Low Carbon Day
Driving the Refining transformation

Juan Carlos Ramírez
Dir. Planning, Logistics & Refining Sales

Berta Cabello
Head of Refining Transformation
Disclaimer

ALL RIGHTS ARE RESERVED
© REPSOL, S.A. 2021

This document contains statements that Repsol believes constitute forward-looking statements which may include statements regarding the intent, belief, or current expectations of Repsol and its management, including statements with respect to trends affecting Repsol's financial condition, financial ratios, results of operations, business, strategy, geographic concentration, production volume and reserves, capital expenditures, costs savings, investments and dividend payout policies. These forward-looking statements may also include assumptions regarding future economic and other conditions, such as future crude oil and other prices, refining and marketing margins and exchange rates and are generally identified by the words “expects”, “anticipates”, “forecasts”, “believes”, estimates”, “notices” and similar expressions. These statements are not guarantees of future performance, prices, margins, exchange rates or other events and are subject to material risks, uncertainties, changes and other factors which may be beyond Repsol’s control or may be difficult to predict. Within those risks are those factors described in the filings made by Repsol and its affiliates with the “Comisión Nacional del Mercado de Valores” in Spain and with any other supervisory authority of those markets where the securities issued by Repsol and/or its affiliates are listed.

Repsol does not undertake to publicly update or revise these forward-looking statements even if experience or future changes make it clear that the projected performance, conditions or events expressed or implied therein will not be realized.

Some of the figures included in this document are considered Alternative Performance Measures (APM) in accordance with the guidelines of the European Securities and Markets Authority (ESMA). Further information on APMs (definition, purpose, reconciliation with financial statement figures) may be found on Repsol’s corporate website.

This document does not constitute an offer or invitation to purchase or subscribe shares, pursuant to the provisions of the Royal Legislative Decree 4/2015 of the 23rd of October approving the recast text of the Spanish Securities Market Law and its implementing regulations. In addition, this document does not constitute an offer to purchase, sell, or exchange, neither a request for an offer of purchase, sale or exchange of securities in any other jurisdiction.

The information contained in the document has not been verified or revised by the External Auditors of Repsol.

#RepsolLowCarbonDay
01. Low Carbon Fuels Framework

02. Providing Short Term Value with LCF

03. What is next? Our Pathway to 2030
01. Low Carbon Fuels Framework
01. Low Carbon Fuels Framework
Transforming our business model

Raw Materials
Scope 3

&

Energy
Scope 1 - 2
01. Low Carbon Fuels Framework

Transforming our business model

1. Regulation
   - Anticipation + advocacy + local dialogue

2. Technology Development and Integration in the Value Chain
   - Cost and CO₂ Competitive
   - Optimum location and integration

3. Products Portfolio
   - Low Carbon Liquid Fuels and renewable gases + other products

4. Supply management and ecosystem development
   - Agriculture and livestock + forestry + agri-food + municipal and industrial waste

New Business Model
01. Low Carbon Fuels Framework

Regulation increases demand and promotes the development of raw materials

The regulatory framework in EU and Spain is promoting low carbon fuels and renewable gases as a decarbonization alternative for transport and other industries.
Regulation can significantly boost the development of low carbon products market

01. Low Carbon Fuels Framework

- 13% GHG reduction in transport
- 50% Renewable H₂ in the industry
- 2.6% RFNBO in transport
- 2.2% Advanced Biofuels in transport
- 5% Biojet in aviation
- 6% GHG reduction in marine

* Proposal for the revisions and initiatives linked to the European Green Deal climate actions and in particular the climate target plan's 55% net reduction target presented under the Fit for 55 package published on 2021 July 14
01. Low Carbon Fuels Framework

Technology Routes

Low Carbon Liquid Fuels

- E-fuels
- Gasification and Pyrolysis – BTL and Pyrolysis Oils
- Fermentation – Ethanol
- Lipidic Route - HVO
- Esterification - FAME

2021

Renewable Gases

- Anaerobic Digestion - Biomethane
- Gasification and Pyrolysis – Syn Gas - Hydrogen
- Electrolysis - Hydrogen

2025

2030

© Compañía. Dirección que ha elaborado el documento. Día/mes/año
01. Low Carbon Fuels Framework

Products Portfolio evolution

Middle Distillates
- Coprocessed HVO 1G
- Coprocessed HVO from UCO
- FAME
- UCOME

Biogas/LPG/H2
- Coprocessed BioC3
- ETBE
- Ethanol

Naphthas and Gasoline
- Coprocessed Bioetanol
- Advanced Biojet 1G
- Advanced Coprocessed Biojet
- H2 from electrolysis
- BioCH₄ for NGV and H₂
- Advanced BioC3
- BioCH₄ for NGV and H₂
- Advanced BioJet
- Bio In marine
- E-jet
- Bio In marine
- E-jet
- E-diesel
- Bioethanol
- E-Naphtha
- Biojet
- Others

