Oil refineries in the EU and considerations in a global scenario

John Cooper, *Director General*

FuelsEurope
REFINING PRODUCTS FOR OUR EVERYDAY LIFE

IENE "Oil Refining, Storage and Retail in SE Europe" International Conference
Thessaloniki, 31 March 2017

AGENDA

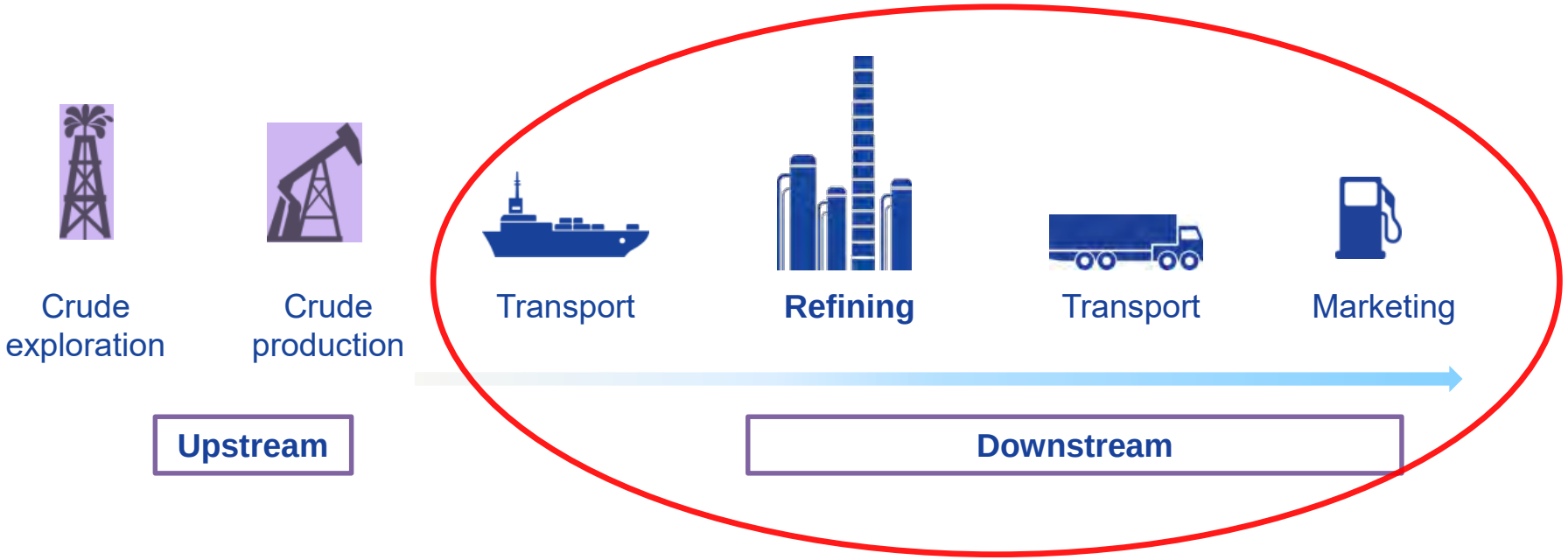
1. About FuelsEurope
2. A global view on product demand and crude supply
3. The value of EU refineries
4. Competitiveness of the EU refining industry
5. Marine fuel and IMO decision
6. A balanced approach to transport
7. Conclusions

Chapter

1 About FuelsEurope

FuelsEurope represents 40 Member Companies ≈ 100% of EU Refining

FuelsEurope represents the voice of the downstream sector of the EU oil industry



#YoungRefiners

Meet the people behind the European oil refining industry

Louise Skott Kristensen
Execution Department Leader at Statoil

Marios Krystallis
Operations Engineer at Hellenic Petroleum

Branislav Sloviak
External Operator - Slovnaft / Member of the MOL Group

Catarina Caiado
Process Engineer for GALP Energia

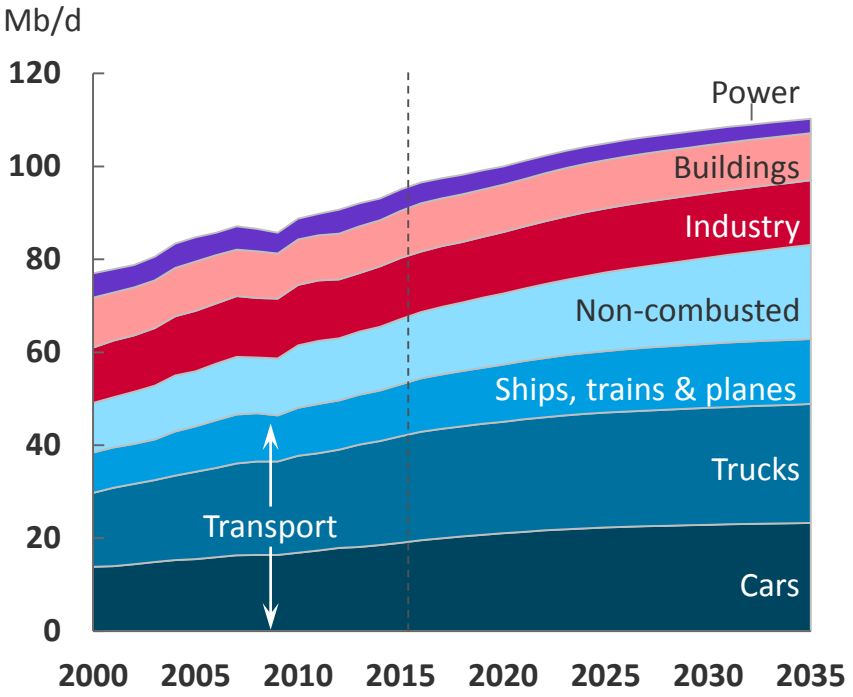
Zofia Frass
Junior Specialist, Energy Efficiency at Grupa LOTOS

Chapter

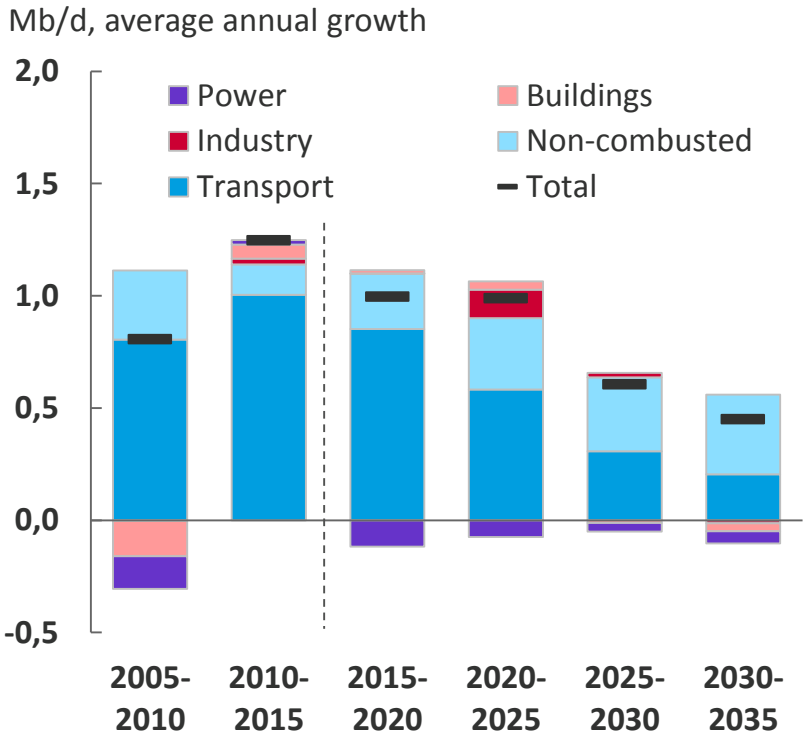
2 | A global view on product demand and crude supply

