HELLENIC PETROLEUM

12th SE Europe Energy Dialogue

Towards an Integrated Energy Company

The transition of the Refining Sector and the role of Green Fuels 2050

Liana Gouta
Group Director, Energy Policy and International Affairs, HELPE
Chairwoman, Downstream Committee, IENE

1. The Greek Energy Sector and the Refining
2. Towards Climate Neutrality – The EU Framework
3. Clean Fuels For All – The Refining's proposal for 2050
4. HELPE's Strategy towards the Refinery of the Future

1.

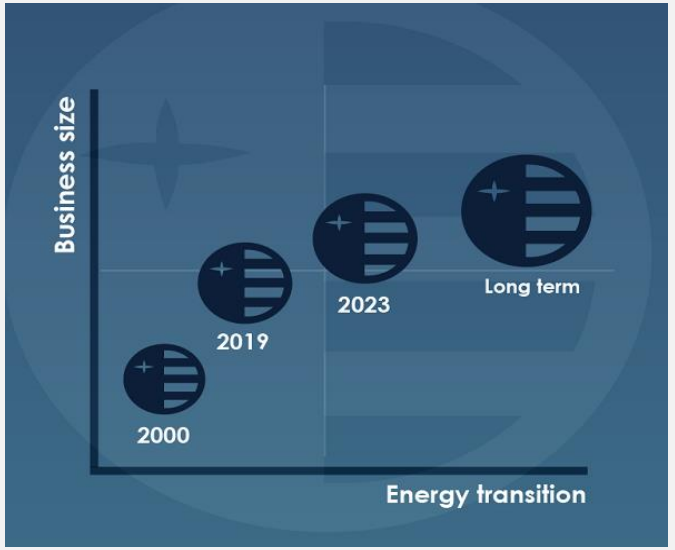
The Greek Energy Sector and the Refining

Refining in Greece

- **A long history of more than 60 years**
- Major, key contributor to the Greek Energy sector
- Strong footprint on the **economic development** and **value creation** for the Greek economy
- Strong support of the **local economies** and societies

A sector in transition – Key questions

- What does **EU Climate Ambition** mean for **Fuels Refining?**
- **Will we still need** Liquid Fuels in the coming years?
- **How can we make** Liquid Fuels compatible with policy vision?
- **What kind** of Fuels, from what kind of Refineries?
- **What technologies and investments** are required to meet 2050 goals?



Our response to the unprecedented COVID-19 crisis demonstrated the key role of the sector to the flexibility and resilience of our societies and our economies:

Refineries **kept working**, **adapting** to new supply needs, **ensuring**:

- **Reliable transport** (critical medical personnel transport and essential goods delivery without disruptions)
- Supply to the EU **industrial value chain** (petrochemical feedstocks)
- **Security of supply** of critical goods (strategic fuels reserves of 90 days)

Refining industry has demonstrated its **flexibility** to adapt to unexpected and challenging conditions, providing an **important contribution to the efforts of governments** to overcome the Covid-19 crisis, even whilst experiencing a very difficult financial situation.

In order to remain **resilient,**

✓ our **competitiveness** must be **kept** and

✓ our **low carbon transition** must be **enabled**

Greek Energy Sector overview

- **Power generation** heavily dependent on Greek **local lignite**
- Western Macedonia (Kozani) providing around 50% of the total electric power in the country
- **Renewables** (wind, solar) growing

> ***One of the oldest vehicle fleets in the EU**, very few EVs*

> *Significant **global shipping** industry with **need for fuels***

> *Economy heavily dependent on **tourism – need for aviation fuel***

NECP, 2030 targets

- **Coal phase out by 2028** | lignite power plants shut down
- Reduction of **GHG emissions by 42%**
- **RES** share in **final energy consumption** to reach at least **35%**
- **RES** share in the **electricity production** to reach at least **60%**

> ***RES** share in the **transport sector** to exceed **14%**, driven mainly by electrification and biofuel technologies*

> ***Electrification of 30% of new vehicle** registrations*

> ***Hydrogen,** a role to play for **lignite-dependent regions***

Liquid fuels expected to play a significant role in the Greek Energy System in 2030, particularly in Heavy Road transport, Aviation and Shipping

