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petroleum  
industry



White Paper on EU Refining



A contribution of the refining industry to the EU energy debate



EUROPIA White Paper on Fuelling  
EU Transport



A contribution from the EU refining industry to the debate  
on the future of transport



“Oil industry: current status and challenges”

Diário Económico & APETRO

Chris Beddoes, Lisboa, 27 May 2013

# Agenda



1. About CONCAWE & EUROPIA and downstream oil
2. The state of play in the refining industry
3. What will be the future role of oil in the EU?
4. Challenges faced by the EU Refining
5. What could be the future of Refining?
6. Conclusions and policy recommendations

# 1 – About CONCAWE & EUROPIA and downstream oil in the EU

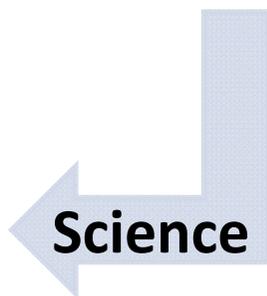


# CONCAWE ASSOCIATION NOW COMBINES EUROPIA AND CONCAWE ACTIVITIES UNDER A SINGLE DIRECTOR GENERAL

**CHRIS BEDDOES**

From 1st of January 2013, the two separate associations EUROPIA & CONCAWE have been administratively consolidated into a single AISBL (Association) under the name CONCAWE.

**This single AISBL will have two separate divisions which will each keep its specific and separate focus:**



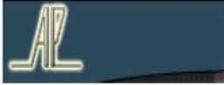
**CONCAWE**, basing on its 50 years old expertise, continuously:

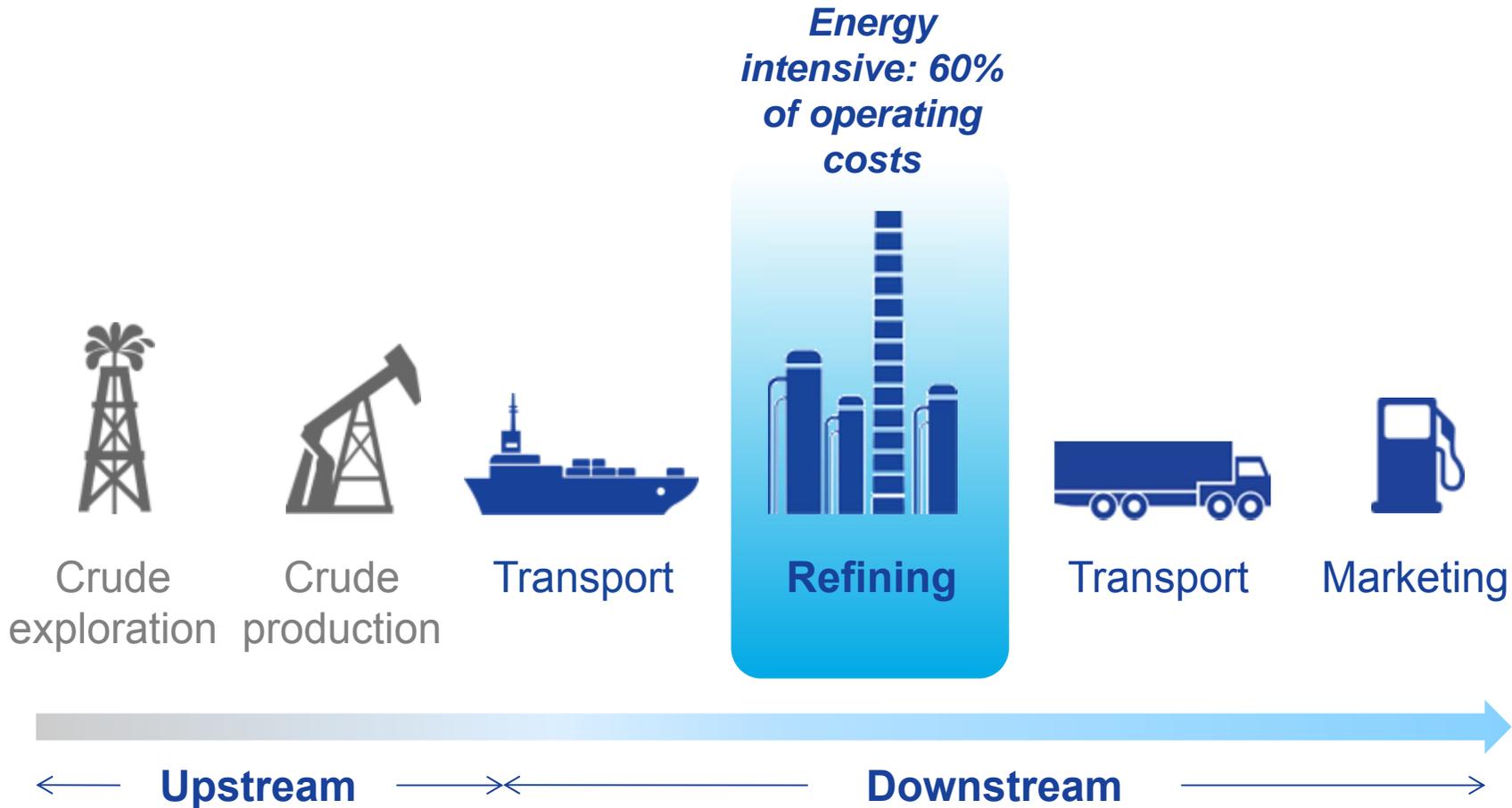
- endeavours to conduct its activities with objectivity and scientific integrity
- **carries out research on environmental, health and safety issues relevant to the oil industry**
- communicate the findings in order to improve understanding of these issues by all stakeholders (industry, the EU authorities, public at large)

**EUROPIA** representing the European Petroleum industry continuously:

- **contributes in a constructive and pro-active way to the development of EU policies** to safeguard the secure and sustainable manufacturing, supply and use of petroleum products
- provides competent input and expert advice to the EU Institutions, Member State Governments and the wider community.

# CONCAWE/EUROPIA Member Companies represent ≈ 100% of EU Refining

	<b>APC</b>				
	<b>ESSAR</b>	<b>ExxonMobil</b>	 galp energia		
	<b>INEOS</b>	<b>IPLOM</b>			<b>LOTOS</b>
<b>LUKOIL</b>	lyondellbasell				<b>NESTE OIL</b>
<b>NYNAS</b>					<b>RAFFINERIE HEIDE</b>
					<b>S.R.D.</b>
 Statoil			 5		<b>VARO ENERGY</b>



**15% of energy in crude used getting to market: 85% used by consumer**



## 2 – EU refining: what does it contribute to the EU and what state is it in?

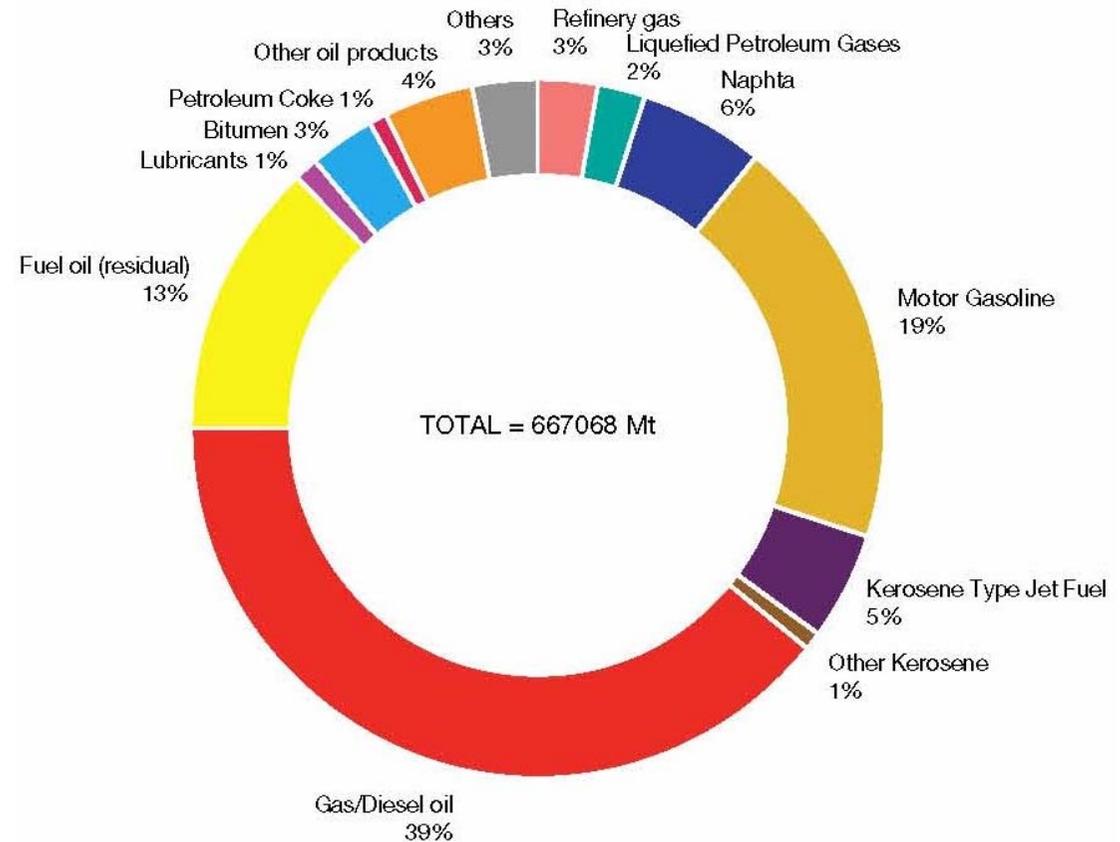
# EU Refining Industry contributes to EU mobility and economic value



Figure: Refinery output by product type

Refiners provide not just transport fuels (2/3rd of output) but also important value to the wider EU industrial chain.

Refineries are often found at the centre of regional business hubs.



Source: OECD



# A domestic refining industry has substantial economic benefits across EU and MS economy



A robust **domestic Refining industry underpins growth and competitiveness** in the EU.

Facilitating the mobility of EU citizens and goods is therefore playing an important role in EU growth



EU Refining is a **major provider of highly skilled jobs** and scientific and engineering expertise.

Providing employment for 140.000 people in refineries and 500.000 in marketing and logistics, and 778.000 in the petrochemical sector which represents €241 billion in annual sales.



Continually **innovating and introducing new technologies** in operations and products;

Investing on average **€5 billion a year in Refining**, R&D, transport and distribution

Setting worldwide standards for **fuels and engines** with the automotive industry.



