ESG DAY 2023

Renewable Fuels and Circular Materials.
Synergies and opportunities for Repsol's Industrial Business

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The Repsol Commitment
Net Zero Emissions
by 2050

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In October 2015, the European Securities Markets Authority (ESMA) published its Guidelines on Alternative Performance Measures (APMs). The guidelines apply to regulated information published on or after July 3, 2016. With effect from January 1, 2023, Repsol has revised its financial information reporting model. More details about said change and all the information and breakdowns relative to the APMs used in this presentation are available on Repsol´s website.

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REPSOL

01.

Repsol’s Value Proposal

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In the current context, four main trends are encouraging the development of a carbon neutral business based on renewable fuels and circular materials

Energy transition and independence

- Fit for 55 sets targets to reduce greenhouse gas emissions by at least 55%. It includes:
  - RED II revision (RED III)
  - ReFuelEU aviation
  - FuelEU maritime
  - Energy Taxation Directive (Directive 2003/96/EC)
- European energy independence: REPowerEU accelerates energy transition to decrease dependency of fossil fuels coming from Russia

Circular economy regulatory push

- Circular economy regulatory measures will stimulate a feedstock market to be recycled or recovered:
  - Waste Framework Directive to reduce landfilling to 10% in 2035
  - Packaging and Packaging Waste Directive (under revision)

Client demand

- Relevant companies in airlines and chemicals sectors are pledging to become net zero and demanding sustainable products such as renewable fuels (i.e. SAF, methanol) and sustainable chemicals in response to customer demands and to shareholders' pressure
- Circular plastics have a low impact on final end customer manufactured goods prices

Competitiveness of green solutions

- Natural gas prices could remain structurally higher than historical values in the long term due to substitution of Russian pipelined natural gas by LNG
- CO_2 emission prices have also significantly increased and will increasingly play a relevant role in production costs and make profitable technologies to reduce emissions (that were not viable with historical prices)

Public aid will also play an essential role: EU State Members have committed cumulative investments of ~450 B€ per year in their National Energy and Climate Plans while, in the US, significant supply incentives are coming through IRA

Repsol has the flexibility to provide the best decarbonization compliant option for customers

Repsol

Repsol has its own regulatory targets as fuel supplier and industrial company:

- Refining & Chemicals: process decarbonization for ETS/CBAM
- Customer Centric: RED and ReFuel Aviation.

We have the capability to provide the most competitive compliant option with a differentiated commercial strategy

Other regulatory opportunities

Repsol can provide competitive product to third parties to comply with regulation:

- Other fuel suppliers: renewable fuels to comply with their RED targets
- Maritime: ship owners and operators compliance with FuelEU Maritime, ETS and IMO requirements.
- Aviation: airlines compliance with ReFuel Aviation, ETS and ICAO requirements.
- Materials: Provide raw materials to produce circular plastics to increase recycled content in packaging and auto industry
- Industry: H_2, biomethane and HVO in industrial processes for ETS and RED.

IBERIA · RYANAIR · AirEuropa · RoyalCaribbean INTERNATIONAL

Voluntary Goals

Players in different sectors are voluntarily committing to sustainability goals

Repsol integrated strategy will enable a 360º approach to tailor its offering to clients needs in renewable fuels, renewable gases & circular materials

Sesé · Grupo Tragsa · LEROY MERLIN · GESTAIR · XPOLogistics

Circular Economy makes sense

7 Mt/y de CO_2

avoided in 2030

Decarbonization of key sectors:

transport, Industry and materials…

… through our **circularity value chain**…

Waste primary transformation

Value creation to local and rural areas

Existing sites

Industrial Transformation

3 Mt/y waste

... through **waste valorization** (Municipal, primary sector and plastic waste)

Repsol can provide a sound response to waste management with its projects

Used Cooking Oil

To avoid water contamination and waste treatment costs

Biomethane from manure

To avoid water and soil contamination

Material recovery of plastic waste

To avoid landfilling and maximize material valorization

Valorization of rejects from Municipal Solid Waste

To avoid landfilling

Valorization of agricultural and forestry waste

To avoid wildfires and landfilling

Material recovery of foam matresses

To avoid landfilling and maximize material valorization

+ Maximum carbon recovery from waste thanks to hydrogen and materials production

*MSW: Municipal solid waste

Repsol is able to integrate different technologies to cover demand with competitiveness