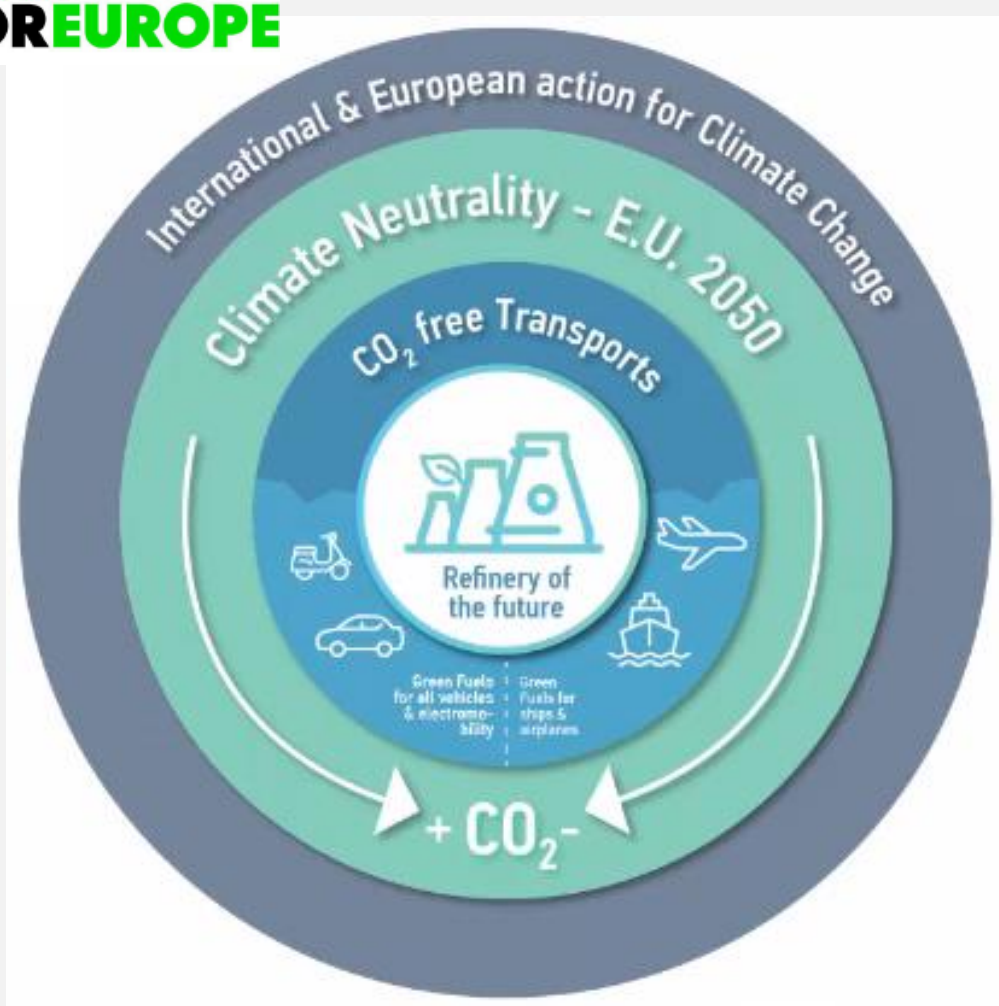
Investments by refineries in low carbon technologies that will reduce the CO_2 of liquid fuels are crucial for the achievement of the NECP targets

2.

Towards Climate Neutrality – EU Framework and Challenges

EU Climate Framework

THE GREEN NEW DEAL FOR EUROPE



Refining Vision 2050

The Refining Industry believes in a climate neutral Europe and has demonstrated its ability and willingness to offer low carbon solutions,

