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## KEROGREEN

"Production of Sustainable aircraft grade Kerosene from water and air powered by Renewable Electricity, through the splitting of CO<sub>2</sub>, syngas formation and Fischer-Tropsch synthesis"

Project No: 763909

### Deliverable D 7.6 Conference presentation on the business concepts

|   |   |
|---|---|
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| <b><u>Responsible partner (&amp; person) for deliverable:</u></b> | <b>INERATEC (Samantha Michaux)]</b>                                   |
| <b>Contributing partners:</b>                                     |   |

|                               |  |                          |           |
|-------------------------------|--|--------------------------|-----------|
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| <b>Project Partners:</b>      | DIFFER (NL), KIT (D), VITO (B), Cerpotech (N), HyGear (NL), INERATEC (D)   |                          |           |
| <b>Start date of project:</b> | 1 <sup>st</sup> April 2018   | <b>Project duration:</b> | 54 months |
| <b>Project web site:</b>      | <a href="http://www.kerogreen.eu">http://www.kerogreen.eu</a>  |                          |           |

**DOCUMENT INFO****Dissemination level**

| Dissemination level |   |          |
|---------------------|---|----------|
| <b>PU</b>           | Public  | <b>X</b> |
| <b>PP</b>           | Restricted to other programme participants (including the Commission Services)        |          |
| <b>RE</b>           | Restricted to a group specified by the consortium (including the Commission Services) |          |
| <b>CO</b>           | Confidential, only for members of the consortium (including the Commission Services)  |          |

**Deliverable Nature**

| Nature of Deliverable |              |          |
|-----------------------|--------------|----------|
| <b>R</b>              | Report       | <b>R</b> |
| <b>P</b>              | Prototype    |          |
| <b>D</b>              | Demonstrator |          |
| <b>O</b>              | Other        |          |

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|                  |                        |                              |

**Changes with respect to the DoA**

| Issue                     | Comments   |
|---------------------------|--|
| Deliverable - Lead change | IC overtook the lead of this deliverable since IC was developing the business concepts. As business/industrial partner, IC will be the partner mainly addressing the business concepts for commercializing e-kerosene. |

**Document Control**

| Document version # | Date       | Author           | Comments                        |
|--------------------|------------|------------------|---------------------------------|
| 1                  | 13.10.2022 | Samantha Michaux |                                 |
| 2                  | 14.10.2022 | Sabine Müller    | Changes with respect to the DoA |
| 3                  | 18.10.2022 | Leonardo Roses   | Changes with respect to the DoA |
|                    |            |                  |                                 |
|                    |            |                  |                                 |

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## 1 Introduction

The following deliverable reports about the oral presentation of the business concepts developed within the project (D7.8). To reach a high impact and broader audience, it has been decided to make the presentation during the lighthouse event ACHEMA, which gathers the process industry with manufacturers and service providers from over 50 countries presenting their products for chemical, pharmaceutical and biotech research, and manufacturing as well as energy and environmental services.

## 2 The ACHEMA 2022

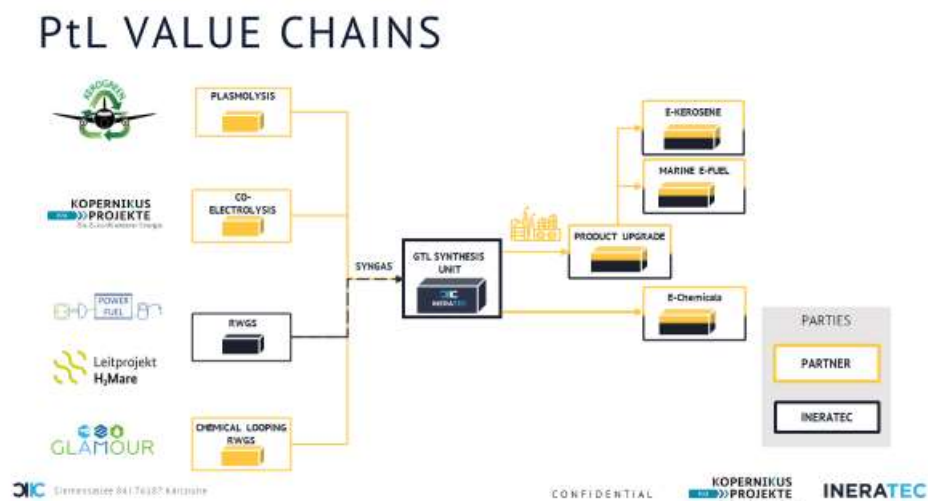
At ACHEMA 2022, the world's leading trade show for the process industry, over 2,200 exhibitors from more than 50 countries showcased the latest equipment and innovative processes for the chemical, pharmaceutical and food industries at the Frankfurt fairgrounds from 22 to 26 August. The ACHEMA Congress covered the entire spectrum of chemical process technology and biotechnology. The lectures provided insights into current research and development projects as well as the latest scientific results. On each day of the trade show, particularly topical issues were dealt with in a separate theme day:

- ✓ Hydrogen Economy (Monday, 22 August)
- ✓ Fossil-free Production (Tuesday, 23 August)
- ✓ Perspectives in Laboratory and Analytics (Wednesday, 24 August)
- ✓ Digitalization in the Process Industry (Thursday, 25 August)
- ✓ Novel Bioprocesses and Technologies (Friday, 26 August).

Since the KEROGREEN project's focus lies within the sphere of hydrogen, it has been decided to hold the presentation during that day (22.08) to reach the broadest specific audience.

## 3 Oral presentation about the KEROGREEN business concepts

The KEROGREEN technology and business concepts have been presented within a general presentation of the Kopernikus-Project P2X ([Kopernikus-Projekte: Kopernikus-Project: P2X](#)) a German project dealing with one of the most promising technology to defossilisation: power-to-X



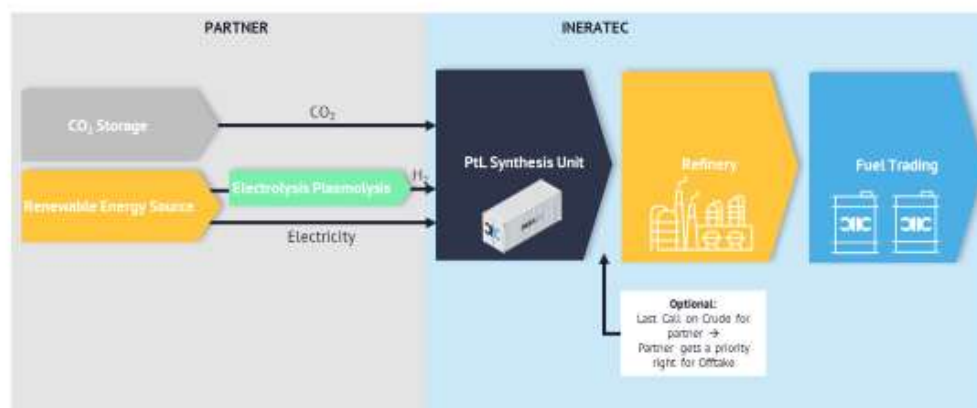
technologies. These are technologies which convert renewably generated electricity into other forms of energy, for example fuels, plastics, heat, gases, chemicals, and cosmetics. This format was chosen to show the existing value chains around existing power-to-liquid processes. The Kopernikus-Session has been chosen as target audience as these German national lighthouse

projects achieve very high visibility on a regional, national and also international level and therefore synergies were expected. Simultaneously, an audience could be addressed which could be anticipated to already have a basic understanding of the Power-to-X concepts and technologies investigated within the KEROGREEN project and therefore a stronger effect on the economic discussion could be expected. The reason to choose the KOPERNIKUS projects as framework for the presentation was also to emphasize the synergy between both projects since the KEROGREEN project was first in this PtX endeavor, as the first stage was submitted in 2016. KOPERNIKUS started a year later in 2017.

The objective of developing business concepts is to commercialise the synthetic kerosene produced through a power-to-liquid process using the plasma reactor technology of KEROGREEN. Two possible collaboration models have been developed that are presented more in detail in D7.8.