**Major contributor to states revenues & EU economy: €270 billion/year duties & taxes** collected by the EU refining and distribution, and an estimated

**Gross value added (GVA) €18 billion/year** average 2008,9,10

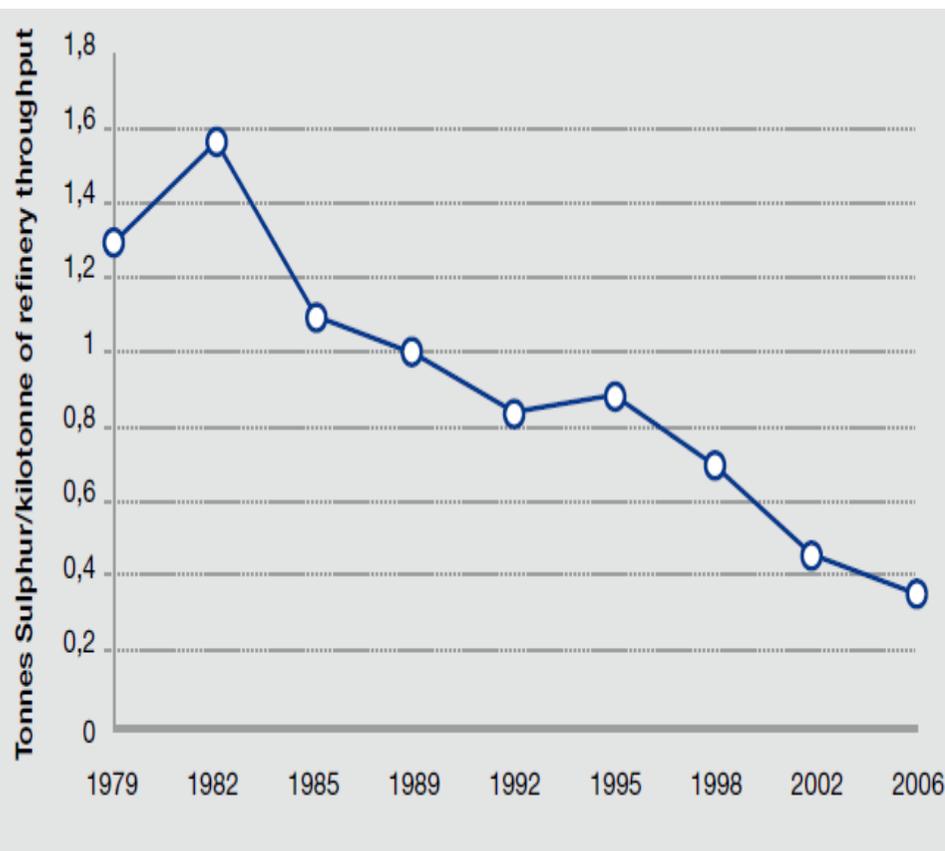


# And the industry has done a good job to improve air quality at refineries and with “cleaner” products



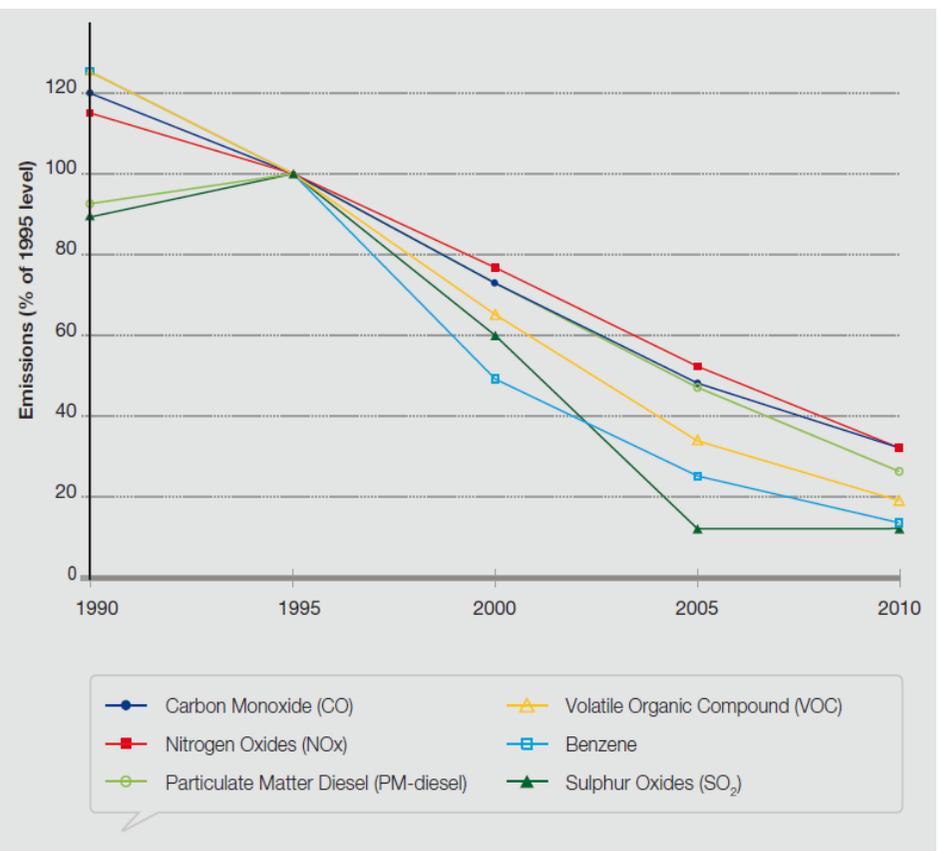
## SO<sub>2</sub> EMISSIONS IN RELATION TO REFINERY OUTPUT

Source: CONCAWE



## EMISSIONS REDUCTIONS OF MAIN POLLUTANTS FROM NEW CARS WITH REFERENCE TO 1995 LEVELS

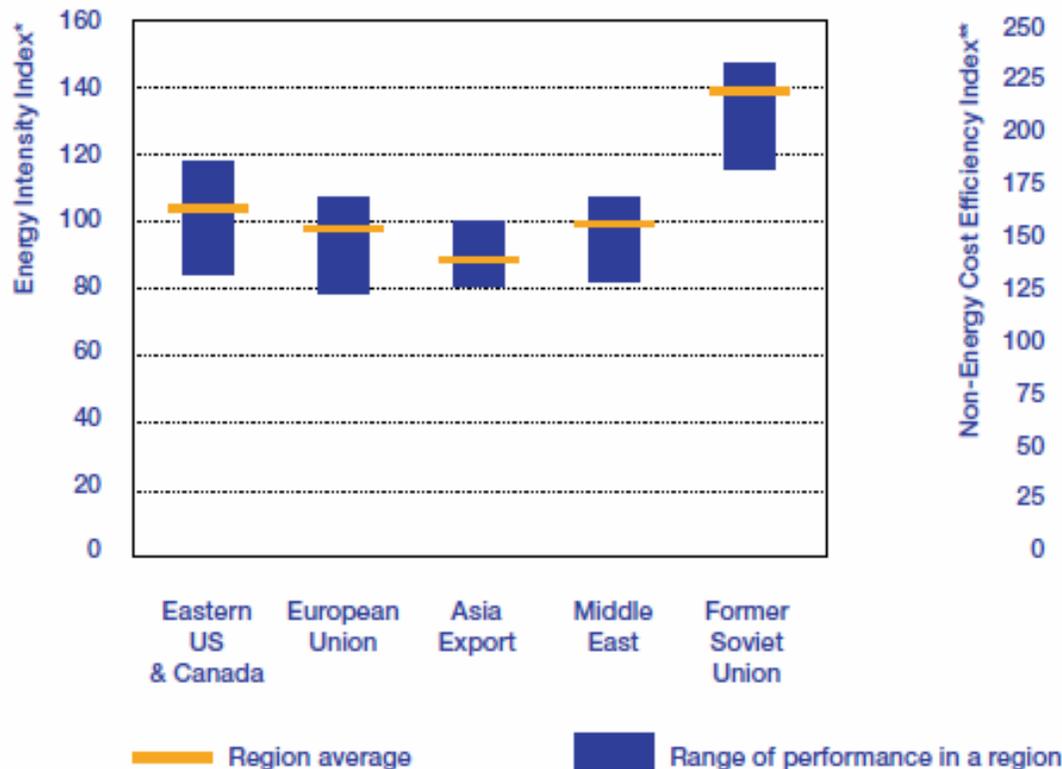
Source: CONCAWE



Although non-energy costs affect competitiveness of EU refining, it is amongst the most energy efficient in the world.....energy is 50%+ of cash cost

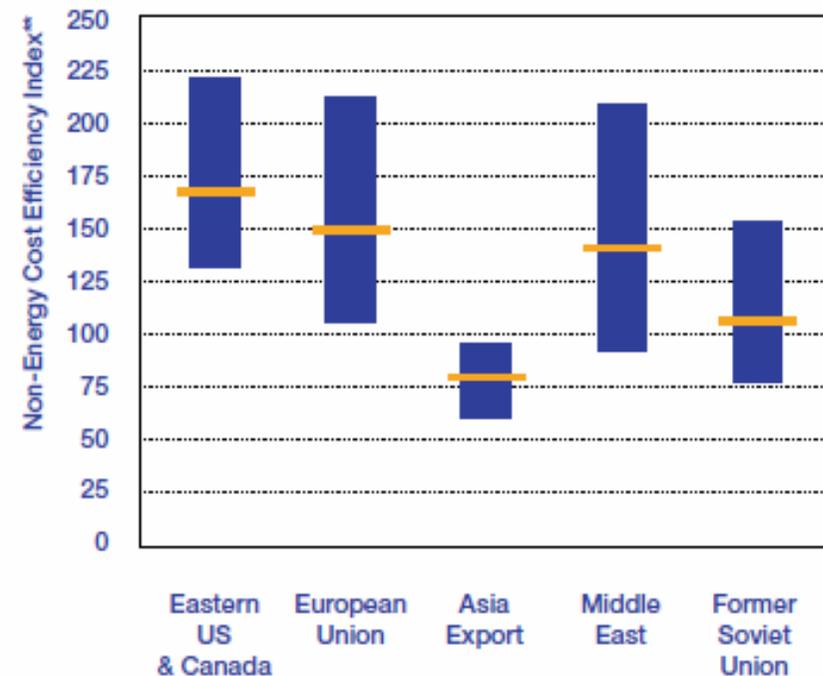


Figure 24: EU refineries are competitive in energy efficiency. The most energy efficient EU refineries are the best in the world.