Production

Blending

Providing Short Term Value
**Low Carbon Fuels. A reality**

**02. Providing Short-Term value**

Already a leading HVO and bio-ETBE producer in Iberia, and first biofuels marketer in Spain

Producing bio ETBE since 1998 and HVO since 2011

**Boosting production of Bio Jet**

- **Puertollano**: 1st co-processed biojet batch produced in Spain. 7,000 Tn in July 2020
- **Tarragona**: Co-processed biojet batch production. 10,000 Tn in January 2021
- **Petronor**: 1st advanced co-processed biojet batch produced in Spain. 5,300 Tn in July 2021

Testing more than 40 wastes and technologies for advanced biofuels and circular plastics

Leaders in renewable hydrogen: First production from biomethane in Cartagena steam reforming in October 2021
HVO, the best short-term route to grow in biofuels generating value

- The higher energy content of biofuels and the higher demand for diesel allow to maximize the content of renewable fuels in the market
- Greater flexibility in raw materials for advanced BIOS production
- No technical limitations for HVO
- Technical barriers to manufacturing allow higher margins
- Technologies compatible with Biojet production

02. Providing Short-Term value

Production of advanced HVO is the best option to comply with the legislation and grow in biofuels generating value
From 2025 additional drop-in biodiesel and biojet production is needed to comply with biofuels mandates.

**02. Providing Short-Term value**

**HVO and SAF demand**

![Graph showing European supply and demand balance (1G+ Advanced)](image)

Source: Argus Consulting. REDII Based. June 2021
03. Our Pathway to 2030

**HVO+SAF**

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Raw Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReFuel Aviation</td>
<td></td>
</tr>
<tr>
<td>FuelEU Maritime</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology</th>
<th>Final Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogenation</td>
<td>Transport (Road, Aviation and Marine)</td>
</tr>
<tr>
<td>Commercial</td>
<td>By-Products for: Renewable Hydrogen Chemical Industry</td>
</tr>
<tr>
<td>New units or retrofitting</td>
<td></td>
</tr>
</tbody>
</table>

**Commercial**

<table>
<thead>
<tr>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>+300 kta</td>
<td>+275 kta</td>
</tr>
</tbody>
</table>

**Initiatives**

Current Margin
250-750€/tep

Forecasted Margin
950-1,550€/tep
New Advanced Biofuels Plant in Cartagena

- **Investment**: €188 M
- **Capacity**
  - 250 kty Low Carbon Fuels
  - 300 kty Waste and Residues Input
- **Start-Up**: 1Q 2023
- **Emissions Reduction**: -900 kt/y CO₂

- **Operation modes**:  
  1. HVO  
  2. Biojet

**Raw material pretreatment** (Wastes + UCO)

**Hydrotreatment + Isomerization**

**H₂ Plant**

- Bio Propane
- Bio Naphtha
- Biojet
- HVO
To go further in this route, raw material availability is key.

Already closing raw material agreements locally and internationally

The demand for these raw materials will stimulate its availability.

Before exhausting this route we are exploring others.
03.
Our Pathway to 2030
There is enough sustainable biomass (organic waste from any kind) in Europe for obtaining the expected advanced biofuel demand in 2050*.

To realise this potential, additional R&D would be required as well as the implementation of improvement management strategies. The supply chain would need to be developed to mobilise all these resources.

* Fuels Europe Clean Fuels for All Scenarios.
Integration with the refineries

03. Our Pathway to 2030

Sustainable Fuels for road transport
Sustainable Fuels for aviation
Sustainable Fuels for marine
Petrochemical Industry
Power generation, Heating, industry, residential

Current refinery
Renewable raw materials
Renewable energy and gas

Low carbon, Liquid Fuels and Renewable Gases
Raw Material for the petrochemical industry

Secondary Conversion ➔ Products ➔ Final Uses
### Integration with the refineries

**Waste and raw materials**
- Sustainable vegetable oils
- UCO
- Lipidic Wastes
- Municipal and Industrial Solid Waste
- Plastic Waste
- Forestry, agricultural, livestock and food industry wastes
- CO₂

**Primary Conversion**
- Waste conversion to synthetic oils + Pretreatment
- Delocalized (National & International) Distributed Integrated

**Secondary Conversion**
- Renewable energy and gas

**Products**
- Low carbon, Liquid Fuels and Renewable Gases
- Raw Material for the petrochemical industry

**Final Uses**
- Sustainable Fuels for road transport
- Sustainable Fuels for aviation
- Sustainable Fuels for marine
- Petrochemical Industry
- Power generation, Heating, industry, residential

---

**03. Our Pathway to 2030**

---

**The Repsol Commitment**
Net Zero Emissions by 2050
The development of a wide pipeline of projects allows us to be ready to achieve our ambition adapting in the way to regulation, raw materials and technology.