		Description
Higher maturity	1 **Lipid hydrotreating**	Biofuels production by hydrotreatment of lipid raw material
	2 **Mechanical recycling**	Production of circular polyoelfins through mechanical recycling of Municipal Solid and Industrial Waste
	3 **Biomethane** (anaerobic digestion)	Digestion of manure, biomass, Municipal Solid and Industrial waste for biogas production and upgrading to biomethane
	4 **Electrolysis**	Obtention of renewable H_2 through water decomposition by employing renewable electricity
	5 **Gasification**	Synthesis of both circular materials and renewable fuels from biomass and Municipal Solid Waste
	6 **Pyrolysis**	Production of circular polyolefins through chemical recycling of Municipal Solid and Industrial Waste
	7 **Fermentation** (alcohols production)	Production of renewable fuels through the fermentation of biomass (mainly agricultural)
Lower maturity	8 **E-Fuels**	Synthesis of renewable fuels employing biogenic CO_2 and renewable hydrogen (RWGS+FT[1], e-methanol based)

Low-Risk Tech | **First-of-a-kind** projects | **Technology optionality** | * Proposals

| 1. Reverse Water Gas Shift + Fischer Tropsch, demo plant in Petronor

Repsol is able to integrate different technologies to cover demand with competitiveness

Higher maturity

Lower maturity

		Description	Contribution to Regulation
1	**Lipid hydrotreating**	Biofuels production by hydrotreatment of lipid raw material	RED III; Fuel EU Maritime; ReFuel Aviation; Waste Framework
2	**Mechanical recycling**	Production of circular polyoelfins through mechanical recycling of Municipal Solid and Industrial Waste	EU PPWR Proposal Vehicle design; Waste Framework
3	**Biomethane** (anaerobic digestion)	Digestion of manure, biomass, Municipal Solid and Industrial waste for biogas production and upgrading to biomethane	RED III; Fuel EU Maritime; ReFuel Aviation; ETS/CBAM; Waste Framework
4	**Electrolysis**	Obtention of renewable H_2 through water decomposition by employing renewable electricity	RED III; Fuel EU Maritime; ReFuel Aviation; ETS/CBAM
5	**Gasification**	Synthesis of both circular materials and renewable fuels from biomass and Municipal Solid Waste	RED III; Fuel EU Maritime; ReFuel Aviation; EU PPWR* Vehicle design*; Waste Framework
6	**Pyrolysis**	Production of circular polyolefins through chemical recycling of Municipal Solid and Industrial Waste	EU PPWR Proposal; Waste Framework
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Low-Risk Tech | **First-of-a-kind** projects | **Technology optionality** | * Proposals

| 1. Reverse Water Gas Shift + Fischer Tropsch, demo plant in Petronor

02.

Waste to Fuels and Materials.
Opportunities and synergies

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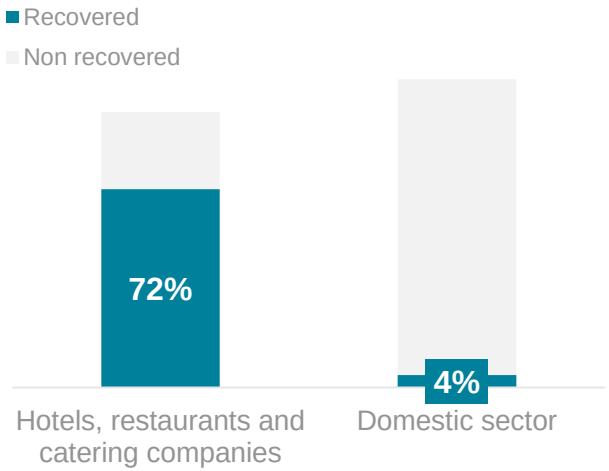
As part of feedstock strategy, Repsol is contributing to UCO recollection

Current situation



Environmental challenge and Legislative objectives

Waste and contaminated soils Law stablishes the obligation from municipal entities to collect in a segregated way the used cooking oils produced in homes starting December 31st 2024.

To achieve this objective, it is necessary to deploy a collection system for the domestic channel, as well as incorporate new waste treatment and recovery technologies, and new actors that are capable of marketing the products on the market.