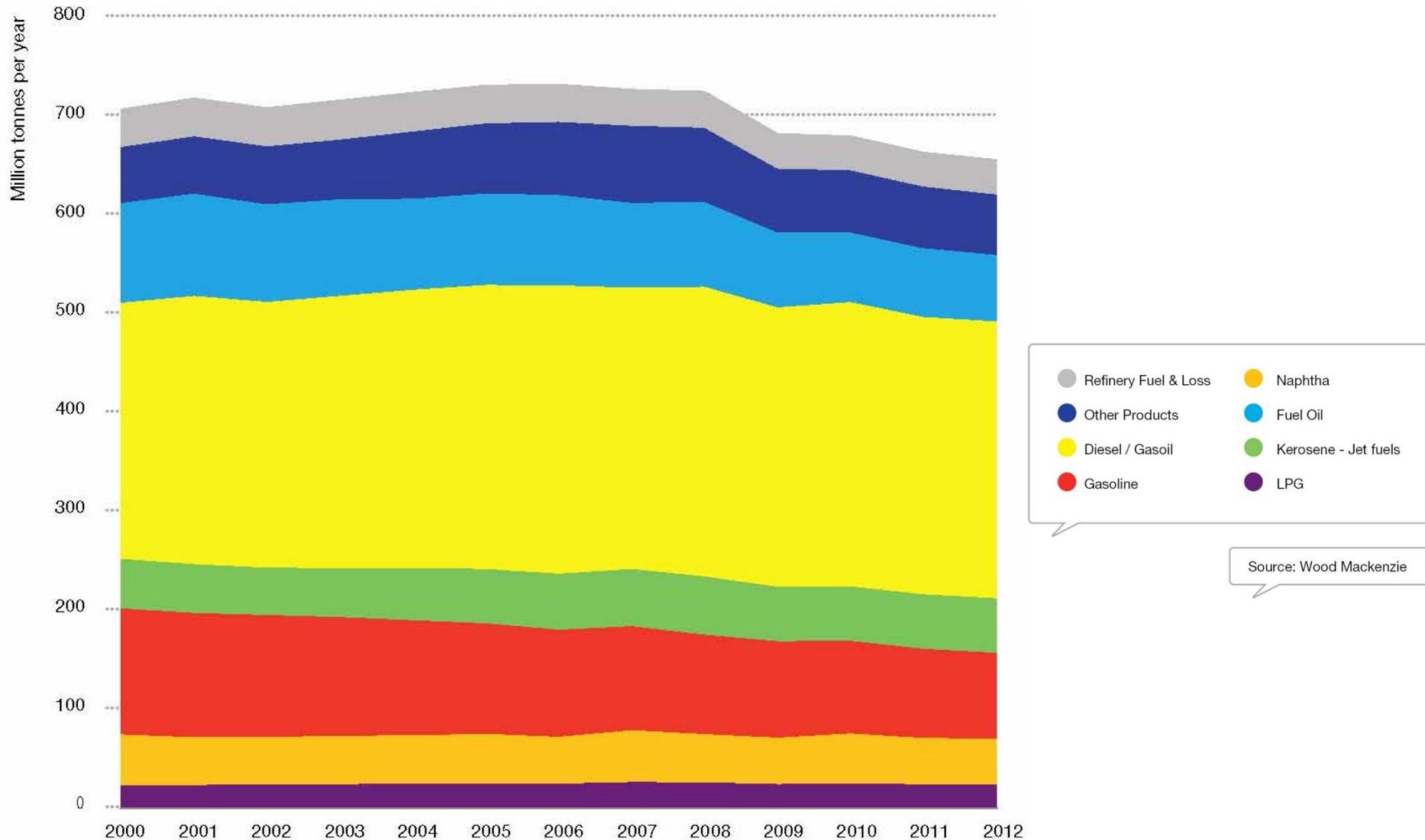
\* EII is an indicator of refinery energy efficiency. Low EII represents energy efficient refinery  
 \*\* NEI cash costs include all refinery operating costs excl. energy

Figure 25: Non-energy cash costs in European refining are higher than in most regions (especially vs. new Asian export refineries).



Sources: Solomon Associates Energy Intensity Index (EII),  
 Solomon Associates Non-energy Cost Efficiency Index (NEI)

# Demand for oil refined products has declined vastly between 2009 and 2012



Source: Wood Mackenzie



# We are seeing significant and fast evolution of EU Refining



- Out of 98 refineries operating in Europe in 2009, 87 remain today:
  - 11 have shutdown: UK, France, Germany, Italy and Romania.
  - 17 have changed ownership: UK, France, Germany, Netherlands, Sweden and Spain.
  - Petroplus bankruptcy resulted in 1 shutdown, 1 still refinery under threat and 3 sales.
    - **30% of EU refineries in 2 years**
  
- “Traditional” ownership of Refining is changing:
  - Withdrawal of majors: BP, Shell, ConocoPhillips, Chevron, ExxonMobil and Total have sold or shutdown capacity in EU in past 5 years.
  - New ownership with different business models: ESSAR (India conglomerate); PETROCHINA (largest oil/gas producer in China); Rosneft/Lukoil (Russian oil “majors”); Valero, ST1, Klesch, Gunvor (smaller independent refiners/traders).
  
- “Integrated” oil companies are detaching refining from upstream into new downstream only companies: Phillips 66 and Marathon
  - ⇒ Will these change the resources and financial strength of EU refining??

# So, certainly a tough situation in the EU.



- Yes, a crisis for each refinery facing closure, for every employee or contractor, for the owners and for the local community.
- But the industry – supply chain as a whole is still reliably and cost effectively supplying EU consumers for the moment.
- The questions is: how much further can capacity be allowed to decline before supply security and economic value are compromised and a more general “crisis” arrives?
- The Petroplus bankruptcy at start of 2012 has been the catalyst for concerns raised by EUROPIA and others to be examined more closely by DG ENERGY, Member States and MEPs.

# 3 – The role of oil and refining in the EU now and in the future?

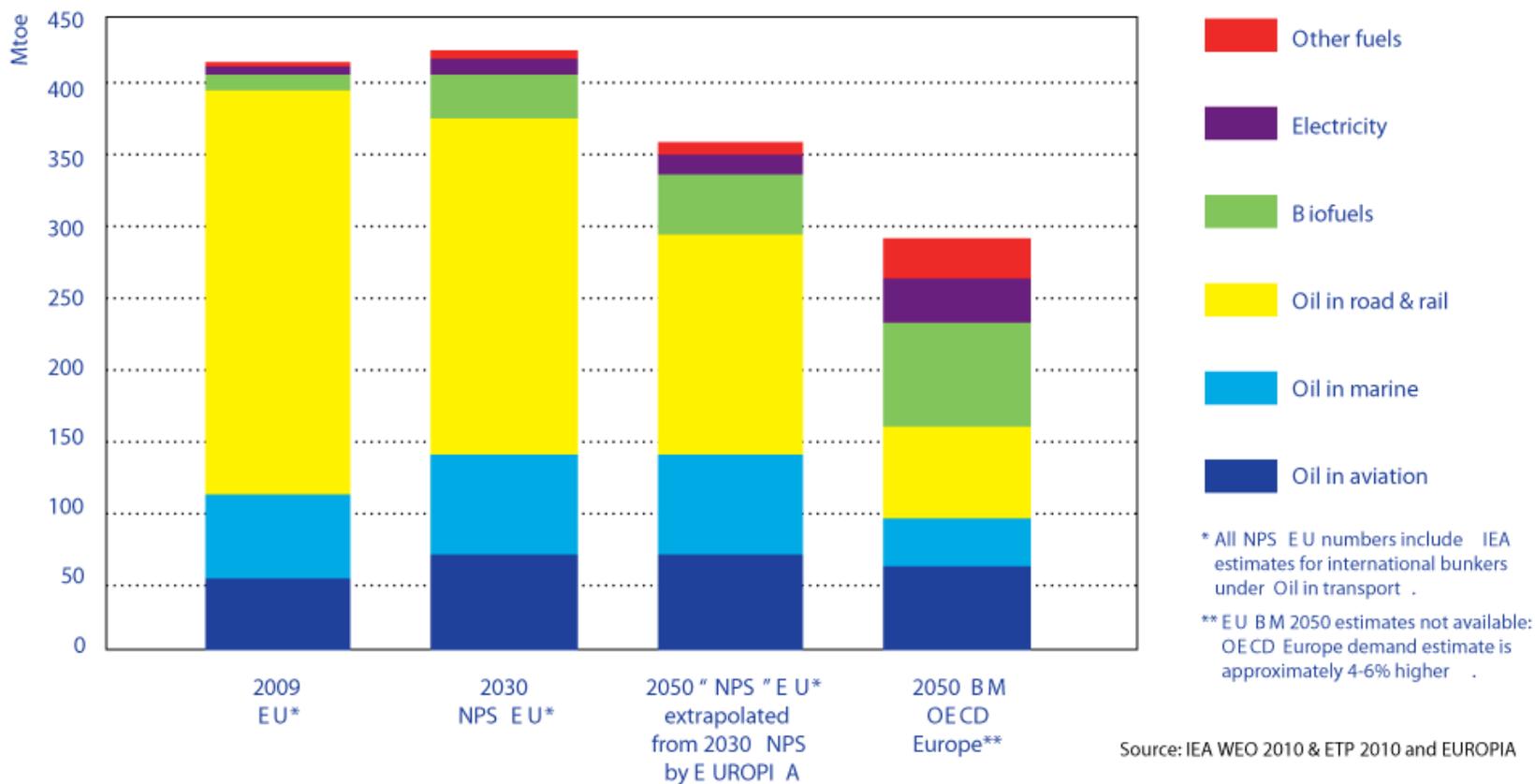
Replacing oil products is not technologically easy nor economically sustainable yet in our society .



