



GRT GROUP
CIRCULAR ECONOMY INDUSTRIES

ACCELERATING ENERGY TRANSITION

Agenda

ABOUT US
ENVIRONMENTAL
GRT SOLUTION
PLASTIC TO FUEL
ENERGY TO STORAGE
CONCLUSION

History and numbers

1971

Company foundation as an R&D group, focusing on industrial development of innovative processes developed in research laboratories at EPFL and other universities.

2004

Reinforcement of engineering capabilities in order to be able to provide innovative industrial solutions in the field of pollution and waste management.

2014

Strengthening of financial position with new shareholders, who contributed to directly finance industrial operations and processing of non-recyclable waste materials projects.

2016

Aquisition of 35% of PROIL

2017

Creation of GRT Italia and GRT Britannia to develop activities in Italy and UK. Successful demonstration of the world first formic acid fuel cell unit as system to efficiently produce electricity.

Beginning of 2020

Installation of the 1st plastic to fuel experimental plant in Italy with Italian technology



Vision

Some of the most relevant challenges for mankind today concern the reduction of human footprint on the planet and the preservation of the environment for future generations.

In this context GRT Group intends to be an active player in the circular economy industry, fuelling the green industrial revolution, through the application of innovative technologies.

GRT Group vision is the commitment to address 3 major environmental challenges:

- Reduce CO₂ emissions,
- Reduce Plastic waste litter in the environment,
- Enable Energetic transition;

by providing technological solutions for present and future.

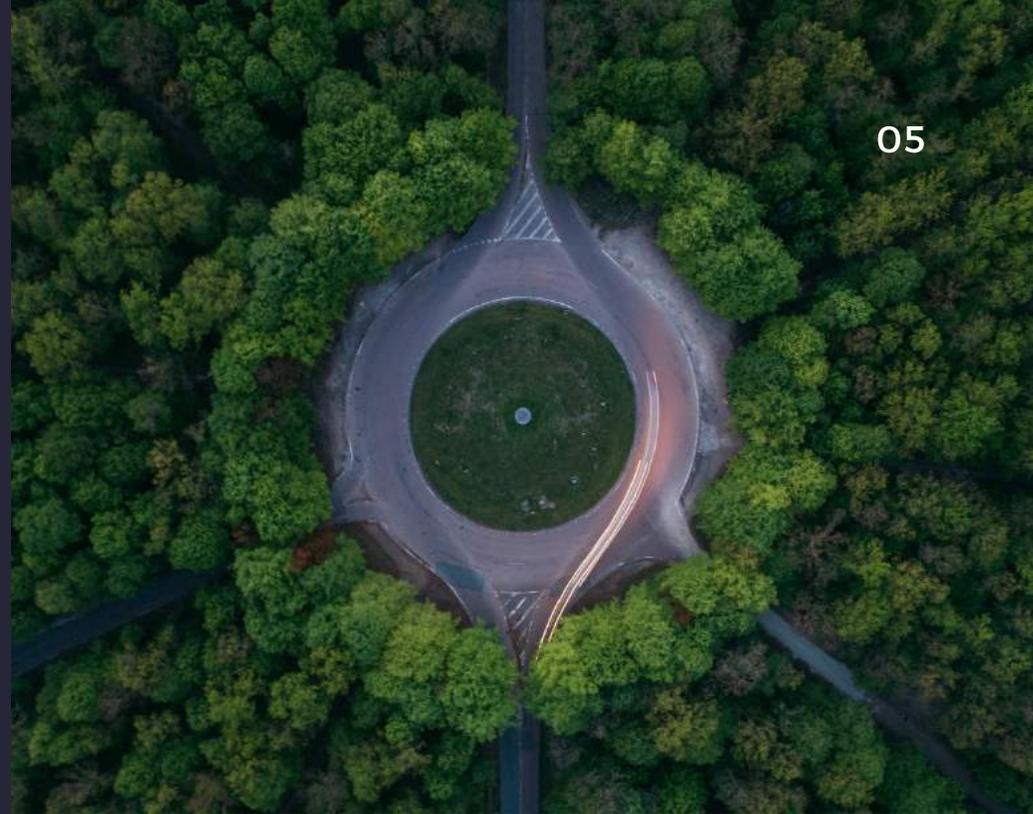
Values

Ethics and Environment first

Continuous innovation through R&D on circular economy technology and processes

Leadership through excellency in processes, people competences and skills enhancement

Responsibility to future generations and local communities



Mission

For over 45 years, GRT Group has pioneered and boosted scientific and industrial approaches by developing original technologies in the sustainable economy sector.

