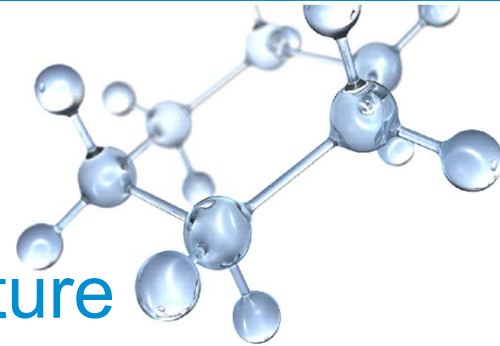


ExxonMobil

Taking on the world's toughest energy challenges.™

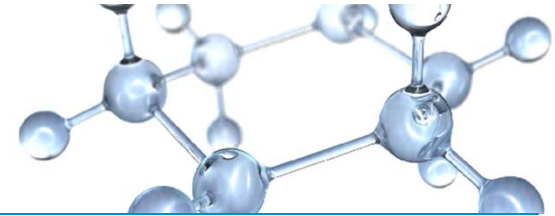
Transport Fuels in Europe: Energy for the Mobility of the Future



Baudouin Kelecom, Fuels Executive, Refining & Supply, ExxonMobil
Norwegian Petroleum Institute
8 November 2011

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 in Item 1 of ExxonMobil's latest report on Form 10-K). This material is not to be reproduced without the permission of Exxon Mobil Corporation.

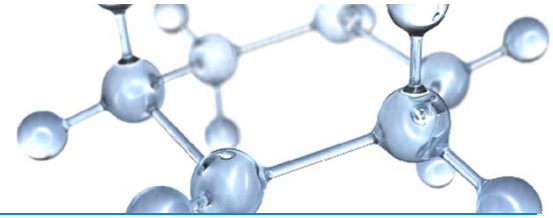
Mobility, Sustainability, Competitiveness



Policies for an efficient transition to a lower carbon transportation system

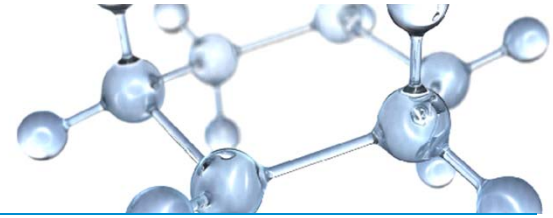
- Cost effective and based on a full CO₂ life cycle analysis
- Economy-wide, transparent CO₂ cost mechanism
- Technology neutrality
- Consistent energy taxation proportional to energy content
- Support innovative research whilst avoiding subsidies for existing technologies





