



Sustainability and Decarbonization activities for the Shipping sector at Bilbao Port

March 23rd 2023



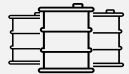
Introduction to Petronor: Leading energy company with over 50 years' history promoting local industry and the Bilbao Port



1,015 employees



Production
12 M tonnes/year
200k bbl/d

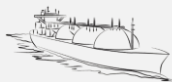


+ 6,200 indirect jobs

9.7 % of GDP in Bizkaia region



40% of vessel traffic through the Port of Bilbao



Petronor is the industrial leader of the



Is part of

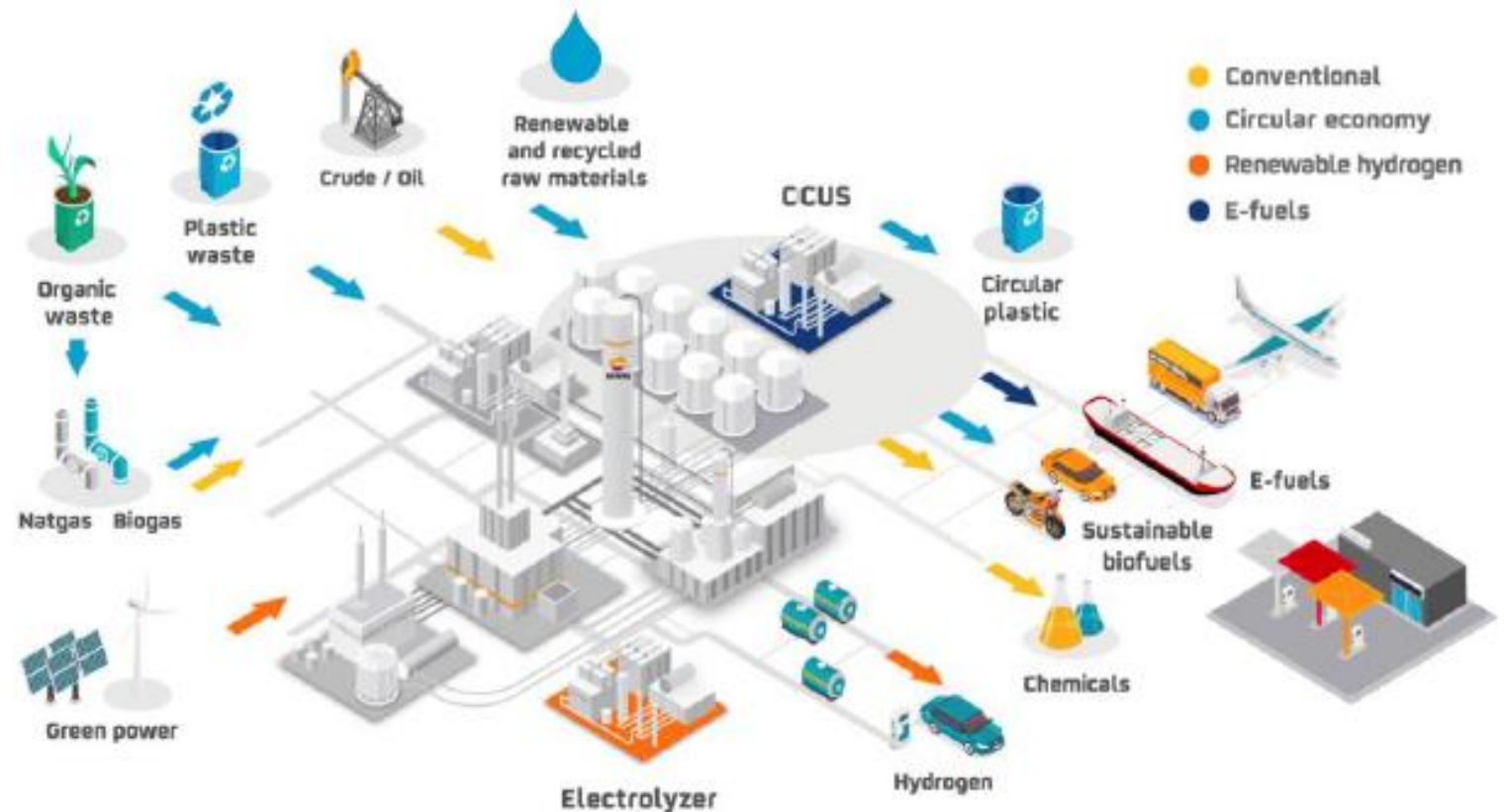


1st company in the sector with the objective



REPSOL 2050 Net Zero Emissions Commitment

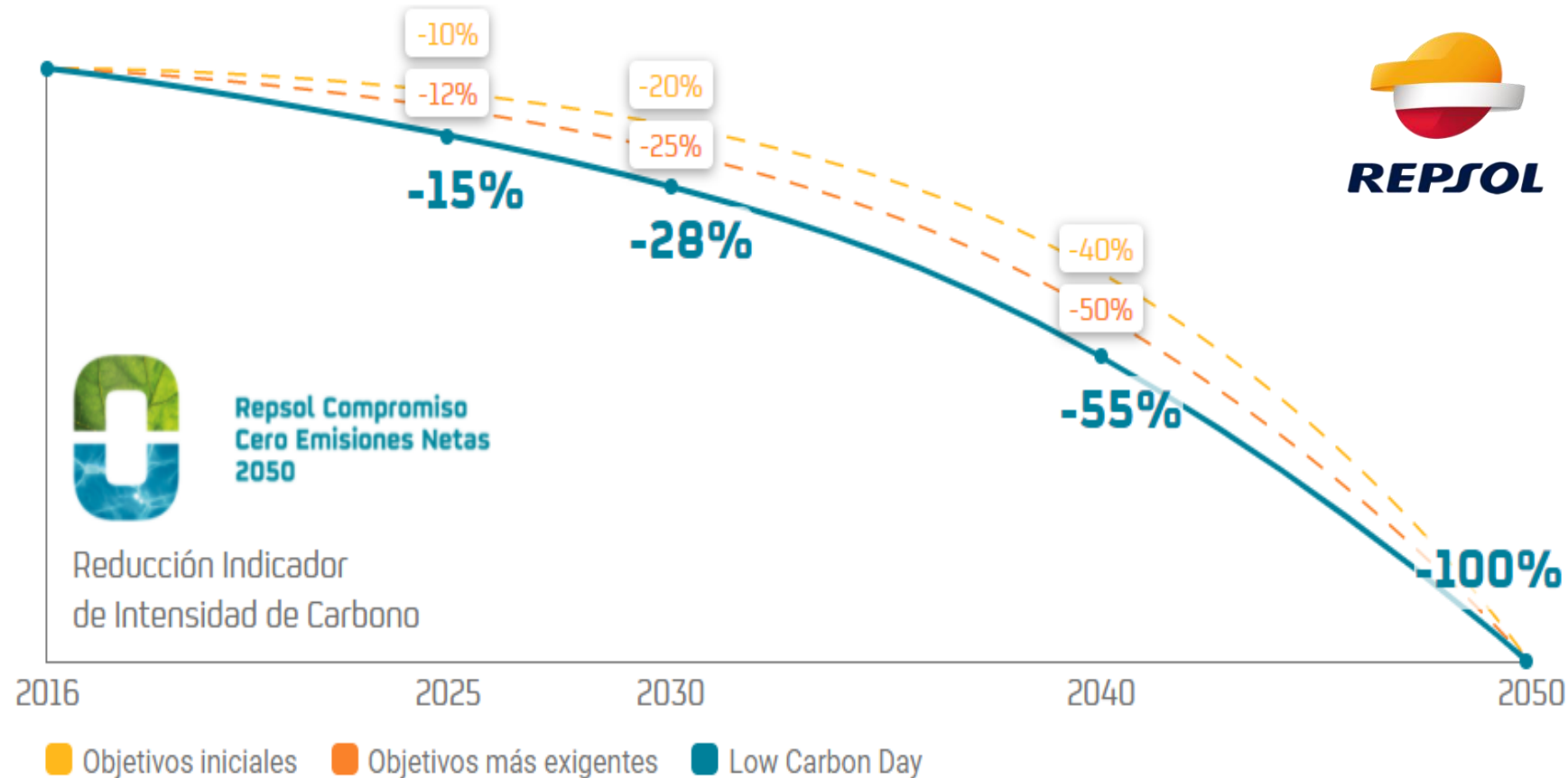
Industrial transformation



Decarbonization: Repsol Group Goals: Net zero by 2050