The mission of GRT Group is to implement, at full industrial level, innovative technologies, in the circular economy environment.



GRT GROUP
CIRCULAR ECONOMY INDUSTRIES

is committed to spread the circular economy principles and to support the development of a sustainable economy. It is member of several associations fostering the circular economy model.

Member of

WORLD ALLIANCE
for EFFICIENT SOLUTIONS

by **SOLARIMPULSE**
FOUNDATION



FONDAZIONE
PER LO SVILUPPO
SOSTENIBILE

Sustainable Development
Foundation



**CIRCULAR
ECONOMY
NETWORK**

**To reduce
CO₂ emissions**

**To eliminate
litter in the
environment**

**To enable
energetic transition
from fossil fuels to
renewables**



To reduce earth limited resources exploitation

To extract Value from waste, reducing local pollution and damages to the oceans ecosystems

To be Responsible towards local communities



CO₂ emissions

ENVIRONMENTAL

Global CO₂ emissions rose by 1.4% in 2017, a record due to the increase in energy demand.

Main consequences:

Global warming -> desertification, sea level rise, stronger storms and extreme events;

Ocean acidification -> world's oceans 30% more acidic since the Industrial Revolution.



Litter in the environment

ENVIRONNEMENT

- Global plastic production increased from 2.3 million tonnes in 1950 to 448 million in 2015.
- In 2015, more than 6.9 billion tons of plastic waste had been generated. About 9% of this waste was recycled, 12% was incinerated and 79% accumulated in landfills or in the environment.
- Plastic waste damages human and wildlife life and actions need to be put in place to prevent waste from leaking in the environment, outside the official stream.
- Assigning an economic value to plastic waste as an input for new production or conversion processes is an incentive to dispose of it properly and to promote environmental protection.

5

TRILLION

pieces of plastic are already floating in our oceans.

-National Geographic 2018-

73

%

of litter on the beaches is plastic.

-National Geographic 2018-

BY 2050

basically all marine bird species on the planet will be eating plastic.

-National Geographic 2018-

Energetic Transition

ENVIRONMENTAL

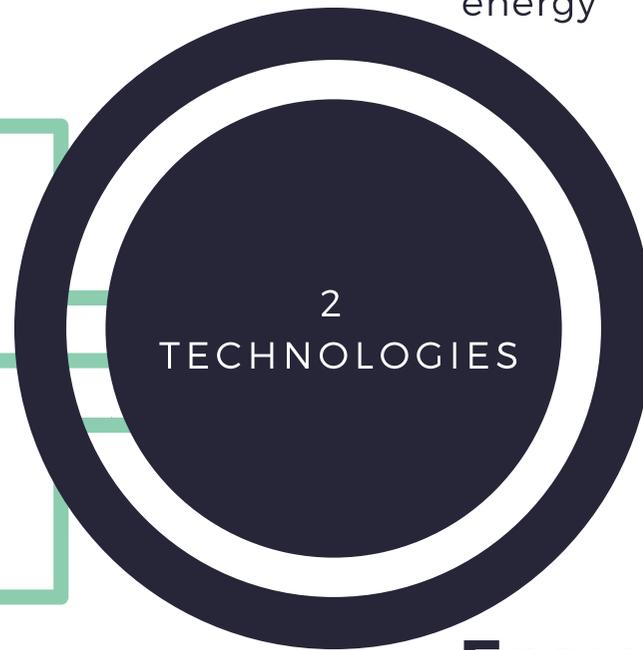
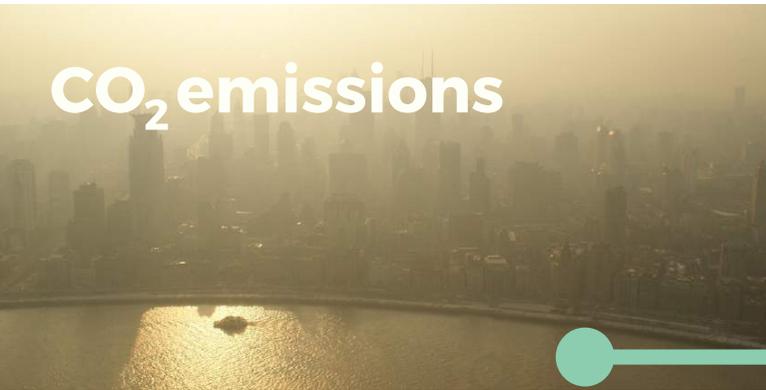
*73.5% of global energy today comes from non-renewable sources.