## COLLABORATION MODEL 1

TRADING MODEL

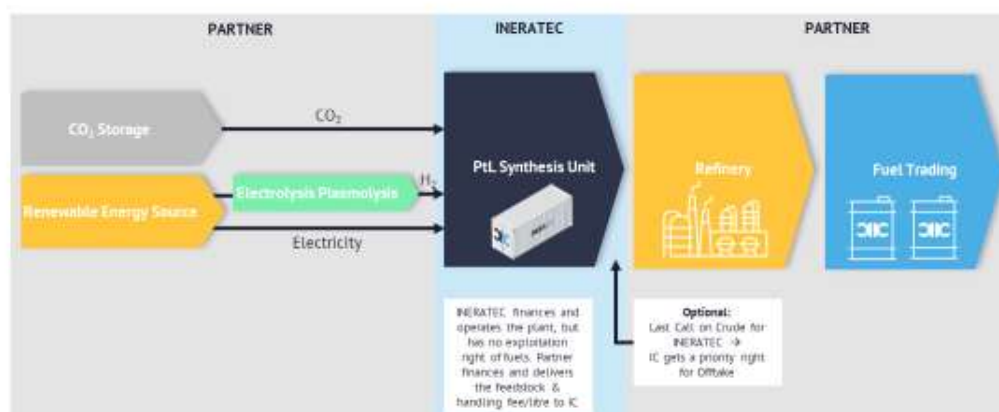


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## COLLABORATION MODEL 2

HANDLING MODEL




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**INERATEC**

## 4 Annexes





Based in Karlsruhe, Germany  
Founded in 2016  
Headcount >80

# INERATEC GmbH

DECENTRALIZED MODULAR PTL APPROACH IN KOPERNIKUS P2X

PTL CONCEPTS AND APPLICATIONS IN EUROPE

KOPERNIKUS P2X SESSION – ACHEMA 2022



# MISSION

PARIS CLIMATE TARGETS REQUIRE GREATER REDUCTION OF CO2 EMISSIONS



By 2035, INERATEC aims to cover 5% of European crude oil demand with its sustainable e-fuels.

