Net zero solutions for Pulp&Paper industry

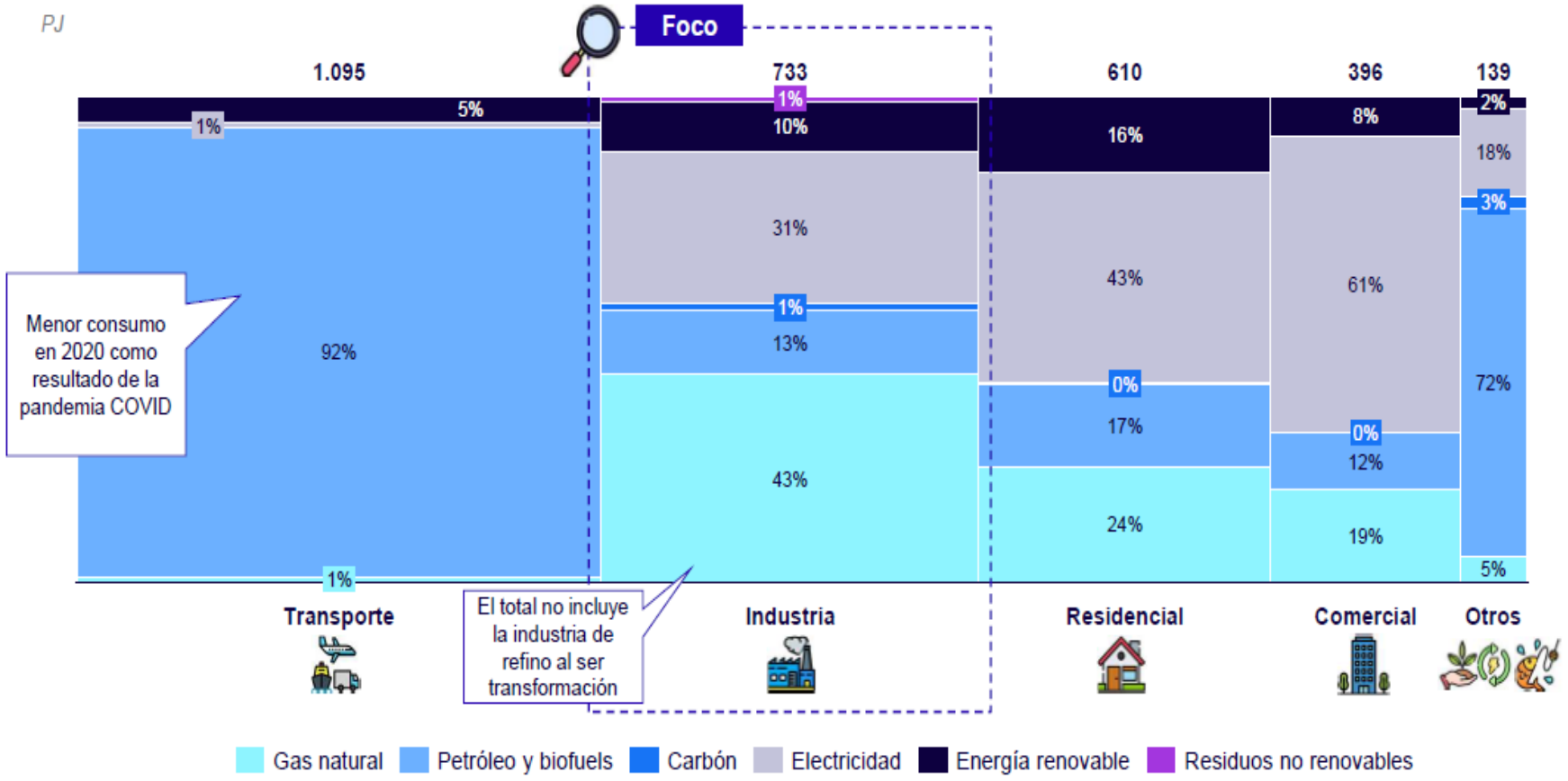
Seminario Cátedra transición energética fundación Repsol ICAI