The intermittent nature of renewable energies creates the need for energy storage in order to allow their use on large scale.

*Estimated renewable energy share of global electricity production, End 2017, REN21 Renewable 2018 Global Status Report

How do we address environmental issues

TODAY AND TOMORROW



Plastic to fuel

To produce liquid fuel with non-recyclable plastics and renewable energy

Energy to storage

To store energy from renewables through Liquid Fuels: LOHC or Bio-diesel

An integrated strategy

TODAY AND TOMORROW

GRT Group is committed to transform non-recyclable plastic into valuable fuel and to accelerate the energy transition via a new concept of energy storage.

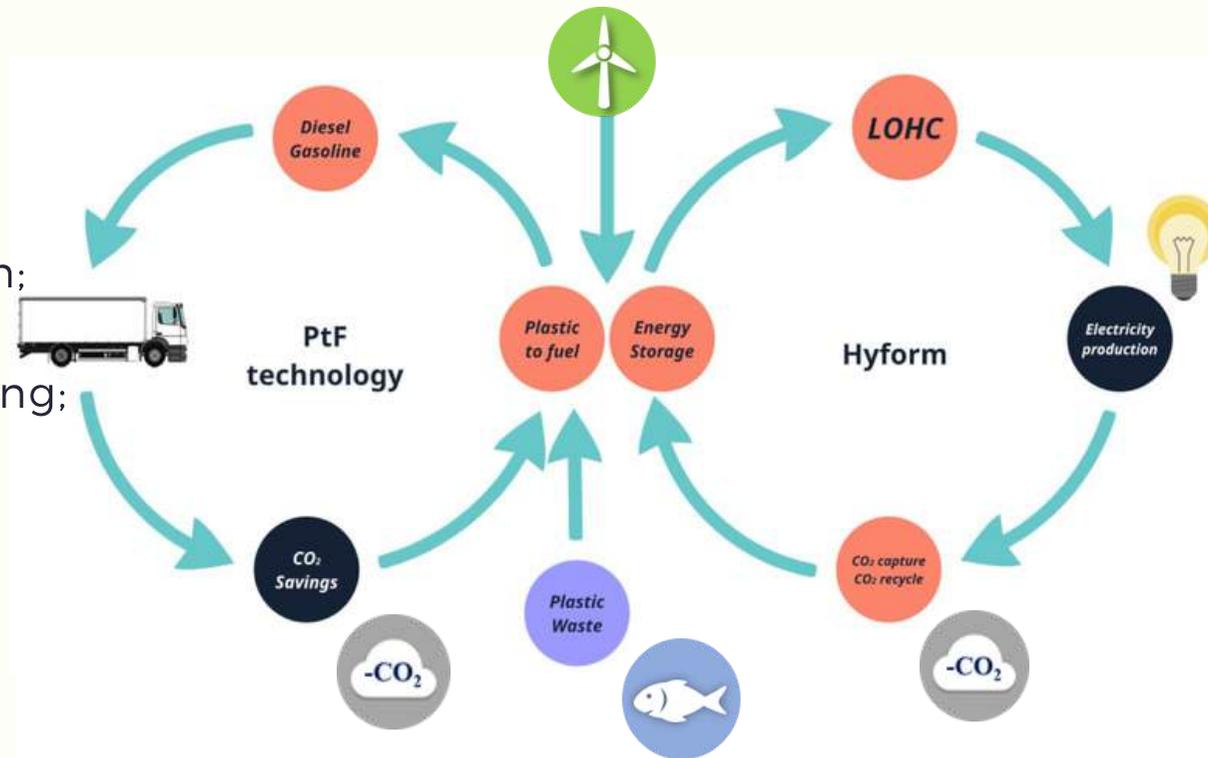
These represent efficient solutions for today and tomorrow, addressing the issues of:

CO₂ emissions reduction;

environment littering reduction;

and energetic transition enabling;

in order to preserve the environment and to allow our economy to move to an economically efficient sustainable model.