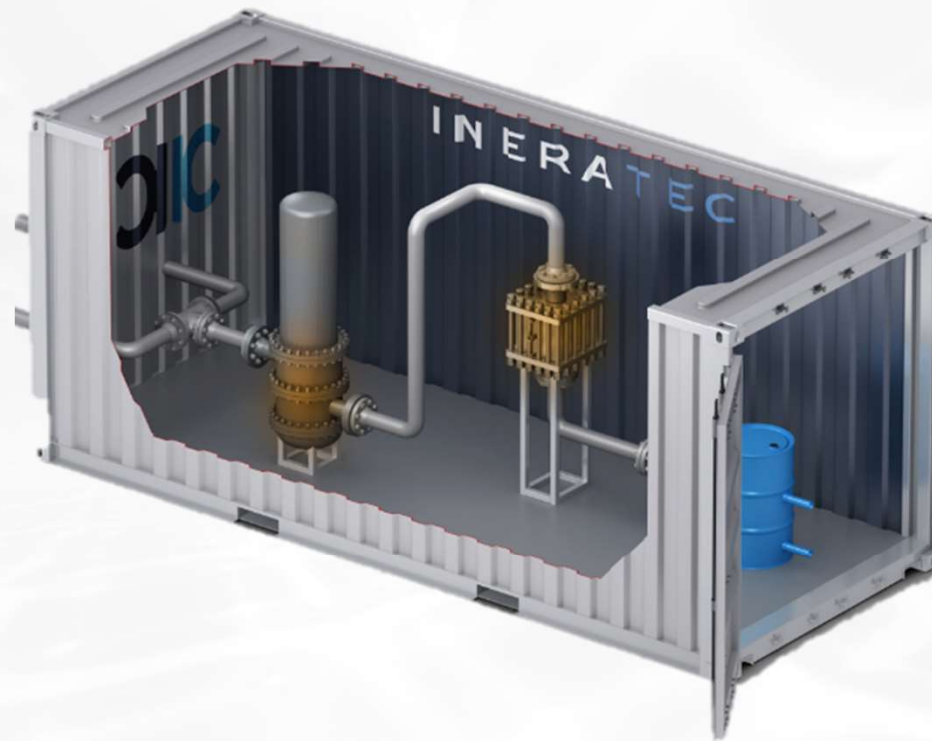


# SOLUTION

COMPACT CHEMICAL PLANTS THAT PRODUCE RENEWABLE HYDROCARBONS

$\text{CH}_4$   
Gas-to-X

$\text{CO}_2 + \text{H}_2$   
Power-to-X

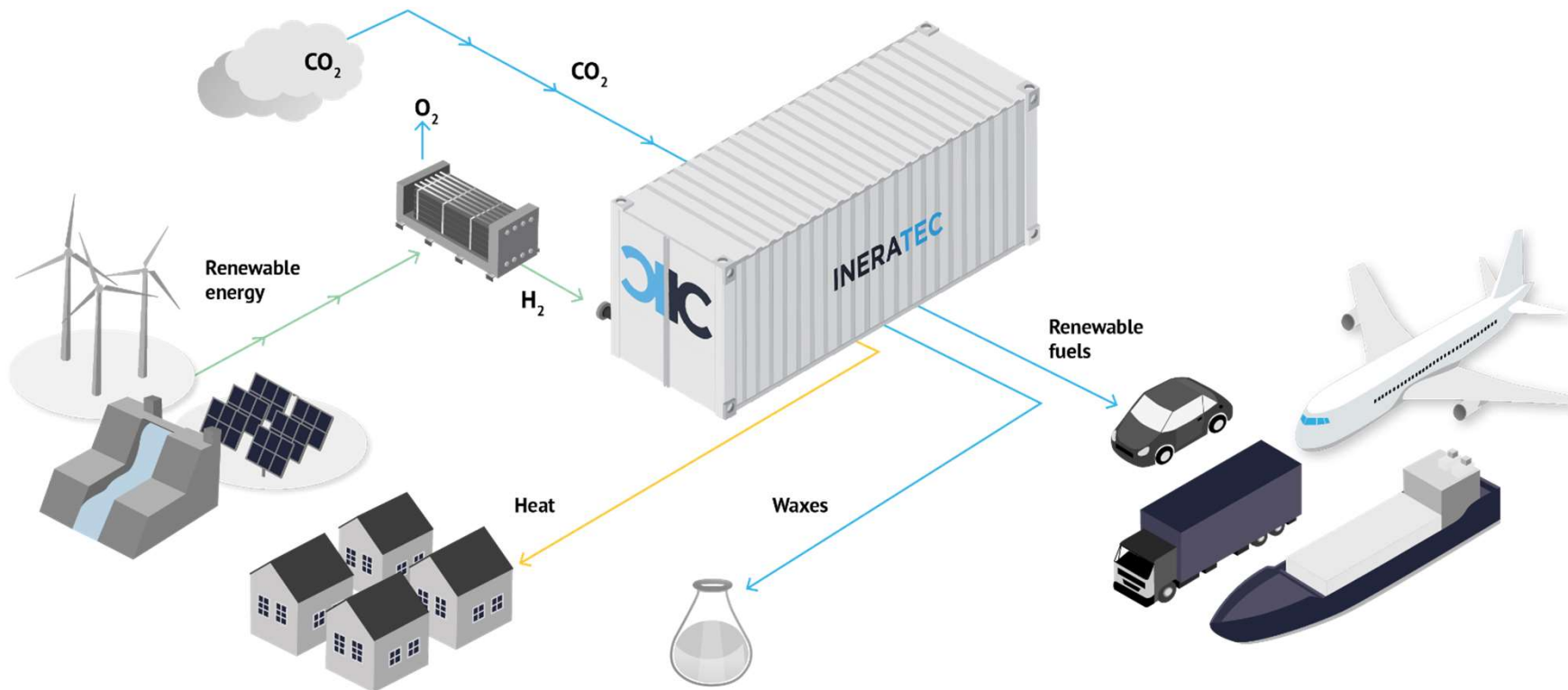


Renewable  
Fuels and Materials

**Greenhouse Gas Recycling** by INERATEC<sup>®</sup>

# POWER-TO-LIQUID

SYNTHETIC HYDROCARBONS FROM CO<sub>2</sub> AND RENEWABLE ELECTRICITY



Waste heat from the chemical processes can be used in the industry as well as in residential areas.

Renewable waxes can be applied in the cosmetics-, food- and chemical industry.

Application in various traffic sectors and near to climate-neutral mobility.