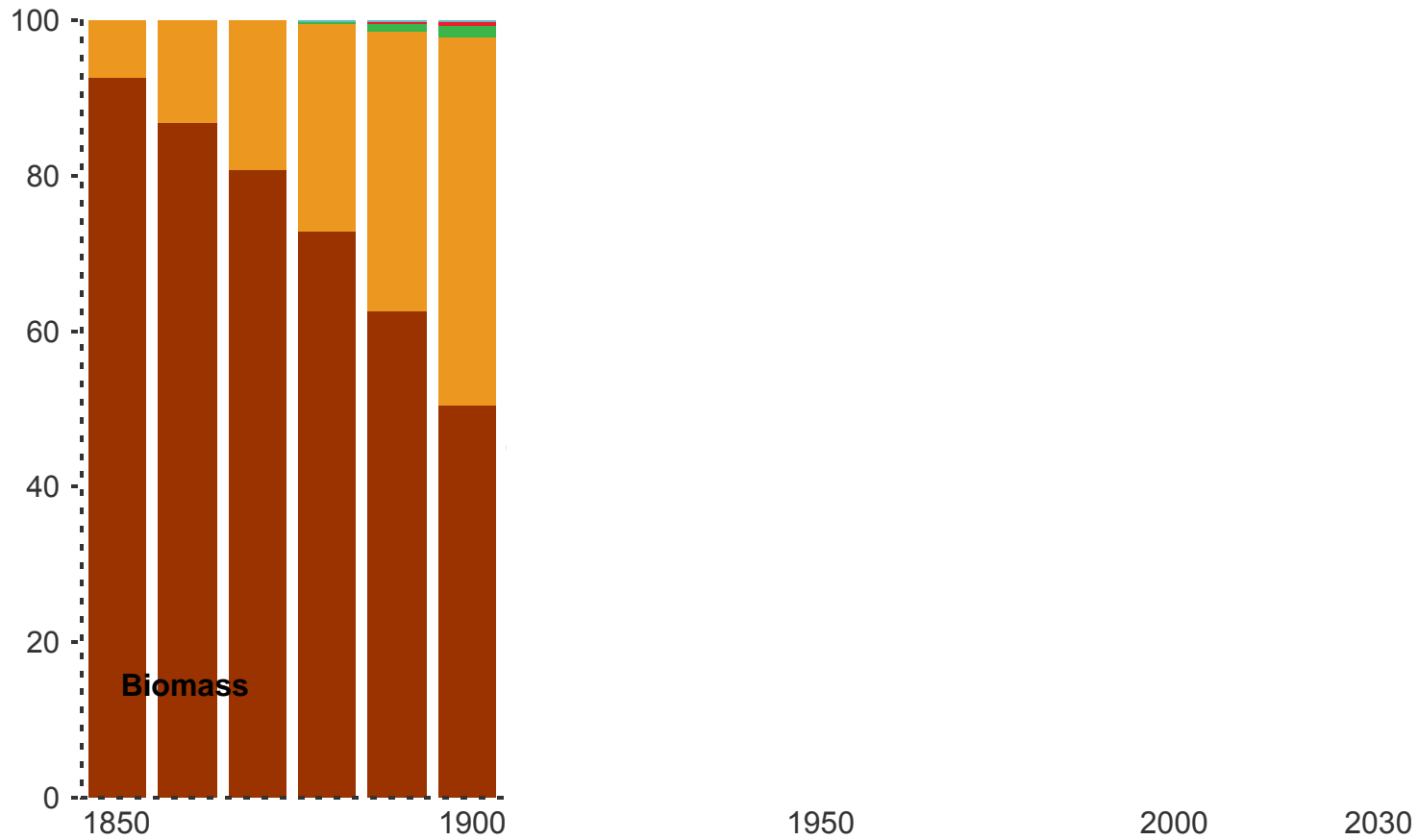
TECHNOLOGY TRANSFORMATION

Energy Needs Evolve Over Time



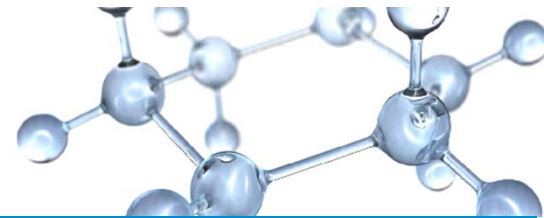
Global Demand By Fuel

Percent

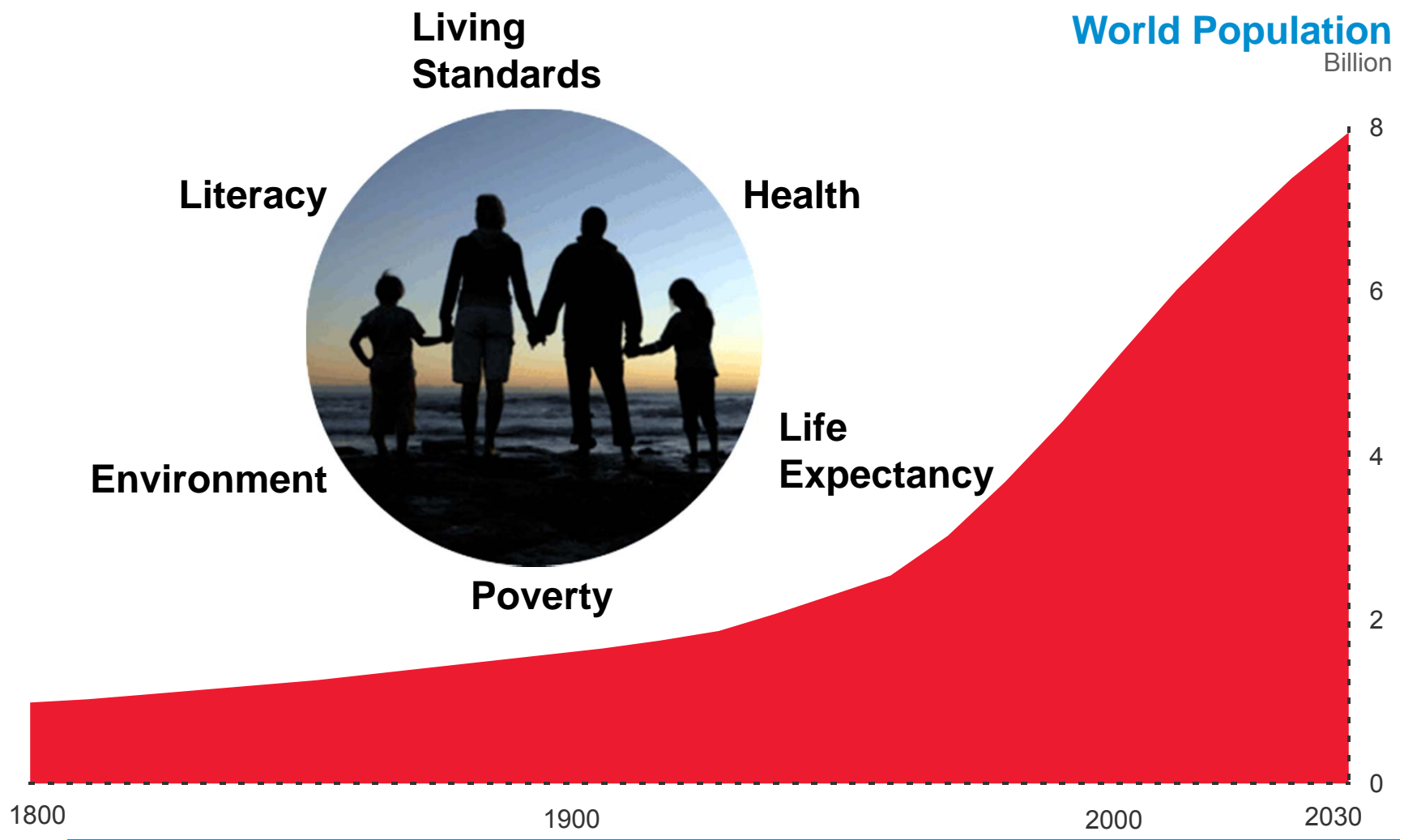