Commitment to achieve Net Zero Emissions for all the Repsol Group by 2050

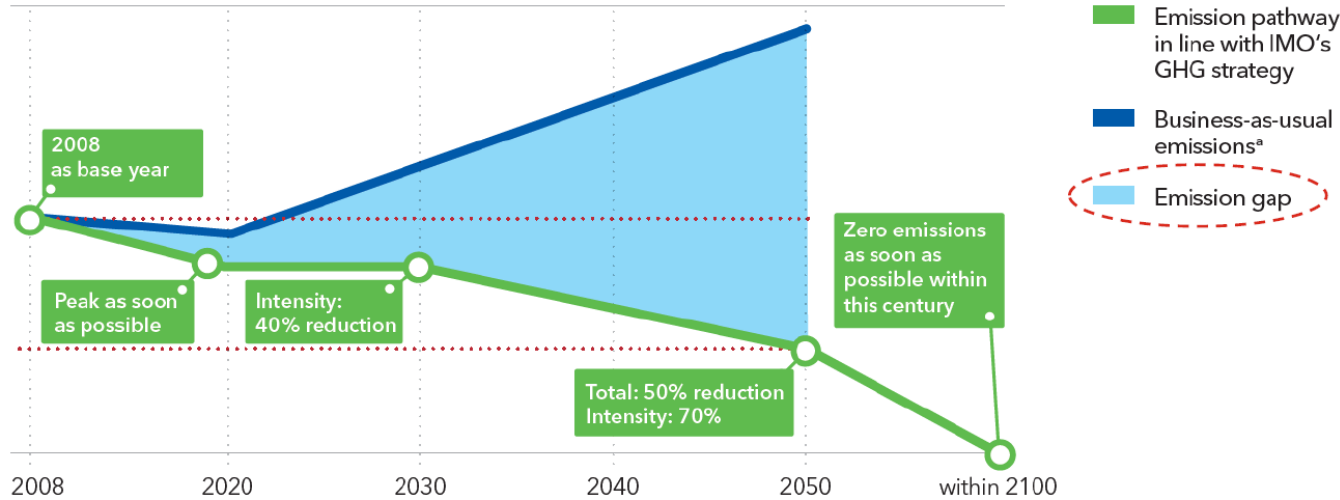
Path towards decarbonization in all group activities (Scope 1-2-3)



- Net Zero Emission Commitment 2050
- <https://www.repsol.com/es/sostenibilidad/cambio-climatico/cero-emisiones-netas-2050/index.cshtml>

Shipping sector decarbonization: energy is the key factor to achieve 50%+ emission reduction by 2050