# CONVENTIONAL

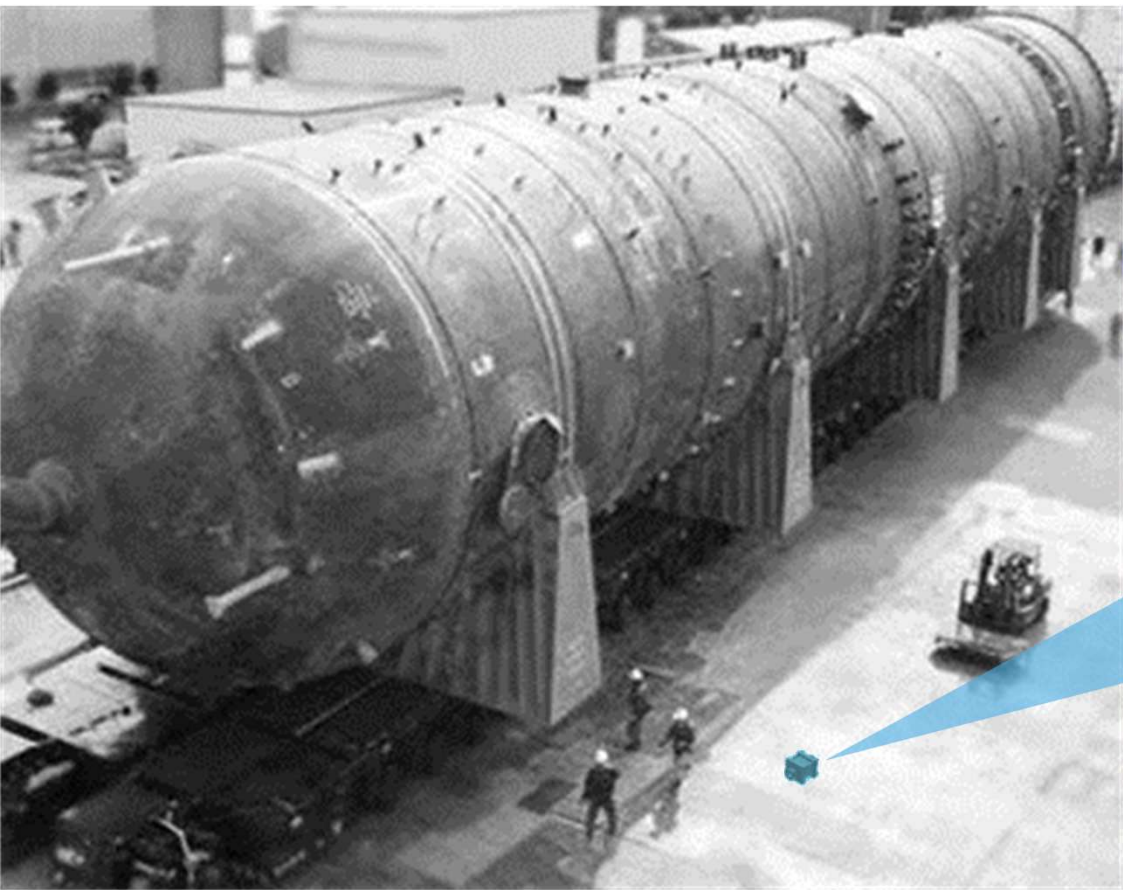
COMPETING TECHNOLOGIES DO NOT MATCH WITH RENEWABLE ENERGIES



Picture source: ausairpower.net

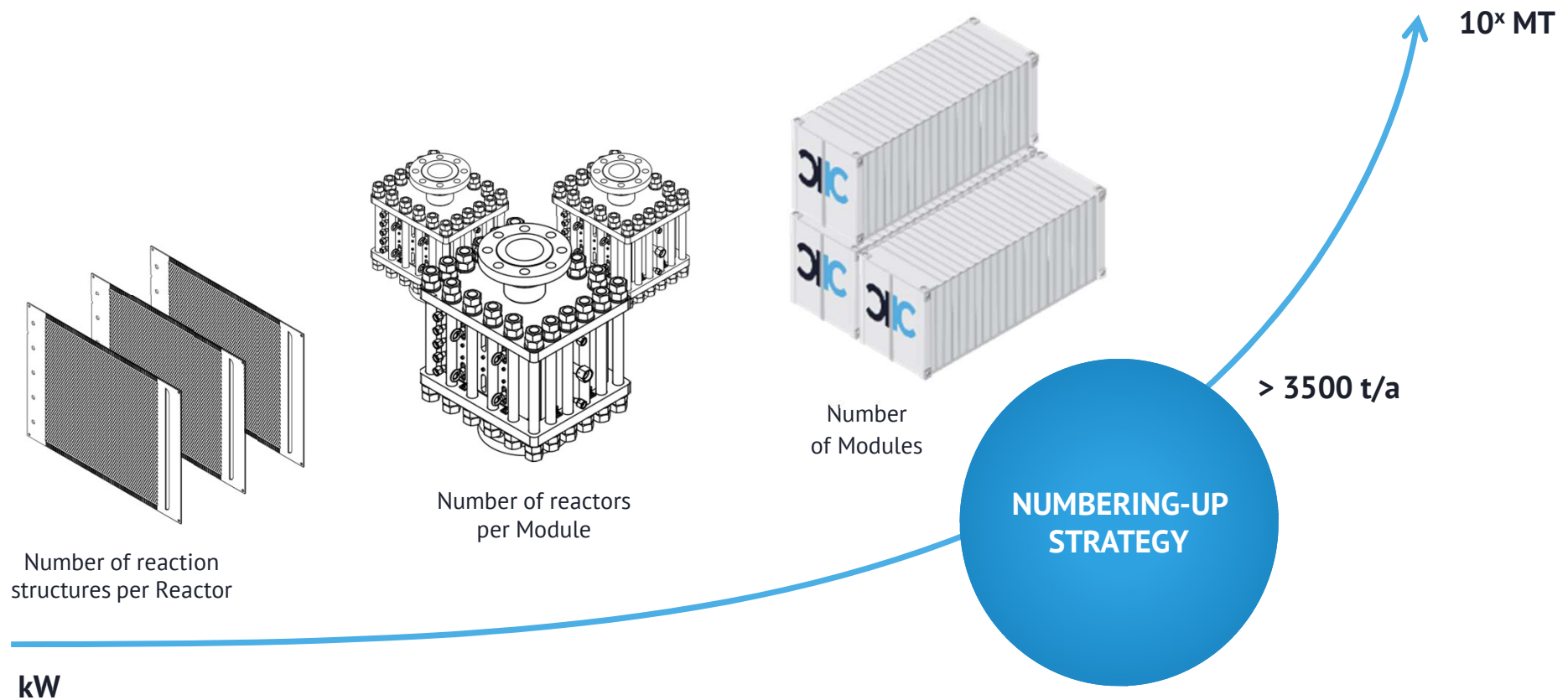