Global Oil demand evolution 2000-2035: oil products will be needed for decades…

Liquids demand



Liquids demand growth



Liquids includes oil, biofuels and derivatives of coal and natural gas

Source: BP Energy Outlook, 2017 edition

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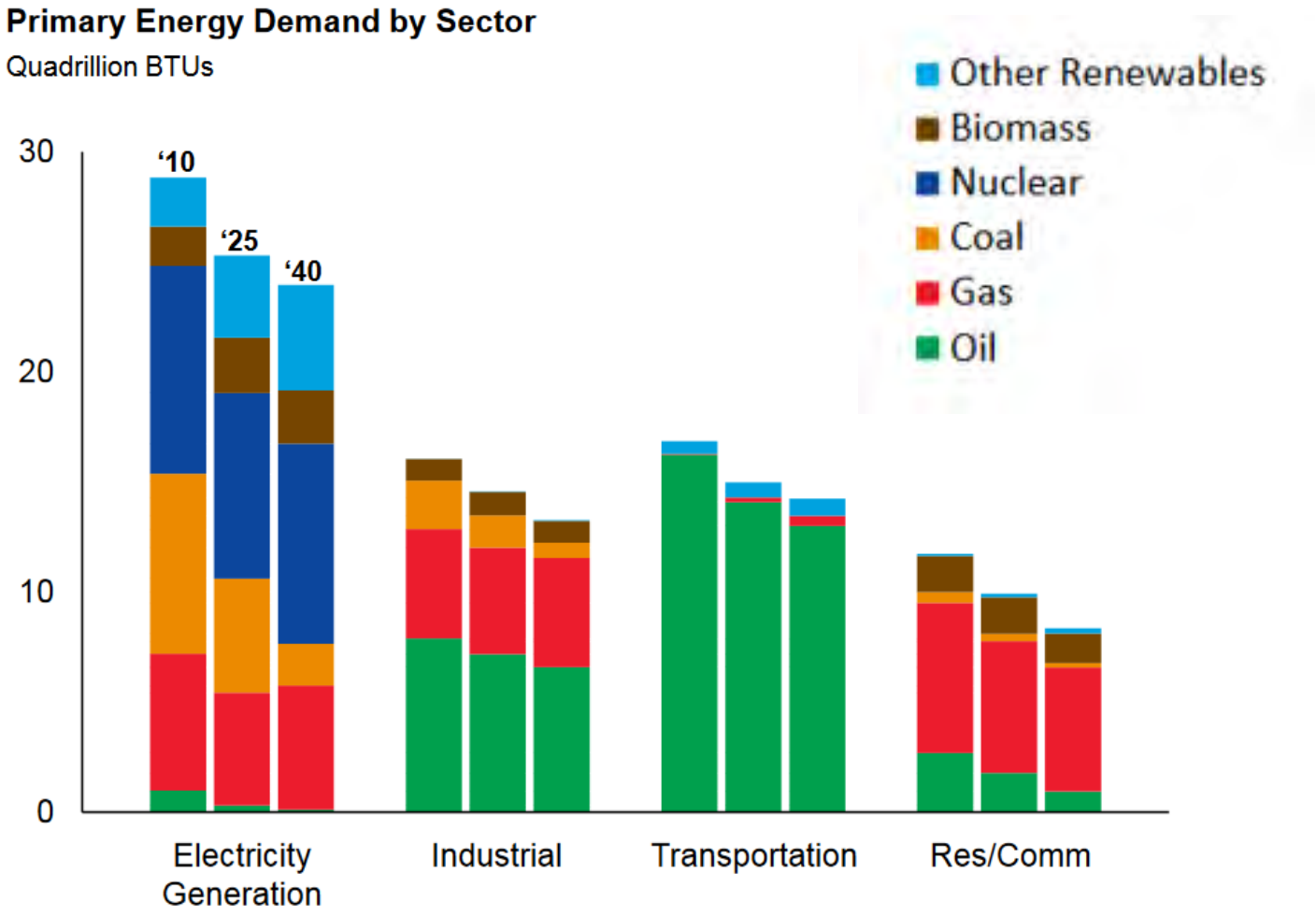
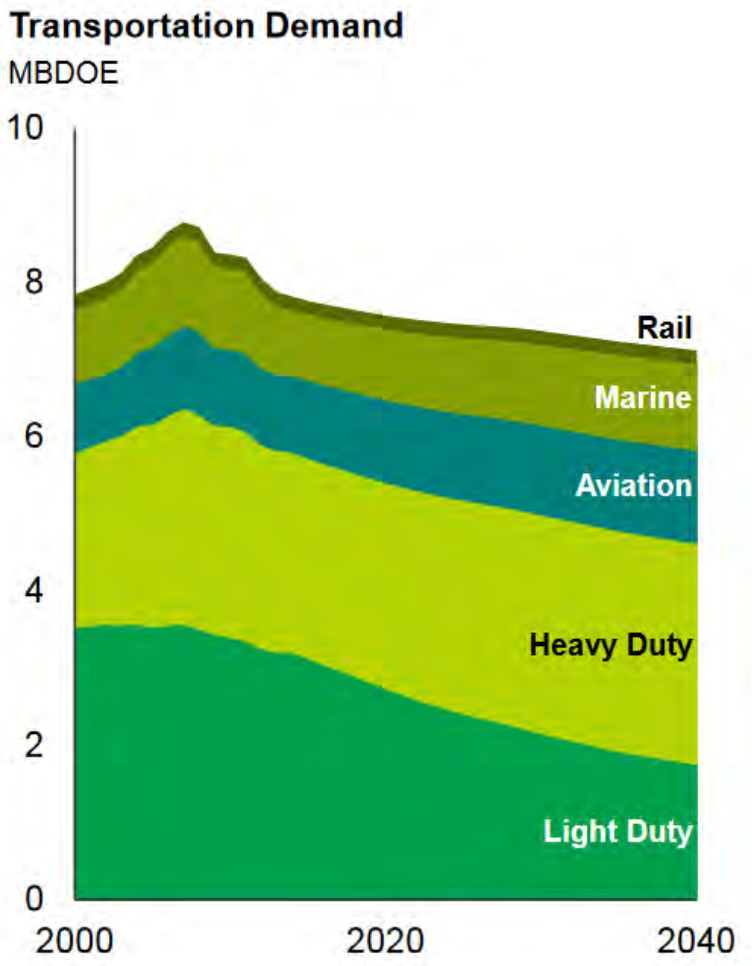
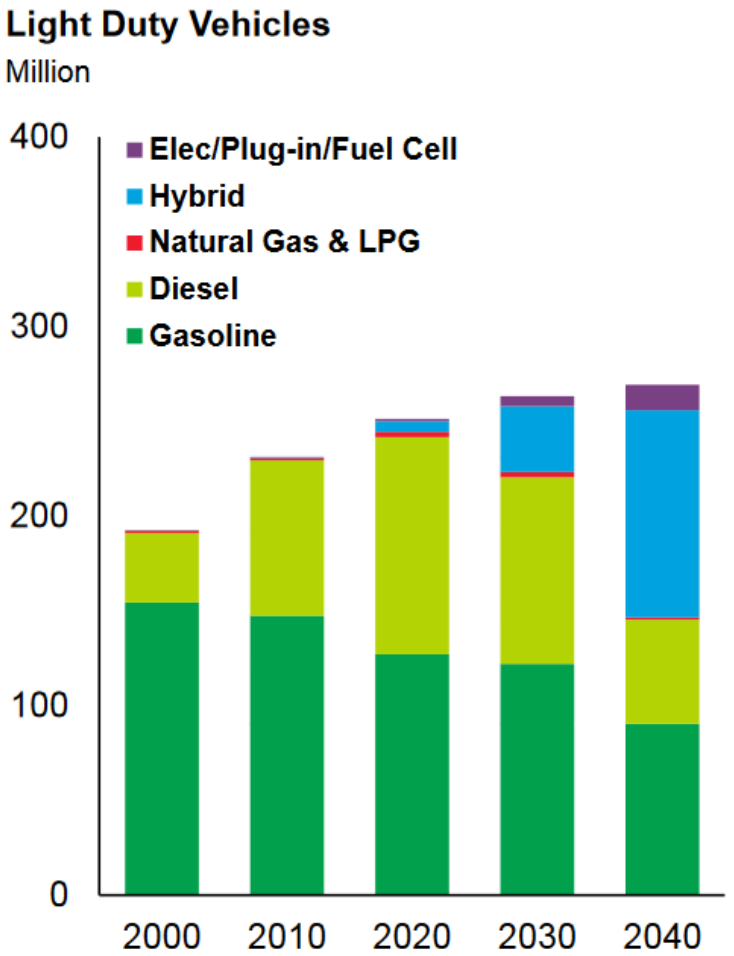
…and in EU oil products will remain key for transport and industry