Units: GHG emissions

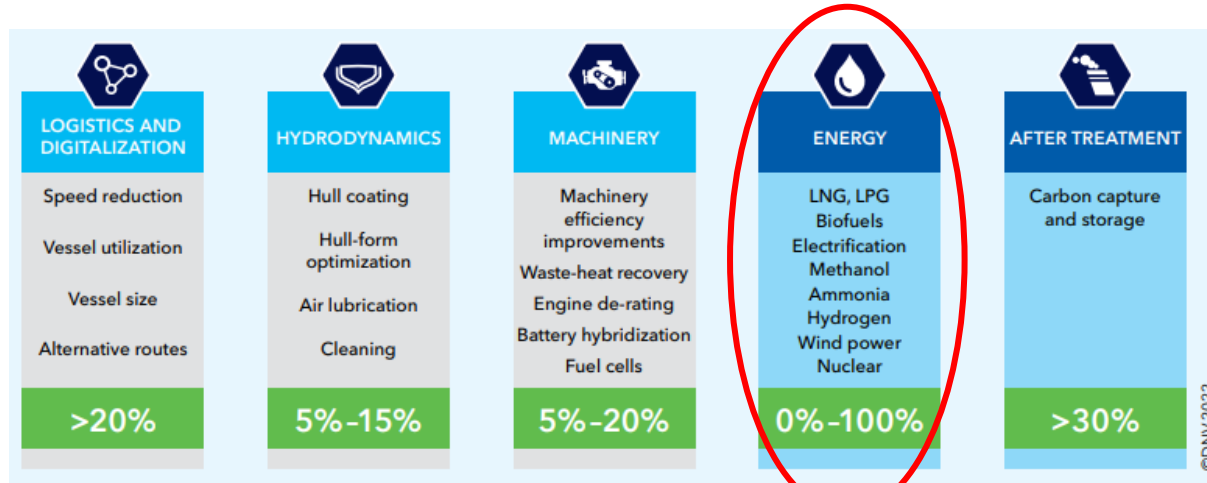


Total: Refers to the absolute amount of GHG emissions from international shipping.
Intensity: Carbon dioxide (CO₂) emitted per tonne-mile.

In line with Paris Agreement, IMO aims to cut CO₂ emissions by 50% by 2050 and 100% before 2100... or faster!

Several regulations involved:
EU ETS, CII, EEDI, EEXI, SEEMP...