# INNOVATION

MOST COMPACT CHEMICAL REACTOR TECHNOLOGY IN THE WORLD



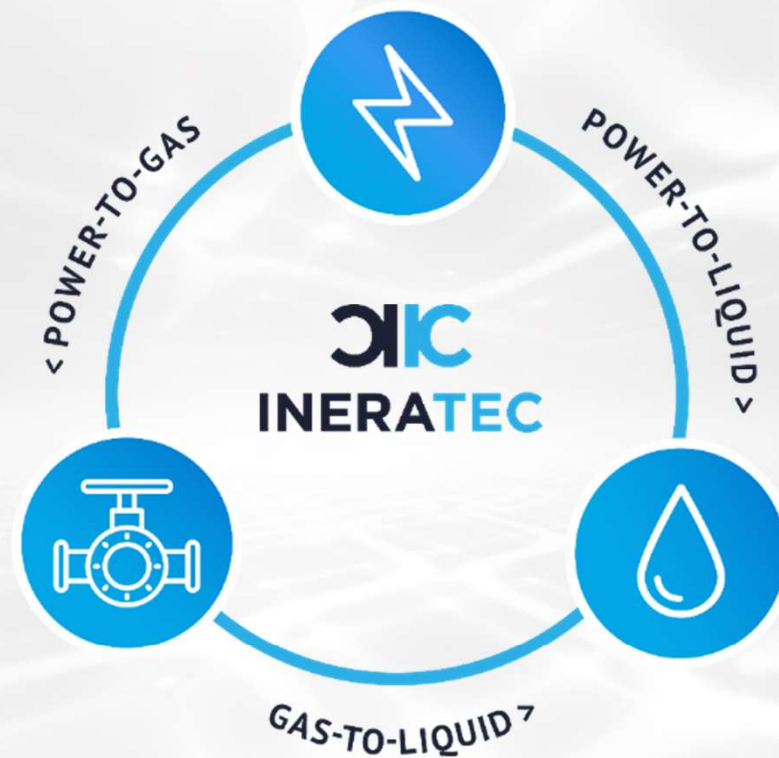
# BUSINESS SCALE-UP

## NUMBERING-UP



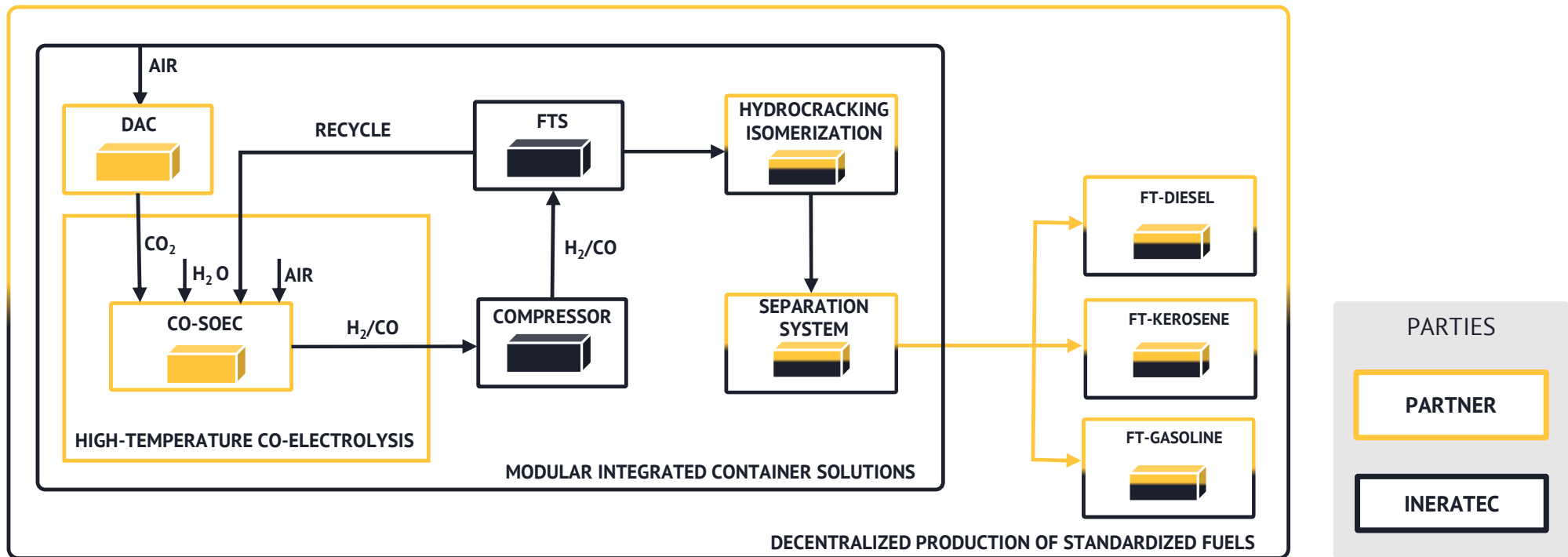