We are ready

- Long List
- Ongoing projects
- 2030 Ambition

- Low Carbon Fuels Production Capacity: 3.5+ Mty
- 2 Mty

- 60+ Initiatives
  Multitechnology. Raw materials flexibility. Competitive

Making use of the organization know-how and capabilities
03. Our Pathway to 2030

BTL and Pyrolisis Oils

<table>
<thead>
<tr>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy Directive (RED)</td>
</tr>
<tr>
<td>ReFuel Aviation</td>
</tr>
<tr>
<td>FuelEU Maritime</td>
</tr>
<tr>
<td>Waste Directive</td>
</tr>
<tr>
<td>Farm to Fork Strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Raw Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Solid Waste (MSW)</td>
</tr>
<tr>
<td>Agriculture and forestry residues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasification + Chemical synthesis/FT + Upgrading</td>
</tr>
<tr>
<td>Pyrolysis + Upgrading</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport (Road, Aviation, Marine)</td>
</tr>
<tr>
<td>Feedstock for chemical industry</td>
</tr>
</tbody>
</table>

2025 Demo
2030 Scale-up
+130 kta

4

Initiatives

Est. Gross Margin
200 – 2,000 €/tep
03. Our Pathway to 2030

E-Fuels

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Raw Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy Directive (RED)</td>
<td>CO₂, Renewable Hydrogen</td>
</tr>
<tr>
<td>ReFuel Aviation</td>
<td></td>
</tr>
<tr>
<td>FuelEU Maritime</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology</th>
<th>Final Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Water Gas Shift – Under dev</td>
<td>Transport (Road, Aviation, Marine)</td>
</tr>
<tr>
<td>+ FT + Upgrading - Commercial</td>
<td>Feedstock for chemical industry</td>
</tr>
</tbody>
</table>

2025 Demo 2030 Scale-up
+2.5 kta

Initiatives

Est. Gross Margin
0 – 4,000 €/tep
## Advanced Ethanol

### Regulated

- Renewable energy Directive (RED)
- Waste Directive
- Farm to Fork Strategy

### Raw Material

- Organic MSW
- Agriculture residues

### Technology

- Fermentation – Scaling up

### Final Uses

- Transport (Road)
- Intermediate Product for: Renewable Hydrogen
- Jet production

### Initiatives

- Est. Gross Margin: 1,100 – 1,800 €/tep

### Demos & Rollouts

- **2025**
  - Demo
  - +8 kta
- **2030**
  - Roll out
  - +16 kta

---

03. Our Pathway to 2030
03. Our Pathway to 2030

**Biomethane**

### Regulation
- Renewable Energy Directive (RED)
- FuelEU Maritime
- Guarantees of Origin
- Waste Directive
- Farm to Fork Strategy
- ETS

### Technology
- Anaerobic Digestion + Upgrading – Commercial

### Raw Material
- Organic MSW
- Agriculture + Livestock residues

### Final Uses
- Transport (Road and Marine)
- Hydrogen production Industry – Heat, Power Residential

**2030 Commercial**

400+ GWh/a

**Initiatives**

- Est. Gross Margin
  - 450 – 750 €/tep
03. Our Pathway to 2030

Renewable Hydrogen

**Regulation**
Renewable Hydrogen EU Strategy
Renewable Energy Directive (RED)
ETS

**Raw Material**
Renewable power and water
Biomethane
Biogas
Bionaphtha

**Technology**
Electrolysis - Scaling - up
Steam Reforming - Commercial

**Final Uses**
Intermediate for fuels production
Transport
Industry
Residential
We have over 45 partnerships in the whole value chain to develop decarbonization projects.

The partnership model is flexible including co-investing, long term contracts, etc.
Repsol is the **leading HVO and bio-ETBE producer in Iberia**, and **first biofuels marketer in Spain**.

We incorporate biofuels in our products since 1998.

Clear pipeline to 2025 with **Cartagena advanced biofuels plant** as main project ready in 1Q23.

**Wide pipeline of initiatives** to achieve our 2030 goals:

- Application of different technologies
- Flexibility in raw materials
- Strategic partnerships

Applying **strengths** and **know how** of the traditional business to new developments: Competitiveness, integration and flexibility.
Low Carbon Day

Investor Relations
investor.relations@repsol.com

#RepsolLowCarbonDay
www.repsol.com