

ETS Innovation Fund Workshop



Oil & Refining Round table

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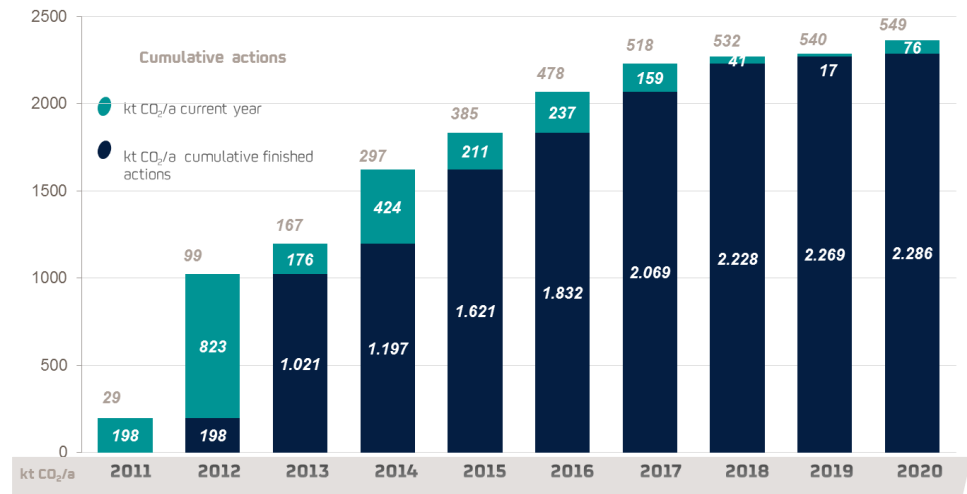
Repsol long-term climate change track record

Overview



- **We set up and deploy ambitious energy efficiency programs to reduce energy consumption and GHG emissions as one of the key elements of our strategy.** These programs pursue long term targets which have been made public in order to facilitate their progress by the stakeholders.
- Refining area leads this challenge through a Reduction of CO₂ Emissions Plan launched in 2010 with the potential to reduce more than **2.5 Mt CO₂/y reduction in 2020** :

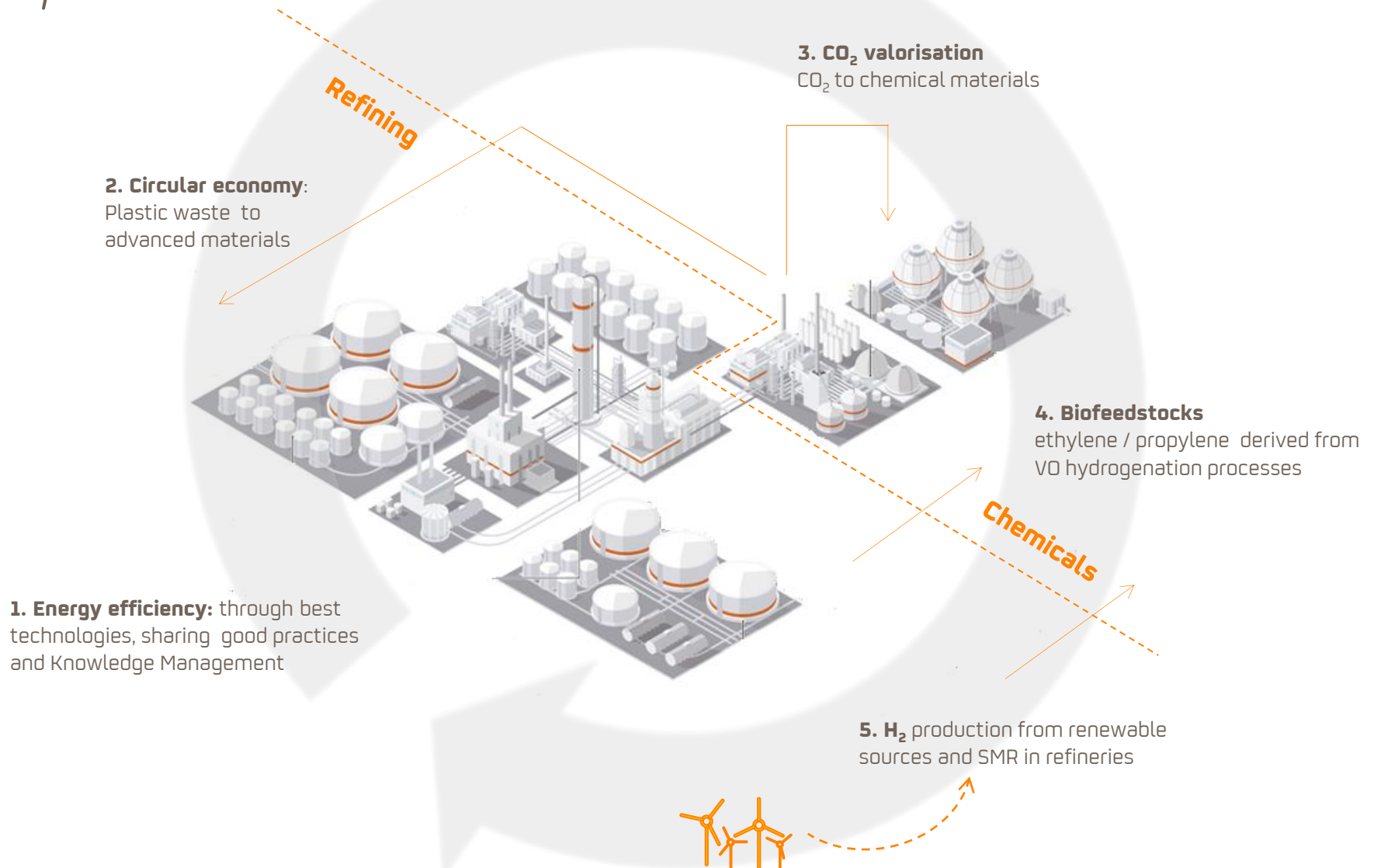
- About **550 energy efficiency and CO₂ reduction actions** are completed or identified to be implemented. More than **340 MME** invested to date.
- **Emissions verified under ISO 14064-1 standard**