The Spanish Government through its PNIEC 2021-2030 also reflects the importance of the collection of used cooking oil and its transformation into biofuels for the reduction of emissions derived from its inadequate management, as well as providing other benefits such as the contribution to renewable energy objectives and the reduction of the risk of contamination of waters and aquifers

ESOPO Project: a comprehensive solution to recover used cooking oil (UCO)

Customers can deliver used cooking oil at Service Stations → UCO delivery is rewarded with balance in Waylet → A certified aggregator will collect and filter the oil → Repsol will transform the UCO into biofuels

Pilot Madrid April 2023 – 135 EESS

Signed agreements with 2 regional governments (Madrid and Galicia), 2 under way

Current 153 EESS

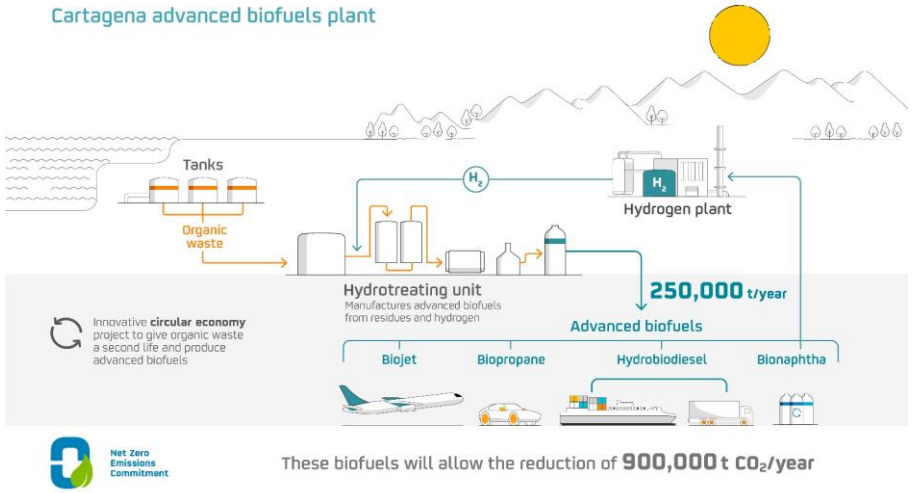
Source: Geregras (2022)

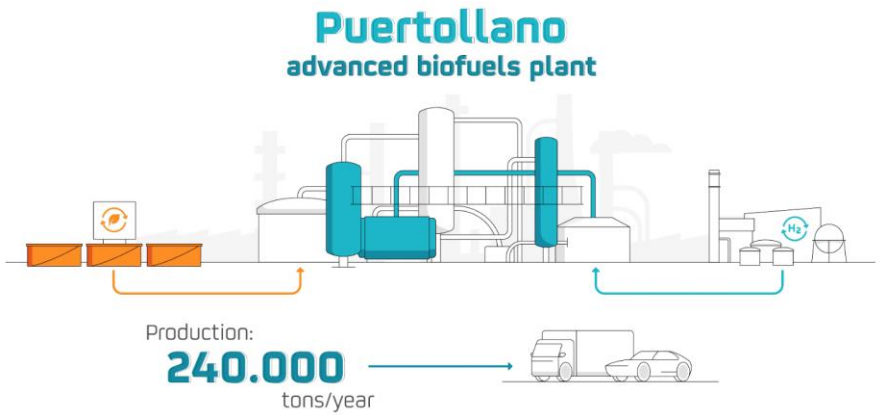
Lipid Waste to Renewable Fuels. Value creation leveraged in current assets with a very competitive CAPEX/production ratio

	New Unit – Cartagena C43	Retrofitting 100% - Puertollano Diesel Desulfurization unit
Capex	~ 250 M€	~ 130 M€
Production capacity	250 kt/y HVO or 195 kt/y SAF	240 kt/y HVO, bionaptha and bioLPG
Capex ratio	~ 1 k€/t HVO	~ 0.65 k€/t HVO
Flexibility	Possibility of feeding raw material with high/low acidity and production capacity of HVO or SAF	Possibility of feeding raw material with low acidity and produce HVO
EBITDA	350 – 650 €/t feedstock	

+

Coprocessing
> 500 kty Very competitive but less flexible available capacity





Biomethane as proper management of livestock waste essential to avoid contamination problems in soil, water and atmosphere

Current situation of livestock waste in Spain

Spain	> 200,000	**Livestock farms**
	>100 TWh	**Biomethane production potential**

