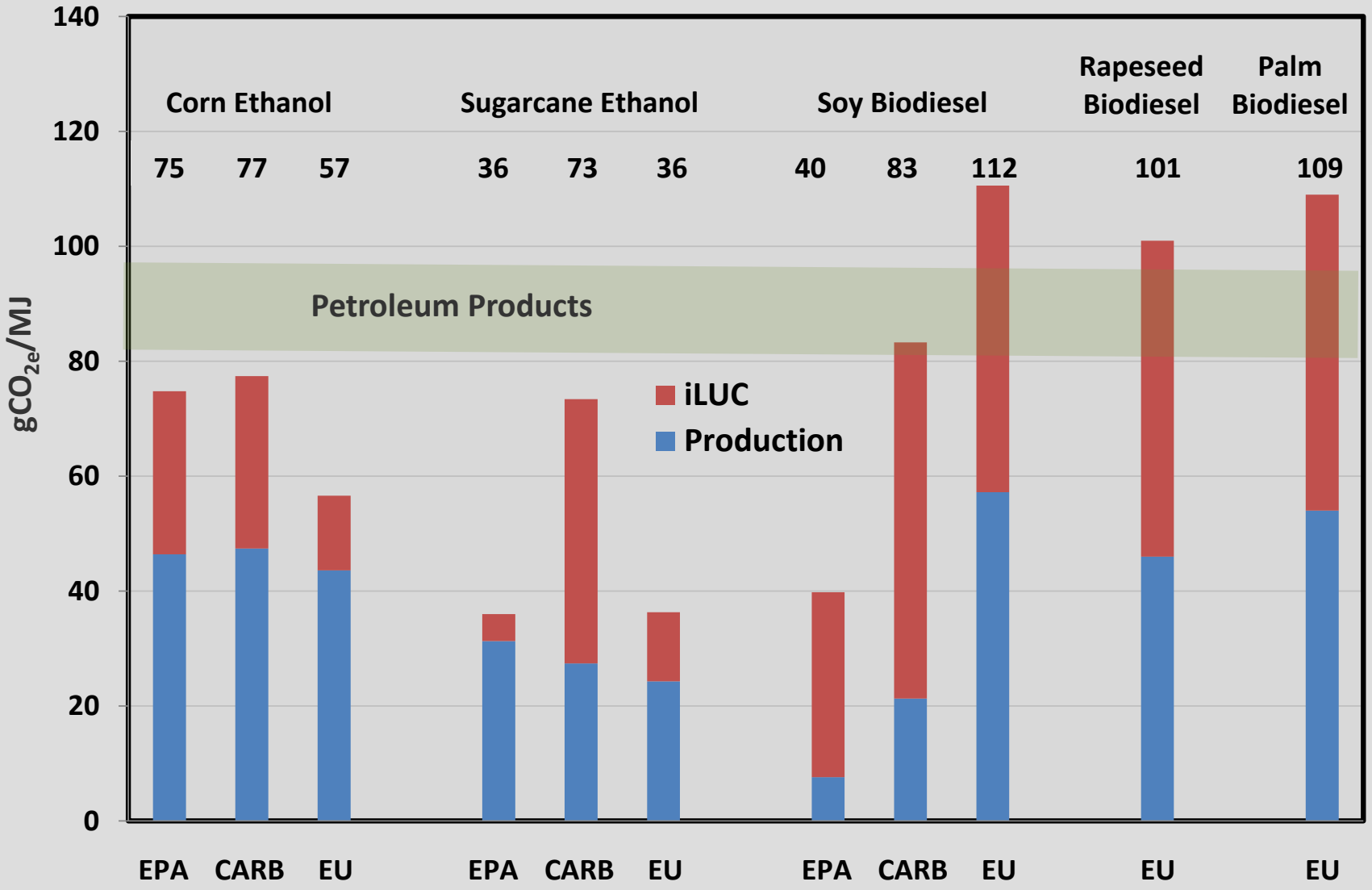
Dieselisation of EU demand

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



Source: CONCAWE

Biofuel Life-Cycle Analysis Comparison