Repsol Net Zero emissions commitment for 2050

1 THE CHALLENGE

INDUSTRIAL TRANSFORMATION VISION

Consumo de energía por sector y tipo de combustible en 2020



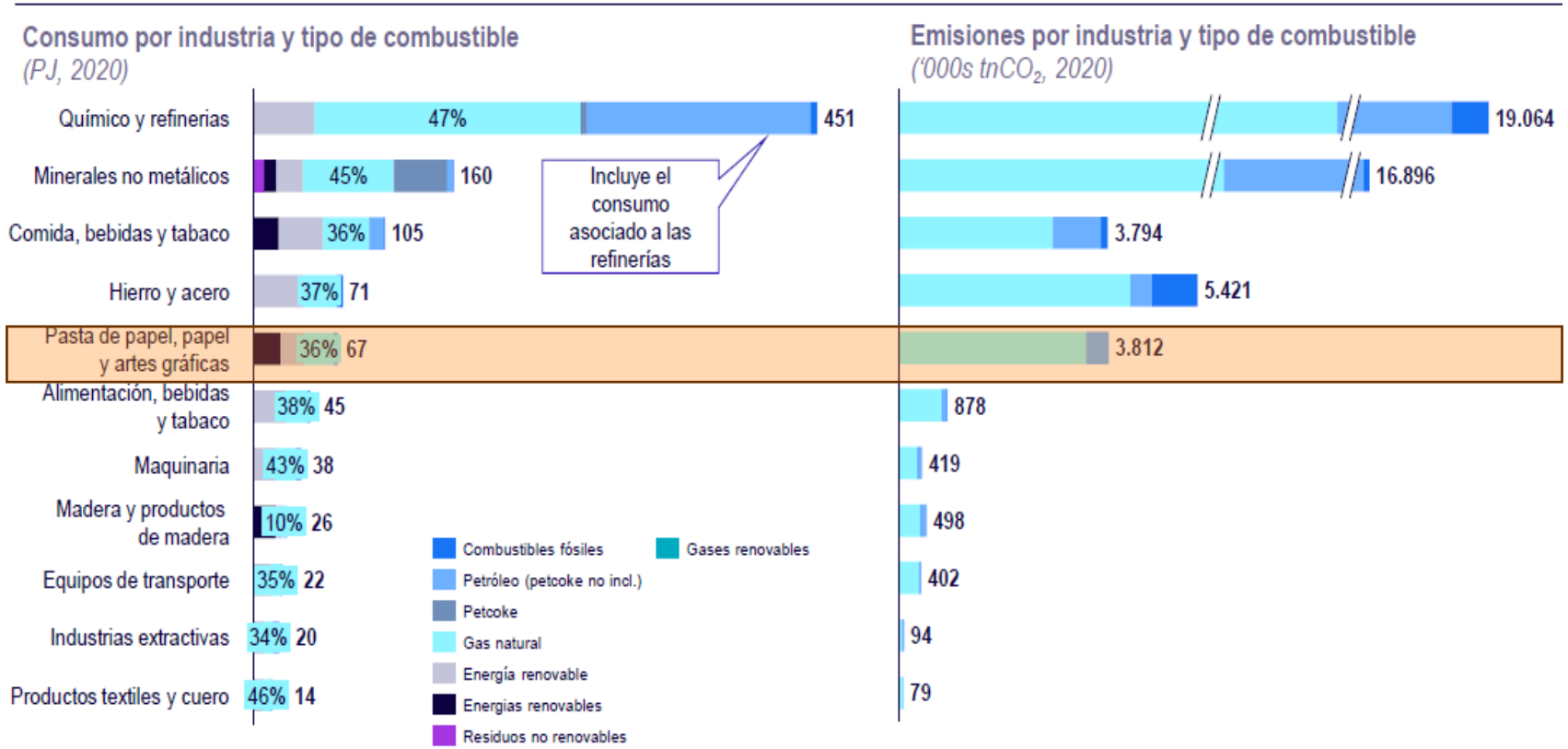
Fuente: Ministerio para la Transición Ecológica y el Reto Demográfico, Arthur D. Little análisis

KEY TAKEWAY

Industry and transport are main energy consumers.