Source: ExxonMobil 2016 Outlook for Energy

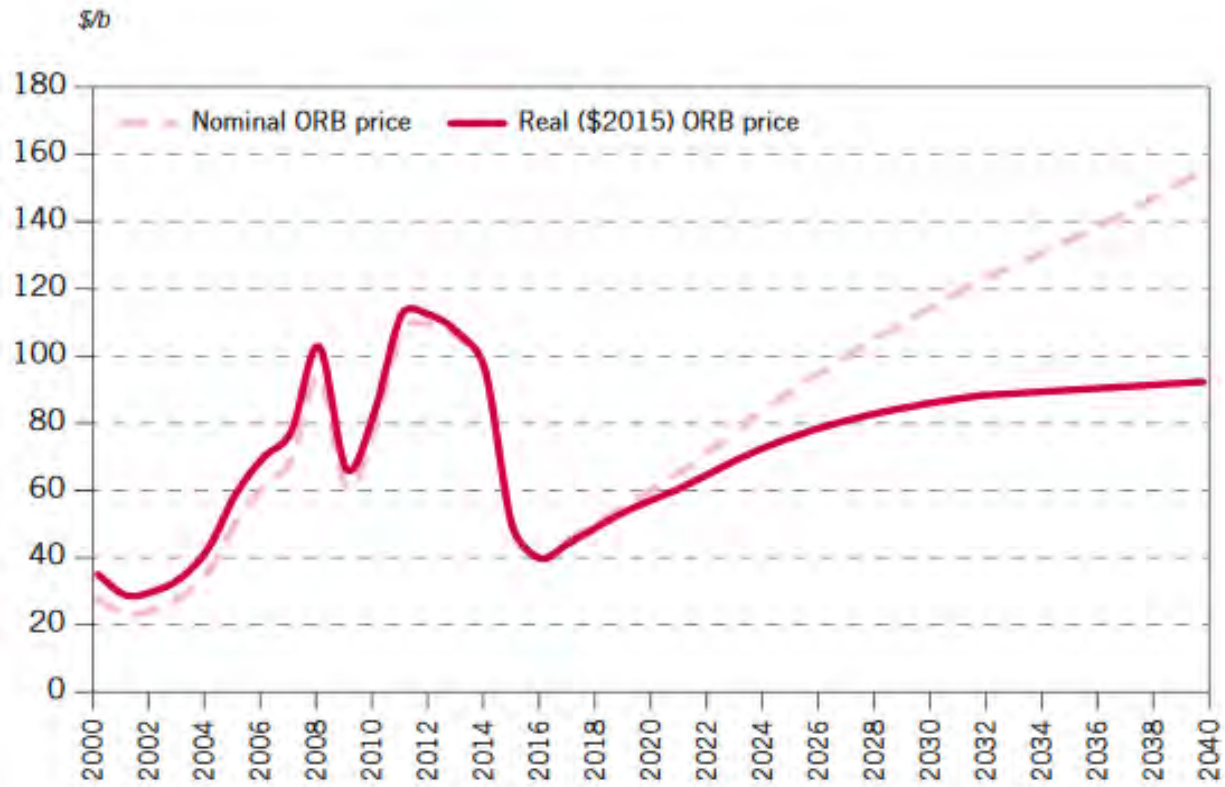
A focus on EU Transportation demand





Source: ExxonMobil 2016 Outlook for Energy

The supply side: oil price



*ORB – OPEC Reference Basket

Important to consider: while gas and electricity prices are higher in EU vs. other regions, OIL PRICE is set in a GLOBAL MARKET and is everywhere consistent.

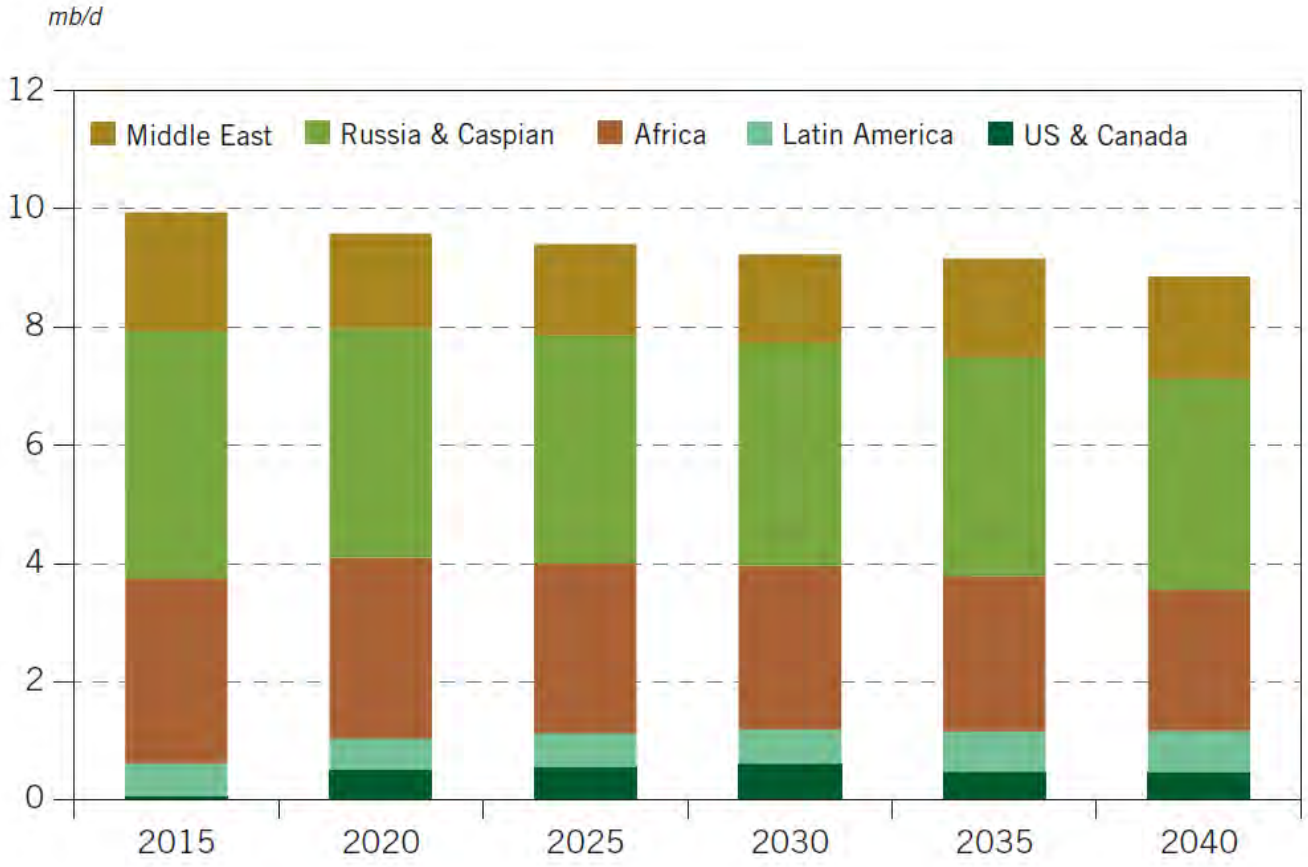
→ NO COMPETITIVE DISADVANTAGE FOR THE EU ECONOMY

Source: OPEC World Oil Outlook 2016

Chapter

3 The value of the EU refineries

Crude oil imports to Europe by origin, 2015-2040



EU refineries are flexible and can process a wide range of crudes

High security of energy supply

Source: OPEC World Oil Outlook 2016

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Refining and other Energy Intensive Industries:
outstanding value for the EU economy and for the planet

EU Refining

- 0.9% of the EU GDP(1)
- 1.3 million jobs(1), (2)
- Integral part of the industrial supply chain
- #1 in EU in process innovation
  #2 in workforce education (3)
- Lowest carbon footprint: Every 100 units of CO_2 emissions reduced in the EU are replaced by 135 units outside the EU *(4)