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

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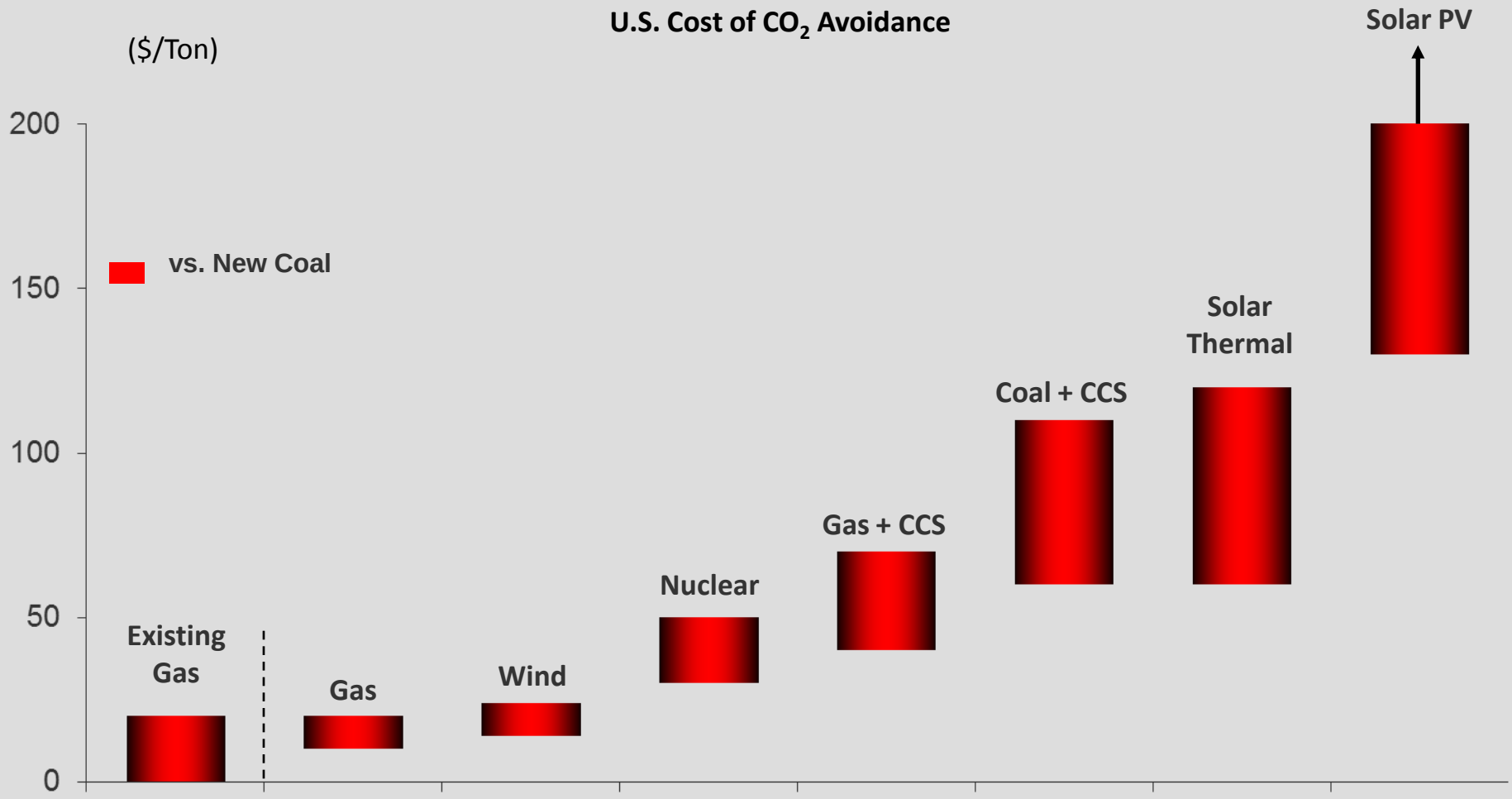
Mitigation Options and Costs