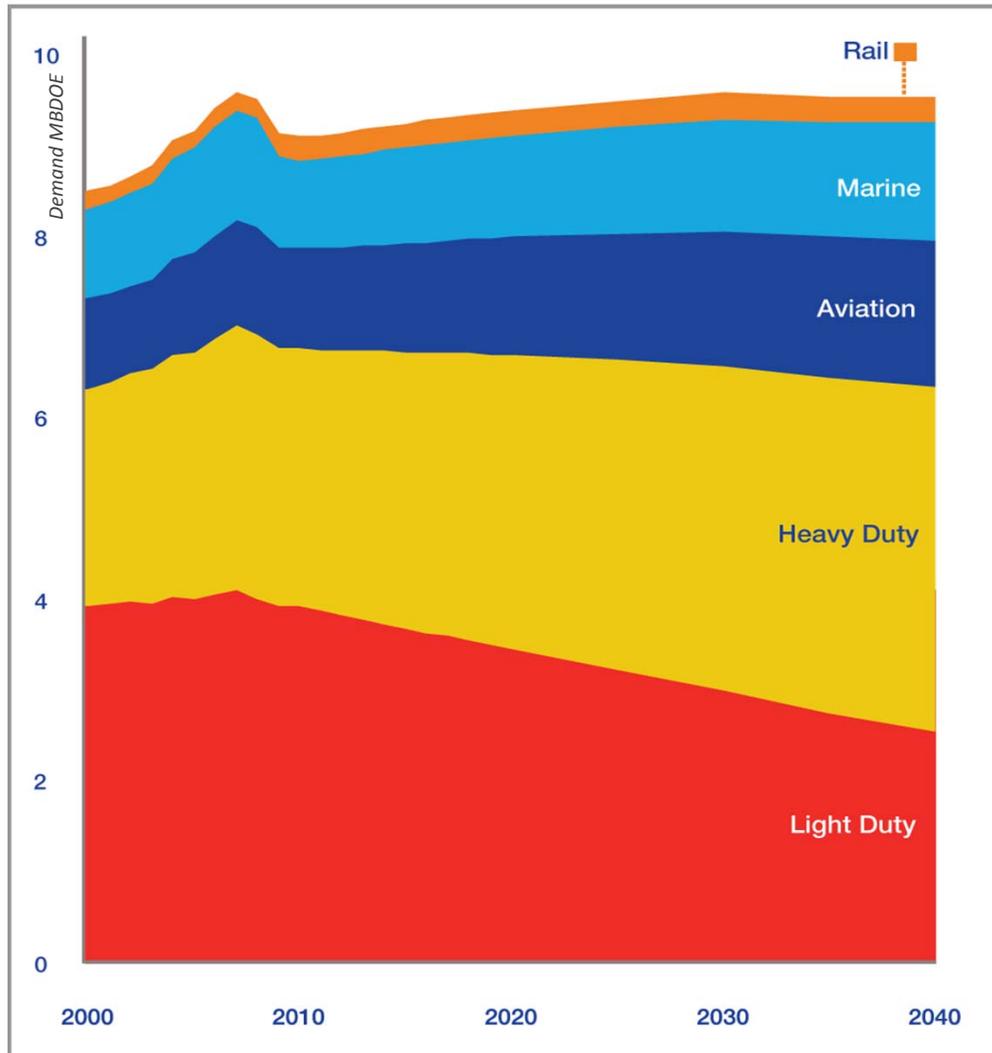
# Transport: Oil will remain the main energy source for transport in 2050 even in the most ambitious scenarios



Estimating the future transport energy mix in Europe gives different results depending upon the assumptions made **BUT >80% in 2030**



# Oil demand changes in Europe to 2040: *Light duty vehicle demand is the only part reducing*



-  **Marine: demand up by ≈ 35%**
-  **Aviation: demand up by ≈ 60%**
-  **Heavy duty vehicles: demand up by ≈ 50%**
-  **Light duty vehicles: demand down by ≈ 30%**

Technology: vehicle weight and engine efficiency, matched by evolving liquid fuels

Economics and effects of high taxation: ≈ 2/3 of pump price

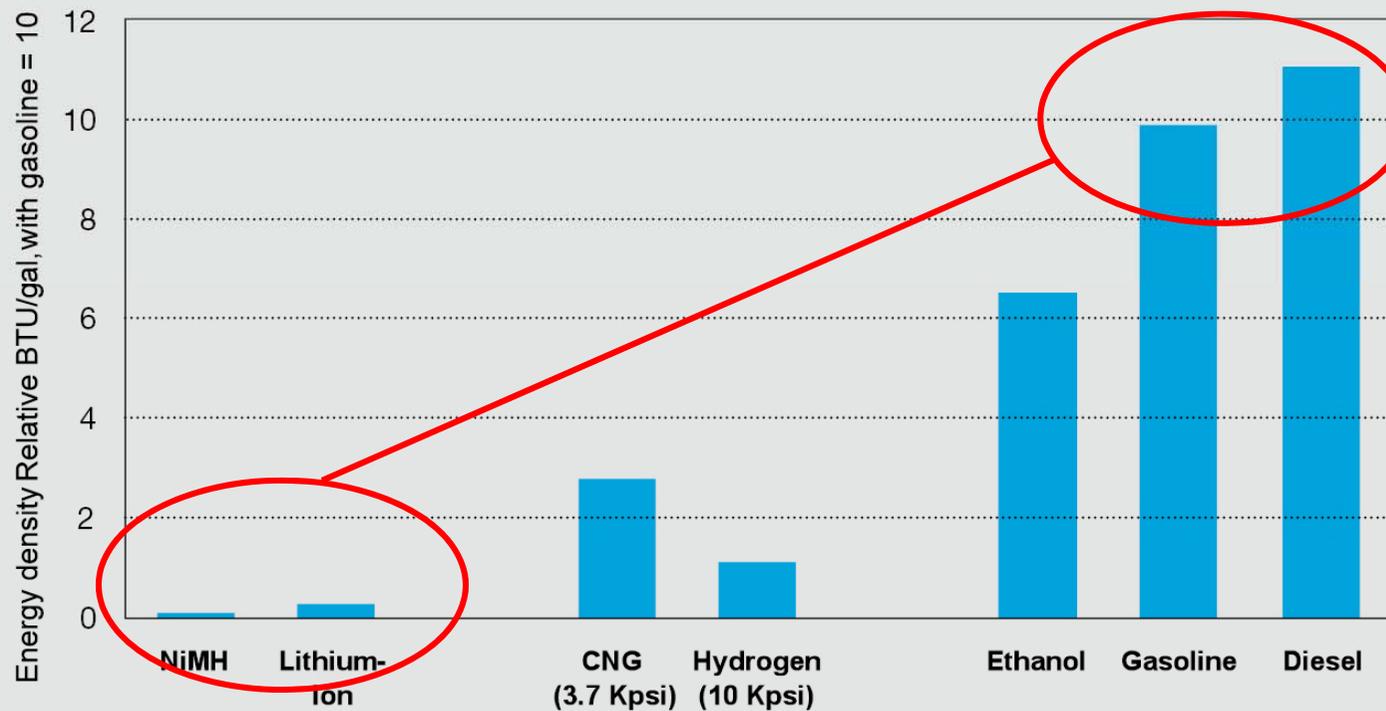
Fuel substitution when technology is sustainable

# There are physical constraints for the replacement of liquid fuels by other energy sources

## Liquid fuels are superior in their energy density

### LIQUID FUELS ARE SUPERIOR IN THEIR ENERGY DENSITY

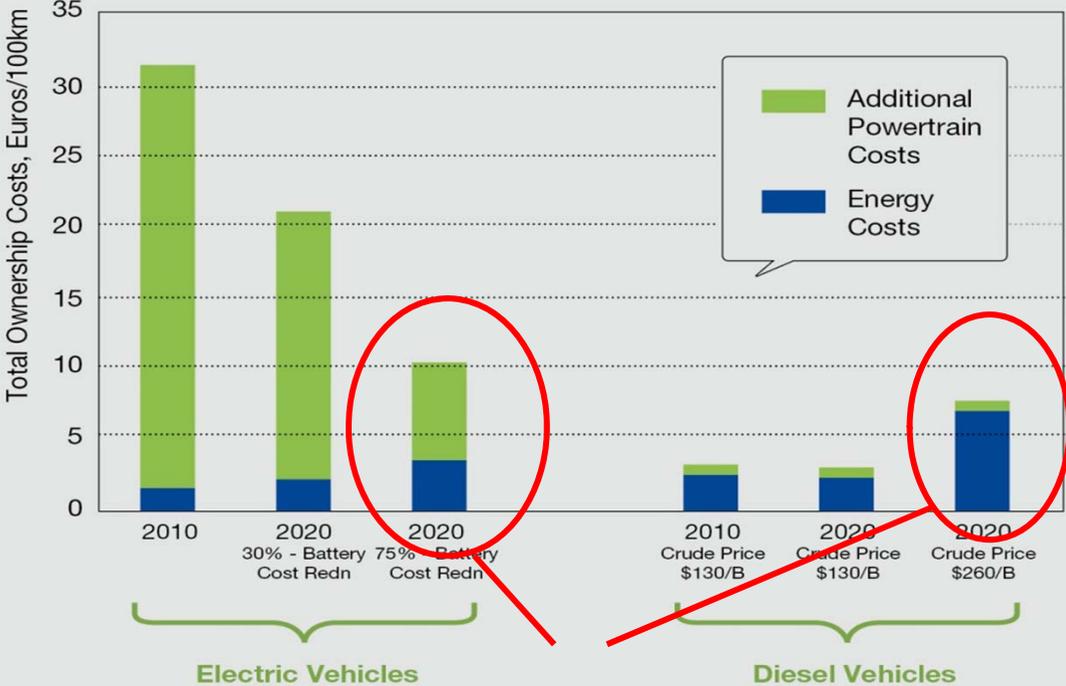
Source: ExxonMobil



# Economic constraints limit the rapid penetration of substitutes to fossil liquid fuels in transport

## COMPARISON OF "TOTAL COST OF OWNERSHIP" OF ELECTRIC VS DIESEL VEHICLES

Source: ExxonMobil analysis based on Bosch internal data



### ELECTRIC VEHICLES REMAIN MORE EXPENSIVE EVEN IF

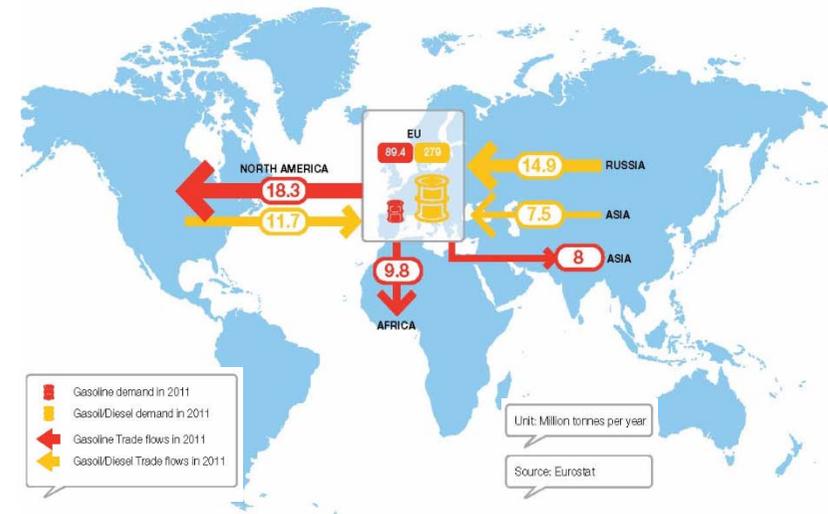
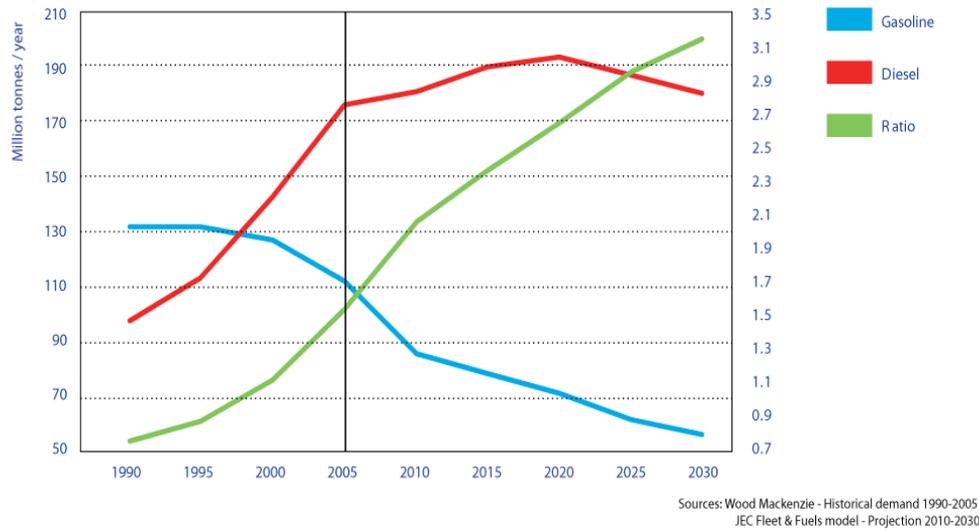
- crude prices rise beyond 260\$ per barrel and
- battery cost reduces by 75% and
- consumers accept shorter driving ranges