# PROCESSES

POWER-TO-GAS, POWER-TO-LIQUID AND GAS-TO-LIQUID

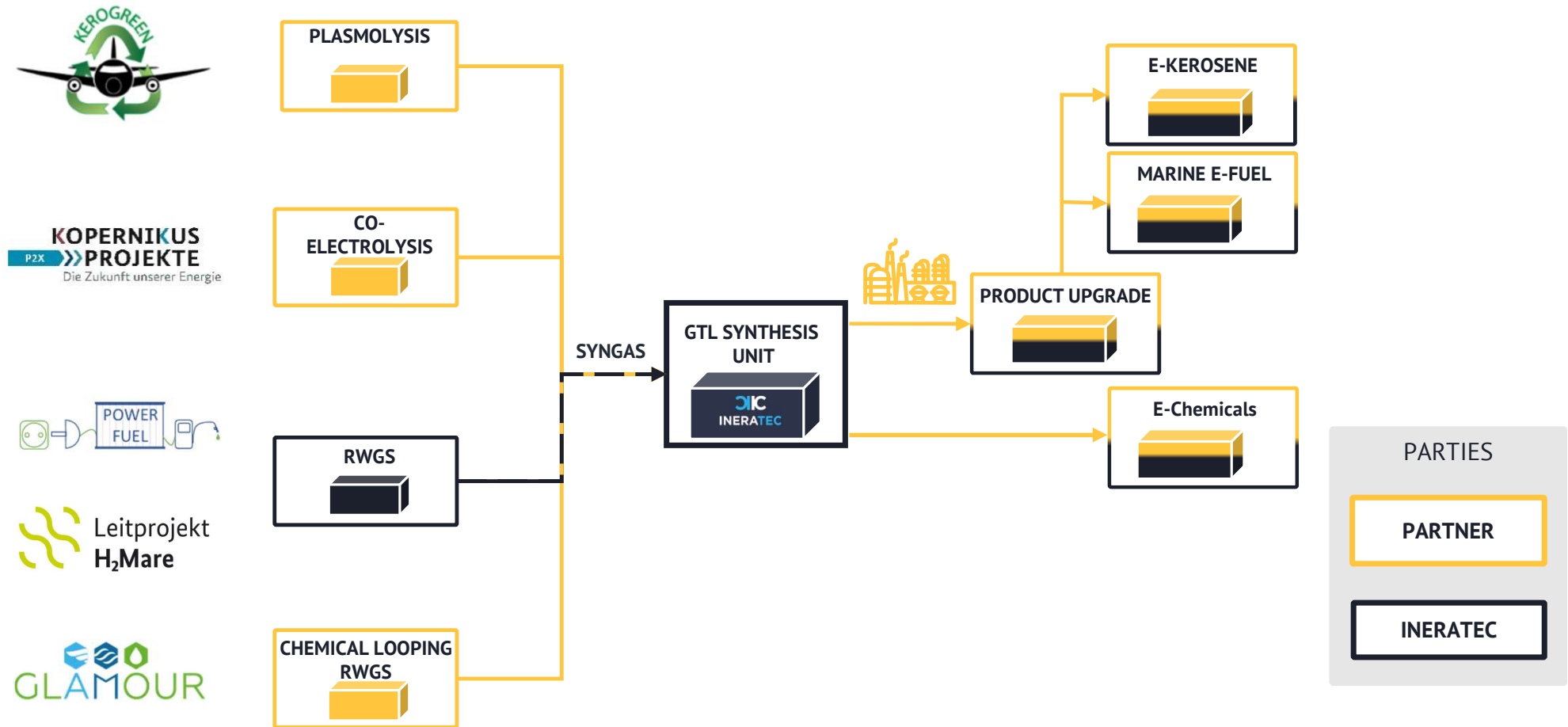


# KOPERNIKUS P2X

P2X PATH: MODULAR PLANT FOR THE FISCHER-TROPSCH SYNTHESIS OF GASOLINE, KEROSENE, OR DIESEL