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

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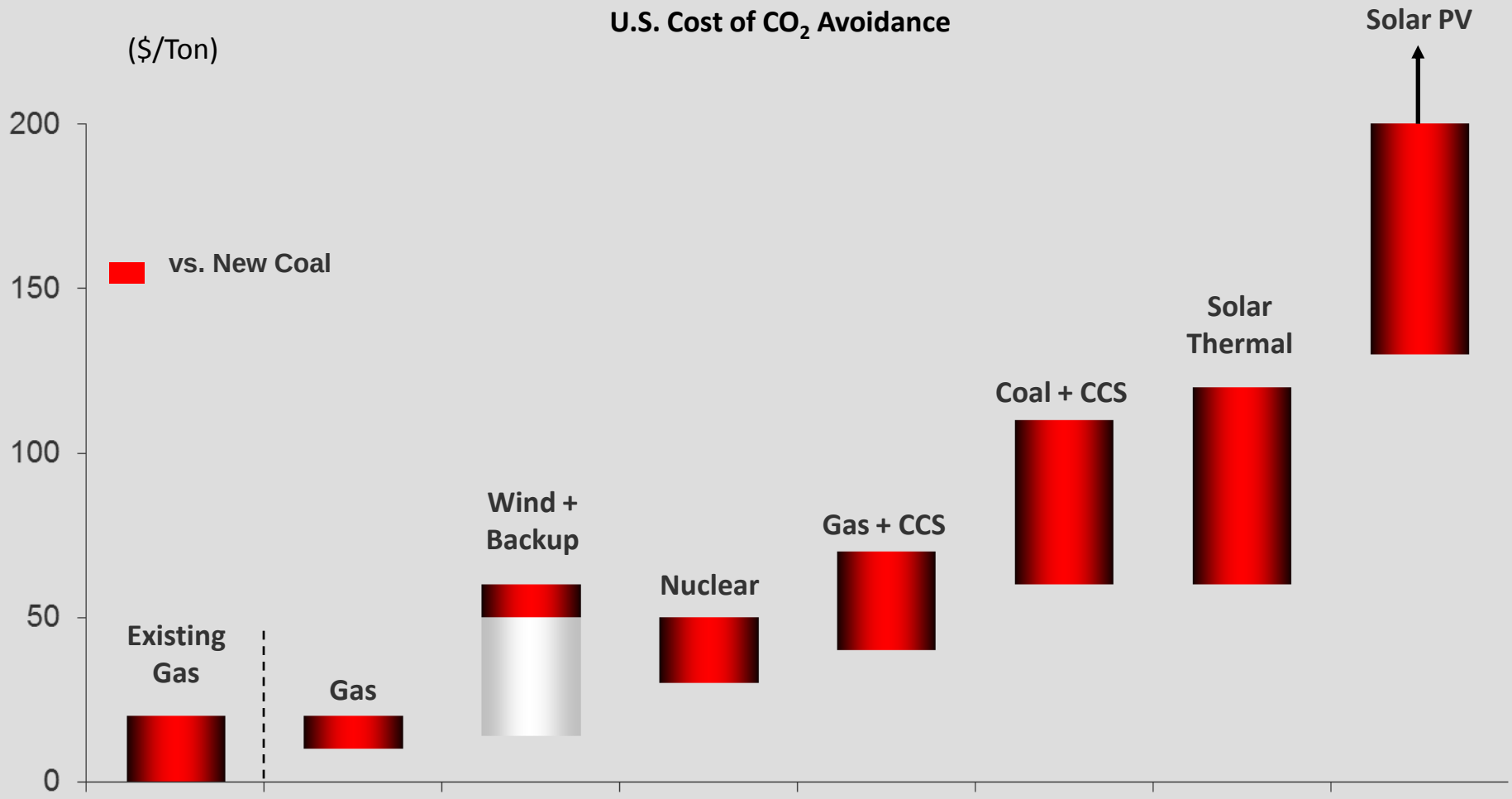
Mitigation Options and Costs