1 THE CHALLENGE

INDUSTRIAL TRANSFORMATION VISION



Fuente: IDAE, PRTR, Arthur D. Little
Notas: (1) No metálicos; (2) Alimentación, bebidas y tabaco; (3) el total indicado no incluye los consumos ni emisiones asociados a "No especificado en otras partidas de la industria" y se ha procedido a incluir dentro de la industria química y refino el consumo y emisiones asociado a las refinerías

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KEY TAKEWAY

Pulp & paper industry uses high rate of renewable energy but still a significant amount on NG to cover energy process requirement

1 THE CHALLENGE

THE 3 LEVELS

LOGISTIC

Minimize GHG footprint associated to logistic operations

1

PROCESS

Minimize GHG footprint associated to production

2

WASTE MANAGEMENT

Pulp & paper residues converted to new advanced biofuels and material.

3

2 DECARBONIZING LOGISTIC

Low carbon fuels Roadmap

	SUSTAINABLE LIQUID BIOFUELS	SUSTAINABLE GAS BIOFUELS		COMBUSTIBLES SINTÉTICOS (E-FUELS)
	ETBE, Ethanol, FAME, HVO	Bio methane Bio LPG Renewable Hydrogen in liquid fuels	Renewable Hydrogen	E-diesel
	FAME, HVO			
	Bio jet (SAF)	Renewable Hydrogen in liquid fuels		E-jet
	Bio bunker	Bio methane Renewable Hydrogen in liquid fuels		E-diesel
	Bio naphtha	Bio LPG		E- naphtha

TIMEFRAME	1998-2020	2021-25	2026-30

KEY TAKEWAY

Substitute use of conventional fuels by advanced biofuels &synthetic fuels

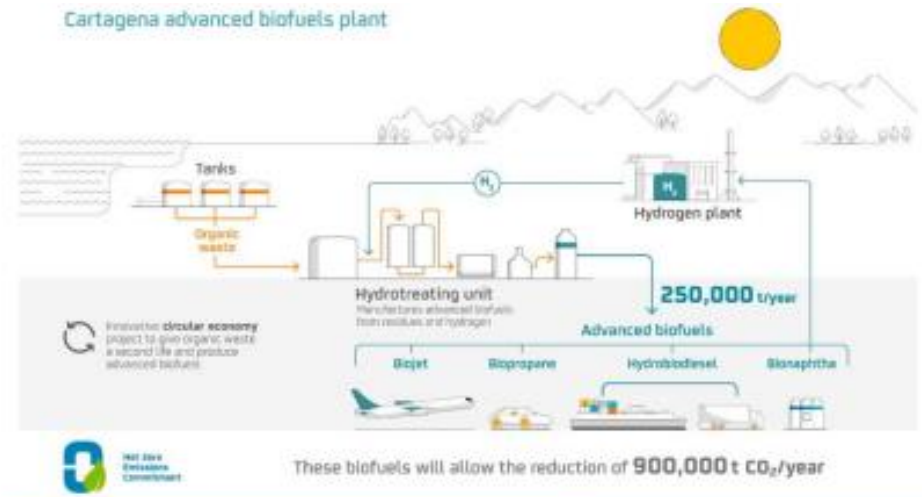
2 DECARBONIZING LOGISTIC

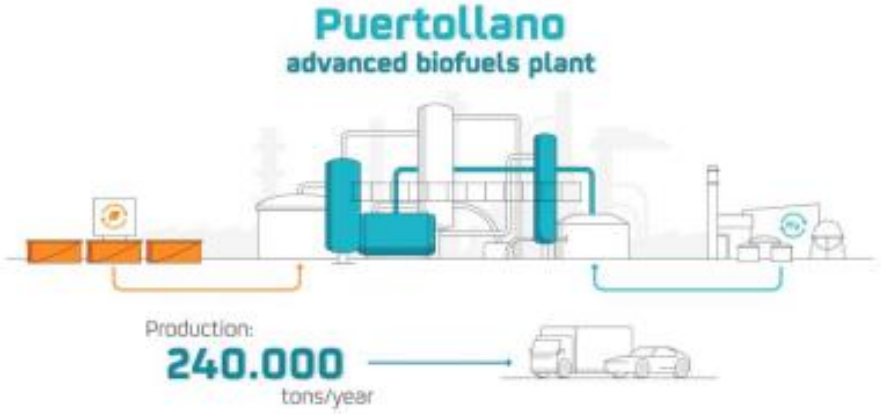
Logistic footprint. Advanced fuels

	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
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