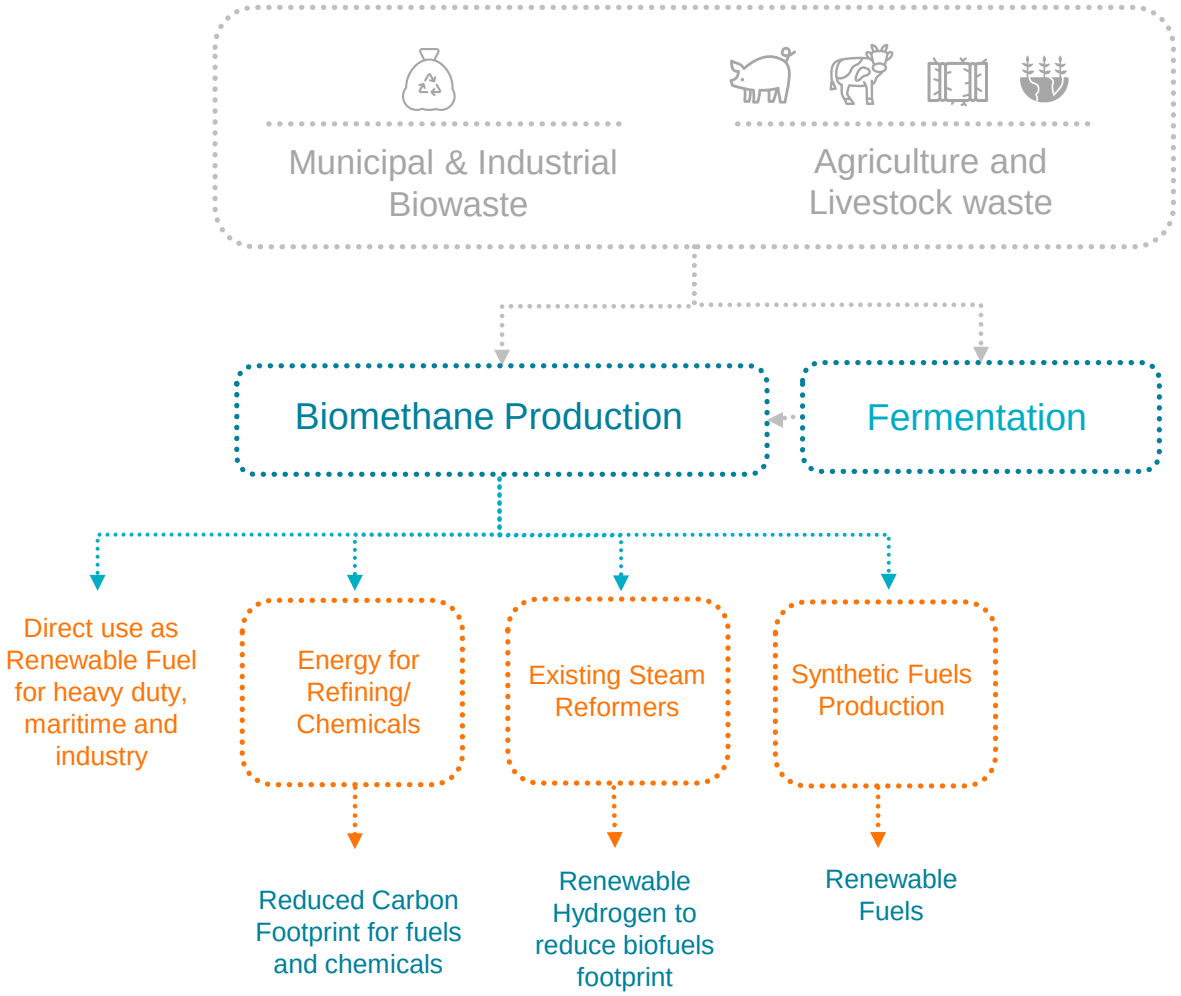
- The development of livestock farming has led to an increase in the volume of livestock waste and, therefore, new solutions are required for its management.
- It is necessary to carry out a correct management of this waste to avoid important environmental consequences in soils, water and atmosphere.
- Livestock sector is key in Spain, specially in rural areas.

Regulation

- Spain has the objective of reducing emissions from diffuse sectors by 37.7% by 2030. Besides, the PNIEC establishes in its objective scenario a reduction of 4 Mtpa of CO2 in 2030 for the livestock sector.
- The European Commission recommends the reduction of methane emissions from livestock by developing the production of renewable energy, investing in anaerobic digesters to produce biogas from waste such as manure.
- The application of manure and slurry directly to the soil is limited by law. It establishes the requirement to adopt measures in its application and storage to avoid emissions of ammonia and greenhouse gases and limits the injection of nitrogen in vulnerable areas.