## 4. Challenges faced by the EU Refining industry

- Decreasing demand as we have seen
- Diesel/Gasoline imbalance
- New competitive pressures from other regions
- Impact of EU policies and legislation on EU refining

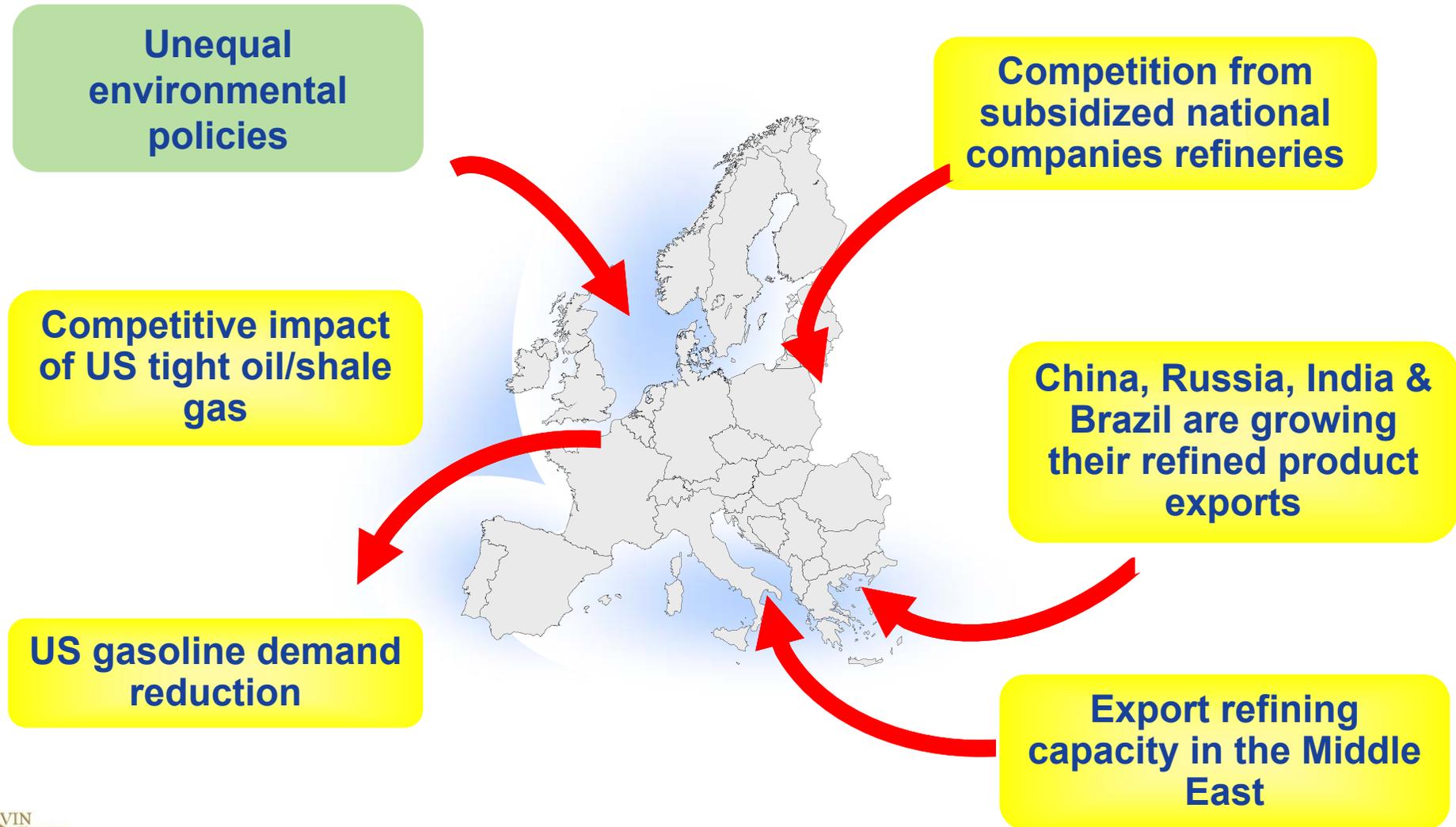
# Major mismatch between gasoline and diesel

The tax incentivized dieselisation trend which has contributed to a fundamental change in the EU demand structure, with gasoline demand declining and diesel demand rising.....looks set to continue.

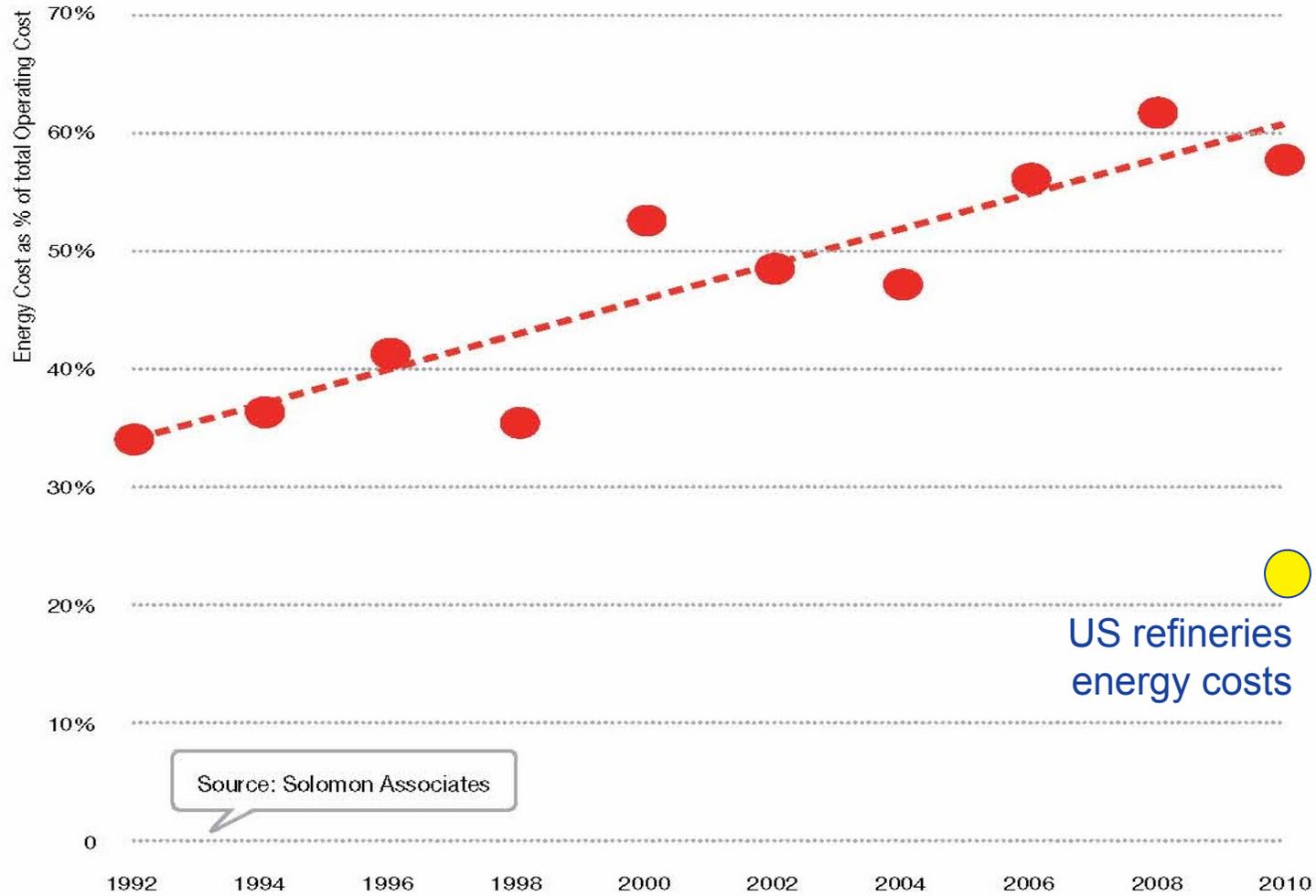


Structural trade : EU increasingly dependent on relatively limited global product supply sources (distillate) and demand outlets (gasoline).