EU Energy Intensive Industries

- Over 30 000 EU companies
- 4 million direct jobs
- 30 million jobs in manufacturing value chain

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(1) Source: EU Commission, Refining Fitness Check, January 2016
(2) "The EU refining industry contributed […] 1.32 million jobs […] in 2011 taking into account its total direct and indirect contributions […]"
(3) European Competitiveness Report 2013
(4) Source: Vivid Economics for UK DECC – Case study on Refining - Carbon leakage prospects under Phase III of the EU ETS and beyond

In summary: why we need a robust and competitive EU refining industry

- For security of energy supply: domestically produced oil products from a broad and diverse supply of crude oils cannot be replaced by imported products

- For its outstanding contribution to the EU economy and society:
  - Industrial supply chain, including strong integration with petrochemical industry
  - GDP creation
  - Highly skilled jobs
  - Innovation and technological leadership

- For the planet: as long as there will be demand of oil products in the EU, sourcing them from domestic refineries minimises global emission of GHG and of environmental pollutants

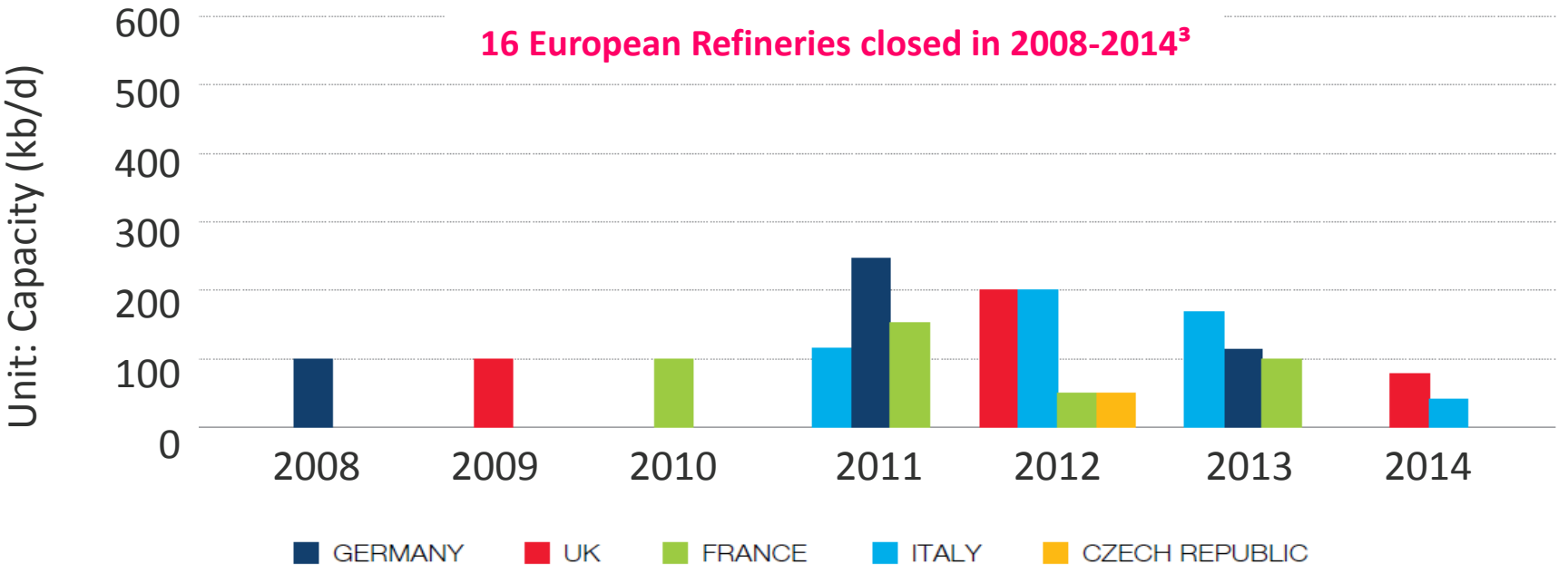
4 | Competitiveness of the EU refining industry

The challenges faced by EU refineries

EU Refining Fitness Check (EU Commission, January 2016)
Main reasons for loss of competitiveness of the EU Refining Industry:

1. Energy Costs (60% of operating costs)[1]

2. Regulatory costs (25% of loss of competitiveness)[2]



Source: 1) Solomon Associates 2) EU Refining Fitness Check 3) IEA & Concawe

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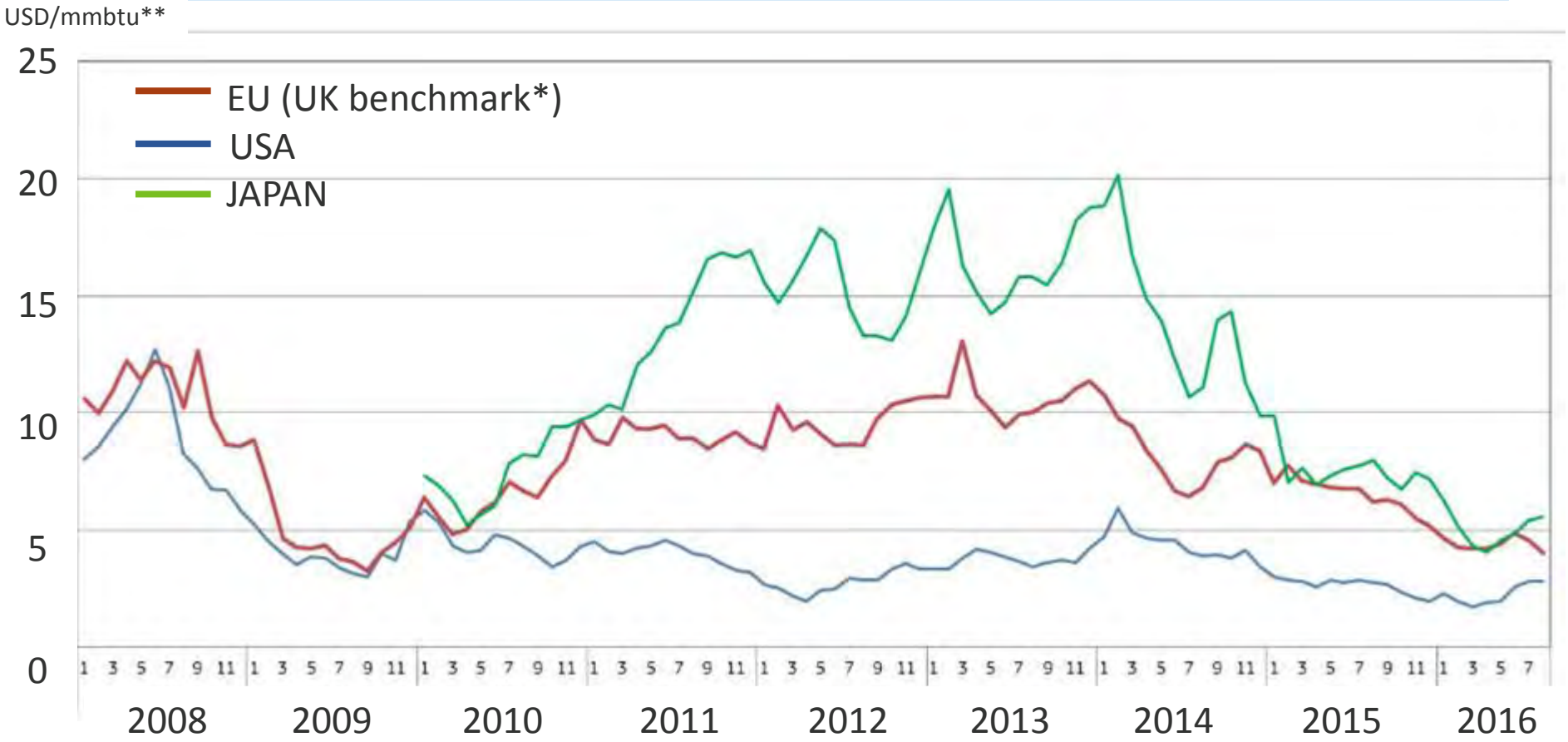
International gas prices