Spain has the potential to be the 2nd producer in Europe

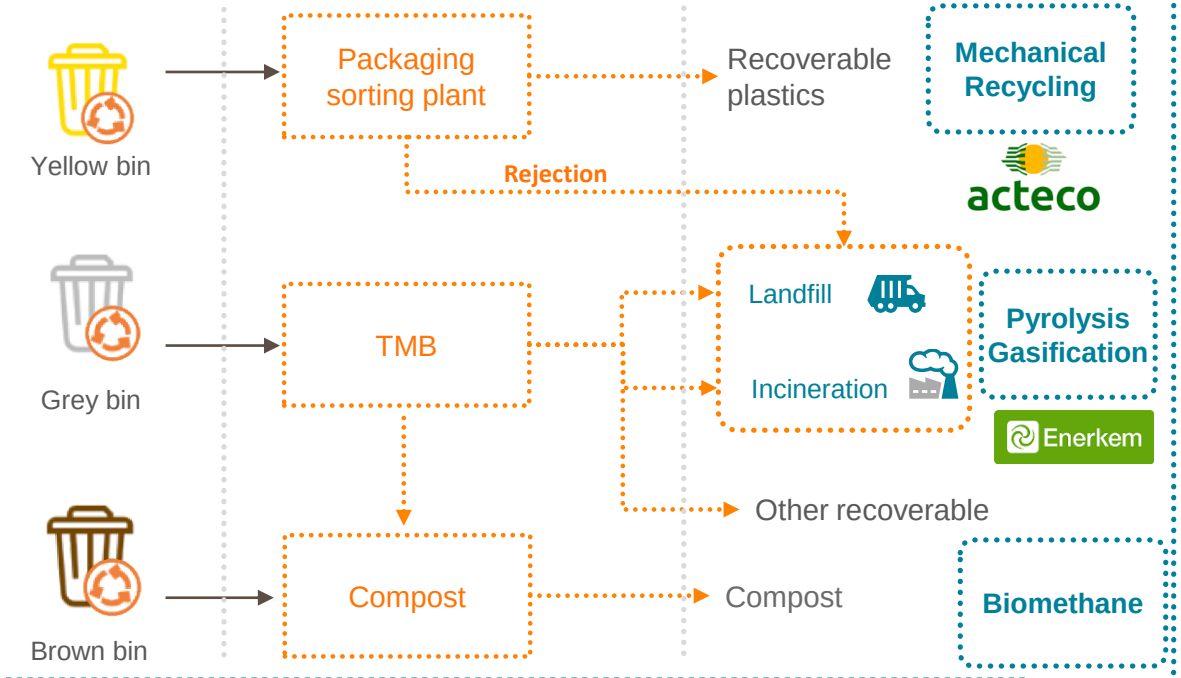
Repsol upsides in Biomethane value chain



Flagship initiative	Galicia Manure Project
Production capacity	600 GWhy Biomethane
Use of residues	Manure / Organic MSW/ISW
Projected number of plants	10

Gasification is key to achieve EU waste management objectives

Waste management



Currently, landfilled waste in Spain is 53% and only 35% is recycled.

Legislative objectives

Spanish legislation (Law on waste and contaminated soils) establishes ambitious objectives on the 2025-2035 horizon that require changes to current waste management schemes.

	2030	2035
% waste to landfill	20 %	10 %
% preparation for reuse and recycling	60 %	65 %

Additionally, the Law on Waste and Contaminated Soils contemplates a new minimum national tax (*) for landfill and incineration (€30/tn for landfill and €10/tn in the case of incineration for municipal waste rejection).

(*) minimum that can be increased in the different regions

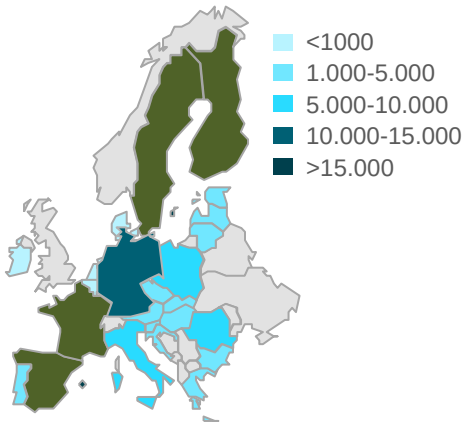
Towards a circular management of waste

Spain has great potential for biomass resources and its valorization can bring important benefits

Current situation

Agricultural and forestry residues are among those with the greatest volume and potential and have multiple technological options for their use.