Plastic to fuel

TODAY

Non-recyclable plastic waste



Renewable energy



are converted into ready to use **liquid fuels** through a thermal conversion process.



Plastic to fuel: how it works

TODAY



Inputs:

renewable electricity



Non-recyclable waste plastics

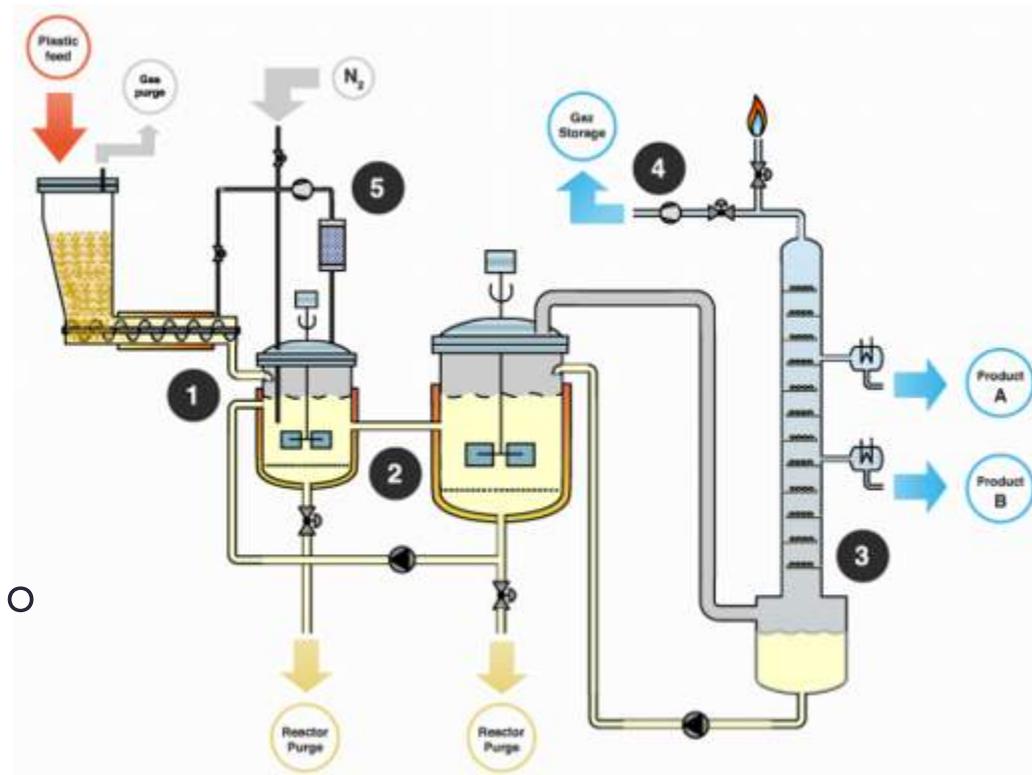
Outputs:



Liquid low-carbon fuels
(Diesel, gasoline)