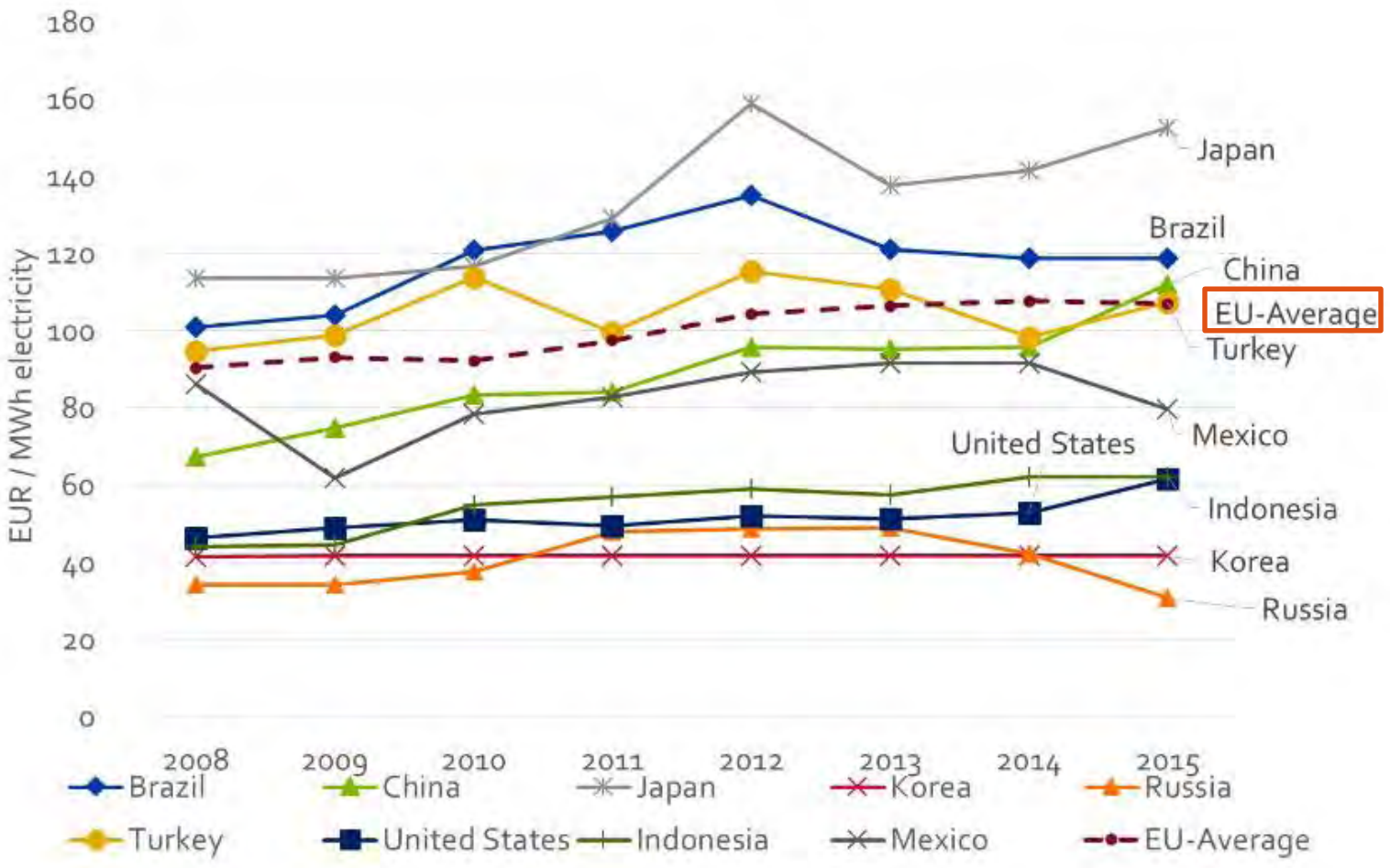


*The price at the UK gas hub is widely used as an indicator for the EU's wholesale gas market

** mmbtu stands for million British thermal units

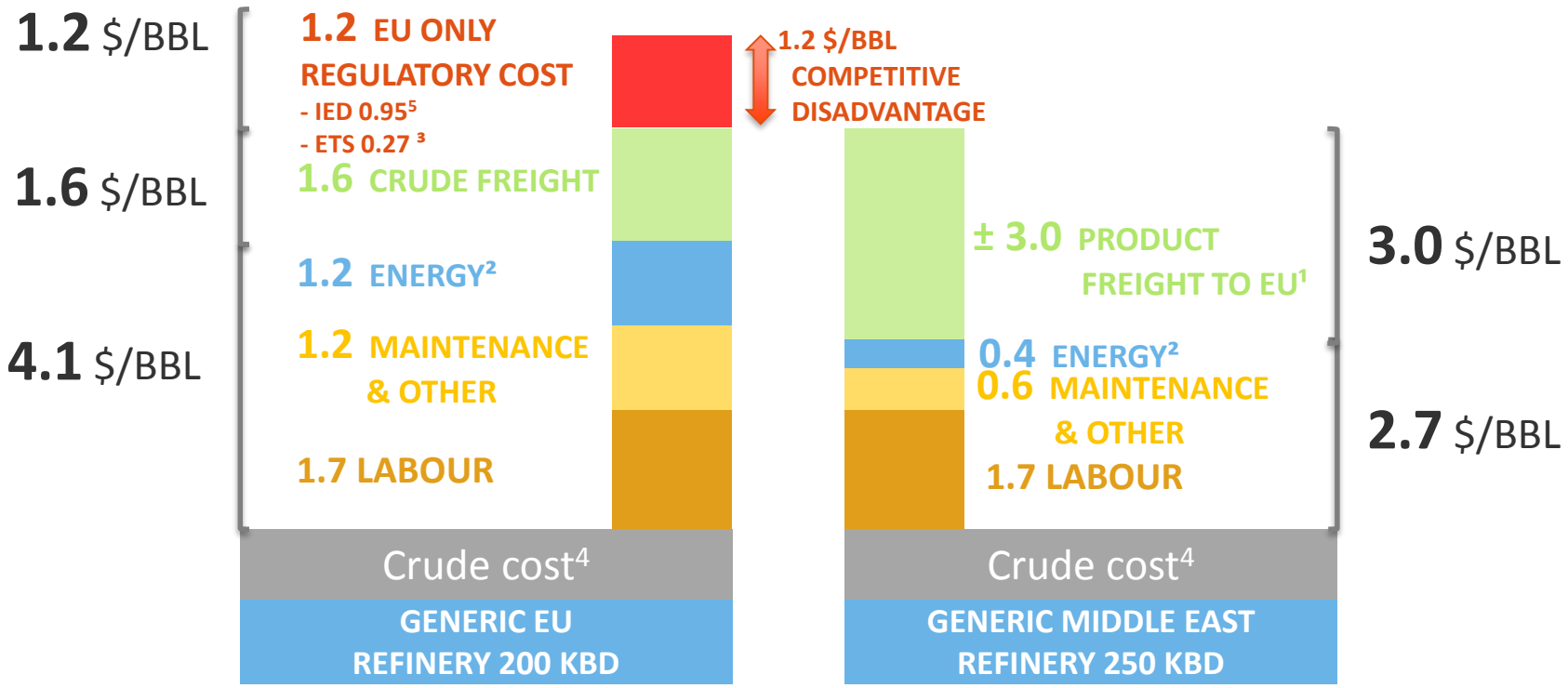
Source: Commission, Energy prices and costs in Europe (SWD(2016) 420 final)

Average industry electricity prices in the EU and major trading partners



Source: Commission, Energy prices and costs in Europe (SWD(2016) 420 final)

Cost build-up for EU refineries vs non-EU export oriented refineries



NOTES:
1 Indicative numbers for product freight to EU from an average refinery - $/bbl of product delivered to the EU
2 Energy costs for purchased energy only
3 ETS average impact on EU refineries in phase IV – Concawe estimate
4 Assumed identical crude cost
5 Industrial Emission Directive – cost of implementation estimated by Concawe in the range 0.45 – 1.45 $/bbl