Wooded land in EU (thousands ha)



Spain has more than 17.5 Mt of biomass dry matter available per year, with a total potential of 36.7 Mt with a huge potential in terms of biomass resources:

EU rank

#3	Wooded land
#2	Highest agricultural production

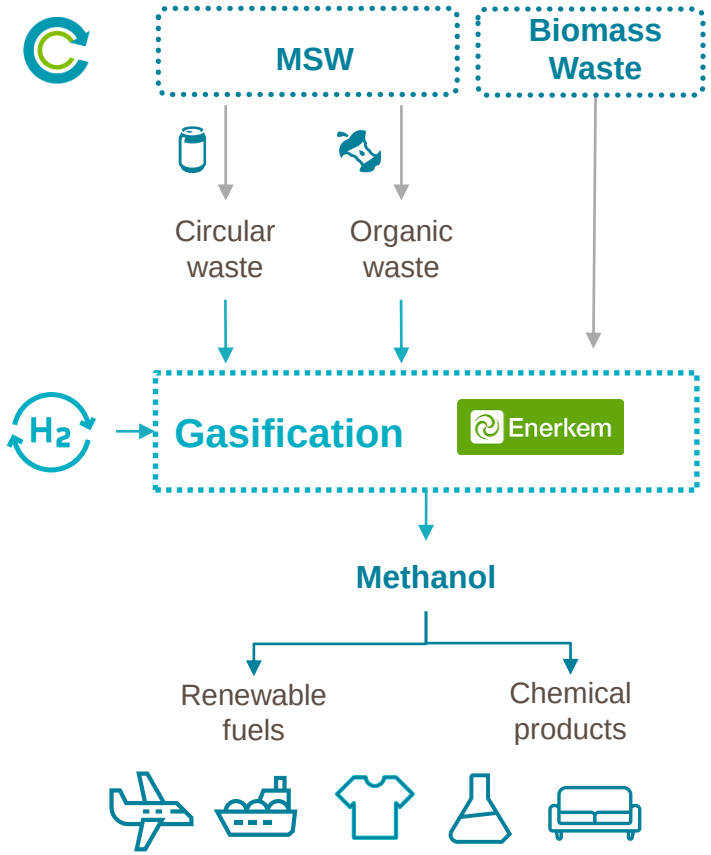
Benefits from valorization

- Prevention of the spread of uncontrolled fires.
- Minimization of the spread of pests and diseases in agricultural crops.
- It offers new options for the agricultural sector such as the use of vacant land or the introduction of rotating crops, without displacement of existing crops.
- Economic development in rural areas is promoted, generating jobs in areas affected by depopulation, thus contributing to a fairer transition, and to the revitalization and structuring of the territory.

Source: Eurostat (2020), Avebiom.

Gasification allows to treat waste that otherwise would be sent to landfill and helps wildfires prevention

Gasification process



Reduction of landfill rate

Using the waste that is currently being sent to landfill contributes to the objectives of: increasing waste recycling rates and reducing landfill rates.

Technology

Enerkem

Enerkem is the technology chosen for this Project, a strategic partner in which Repsol invested in 2022. Enerkem has an industrial demo operating since 2016, de-risking future investments

Ecoplanta

Project has been awarded with the **Innovation Fund** grant and has been one of the seven chosen projects amongst more than 300 projects in 2021.

Co-funded by the European Union

Ecoplanta

Production capacity	240 kt/y Methanol
Use of residues	MSW / biomass waste
EBITDA	~ 500 €/t MOH
Flexibility	HIGH Co-production of biomethanol / circular methanol and e-methanol Biomass and MSW Feedstock

What's next

5 initiatives under dev

Up to 2.4 Mty waste and 1.5 Mty methanol

Our initiatives are integrated creating additional value

Renewable Hydrogen as feedstock for ...

Renewable hydrogen as an enabler for renewable fuels and circular chemicals production

H_2 needed to improve H/C ratio and energy content

Renewable H_2 improves GHG footprint for biofuels

All phase 1 projects funded by EC or Spanish Government.