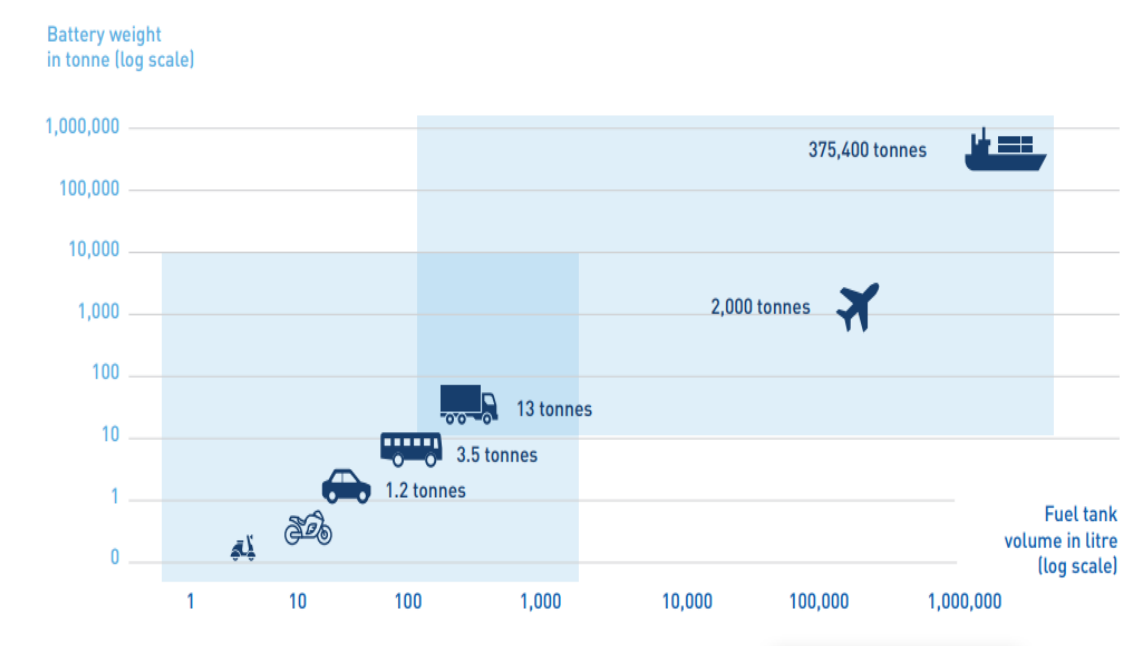
by:

- ✓Gradually transitioning to **new feedstocks**, and **carbon neutral technologies**, reducing product-related GHG emissions
- ✓Further increasing GHG **efficiency** in refineries

HVO	Biofuels & Algae	Synthetic Fuels
Hydrogen	Waste*-to-Fuel	CCS & CCU

*Municipal Waste, Plastic Waste etc.

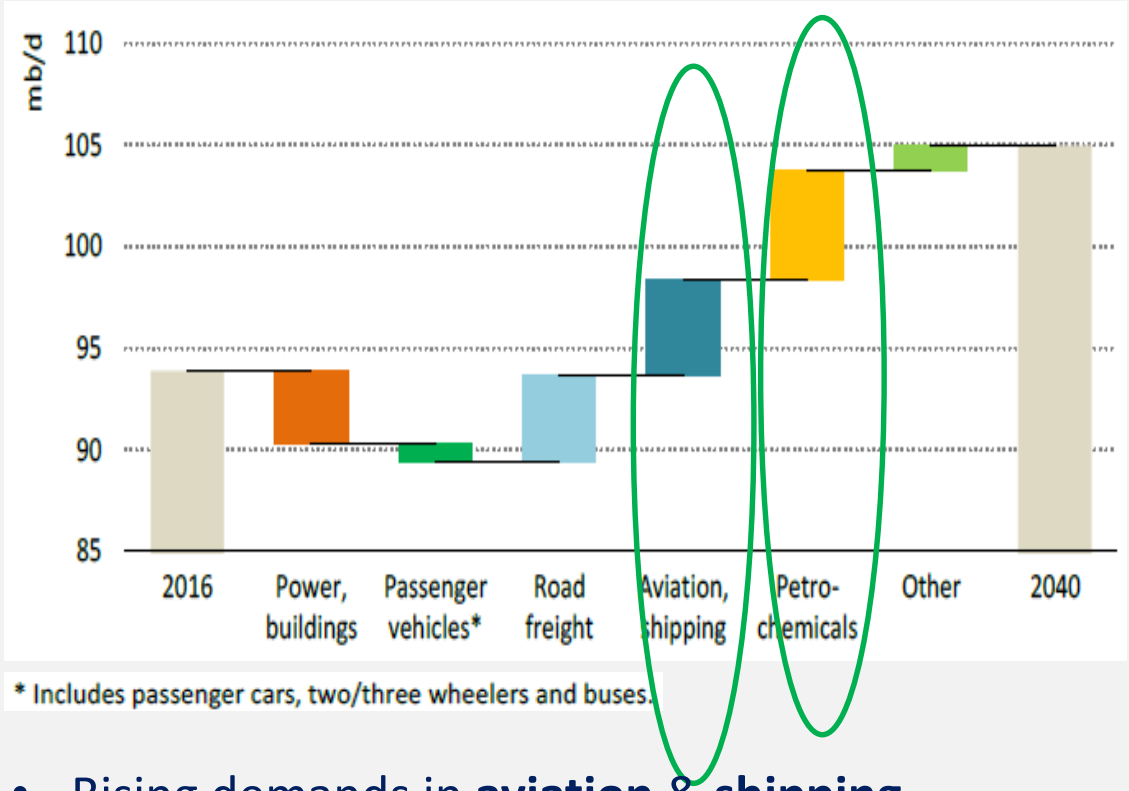
Full Transport Decarbonization



- **Limited electrification** beyond the bus and the light truck segment
- For **aviation and maritime**, the density of Liquid Fuels consists a fundamental advantage
- Several **technological solutions should deliver** the EU Green Deal goals

Decarbonization of Industrial Chain

Change in World Oil Demand by Sector by 2040



* Includes passenger cars, two/three wheelers and buses.