Syngas: process energy when no
renewable energy available

Char: used in agriculture,
construction, cementeries

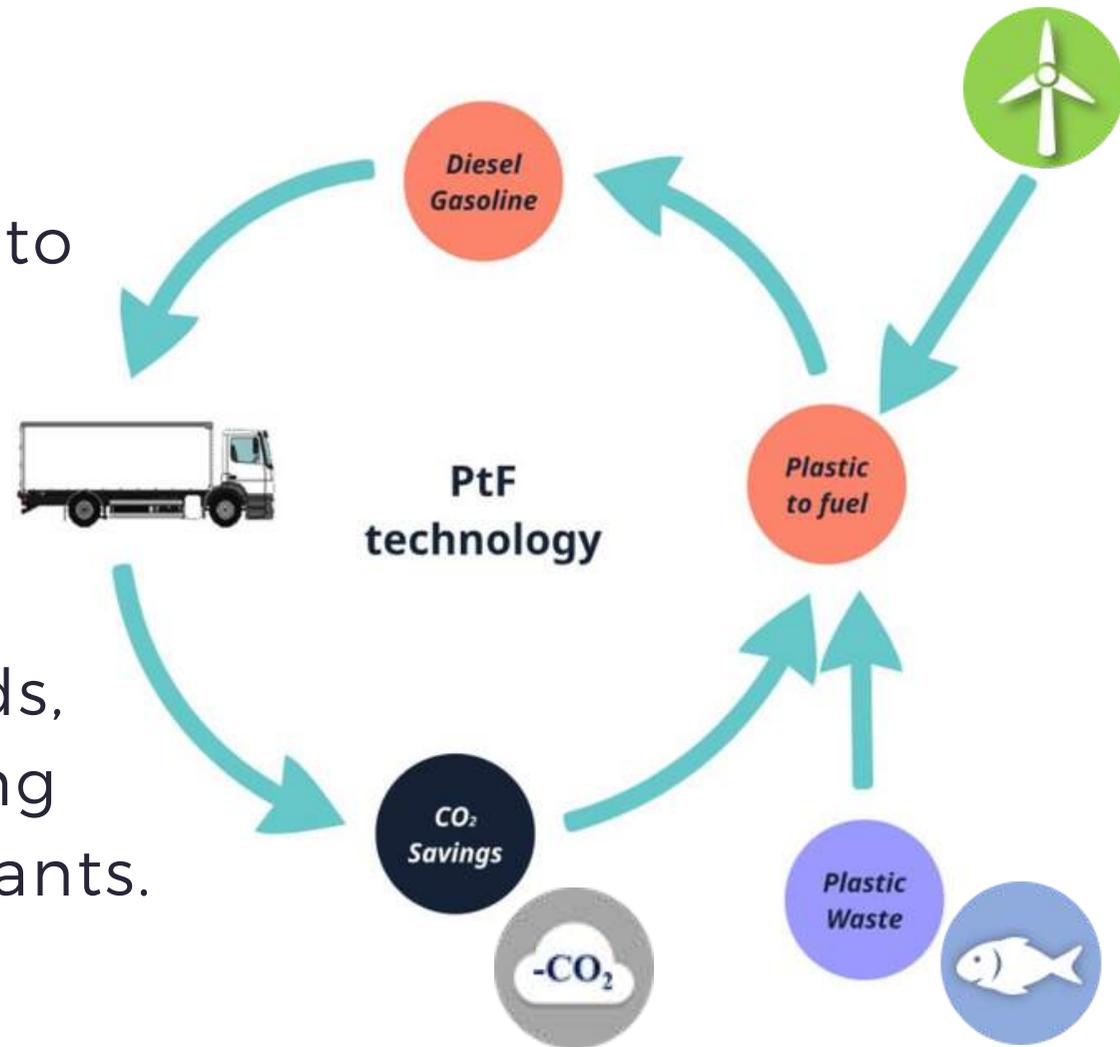


Fuel produced as a way to store energy

TODAY

Energy, from waste and renewables, is stored into liquid fuels.

Fuel produced is compliant with transportation standards, it can be used in existing engines or industrial plants.



Environmental gains

TODAY



Promote recycling by increasing the value of waste

Waste plastics are not landfilled and will not leak into the environment,



Store renewable energy,



Local production: no need for extraction, refining and transportation,

low sulphur content,

70% CO₂ savings compared to fossil fuels, no incineration of waste plastics.