+

Coprocessing
> 500 kty Very competitive but less flexible available capacity



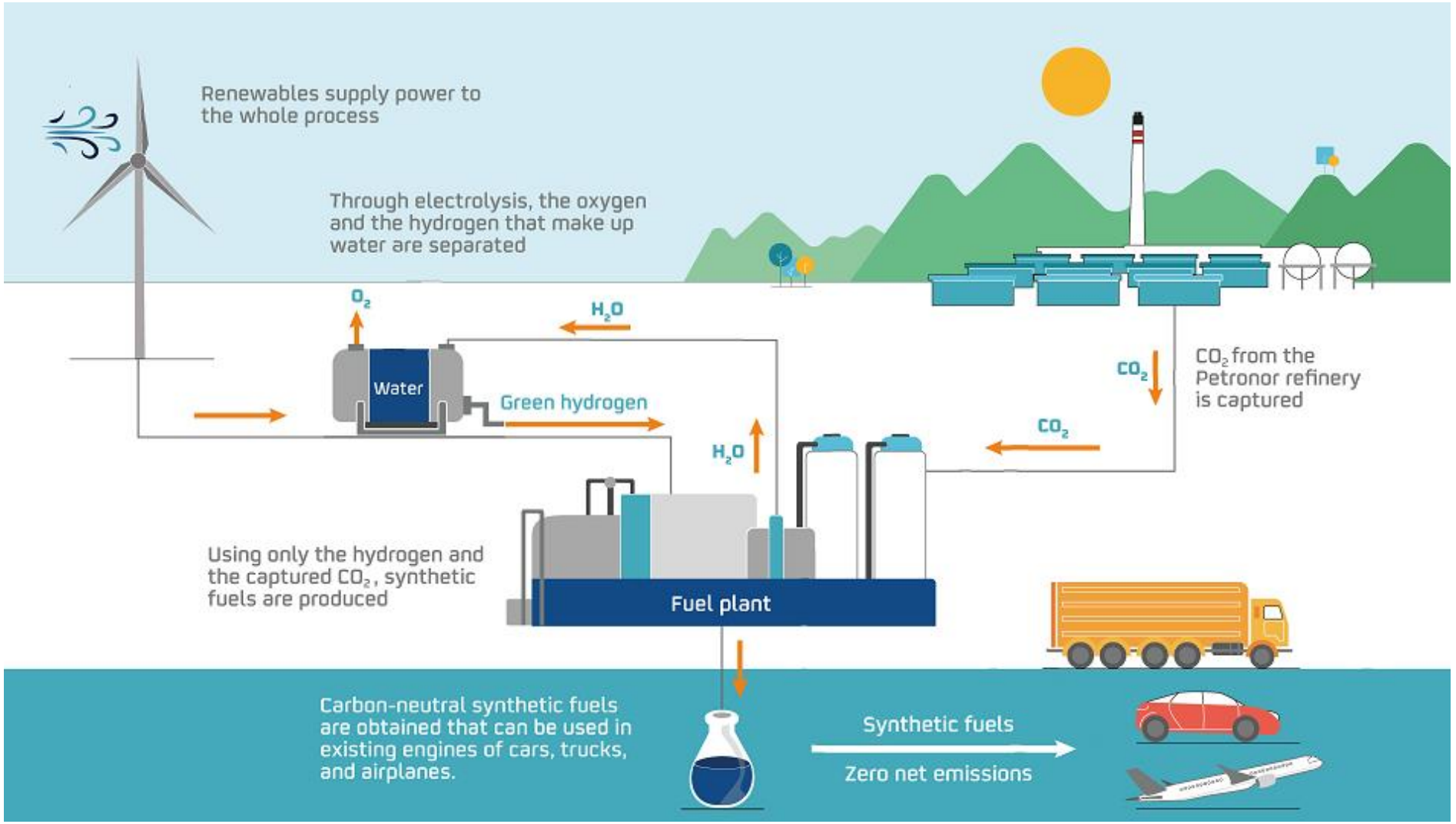


KEY TAKEWAY

Substitute use of conventional fuels by advanced biofuels &synthetic fuels

2 DECARBONIZING LOGISTIC

Logistic footprint. Synthetic fuels



Demo e-Plant in Petronor Harbour

KEY TAKEWAY

Substitute use of conventional fuels by advanced biofuels &synthetic fuels

3 DECARBONIZING PROCESS

Process footprint.