- Rising demands in **aviation** & **shipping**
- Rising demands in **petrochemicals** and the industrial value chain

Source : IEA, World Energy Outlook 2017

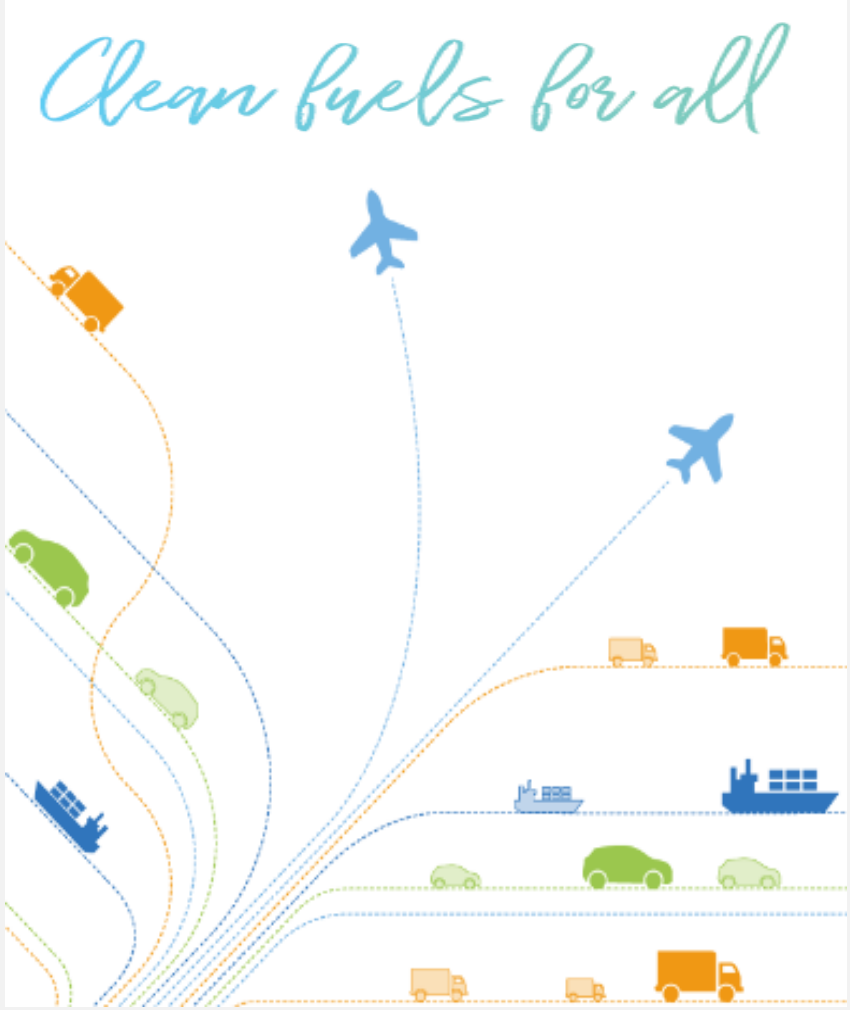
3.

Clean Fuels For All – The Refining's proposal for 2050

What are the Low-Carbon Liquid Fuels?

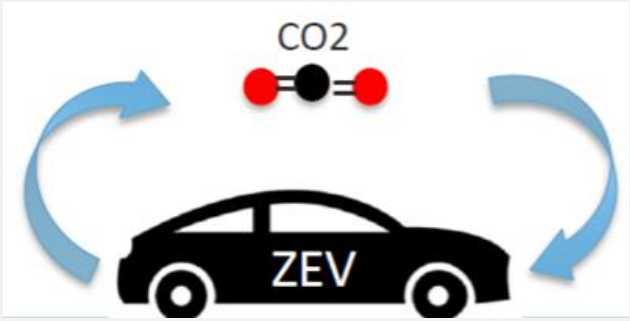
- Sustainable Liquid Fuels from **non-petroleum origin**, produced from **new feedstock** such as biomass, renewables, waste and captured CO_2.