Energy storage for energetic transition

TOMORROW

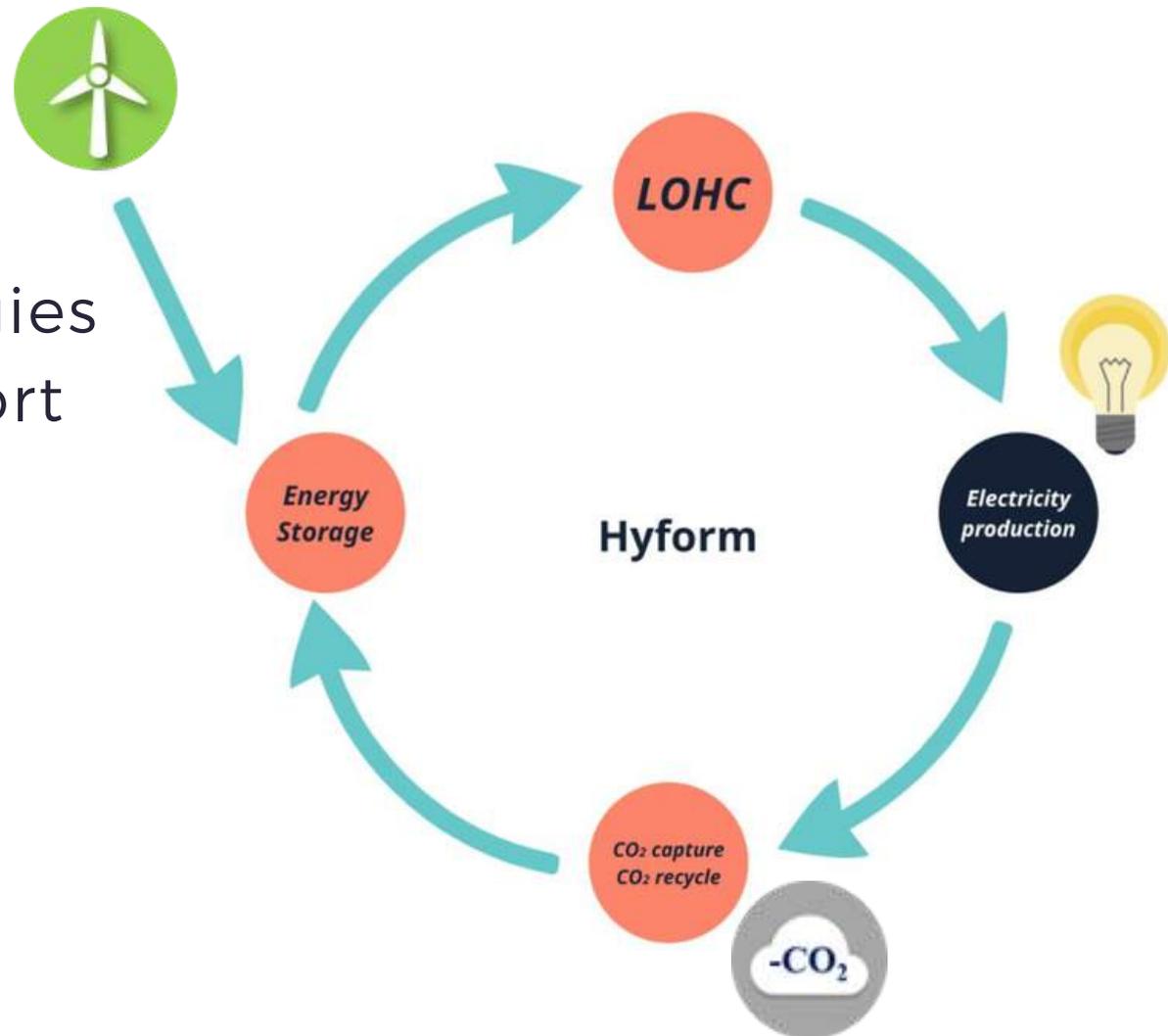
Efficient storage methods for renewable energies
are mandatory
to enable a transition
from fossil to renewable energy



The circular energy

TOMORROW

We develop technologies to support the transport and production of Hydrogen, for a clean environment.





GRT Technology status

TODAY

Conversion of Formic acid into hydrogen
Conversion of Formic acid into electricity

We successfully demonstrated efficient electricity production from formic acid and hydrogen fuel cell.

Current applications

easy and safe transportation of hydrogen in a LOHC (Liquid Organic Hydrogen carrier)

Off-grid power generation demonstration unit

Additional storage mgt capability

FURTHER DEVELOPMENT IN OUR PIPELINE

Combining renewable energy and CO₂ to produce a LOHC

Future applications

Innovative efficient high pressure Hydrogen delivery for transport.

Seasonal/Long term energy storage, allowing stable large scale renewable energy use.

Carbon capture



Environmental gains

OUR LONG TERM TECHNOLOGY VISION



Complete energetic transition from fossil to renewable energy made possible through:

- Long term energy storage;
- Transport of Hydrogen: support Hydrogen economy implementation;
- Green industrial revolution.



- no CO₂ emission.
- CO₂ capture for Hydrogen storage.

Conclusions

Our company values are based on Ethical and Sustainable Economy Model looking at long term benefits for all stakeholders : from the environment to local communities.

Rethinking consumption models, moving to a circularity principle is key for GRT Group, that develops plants to transform non recyclable plastic waste into liquid fuels/liquid energy vectors.

The GRT plastic to fuel solution addresses major environmental issues of today.

The GRT energy to storage R&D enables a sustainable future, replacing fossil fuels by efficient renewable solutions accelerating energy transition.

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