Source: Smil, *Energy Transitions*; ExxonMobil

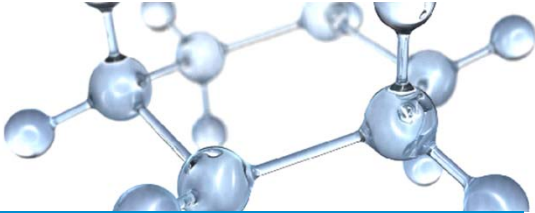
Ongoing Development Challenges



World Population
Billion



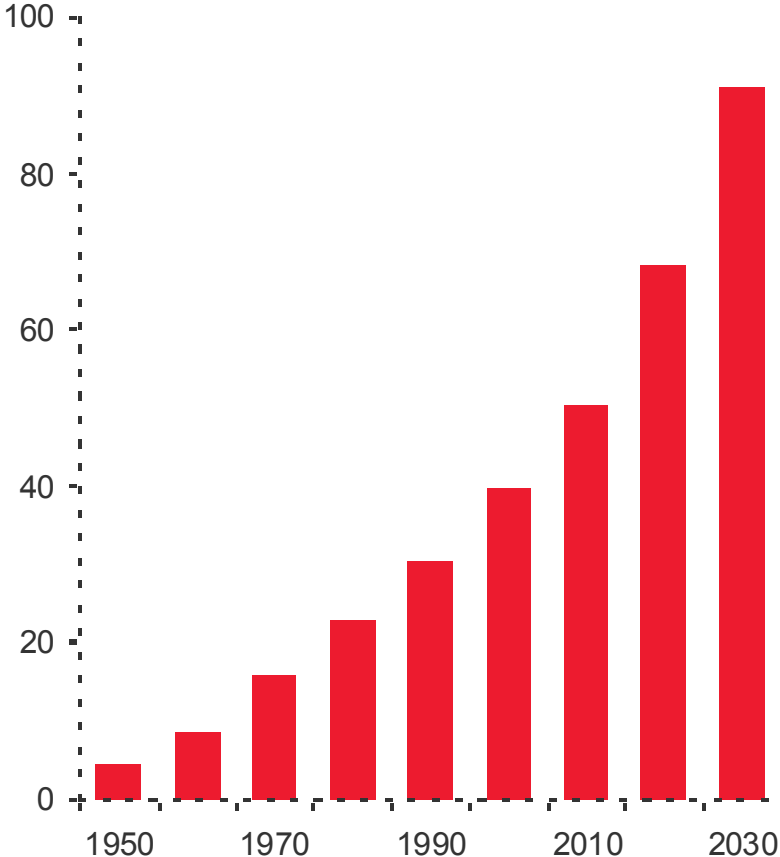
Source: United Nations; ExxonMobil