Renewable Fuels coproduced with…

…competitive thanks to our Industrial Sites

Industrial infrastructure and know-how

CAPEX reduction, reliability increase

Circular Materials

Material valorization of waste is needed. Repsol offers fuels and materials valorization having better access to waste

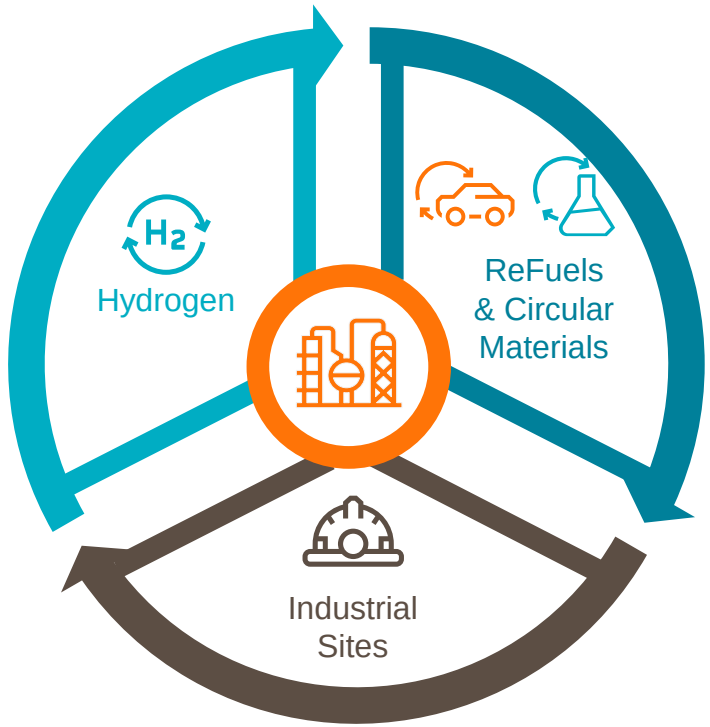
Processing mixed organic and plastic waste has value for Repsol

Flexibility to use bioproducts (BioLPG, Naphtha, HVO) in fuels or materials

The integration goes beyond industrial business

Low Carbon Generation

Repsol's low carbon generation and pipeline gives us presence in the whole value chain as renewable electricity is key for hydrogen and renewable fuels production.



Customer Centric

Repsol has a strong track-record and know-how in commercializing a wide variety of products being the leader in Iberia.

Puertollano Renewable and Circular Site Case. Synergies

2024 Biomethane

2021 UCO and other lipid waste

2015 Plastic waste pyrolysis oil

2022 Plastic waste

2023 Foam matresses waste

2024 Existing H_2 Plant

2026 New Electrolyser

Renewable H2

2025 Transformed Diesel Desulf Unit to HVO

BioNaphtha Biogas

Current Industrial Site

2022 New Reciclex

2023 New RecPUR

2025-6 Solar PV Self consumption

HVO / SAF

Bio and Circular polyolefins

Bio and Circular polyols

Our inland refinery is already a recognized reference for circular materials and biofuels production, with several projects underway for biofuels and hydrogen.

The refinery employs ~1300 people directly and ~1900 indirect, a ~7% of total population. Additionally, around 4000 employments are induced to the site activity.

03.

Conclusions

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Repsol can rely on its competitive advantages to give a solution for decarbonization of our customers and waste management

01

Industrial sites across Iberia

- 1st quartile refining assets can be retrofitted to carbon neutral production
- Repsol's influence in Iberia is relevant for direct access to feedstock
- Iberia has cheap renewable electricity

02

Integration throughout value chain

- Presence in all the value chain from waste and renewable electricity to final customer
- Repsol's activities can provide critical feedstocks (renewable H_2, biogenic CO_2, etc)
- Repsol can benefit from its position as producer and consumer

03

Fuels, Hydrogen and Chemicals integration

- 360º approach to waste, valorization routes and technologies
- Repsol to produce ren.fuels and circular materials depending on feedstock availability and market conditions, pivoting in intermediate products (e.g., methanol)

04

International presence and partnerships development

- Repsol's international presence and size position the company as a suitable partner for companies in the low-carbon business
- Repsol has developed a strong portfolio of collaborators and partnerships across the whole value chain

Complex project execution experience with large industrial transformations already developed

THANK YOU

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