- With **no or very limited net CO_2 emissions** during their **production and use** compared to fossil-based fuels.
- These feedstock are **sustainable** and comply with the existing EU sustainability standards.
- Low-Carbon Liquid Fuels are **complementary to electrification and hydrogen**. We will need all technologies to deliver climate neutrality.



What are the benefits of Low-Carbon Liquid Fuels?

- Liquid fuels have an unrivalled **energy density**: easy for **transport** and **storage**
- They enable the **decarbonisation** of sectors with no other technological alternative: **aviation, shipping and heavy duty transport.**
- No need for new distribution or storage **infrastructure**.
- Their use can achieve a **CO_2 reduction at once**, when used in all **existing fleet**, in all transport sectors.
- Consumers can keep the option to choose the technology they prefer, contributing to an **economically feasible transition**.
- They support energy security reducing **energy dependency** on third countries
- They support EU leadership in ICE technologies, enabling the creation of new high-skilled jobs.



A vehicle using Low–Carbon Liquid Fuels emits recycled circular CO_2
⟹ Net Zero impact on Climate

Clean fuels for all

By 2050:

- ✓ every drop of **liquid fuel for road transport** could be **climate neutral by 2050**
- ✓ **100%** emissions reduction in **road** transport
- ✓ emissions reduction from fuels in the **aviation and shipping** sectors could be **reduced by 50%**
- ✓ **a 100 Mt CO_2/yr reduction could be delivered in transport by 2035, equivalent to the CO_2 savings of 50 million BEVs on the road.**
- ✓ an **ambitious**, but **feasible** proposal

Refining can lead the way to those new technologies, using its know-how and its flexible infrastructure

- ➢ **Significant investment needs in the EU around € 400-650 billion by 2050**
- ➢ **Need to set the right policy framework**

4.

HELPE's Strategy towards the Refinery of the Future

Innovation and reduced carbon footprint operation is a cornerstone for HELPE's strategy

Wave 1

Plastic based feedstocks

Provide plastic based feedstock to upgrading units

Bio-based feedstocks

Co-process and blend bio based feedstock to displace conventional oil

Wave 2

Hydrogen

Produce green hydrogen to supply refining processes and new demand from co-processing

Retail

Further adopt digital and embrace retail of the future

Green operations

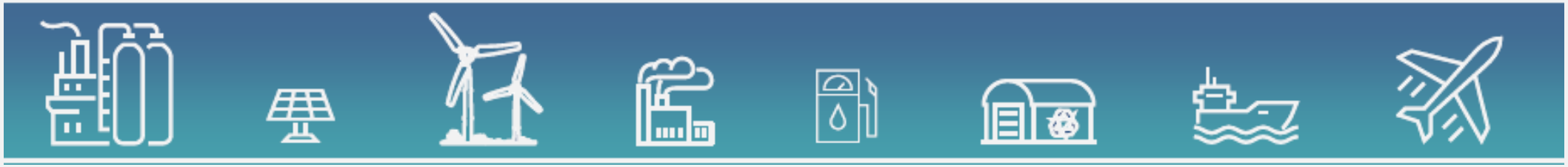
Integrate renewable power into utilities / power-to-x applications (electrification of thermal units and steam)

Carbon capture

Capture CO_2 and use to produce carbon neutral synthetic fuels

Hard to abate sectors

Produce renewable fuels (bio/H2) for hard-to-abate sectors like aviation and heavy transport



Leveraging our existing industrial assets to develop new Energy Transition opportunities

Energy Efficiency

An ongoing investment

2030 target: 10% reduction in energy consumption and CO_2 footprint of our 3 refineries.
(Refineries' energy consumption: 16 TWh/yr)

Diversifying our processes

Biofuels production

Recently converted our methyl ether producing units substituting methanol with bioethanol, so as to meet the higher biofuels content spec in gasoline (3.3% in energy content)

Diversifying our feedstock

Used Cooking Oil

Developing co-processing ~10 vol.% **Used Cooking Oil (UCO)** in one of our HDS units

Plastics recycle

Evaluating technologies for plastics re-use and recycle to introduce in our fuels and petrochemicals production

Hydrogen

Evaluating options for integrated Green H_2 production to substitute existing H_2 production

Participating in R&D projects

Low-carbon technologies

R&D projects related to low-carbon technologies with a special focus on 2nd & 3rd G biofuels, green hydrogen production, waste-to-fuel technologies, storage, biorefineries.

HELPE Group is currently reviewing its strategic plan and considering the investment projects to be implemented by 2030. Numerous opportunities linked to energy transition towards low-carbon fuels and energy portfolio diversification will be evaluated

Thank you!

 # Clean fuels for all