# Changes outside Europe and EU policy and legislation add to the competitive pressure



# EU refining is facing increasing energy costs which impacts its competitiveness



EU refineries energy cost as percentage of total cash operating costs

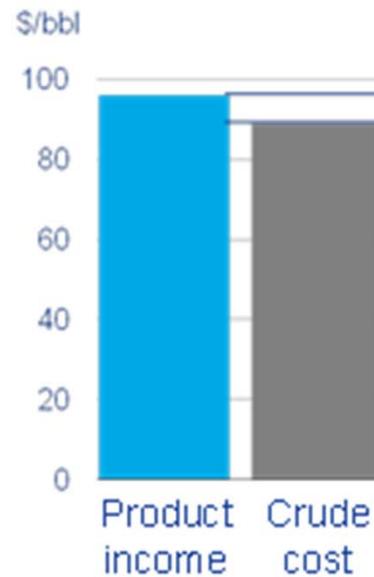
## Current and impending legislation is creating additional burden for EU Refining/downstream



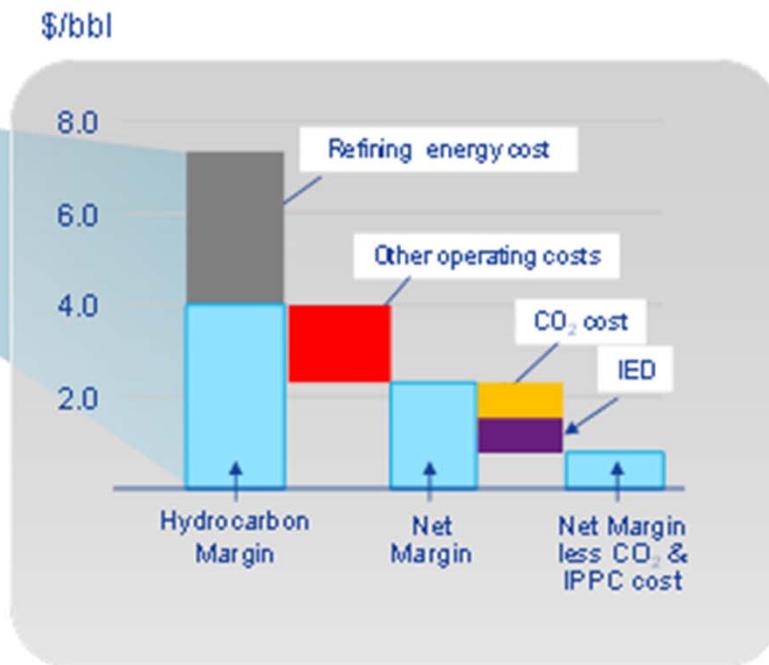
- **EU Emission Trading System:** refiners will buy 25% of their allowances;
- **Fuel Quality Directive Art 7A:** could limit EU access to many heavy crudes – very important to modern refineries such as in Iberia AND limit access to diesel produce from these crudes
- **Industrial Emissions Directive:** compulsory application of best practices could cost 10-30 G€ investment;
- **Sulphur in marine fuels Directive:** EU goes beyond IMO sulphur reductions by 2020;
- **Infrastructure mandates for alternative fuels:** draft proposals to force development of LNG, CNG, H<sub>2</sub> and electric refueling networks.

# EU legislation impacts directly EU refining costs and margins compared to other regions

**Crude cost and Income from Products**



**Refinery operating cost 2007**



Sources:  
- Prices: Platts  
- Typical refinery yield: CONCAWE

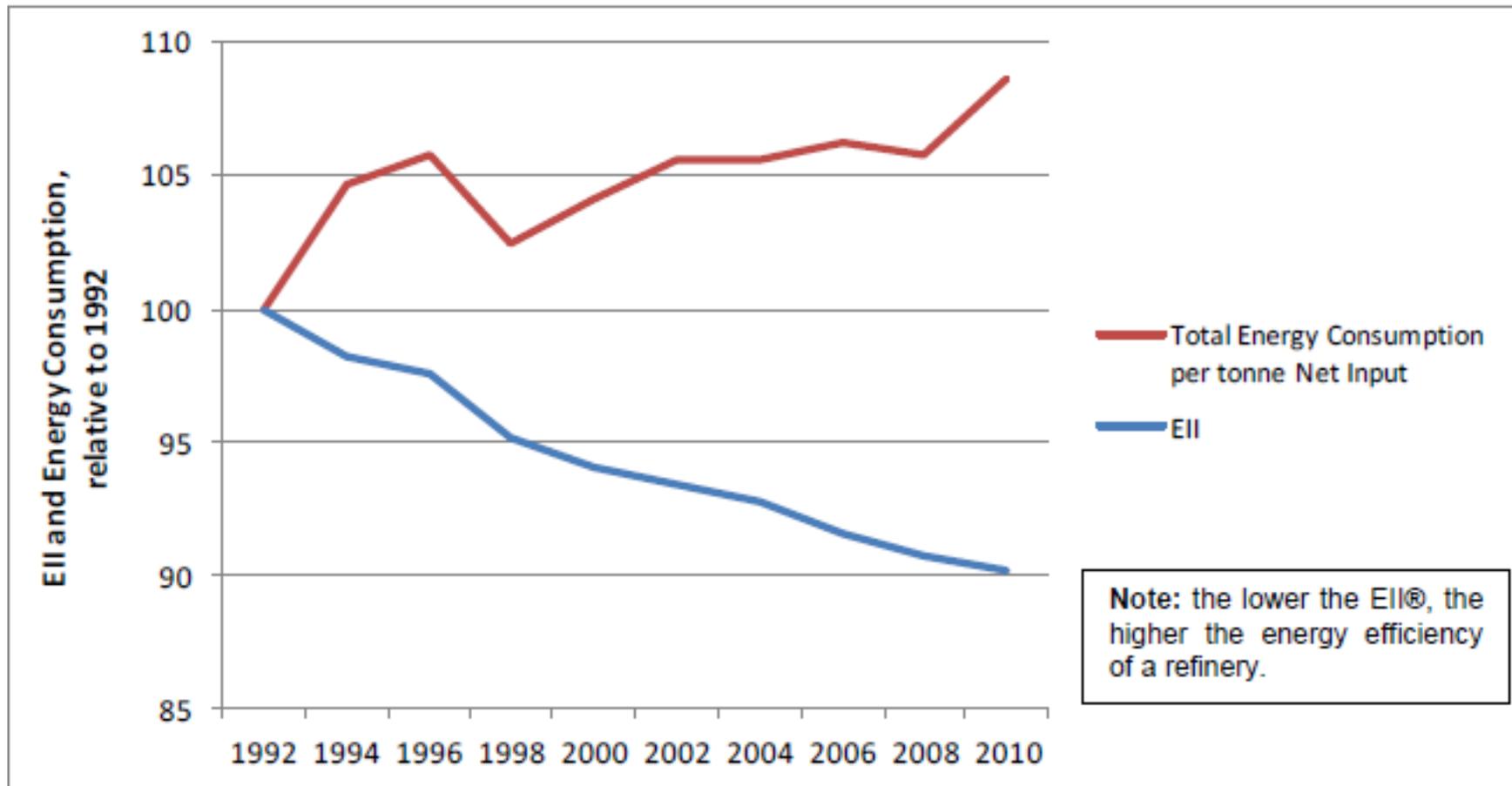
Sources:  
- Operating cost: CONCAWE



## 5. How could Refining evolve in EU?

To cope with shifting market demand and environmental legislation the EU refineries increased its complexity which led to increased energy usage

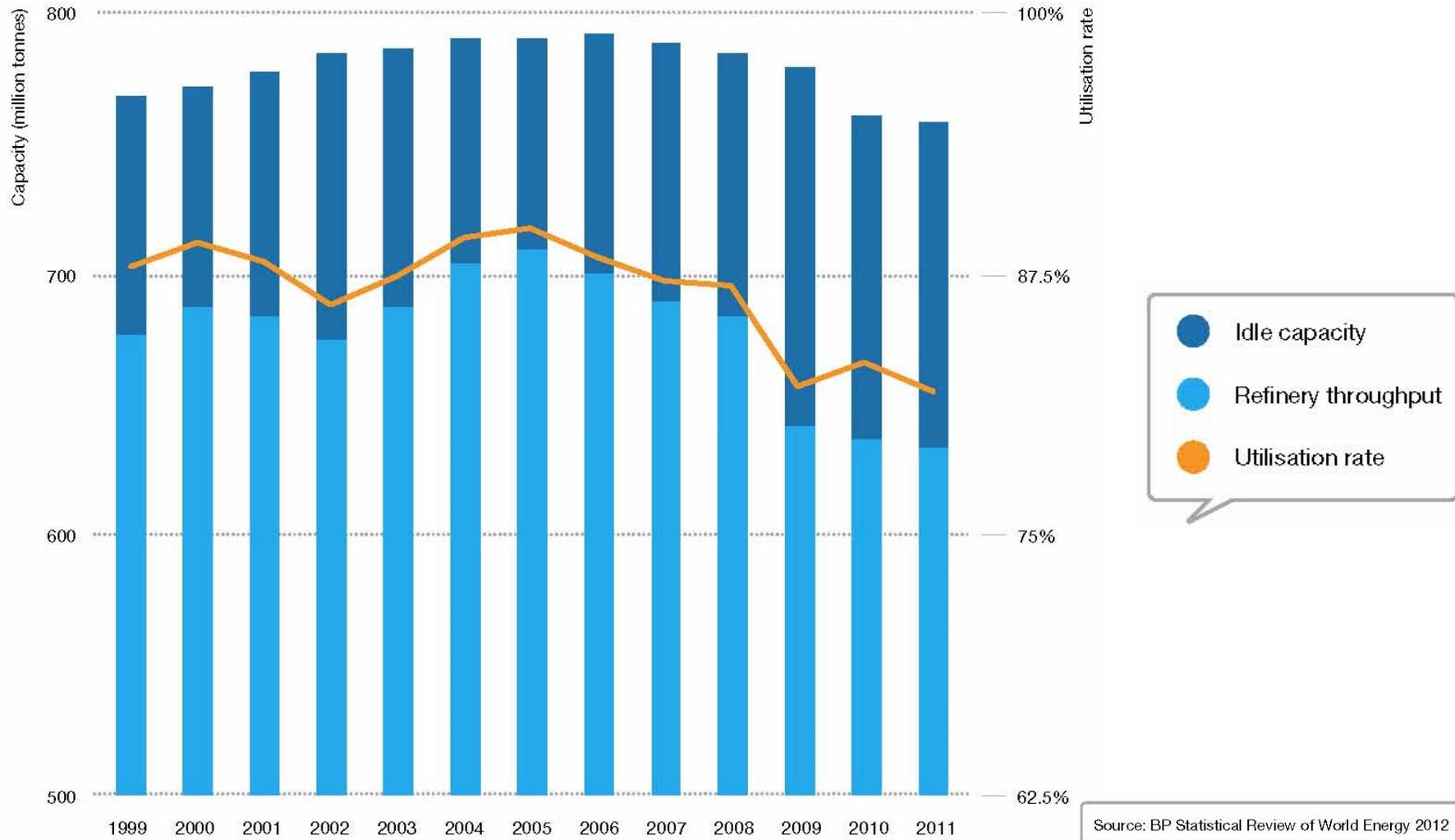
Figure: EU energy consumption and efficiency trends relative to 1992