	ENERGY EFICIENCY	RENEWABLES + ELECTRIFICATION	RENEWABLE FUELS	CCUS	LOW CARBON HYDROGEN
	REDUCE	**ELECTRIFICAR**	**RENEWABLE FUELS**	**CO2 CAPTURE**	**H_2**
TECH. PATHWAYS	Low temperature streams recovery – Head pumps EMS IoT & IA Operative excellence	Electrification Renewables (Eolic, Solar, Geothermic)	Biomethane Biogas Pyrolisis oils Bio char	CO_2 Capture CO_2 Transportation CO_2 Storage CO_2 Use	Blue Hydrogen Green Hydrogen
USES	Tasks automatization Real time monitoring and optimizing	Dynamics machines Low carbon steam generation Low carbon heat generation Industrial cold generation	Low carbon heat generation Low carbon steam generation	mineralization New materials (synthetic chemicals)	Hydrogen as raw material Hydrogen firing

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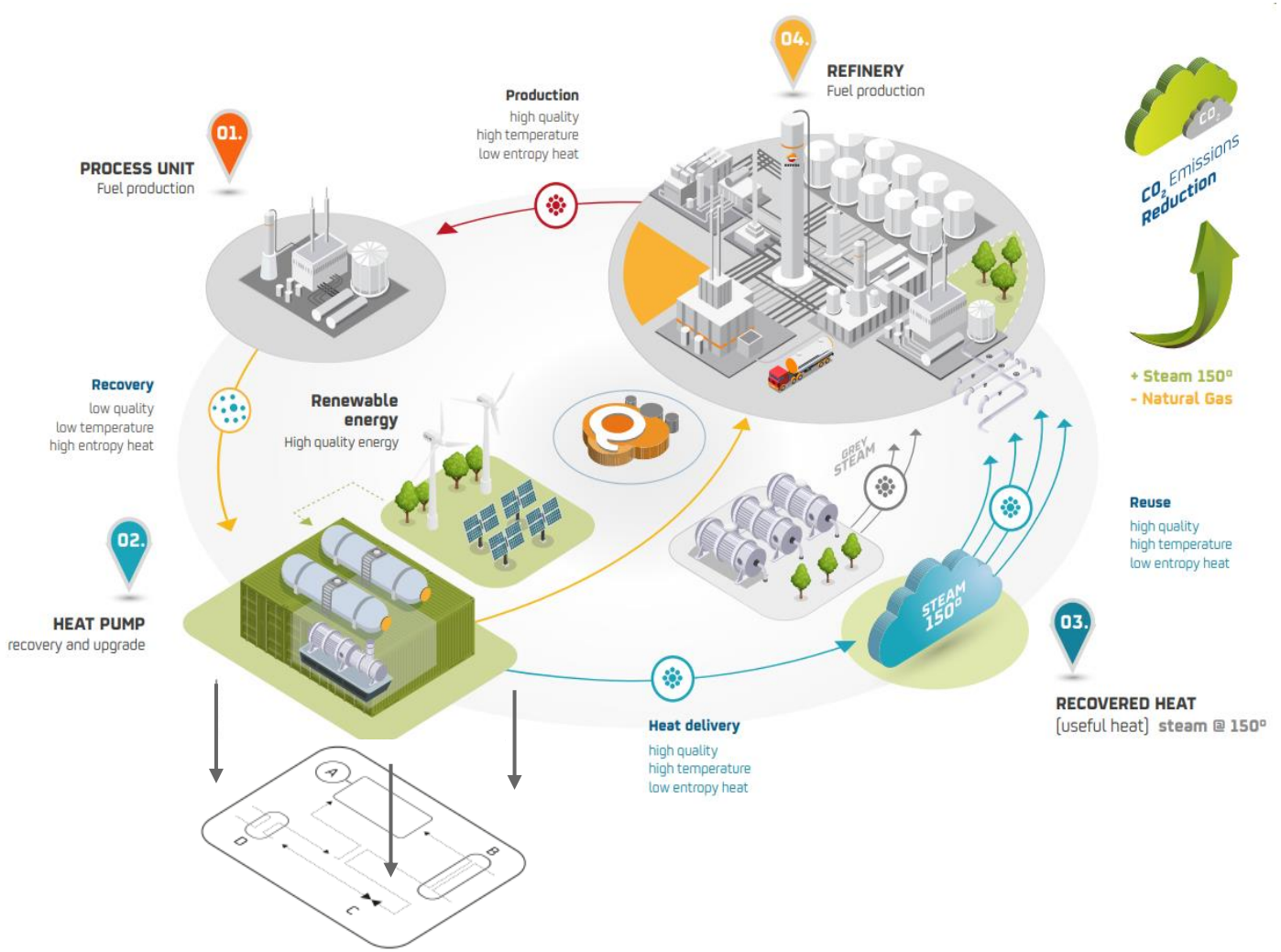
KEY TAKEWAY