Economic and Energy Evolution

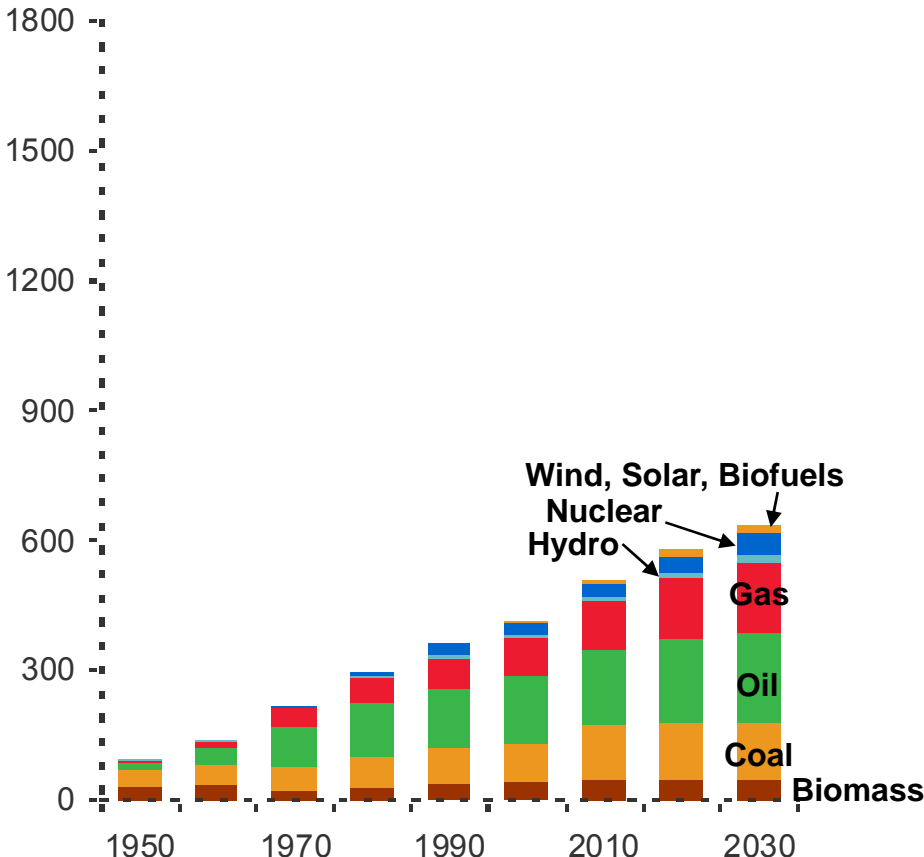
Global Domestic Product

Trillion 2005 \$



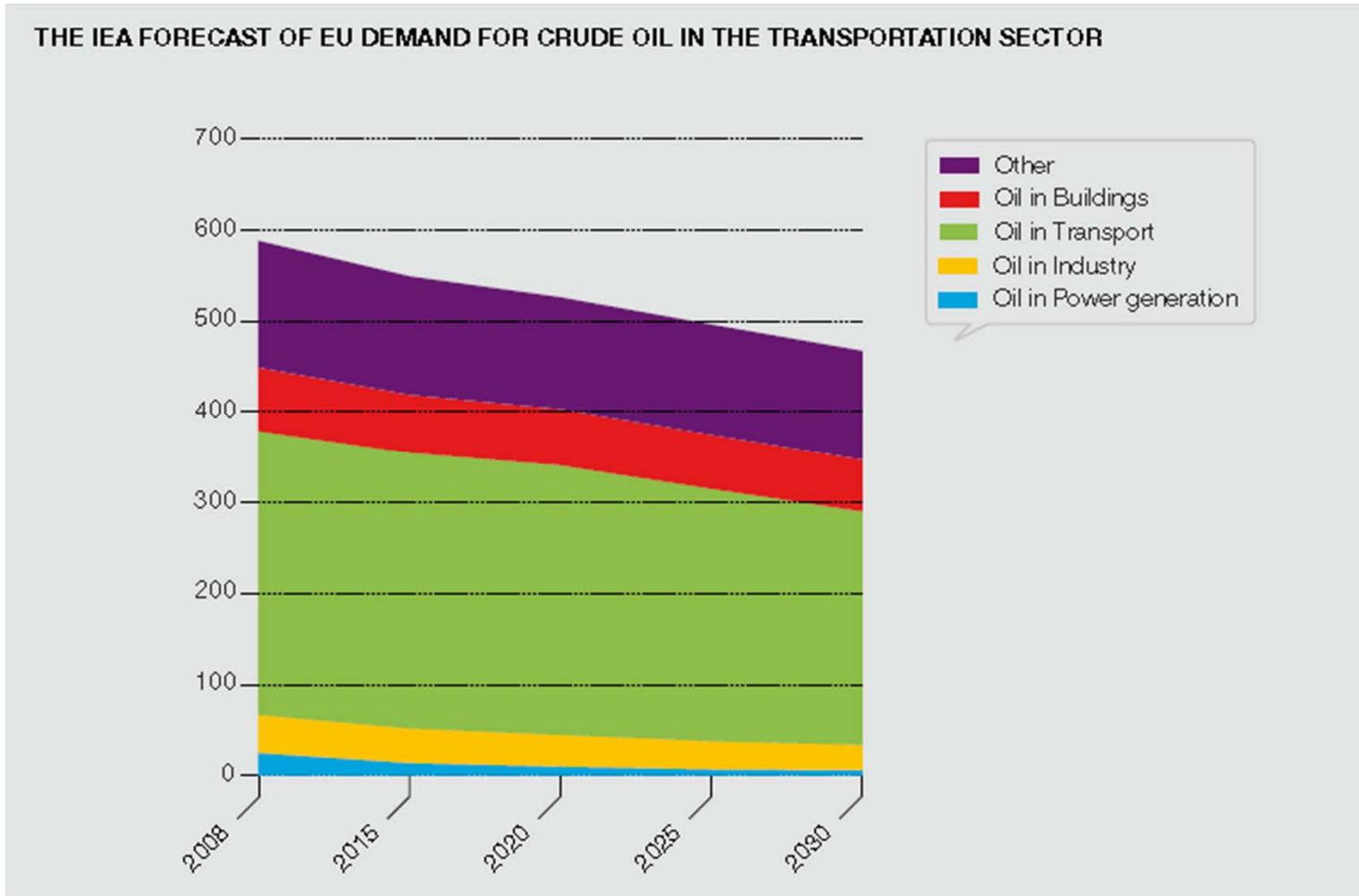
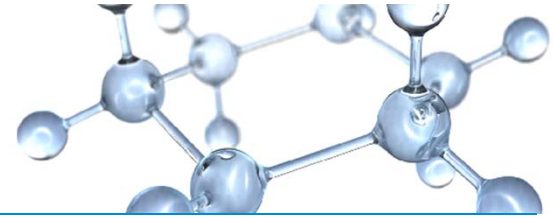
Global Energy Demand