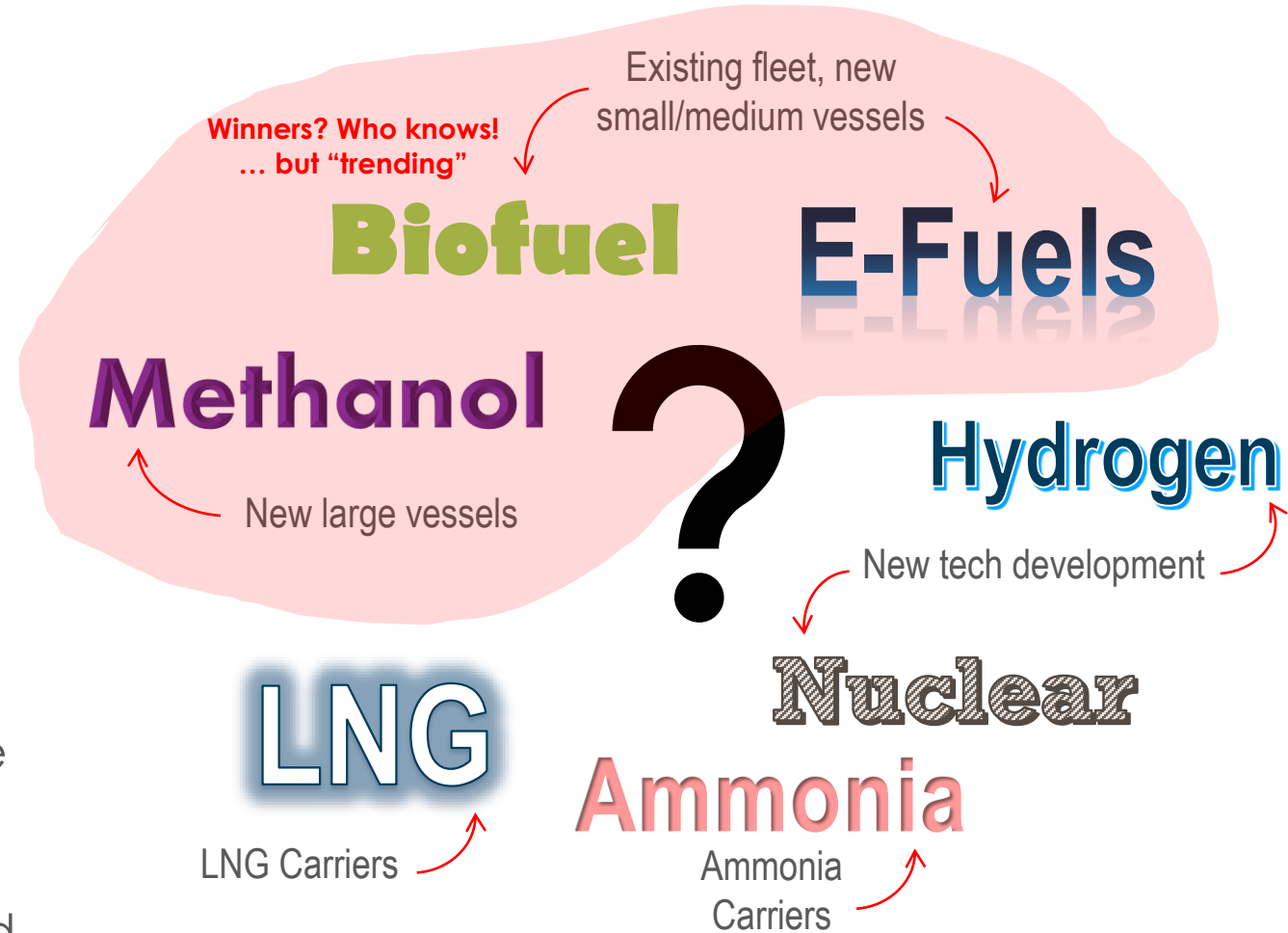
Source: DNV



...and energy is the main emissions culprit, but also brings the largest reduction opportunity

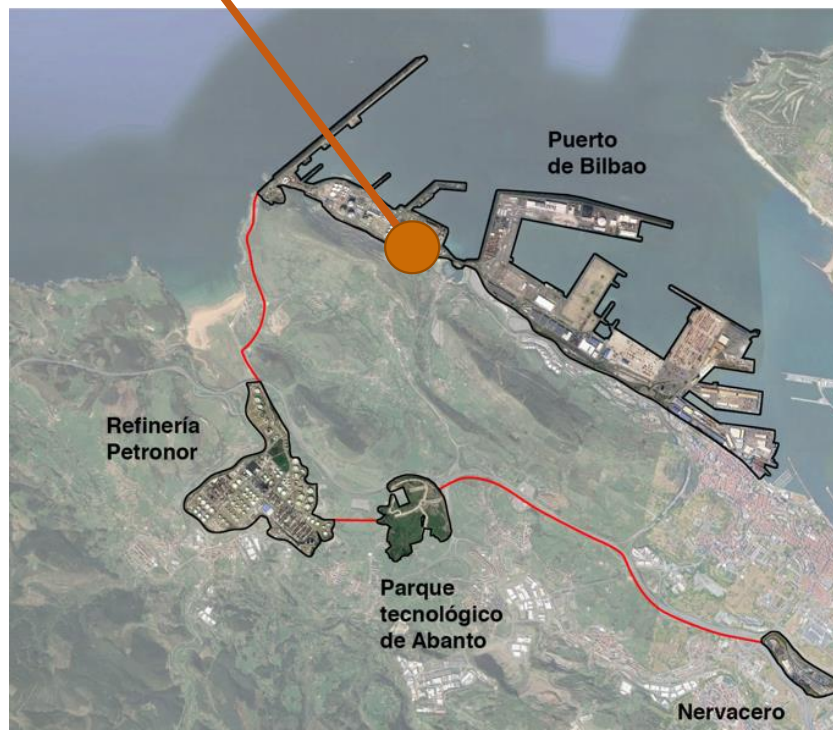
Low to zero carbon marine fuels: there are many different energy roadmap options for many different shipping needs