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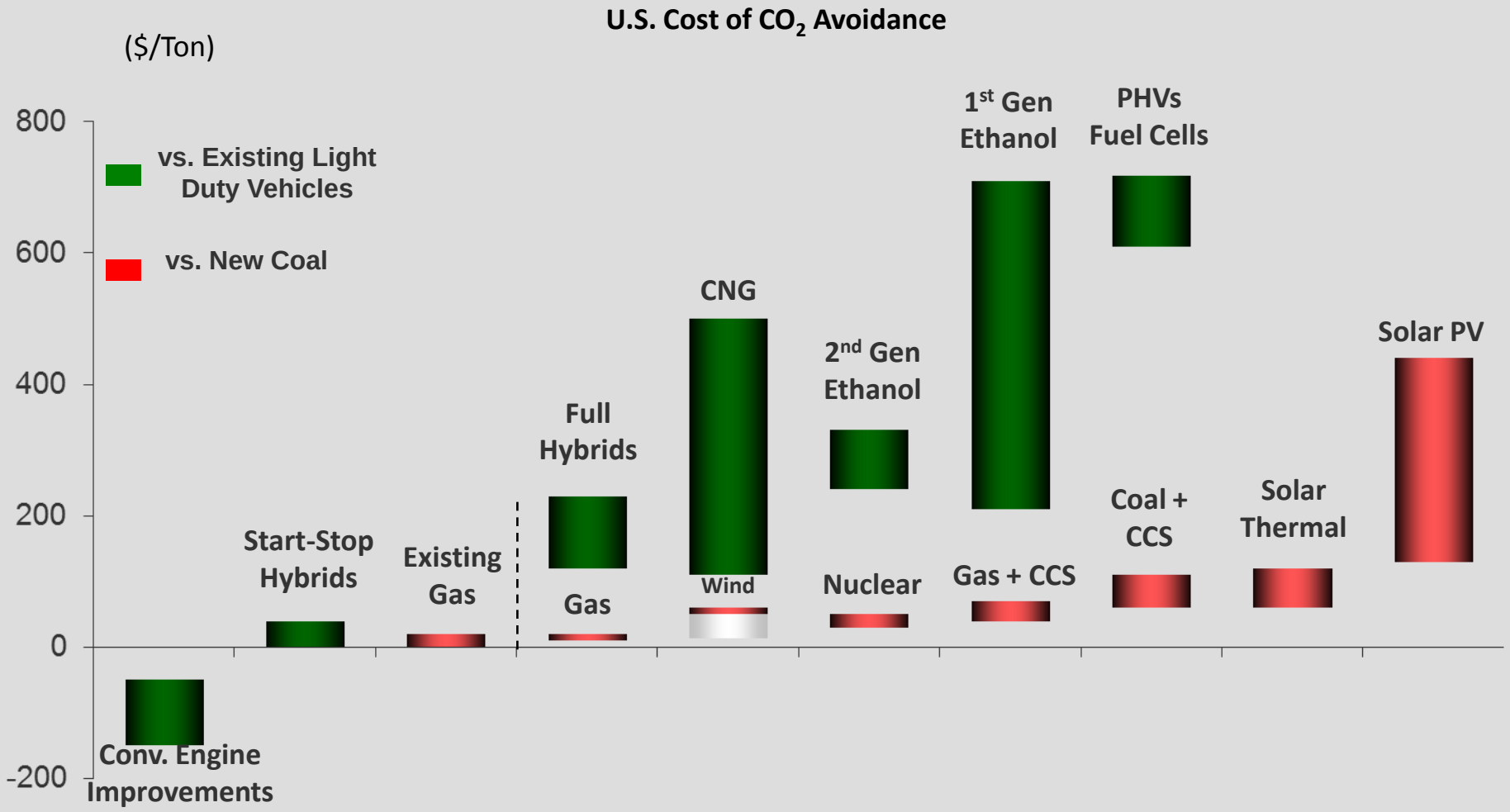
Mitigation Options and Costs