Quadrillion BTUs

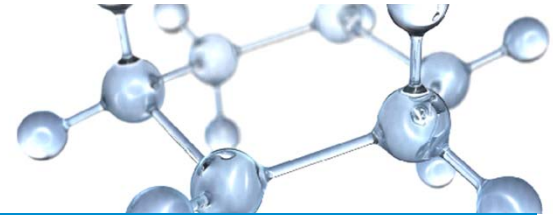


Source: Smil, *Energy Transitions*; Maddison, *The World Economy: A Millennial Perspective*; ExxonMobil

IEA: oil in EU is declining but is key in transportation now and the future



Technology Transformation

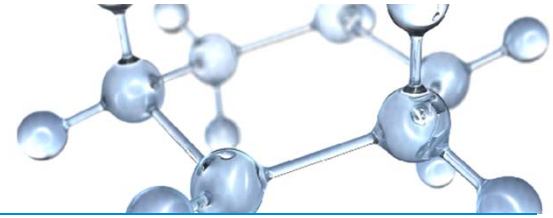


- **Growth and competitiveness:**

- Mobility is vital – policy choices should aim to achieve the greatest amount of CO₂ reductions for the lowest cost
- Energy technologies evolve over time
- Technology transitions are only sustainable if they are cost-effective
- Currently, high density liquid fuels such as oil are the best fuel source for transport, and will remain a vital contributor until other solutions become widely available and competitive

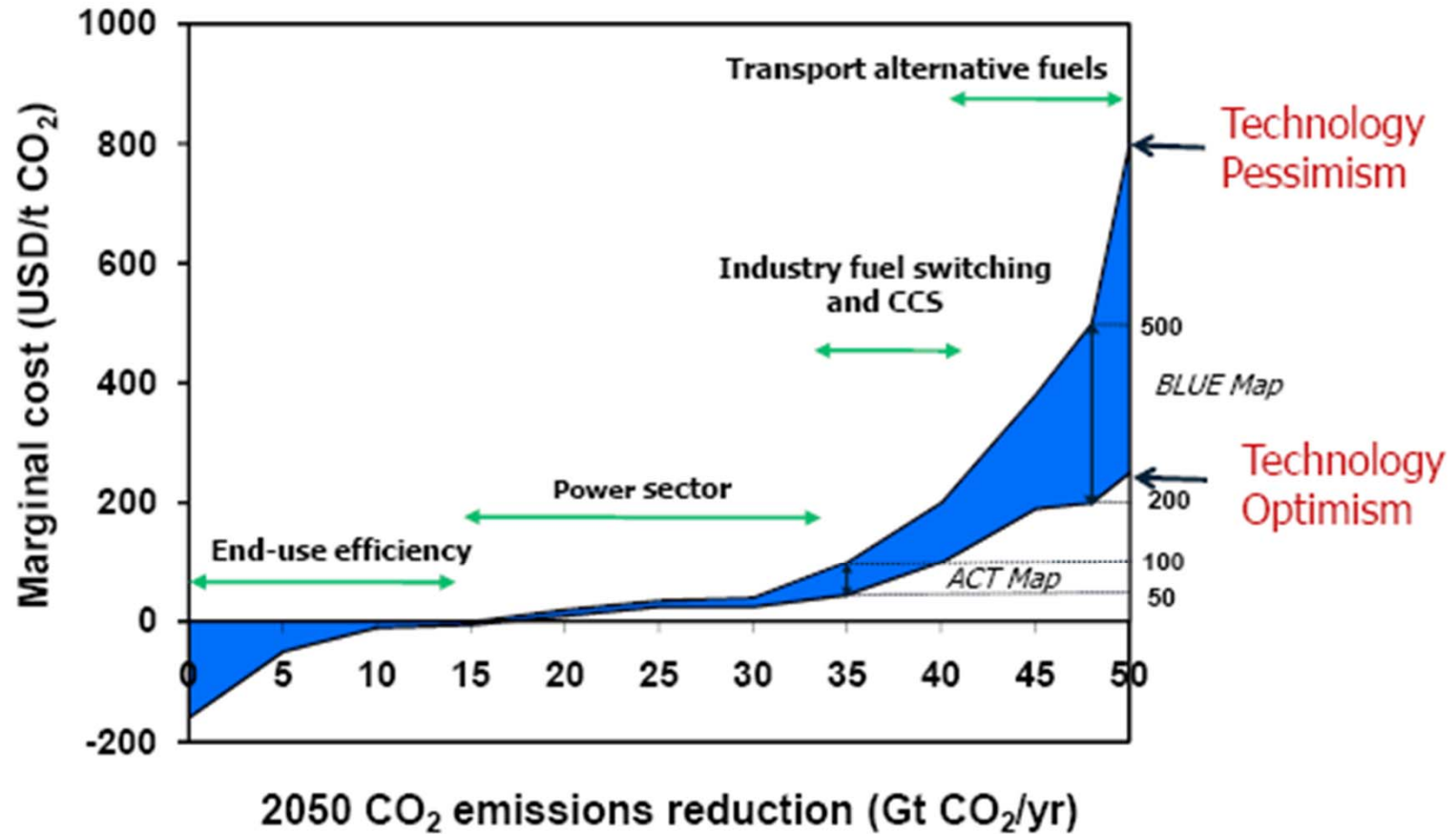
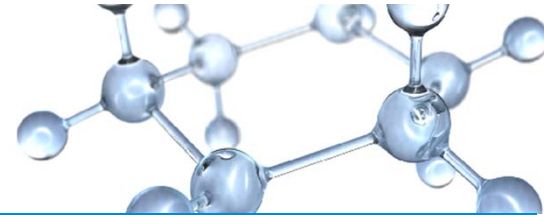
Policy recommendations:

- Evaluate new technologies on cost effectiveness (€/tCO₂) and full CO₂ life cycle
- Set an economy-wide, transparent CO₂ cost mechanism that provides a price signal to shape business investments and consumer decisions
- Assess competitiveness at both macro and micro levels across sectors and geographies



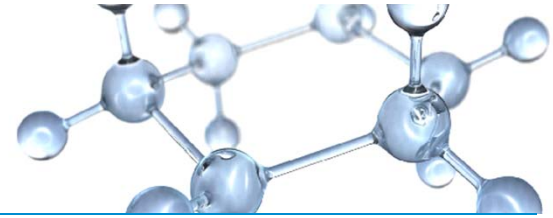
TRADE-OFFS

CO2 Abatement Cost Comparisons



Source: IEA, Energy Technology Perspectives

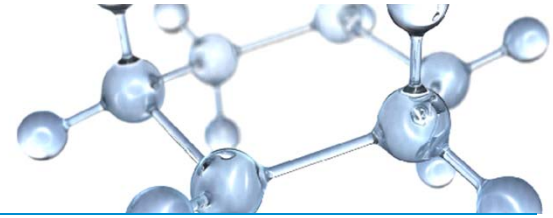
Trade-offs



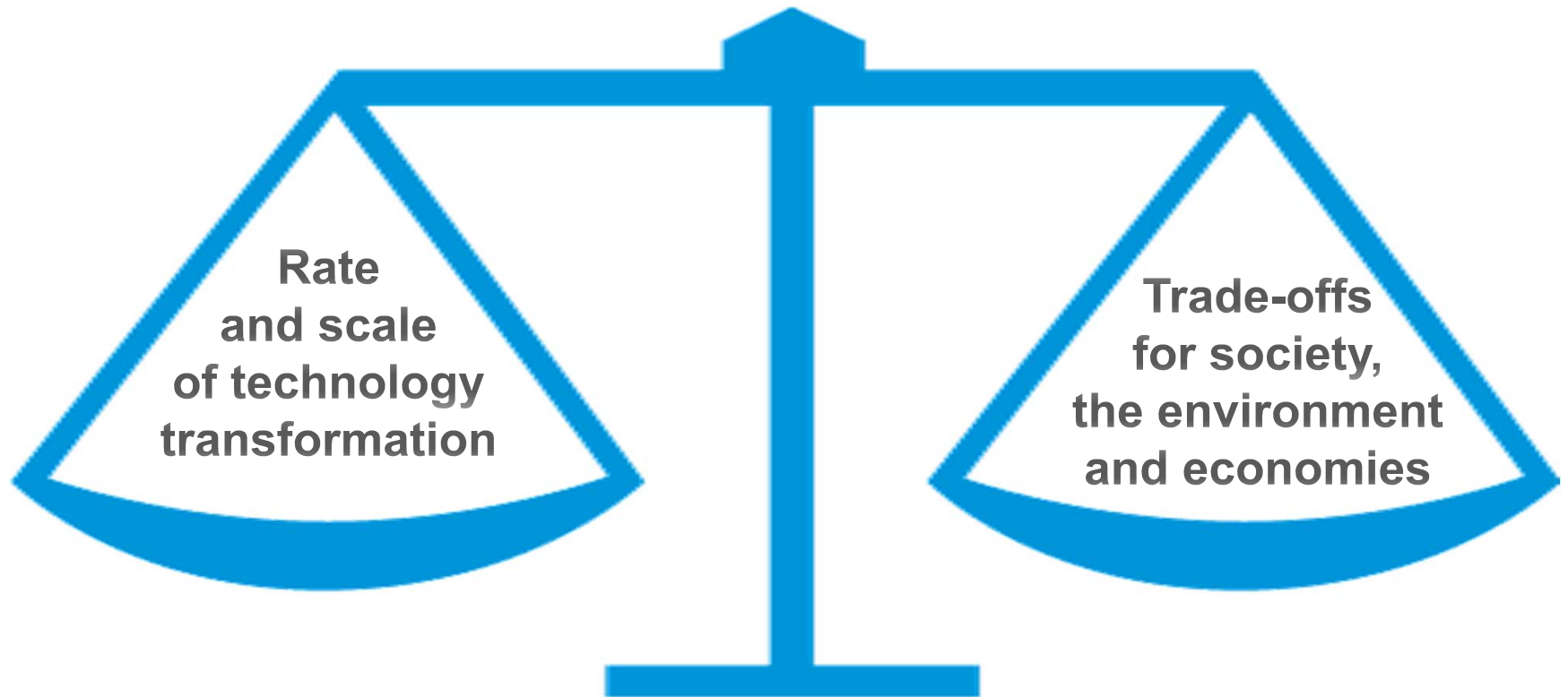
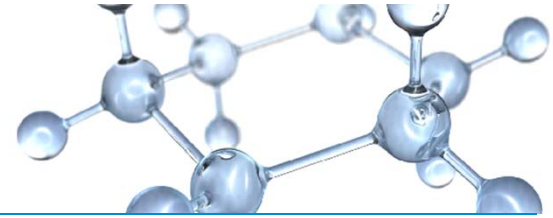
- **Jobs:**
 - Policy may create EU demand for certain technologies, but EU supply is uncertain
 - Balance between job creation and job destruction in existing industries at national, regional and local levels
- **Economy: Value chain implications:**
 - Uncertain supply of feedstocks and intermediates to the chemicals sector
- **Tax revenues:**
 - Fuels taxes amount to an average 10% of taxation revenues for governments in Europe
- **Consumer acceptability:**
 - Consumers would face—and would need to accept—trade-offs in transport mode choices, refueling convenience, potential reduction in distance travelled and cost