- A huge amount of work has already been done . We are convinced that **innovation and technological development** are essential for ensuring reliable and sustainable energy supply in the long term.

Refining – Chemical Integration

Innovation as a key driver



Waste to fuels

Path 1: Bio to fuel

Used cooking oils

Industrial food waste

Non-wood biomass

Farm manure

Wood biomass

Pyrolysis and bio-oil upgrading
TRL 5

Path 2: Crude to fuel



Refining and coprocessing
TRL 5 - 7

Path 3: Mineral waste to fuel

End of life (EOL) plastics

Used tyres

Municipal solid waste

Waste lubricants

Solid recovered fuels

Pyrolysis
TRL 7

Feedstock

Manufacture

Use

Biofuels

Fuels



Low carbon fuels

Waste manager

Technology developers

Oil refineries and retailers

Fuel consumers

Biomass availability

Circular economy: end-of-life residues

Up to 70% plastic waste re-used

Industrial scale > 2020

Tech. Development for process refinery adaptation

Ensuring Quality and price

End-of life (EOL) plastics to fuel

Project development: Thermal anaerobic Cracking Oil



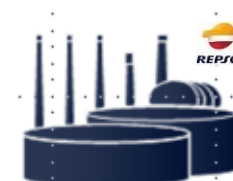
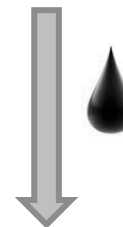
- **CO₂ reduction by:**
 - Replacing crude as feedstock in refineries
 - Avoiding plastic incineration
 - Local transport
- **Circular economy** by chemical plastic recycle. Cycle of life improvement of petrochemical products.
- **Competitive advantages:**
 - Low cost and local raw material
 - More than 100 kt/y in Spain now sent to landfill
- **Technology:** Anaerobic Thermal pyrolysis [TRL 7].
 - **Modular technology:** Process capacity 10-20 t/d.
 - **Ongoing technological development** to adapt plant production for refinery processing.
 - Corrosion from acidity components
 - Metals: catalyst deactivation
 - Fouling or deposits
 - **Industrial refining test: 2018**

EOL Plastics



17% fuel gas: self-consumption

77% Synthetic crude: aprox.
Naphtha: 22%,
Kerosene: 20%,
Diesel: 50%,
Wax 8%



Waste to fuel

Financing and support



In order to ensure leadership of the European refining industry in clean technologies for the valorization EOL petrochemical products , it is essential to:

- 1) Provide appropriate support to waste conversion technologies as refinery feedstock:
 - Investment for the development and scale-up of the new technologies to reduce operating costs, capital expenditures, scale-up risks, take advantage of scale-economies, etc. → **ETS Innovation Fund**.
 - Incentives for waste conversion streams in refining process: Regulatory framework can provide synergies among waste and refining industries -> Refineries as a sustainable solution .
 - ✓ **ETS:** waste in fuels as CO₂ reduction solutions should be eligible for Innovation Fund
 - ✓ **RED:** all EOL waste derivatives should be considered as low emissions fuels
- 2) Ensure Resource and Energy policy coherence and stability over time to allow investment in low emissions related technologies in Europe:
 - **Policy and regulation**, should take into account products made of waste. Currently, not all fuels made from EOL waste streams are recognized as low emission fuels.

Inventemos el futuro

THANK YOU