Reduce energy consumption, replace conventional utilities with renewable utilities and CCUS

3 DECARBONIZING PROCESS

CirQlar Process footprint.



CirQlar

Funded by the European Union
Emissions Trading System
Innovation Fund

REPSOL

Rank®

TECNICAS REUNIDAS

REPSOL

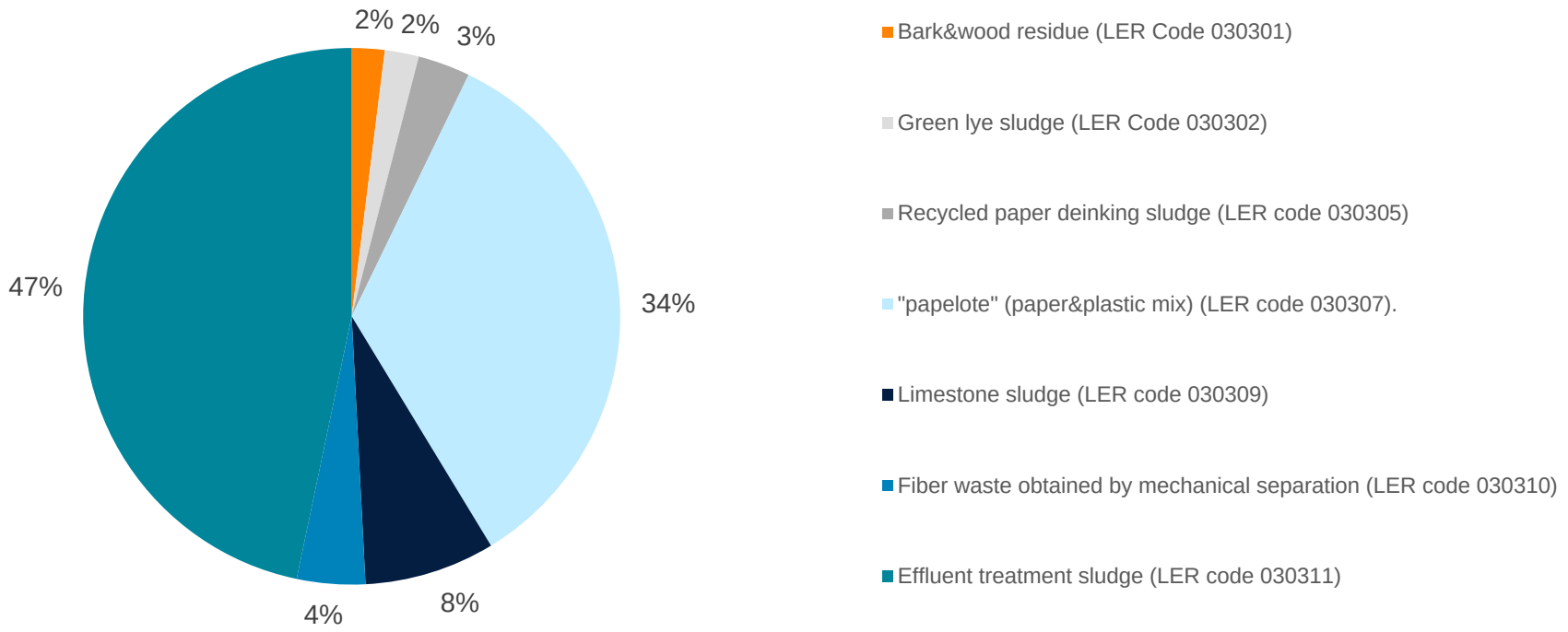
KEY TAKEWAY

DEMONSTRATION OF A **HIGH TEMPERATURE HEAT PUMP**, UPGRADING **3 MW** OF HEAT FROM **100** TO **150ºC.**

4 DECARBONIZING PROCESS

Decarbonizing

Pulp & paper waste 2020. 1350 kta [1]