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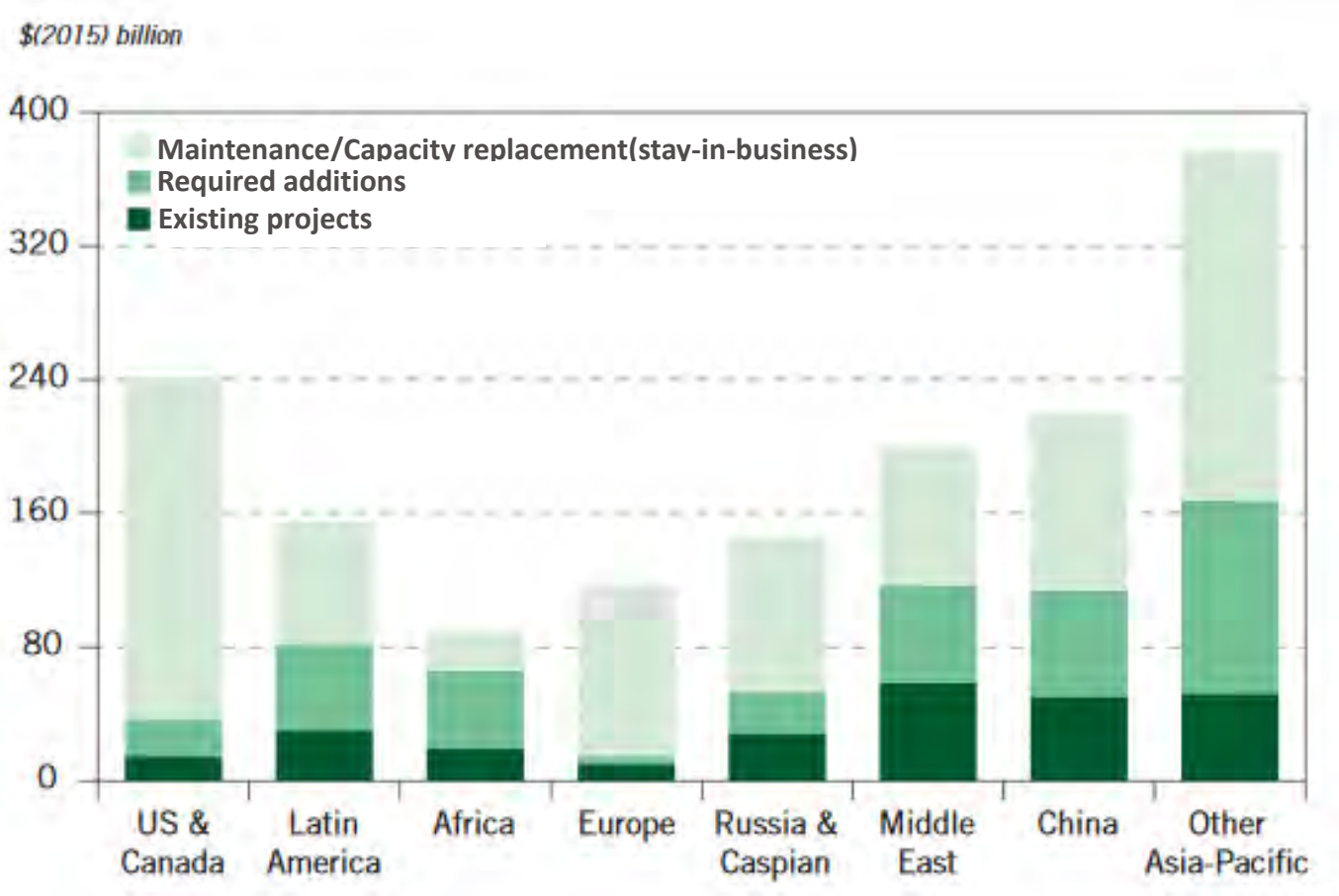
Source: Solomon Associates 2014, Concawe

Total refinery investments in the Reference Case, 2016-2040



Source: OPEC World Oil Outlook

The EU Refinery Forum: a recurring event dedicated to the competitiveness of the domestic refining industry

- Established by DG ENERGY of the EU Commission in 2012 as a high level event, attended by:
  - Leading officials of the Commission, Members of the EU Parliament
  - Representatives of 20+ Member States
  - Industry, other stakeholders

- Scope: Institutions and industry to come together and discuss planned and future regulatory proposals with potentially significant impacts on the EU oil refining industry and on the EU's security of supply of petroleum products
- Last edition in February 2017

- Joint declaration of 6 Member States after the Forum in March 2016:

"[…] It is important that EU refining is enabled to compete on a level playing field with other global actors and that EU policies refrain from distorting the market"

5 | Marine fuel and IMO decision

Focus on Marine Fuel and IMO decision

- **2012**: The EU decided to unconditionally and unilaterally introduce the 0.5 % sulphur cap in marine fuel effective on 1 January 2020.

- **October 2016:** MEPC 70 (the responsible body within IMO) decided that 1 January 2020 remains the implementation date for the global sulphur cap of 0.50% and invited the Pollution Prevention and Response (PPR) sub-committee to develop justified additional measures that may be considered to promote consistent implementation of the sulphur limit.

- **IMO/MEPC mid 2017**: Acceptance of work item on implementing measures proposal by PPR.

- **PPR 2017 – early 2019**: Development of the implementing measures guidance. It is expected that this will occur in 2 PPR meetings, supported by intermediate working group meetings.

- **IMO/MEPC 2019**: Discussion and decision on acceptance of the proposed implementing measures guidance

Focus on Marine Fuel and IMO decision

❖ MEPC 70 debated on the two Fuel Availability studies:

- **CE Delft study (commissioned by IMO):** the global refinery industry can produce sufficient amounts of (low sulphur) marine fuels and at the same time satisfy the demand of petroleum products from the other sectors of the economy.
- **EnSys (commissioned by various industries):** the global refining industry will find extremely difficult (or even infeasible) to supply everywhere both the marine fuels and the other petroleum products. This is mainly due to insufficient capacity in sulphur and H2 plants.

❖ Other key issues and uncertainties:

- **3 competing solutions:** LS marine fuel, adoption of scrubbers, LNG. Difficult to forecast what solution will prevail and in what time
- **Enforceability of the LS specification:** what body(ies) is (are) going to enforce the rules, e.g. in open seas
- **The countries with more robust compliance with the rules** should not be penalised in terms of competitiveness

6 | A balanced approach to transport

Two main challenges for transport

1. Air quality in cities: identify viable and cost/effective solutions, considering the specificity of individual cities

2. Low carbon mobility: reduce GHG emissions from transport

FuelsEurope supports the objective to progressively reduce emissions of GHG and air pollutants from transport through a holistic approach, to include fuels, vehicles, traffic demand and management, infrastructures improvements and driver education/behaviour

The reviews of RED, efficiency standards and EURO emission standards in cars will be key.

Addressing air quality: Concawe study (2016)

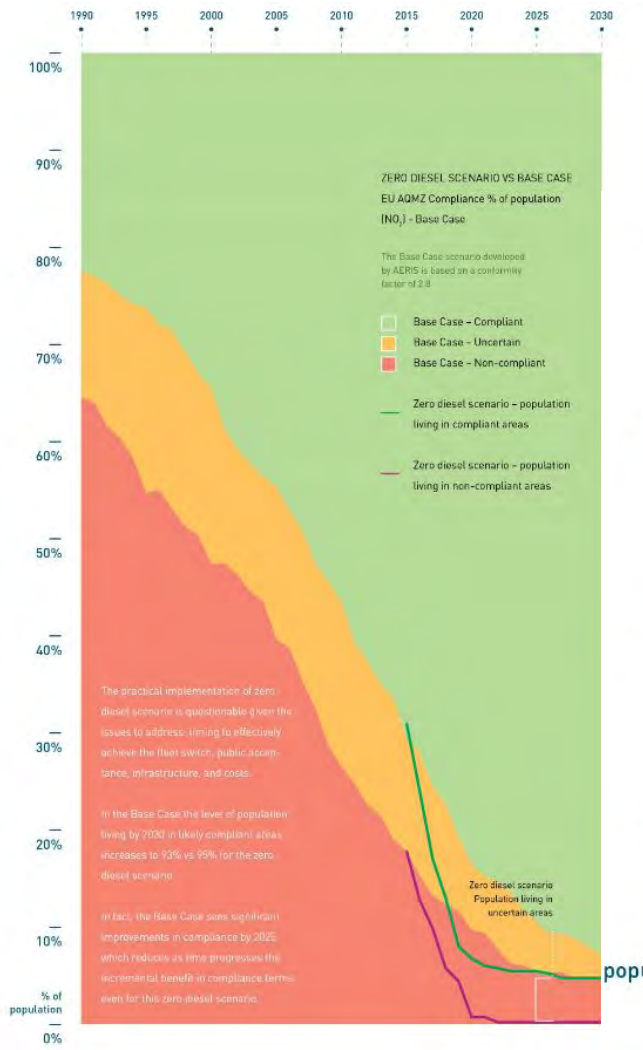
Particulate Matters (PM):