Policy Recommendations:

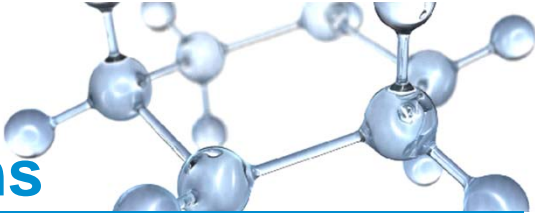
- **Apply a consistent energy tax directly proportional to a product's energy content**
- **Thoroughly evaluate trade-offs through real life impact assessments**



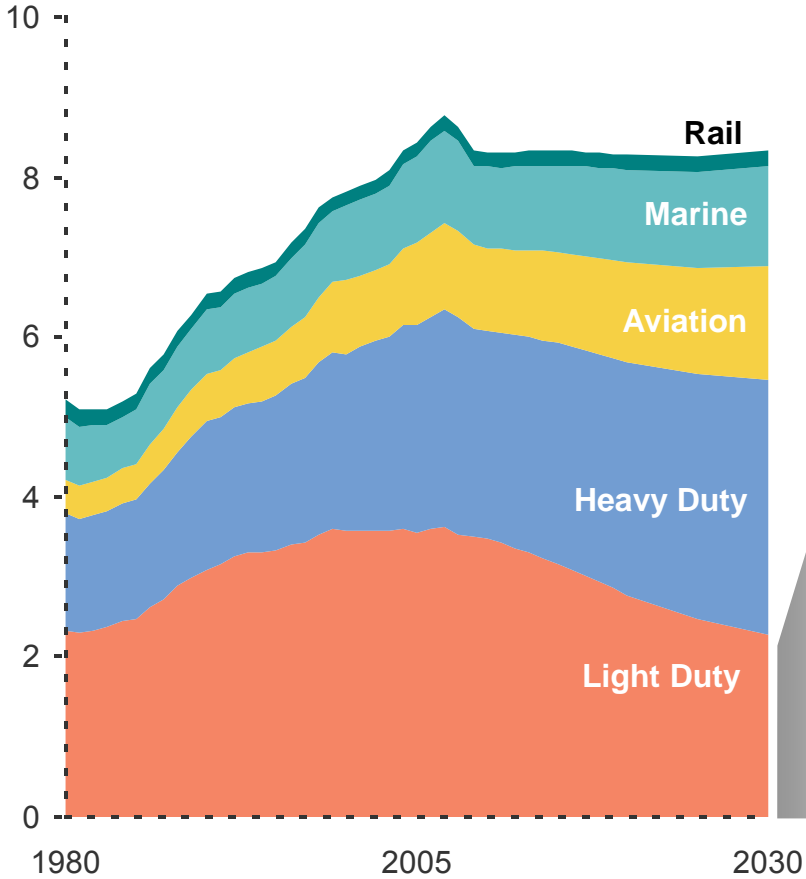
GOING FORWARD



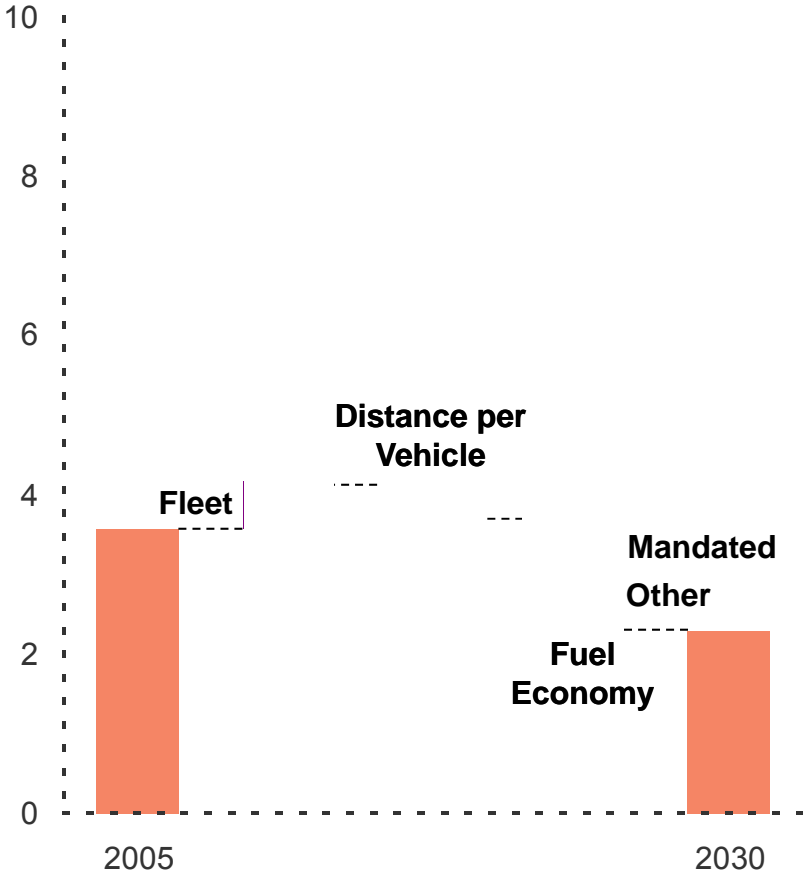
EU27 Transportation Demand Flattens



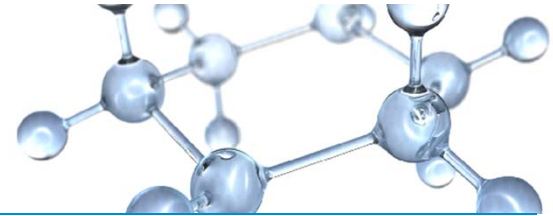
Demand
MBDOE



Demand Changes
MBDOE



Going Forward



- **Segmental Analysis:**
 - Every segment in transport—light and heavy duty vehicles, aviation, and marine— has unique characteristics and unique opportunities:
 - Energy demand may be on the decline or rise
 - There may be several technology alternatives or relatively few
 - Evaluating transport modalities on the basis of available technology options and costs will help prioritize EU CO₂ mitigation policies
- **Energy Efficiency:**
 - GHG reductions in transport are possible on a Well-to-Wheel basis using liquid fuels, advances in internal combustion engine technology and existing infrastructure, providing both utility and cost advantages

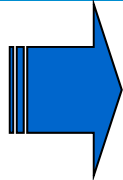
Policy Recommendations:

- **Avoid direct or indirect technology mandates**
- **Support innovative research whilst avoiding subsidies for existing technologies**
- **Give the direction without prescribing the path**

Expand supply: upstream technology



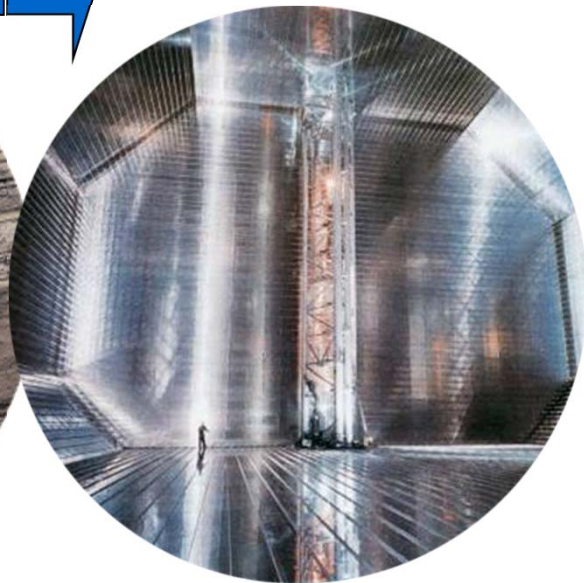
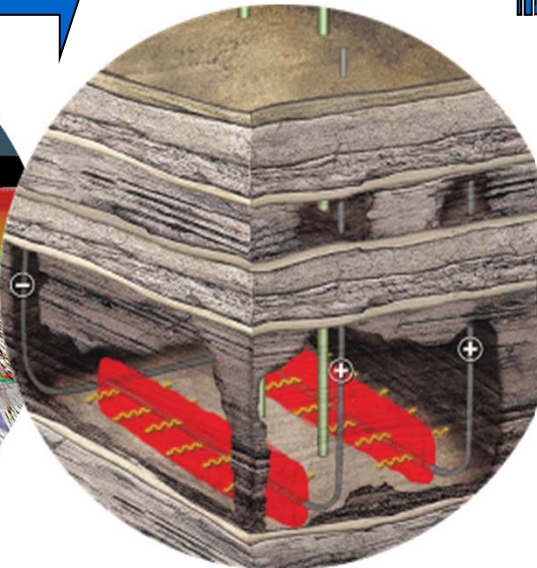
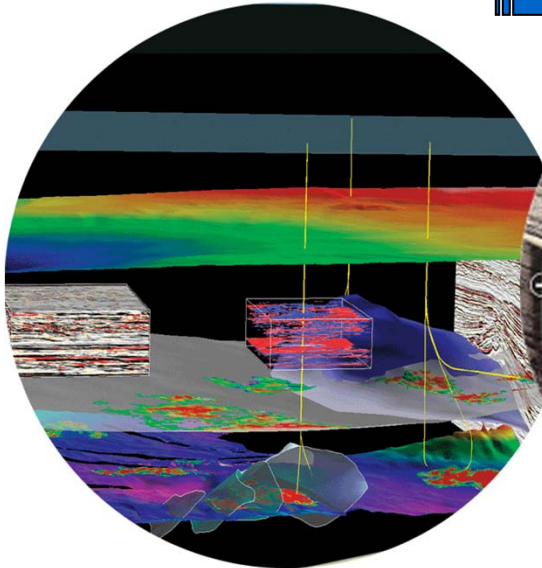
opportunities