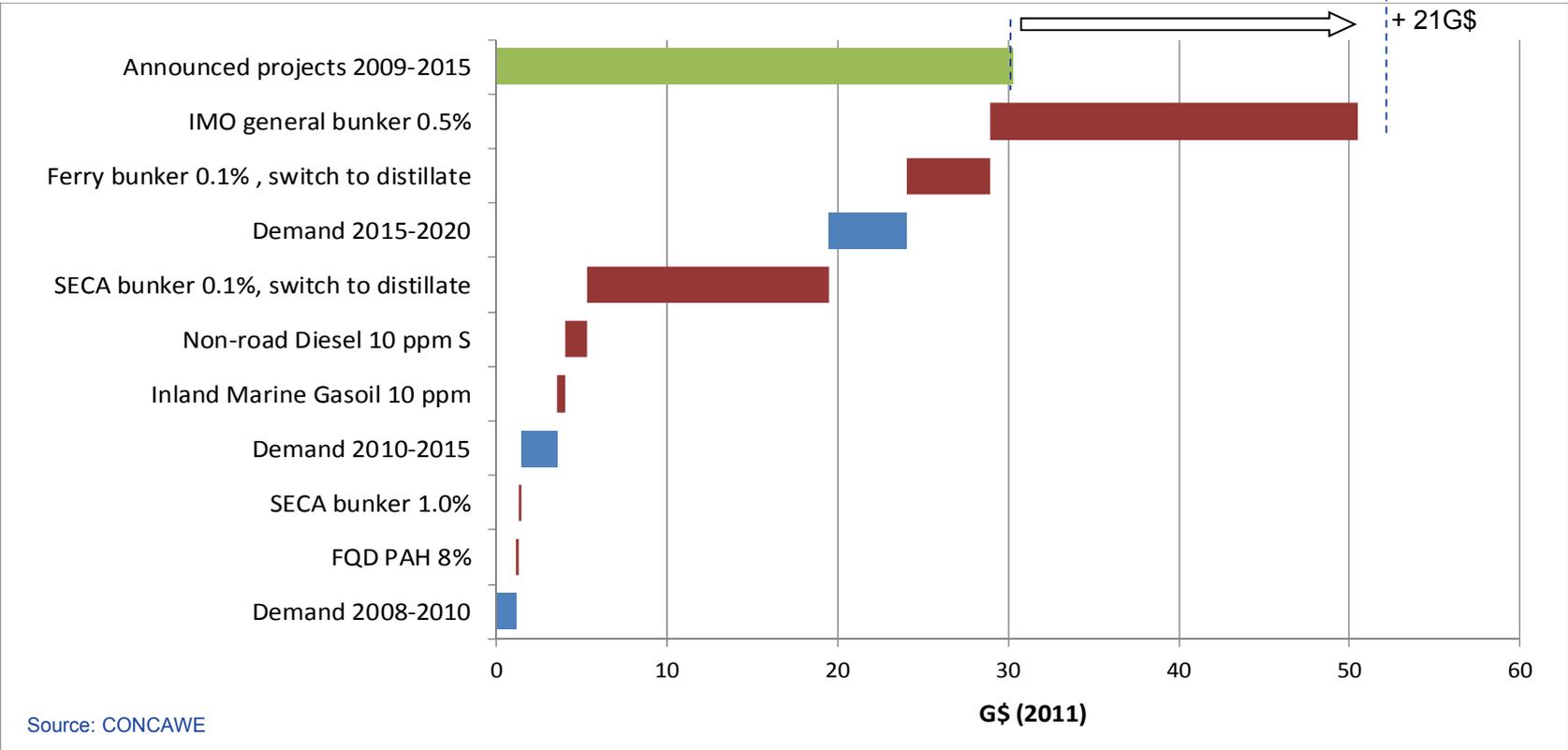
# EU refining capacity will likely adapt to EU demand decrease....but should it be pushed further?



Figure: Capacity and utilisation rate of European refineries



# Despite vast improvements in recent years the EU Refining faces further substantial investment requirements



- ▶ Additional 21 G\$ of investment required above the estimated 30 G\$ for announced investment projects by 2020= 51 G\$
- ▶ 51 G\$ equates to about 1 \$<sub>2011</sub>/bbl of crude processed over the 2008-2020 period, compared to typical historic EU refining margins of 1-5 \$<sub>2011</sub>/bbl.
- ▶ **But, declining demand post-2020 would lead to under-utilisation of new-build capacity - doubt on investment decisions prior to 2020?**

Commission and Member States are also taking notice of EUROPIA and other voices on the risks to the refining sector in Europe and implications of its decline



Commission led RoundTable (May 2012) and Conference (Nov 2012) on: “ The future of refining in the EU: safeguarding competitiveness” .

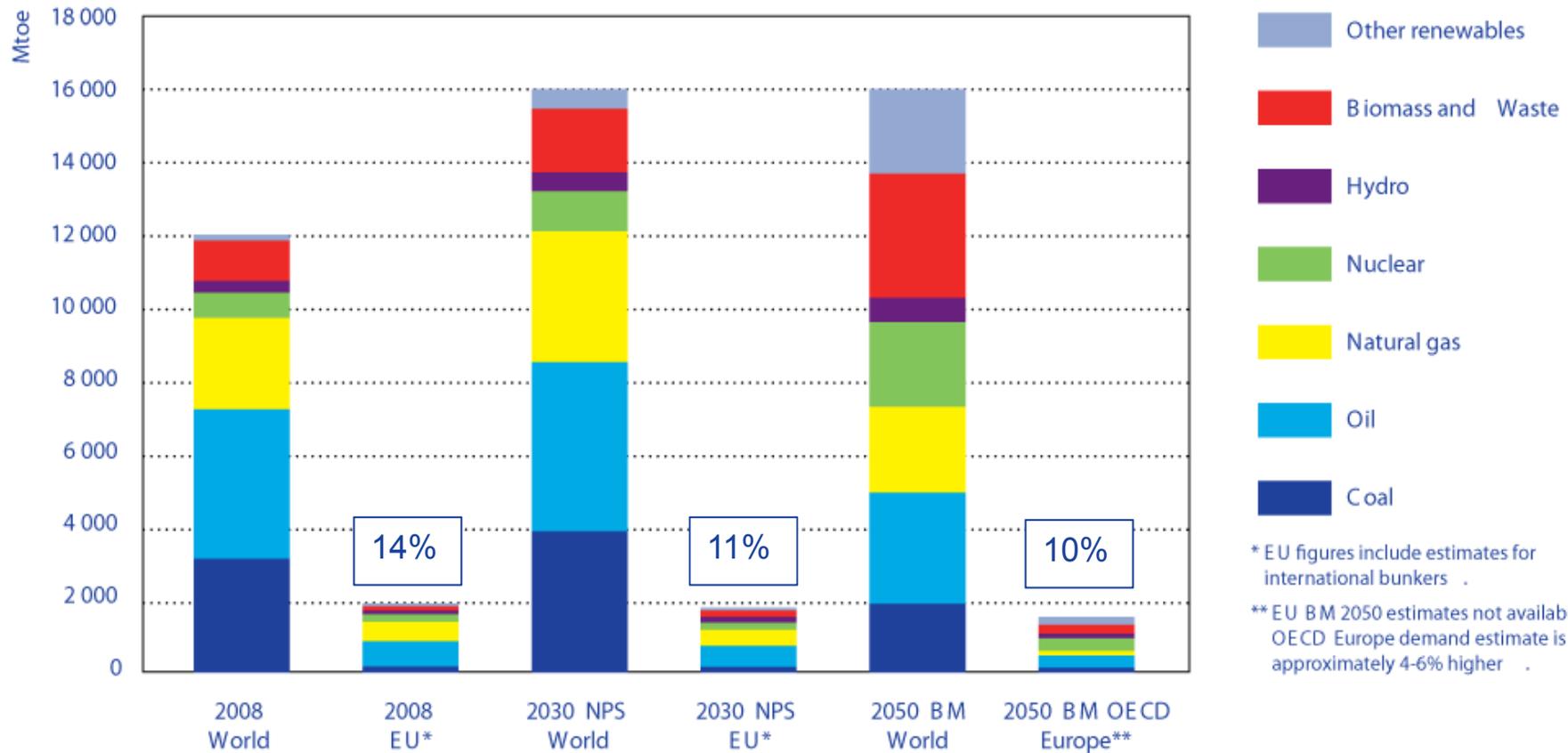
Commission Joint Research Centre: RoundTable on « Scientific support to EU Refining Capacity » Oct 2012

- **First Refining Forum on the 12th of April 2013**, to discuss state of refining in the EU with presence of Member States, Industry and other key stakeholders.
- **Fitness check** to examine the impacts on competitiveness of EU legislation on refining industry

IEA Special report on Unconventional oil and impact on Refining.

# 6. Conclusions and EUROPIA policy recommendations: Balance and realism

# Europe represents a decreasing proportion of the world energy demand - and emissions



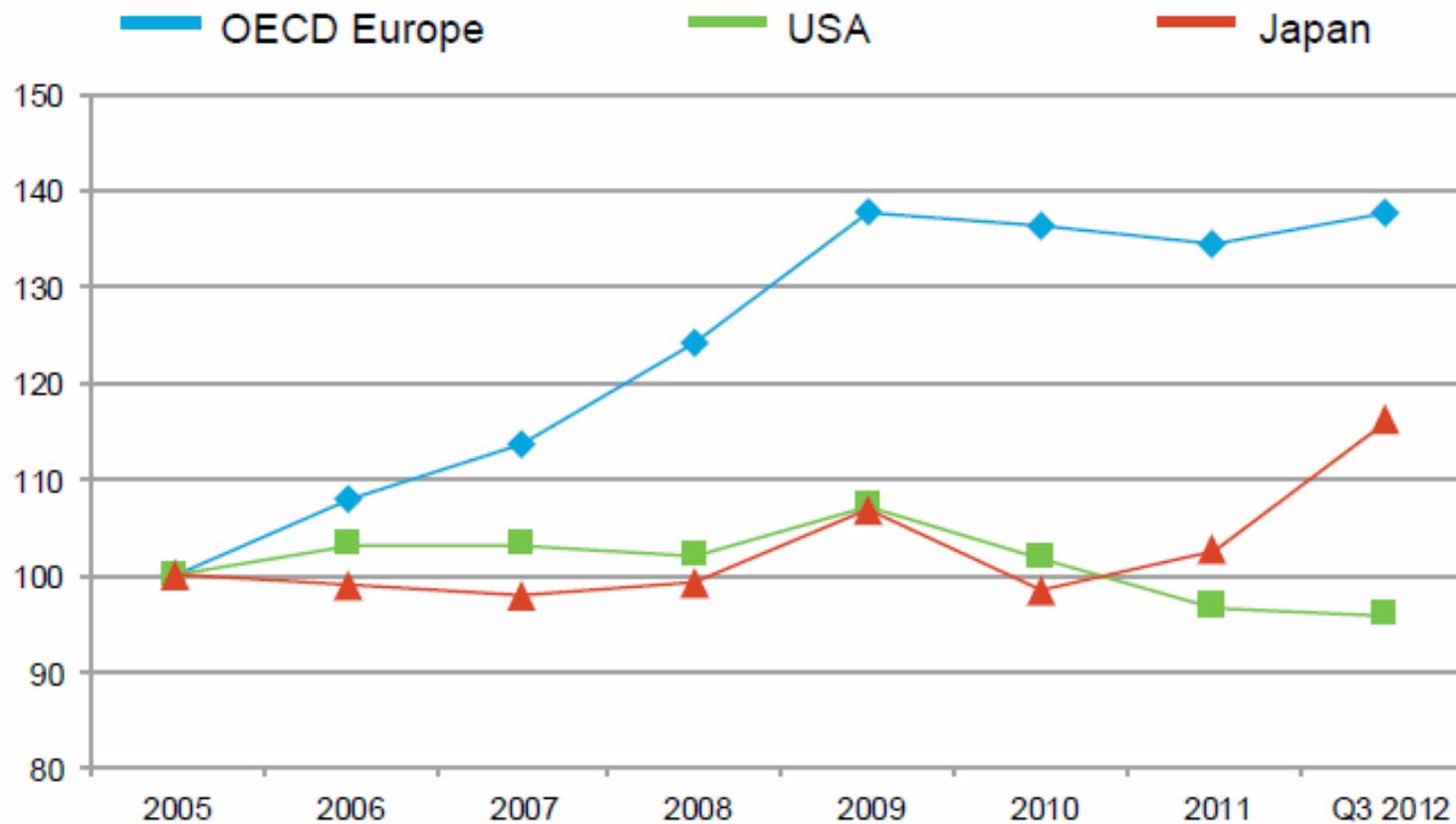
\* EU figures include estimates for international bunkers .  
 \*\* EU BM 2050 estimates not available: OECD Europe demand estimate is approximately 4-6% higher .