- Regulatory push vs Pragmatism
 - Best solution is always the minimal (or no cost) solution, e.g. operational improvement (increase efficiency, reduce speed..)
 - Need to define future decarbonization targets that fall within the lifetime of the assets (2050 targets?).
- Retrofitting the engine and vessel systems in existing fleet?
 - Key driver for the industry: Total cost!
- Availability of fuels and infrastructure in required quantities?
 - Major Ports will need to supply different energy sources and install the required bunkering infrastructures.
 - Will bio scale up?
- Drop-in decarbonization alternatives are much welcome!
 - Greening the existing fleet is the “greenest” option.
- Energy companies need to develop and provide all decarbonized products required by the market



Petronor's low carbon marine fuel pilot plants at Bilbao Port

Punta Sollana plot



Synthetic Fuels Demo plant



Renewable Hydrogen 10MW
Electrolyzer

Low Temp Pyrolysis
Biobunker plant

* Pending positive FID by Petronor and final plot assignment by APB

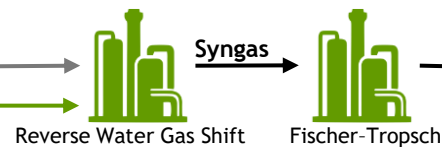
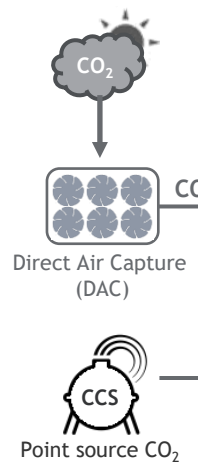
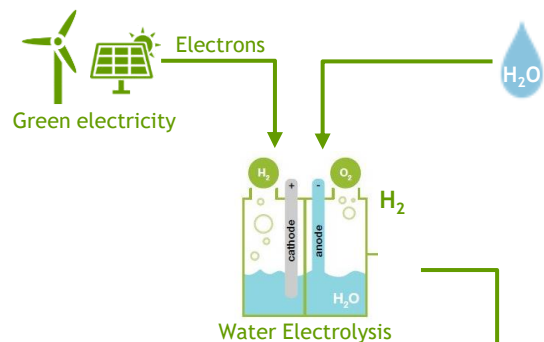
Synthetic fuel demo plant for e-diesel, e-kerosene production

E-Fuels or synthetic fuels are hydrocarbons made out of the combination of **renewable electricity** and the base molecules: **renewable hydrogen and captured CO₂**, either from concentrated sources or direct air capture (DAC)

INVESTMENT **160M€**

SOP: **2025**

Location: **Bilbao Port, decarbonization hub**

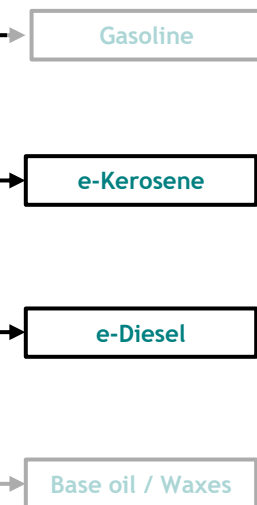


50 bbl/d
aprox.

Partners



أرامكو السعودية
saudi aramco



Low temperature Pyrolysis pilot plant for Biobunker production

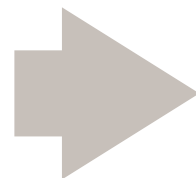
Pilot plant to create **sustainable marine biofuel (biobunker)** out of pyrolysis oil (4kta) blending with traditional fuels manufactured in the refinery (100kta)

Important step to validate the technology and industrial process before a potential scale-up in a second phase (5x)

INPUT:
Solid urban Waste



CSR
13kt/a
approx.



**Low Temperature
Pyrolysis Pilot plant**

13 kta

Technology partner



OUTPUT

3 kt Bio oils
(70% advanced bio
+ 30% circular)

Blending
↑
97 kt VLSFO

Marine LCF Blend
100 kt

2,5 kt Bio Char

9 GWha biogas

Location: **Bilbao Port,**
decarbonization hub

INVESTMENT **30M€***

SOP: **2025**

Partners



Gracias
Eskerrik asko
Thank you!

Aitor Arzuaga

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