evaluation



success



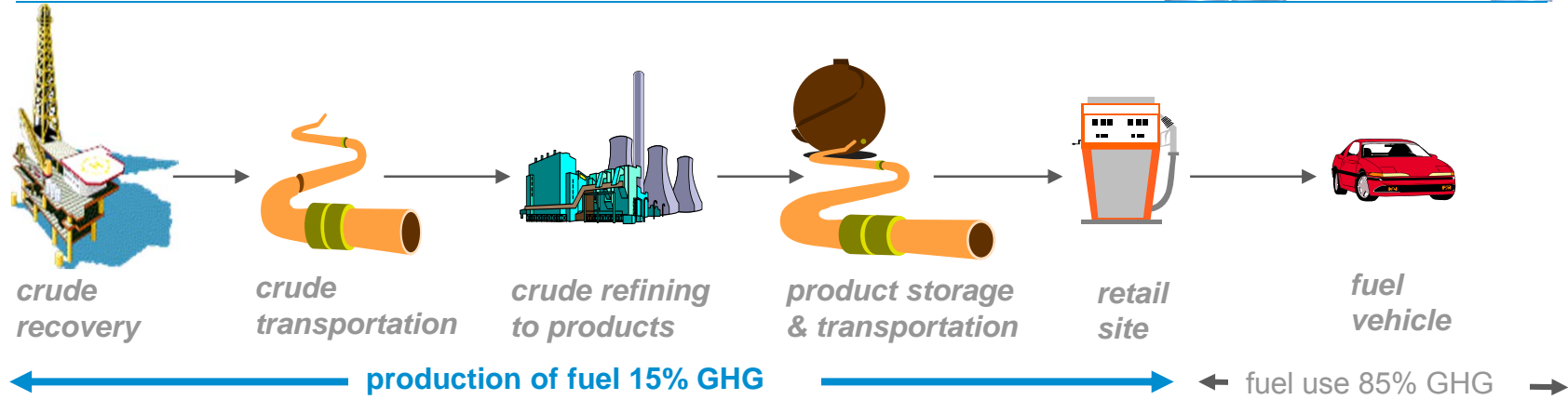
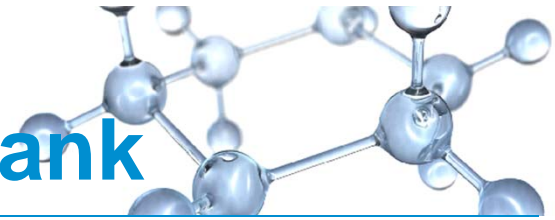
- Next-Generation Imaging
- Directional drilling
- Rapid Reservoir Performance Prediction

- Bitumen recovery
- Shale Oil Recovery
- Floating production storage, offloading vessel (FPSO)

- Unlocking Tight Gas (MZST)
- Large LNG Production
- Advanced Hydrocarbon Detection (R³MSM)

Breakthrough technologies help meet rising global energy demand and minimize environmental footprint

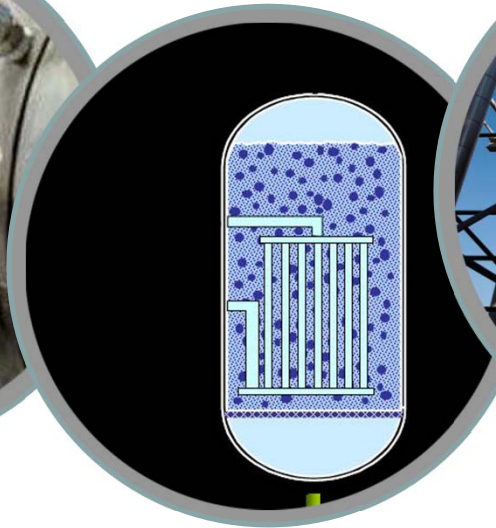
Increase efficiency well to tank



Cogeneration



X to Liquids

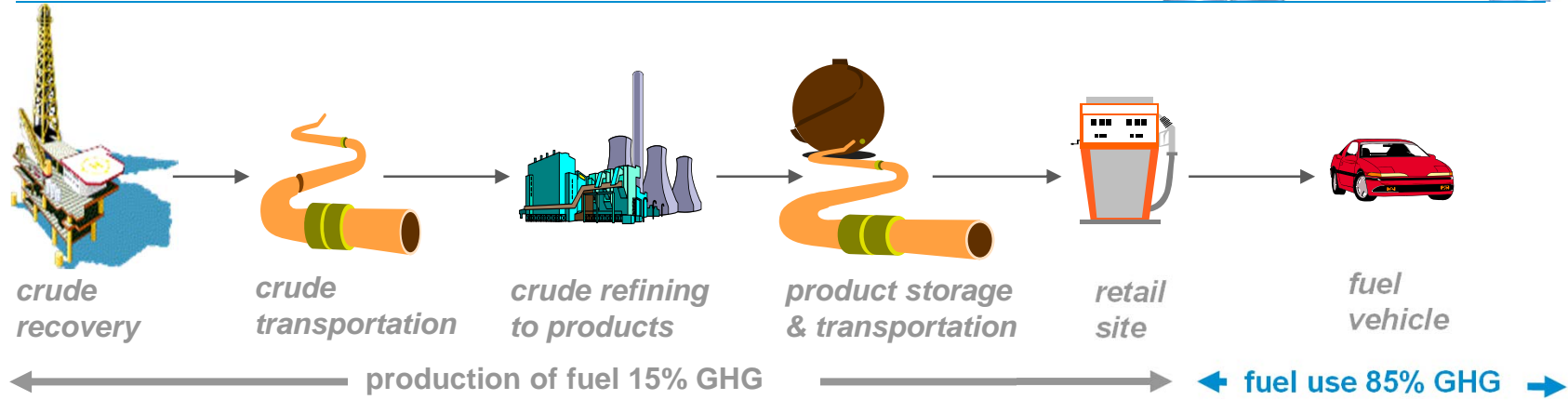
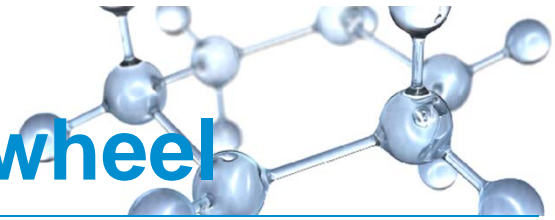


Gasifier

Carbon Sequestration



Increase efficiency tank to wheel



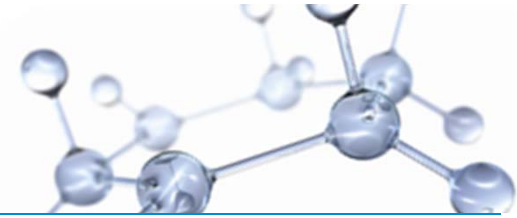
H₂
On board reforming

Electricity
Lithium battery films

Biofuels Algae

ICE improvement
Combustion fundamentals

Mobility, Sustainability, Competitiveness



Policies for an efficient transition to a lower carbon transportation system

- Cost effective and based on a full CO₂ life cycle analysis
- Economy-wide, transparent CO₂ cost mechanism
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