- From Euro 4 onwards, dramatic reduction of PM levels from diesel vehicles, in both official certification tests and real driving conditions.
- The major contribution to the total primary PM emissions is and will be the domestic sector.
- By 2020, primary PM emissions from road transport will mainly consist of non-exhaust emissions from tyres, brakes or road abrasion (i.e. independent from the vehicle technology).

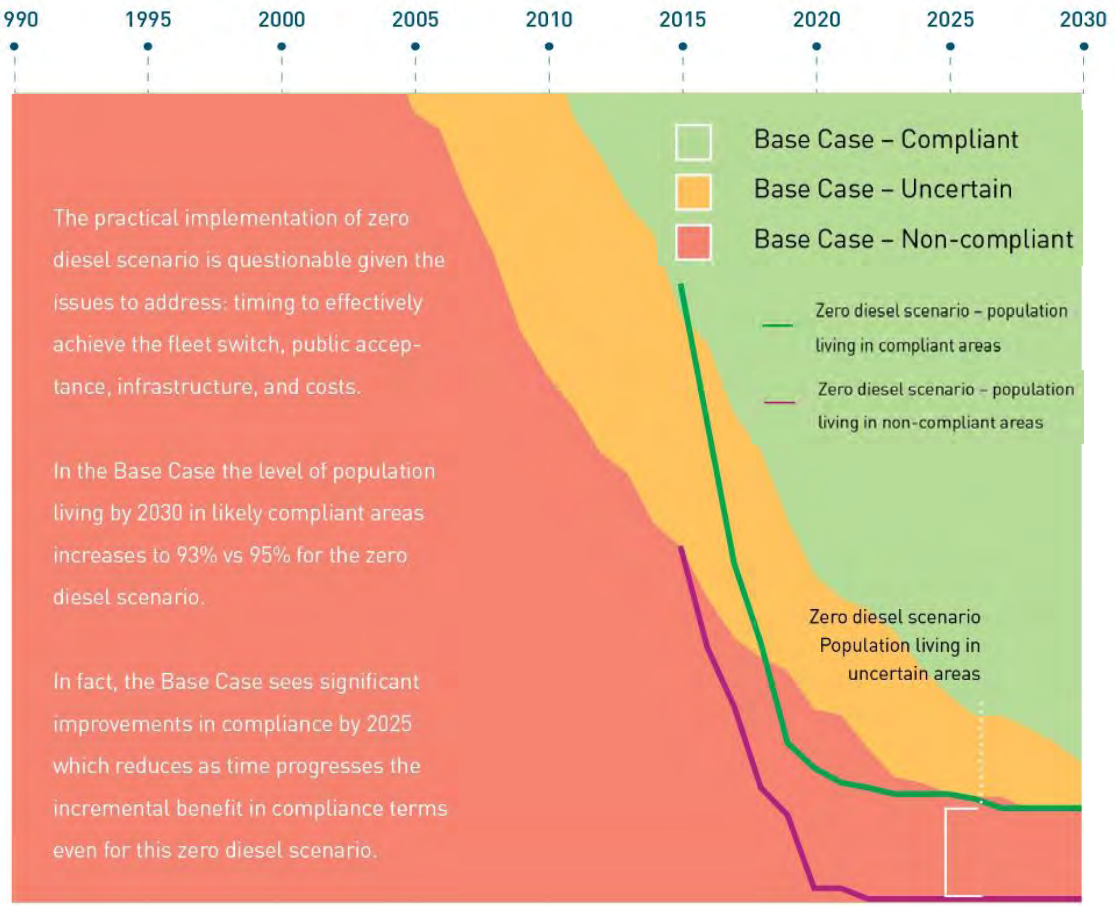
NOx:

- Euro standards have not been as successful at reducing NOx as for PM: reductions recorded in official certification tests, but not always achieved in real driving conditions.
- Transport is the main – but NOT the only - source of NOx in cities.
- EURO 6 is successful: Fully compliant diesel vehicles already on the road: e.g. BMW X5 with SCR technology.
- Addressing NOx in a cost-effective way:
  - Robust implementation of Euro 6, with RDE and WLTP
  - Support for Fleet turnover & removal of worst emitters
  - Enforcement of maintenance standards
  - Address residual areas of non-compliance through targeted measures (e.g. electric buses)

Addressing the Urban Quality challenge



Base case on a regular fleet turnover and a conformity factor is equal to 2.8 on average over the period.



Source: Concawe - Aeris Europe, Urban Air Quality Study, March 2016

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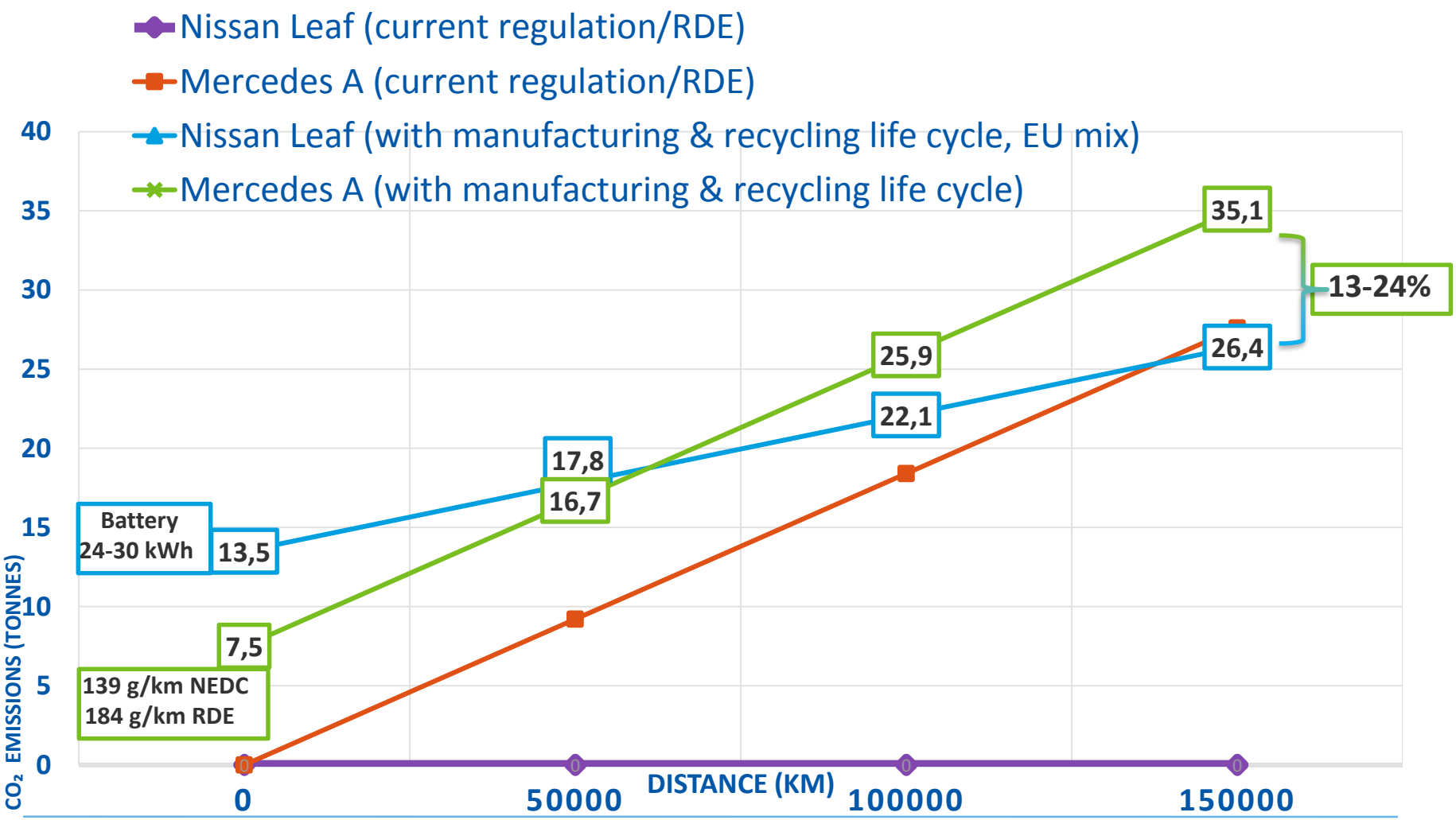
Challenging the dogma of "electromobility as the only way forward"