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

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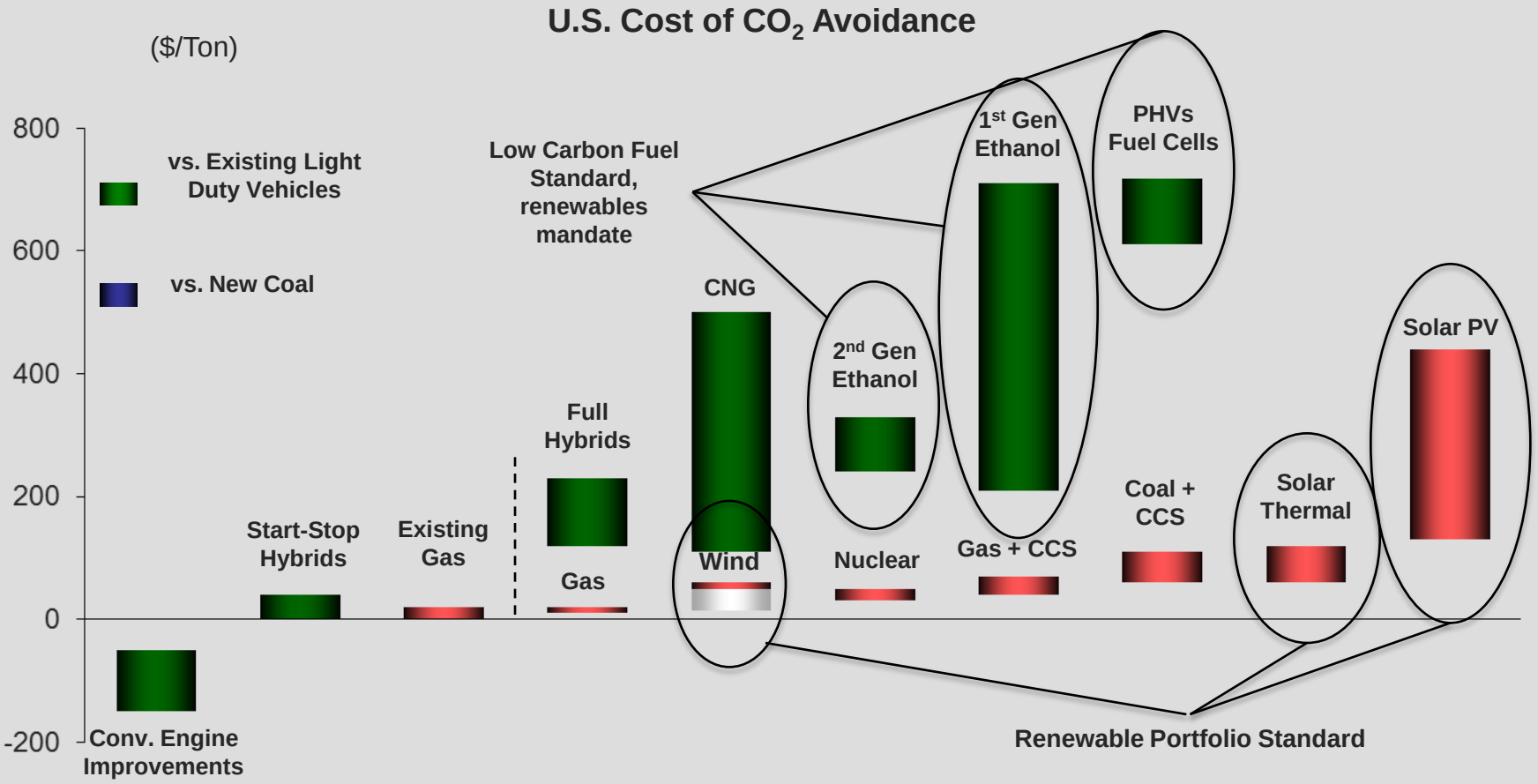
Regulatory Policies Drive High-Cost Mitigation