1. Source: Aspapel

KEY TAKEWAY

Big potential for depeloping advanced fuel and recycled plastic using waste produced by pulp&paper industry

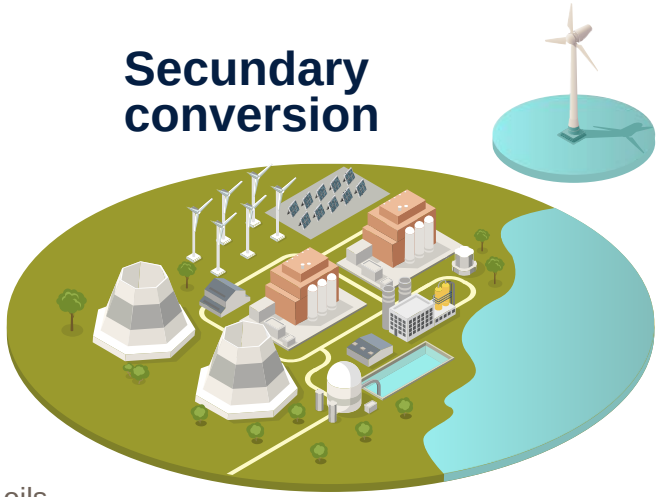
4 DECARBONIZING PROCESS

Decarbonizing

Raw materials

1.1 Availability
1.2 Prize
1.3 Quality
1.4 LCA

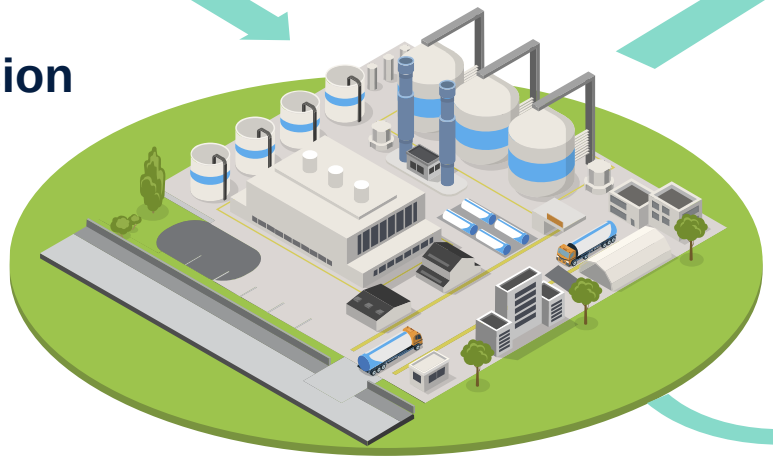
Secundary conversion



PyOils/lipid oils
Alcohols
FT-Wax

Primary Conversion

Thermochemical pathway
Lipids pathway
Synthetic pathway
Biological pathway



Products

Advanced fuels
Advanced gas
Renewable H2

Low carbon &recycled chemicals
Low carbon specialties & lube oils

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KEY TAKEWAY

Big potential for developing advanced fuel and recycled plastic using waste produced by pulp & paper industry

Repsol Compromiso Cero Emisiones Netas 2050

/ Repsol Technology Lab

5 CONCLUSION

REPSOL NET ZERO SOLUTIONS FOR P&P SECTOR

LOGISTIC 1

Minimize GHG footprint associated to logistic operations

Portfolio solutions:

- Adv bio diesel
- SAF –Sustainable aviation fuel
- Low Carbon maritime fuel
- E-fuels

PROCESS 2

Minimize GHG footprint associated to production

Portfolio solutions:

- Carbon Capture
- Heat pumps
- Low Carbon Heat
- Renewable Power

WASTE MANAGEMENT 3

Pulp & paper residues converted to new advanced biofuels and material.

Portfolio solutions:

- Gasification
- Pyrolysis
- Anaerobic Digestion

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Technology Lab

from ideation to real business

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