- **Electric vehicles** have some undisputable advantages: very high efficiency, simple, lower maintenance, no tailpipe emissions.
- However, in a **GHG life-cycle approach**, they are not always better than ICE (see next)
- **Subsidies (in many forms) to electric cars** are very expensive for public budget (up to 20 k$ in Norway)(1) and hardly sustainable in case of mass-electrification.
- The **cost in € per ton** of CO_2 saved through electric cars is 1 or 2 order of magnitude higher than the cost of other measures in transport or in other sectors
- Mass electrification of transport would also mean huge cost for **distribution infrastructures** – not always factored in in studies
- Batteries are mostly non-EU made. EU is **technology leader** in ICE, not EVs
- **Urban air quality**: electric cars are but one way to address the problem

(1) Purchase incentives for BEVs. Source: OECD/IEA 2016

Life cycle GHG Impact: Nissan Leaf vs Mercedes A class



Sources: University of Trondheim, 2012/2013/2016 and Concawe 2017

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Sustainable alternatives

The "alternative" with most potential is not really an alternative:

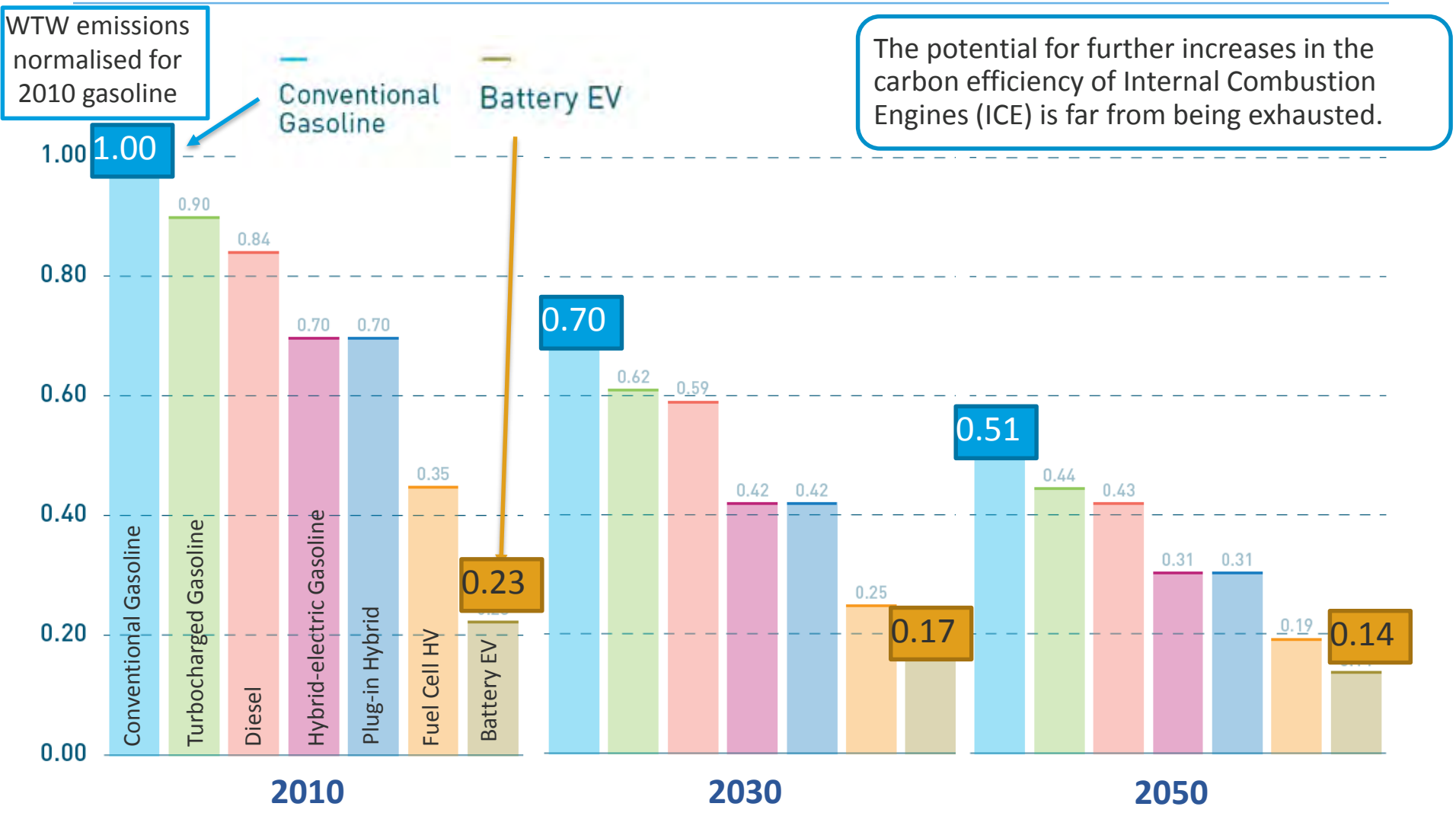
- Energy efficiency of internal combustion engines through innovation in advanced engines, advanced vehicle and advanced liquid fuels (see next slide).

- Sustainable biofuels are key in lowering the carbon intensity of transport. Their contribution should be recognised in the CO2 in cars regulation.

- Other technologies – electricity, power to liquid, hydrogen, natural gas, etc. – should be supported in the development phase but eventually compete on their own merits.

- Over the long term, a market-based cross sectoral approach will deliver low emission mobility at the best value for the planet and the citizens, as opposed to a current silo approach

Reducing GHG emissions from transport



Source: J. B. Heywood, On the Road towards 2050, Massachussetts Institute of Technology, November 2015

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The key role of innovation

- An appropriate regulatory framework should support the development and implementation of:
  - Low carbon technologies for use in the manufacturing of petroleum products
  - Alternative feedstocks and components for liquid fuels to complement the current fuels
  - This will allow to develop evolution of business models to include technologies such as:
    - *CCS & CCU*
    - *Power-to-gas/liquids*
    - *Sustainable biofuels*
    - *Advanced energy efficiency and low carbon technologies*
- For private investments to fund innovation, regulatory stability and predictability is an essential condition

Chapter

7 Conclusions

Fuels and other strategic oil products should be made in EU (1)

- The world – and the EU - will continue to use petroleum products for decades
- An ample and diverse availability of crude oils – which can be processed in the flexible EU refineries – are a guarantee for energy security in the EU
- A robust and competitive refining industry is a key asset to the EU economy and society.
- European refineries and vehicles already the most efficient in the world
- Comparatively higher energy and regulatory costs are contributing to relocation of refining activities out of the EU
- Our industry has a record and a big potential for innovation, to contribute to the energy transition towards a low emission economy

Fuels and other strategic oil products should be made in EU (2)

- The refining industry needs a regulatory and policy framework which is:
  - Stable and predictable
  - Ambitious in its objectives but always based on science and setting achievable targets
  - With a thorough assessment of its impacts on economy and society
  - Technology neutral
  - Aiming at rebalancing the competitive disadvantage of the EU refining industry vs. its global competitors

THANK YOU FOR YOUR ATTENTION

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