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

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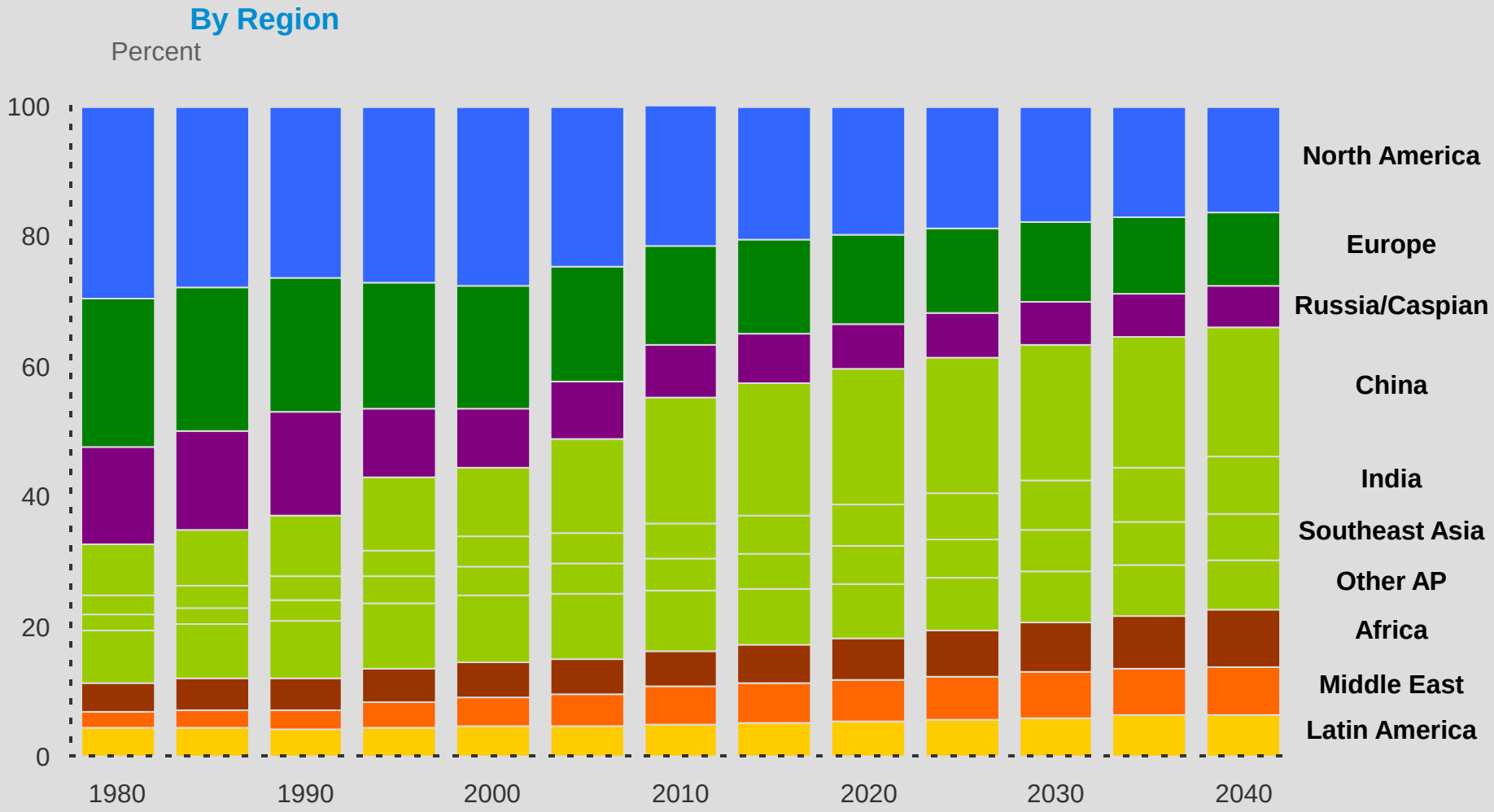
Regional Energy Trends Evolve



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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.

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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 CO_2 costs allocate resources most efficiently to help ensure reliable, affordable energy

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Policy developments for transport GHG reduction: EUROPIA's priorities

europia representing the european petroleum industry

POLICY RECOMMENDATIONS

Policy measures focused on reducing CO_2 emissions should be based on realistic and attainable objectives and should be at the lowest cost to society.
A framework for consistent CO_2 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 CO_2 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 CO_2 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 CO_2 emitted when the product is consumed at a level consistent with the ETS CO_2 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

Reference : EUROPIA White paper on fuelling EU Transport – April 2011

Advanced Powertrains and Alternative Fuels