Source: IEA WEO 2010 & ETP 2010



# US industry in competitive advantage for energy over EU industry

**Evolution of end-user electricity prices for industry, taxes excluded (2005 = index 100)**

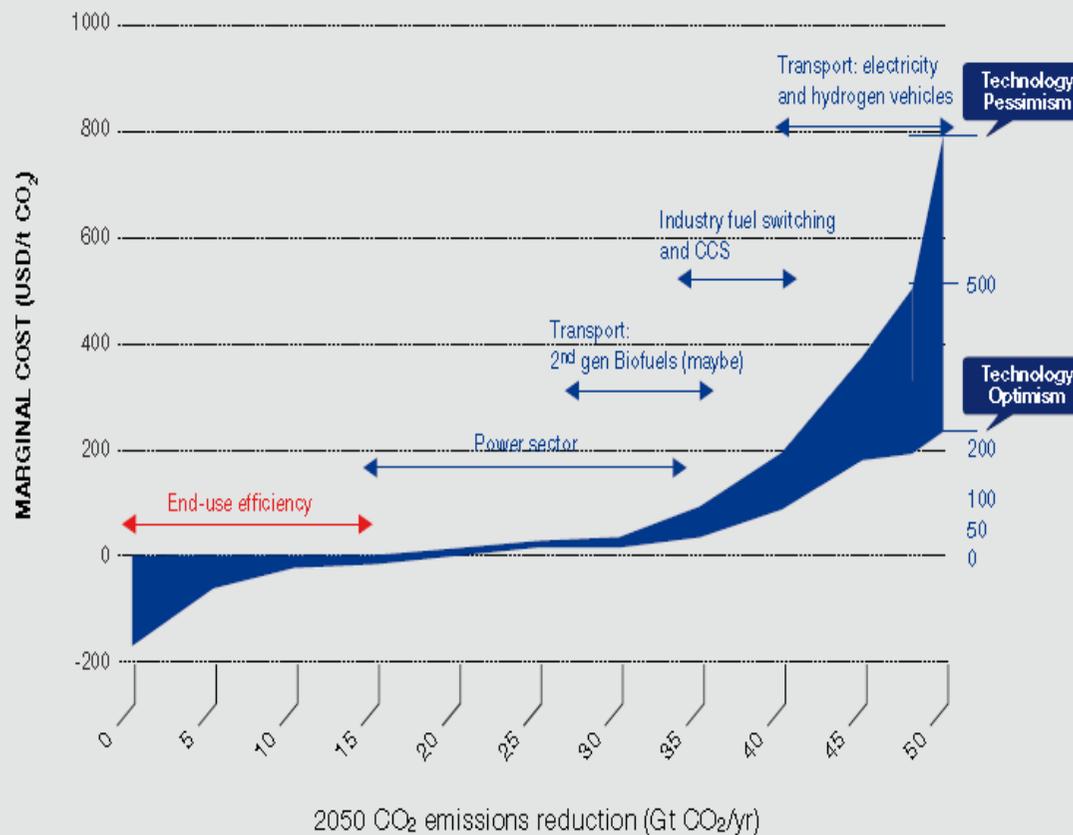


Source: International Energy Agency

# Use science and technology carefully to target improvement: Start with end-use efficiency before the expensive measures

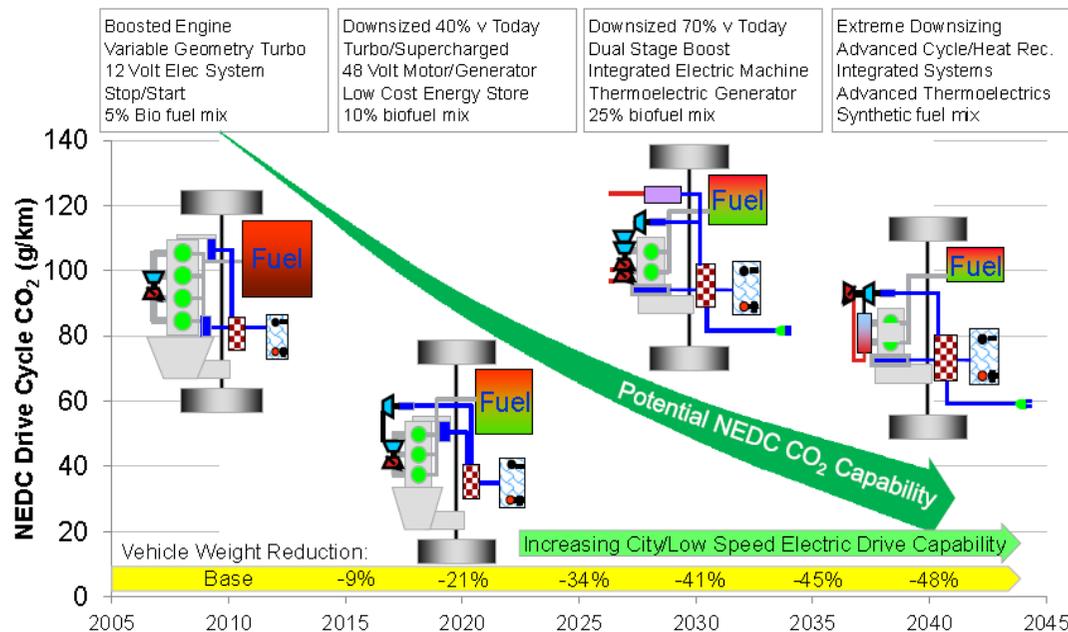
## IEA CO<sub>2</sub> ABATEMENT COST CURVE

Source: International Energy Agency (IEA)



# Economic and environmental sustainability of technologies must both be achieved together

- **Set targets or goals based upon outcomes: be clear what we want**
  - Promote technological neutrality
  - Realistic targets just ahead of economically achievable technology.
- **Recognise the value of all technologies:**
  - Existing technologies have a long way to run
  - R&D for new ideas, but do not build solutions on unsustainable subsidies.



IC Engine/System efficiency improvements & low carbon fuels could deliver ~ 30g/km CO<sub>2</sub> by 2040  
 IC based systems competitive with EV's on life cycle carbon basis

- **Use “command and control” measures with great care:**
  - Market based measures, including taxation of fuels on their true merits. But beware...
- **Infrastructure is precious**
  - Do not destroy existing industries and jobs until replacements can economically replace them

# EU Climate and Energy Policy Beyond 2020 should follow certain principles

A single, transparent, cost effective, long-term trajectory for carbon abatement, shared economy-wide and accepted by society. Any GHG targets should be set under the following conditions:

Targeted, effective and policies with no overlap between measures such as ETS, renewables and energy efficiency.

Support may be required to bring promising low-carbon technologies through the R&D phase....but stop then

EU's ambition should take account of pace of commitments by other countries.

Other non-industrial sectors need to contribute using the most appropriate instruments.

Policies should be technology-neutral to maximise innovation through market competition.

# Industrial policy as part of EU energy and climate policy – a question of balance



## ■ Industrial Policy Communication

EU should reverse the declining role of industry in Europe from its current level of around 16% of GDP to as much as 20% by 2020

## ■ Fitness check:

- The Commission will carry out pilot horizontal sectorial fitness checks. The first two of these will look at petroleum refining and the aluminum sectors perceived as critical for the EU's industrial value chain, but urgently require new investment to be made in the face of strong international competition.
- The fitness checks will focus on the implementation and interaction of those policies that are most important for the competitiveness of these sectors.

## ■ Investment perspectives

- **Coherent EU legislative framework with clear and demonstrated benefits for sustainability and competitiveness** is needed to create a clear investment environment over time.
- Enable introduction of new technologies in Europe, without undermining the level-playing field between technologies.



# If we dream a little....refining can work with existing and emerging technologies as part of combined flexible manufacturing platforms



## ■ Build on existing technological EU leadership:

- adapt existing oil-based fuels to changing demands of engine technology and other end uses.

## ■ Accept different feedstocks - oil-based and *sustainable* biomass:

- Co-process or blend them in an effective, quality controlled manner.

## ■ Use the molecules from different feedstocks and processes - refining, chemical or bioprocess - **where they add most value to the consumer.**

## ■ Further improve the efficiency of refining processes:

- technology : e.g. in catalysis, lower energy processes, more efficient pumps and compressors , more advanced control systems.

## ■ integrate manufacturing processes to create synergies and efficiencies, in resource and energy efficiency:

- e.g. economic high efficiency cogeneration, heat integration, “critical mass” for the potential use of developing technologies such as CCS.

**There are opportunities...if the economic and legislative conditions are supportive.**

Conclusion: EU policies should enable a viable and competitive refining industry to maintain affordable and secure fuel supplies to European consumers and value to the economy



- Refining plays important role in the EU:
  - Value added to the economy, security of supply, maintain industrial infrastructure.
- Oil products will still be needed in EU economy for many years:
  - Technical merits and economics hinder their replacement.
- EU Refining under strong pressure:
  - Production – demand imbalance, global competitive pressures and EU legislative burden.
- Despite vast investments in recent years the EU Refining required by EU legislation the industry faces further substantial investment requirements
  - Required investments enforced by EU legislation only allow to 'stay in business' but do not generate returns. Planned legislation increase further operating costs thus reducing returns in already extremely tough market(e.g IED –which require an estimated 300 M euro on av. per EU refinery in next 10 years)

**The Bottom Line: EU needs more balanced policy: a greater emphasis on industrial competitiveness in energy, climate and environmental policy.**



# Thank you for your attention



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