WITH INTEGRATED CO-ELECTROLYSIS



# PtL VALUE CHAINS





# BUSINESS MODEL

PLANT & PRODUCT SALES



SINCE  
2016

PLANT SALE

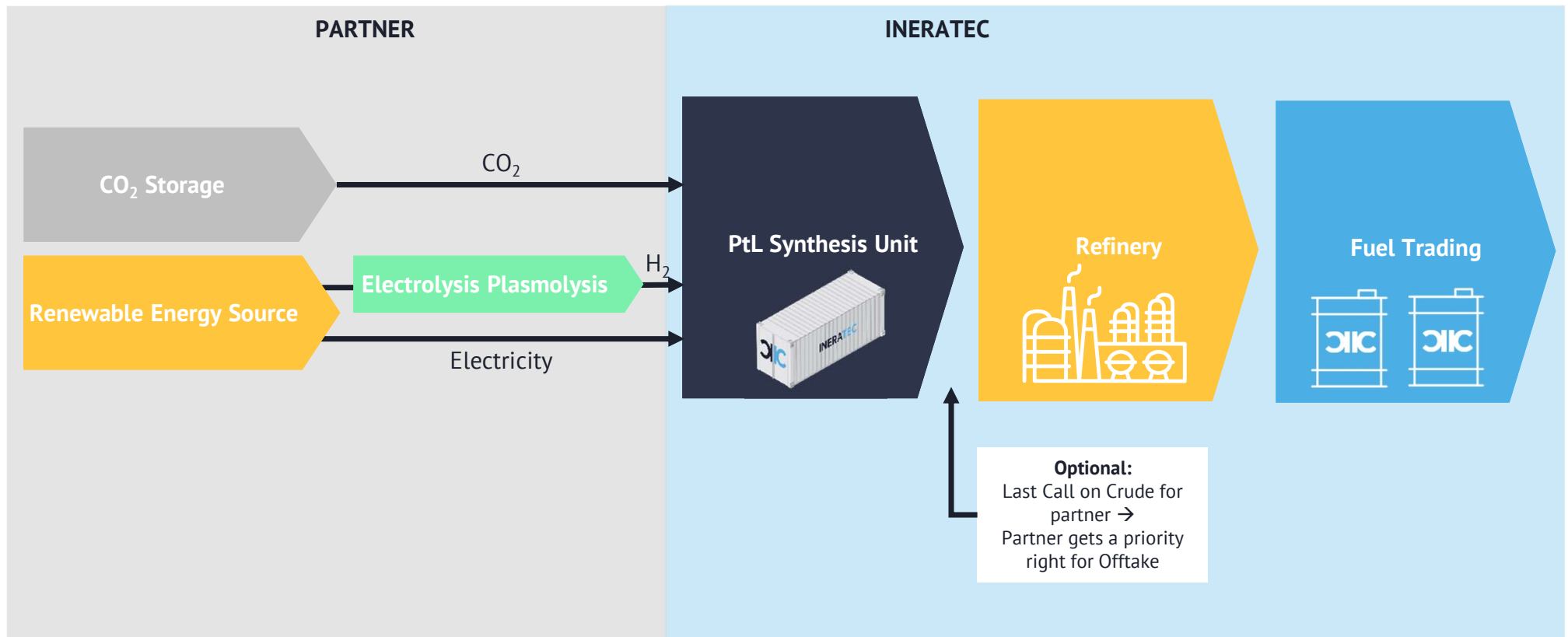


SINCE  
2020

e-PRODUCT SALE

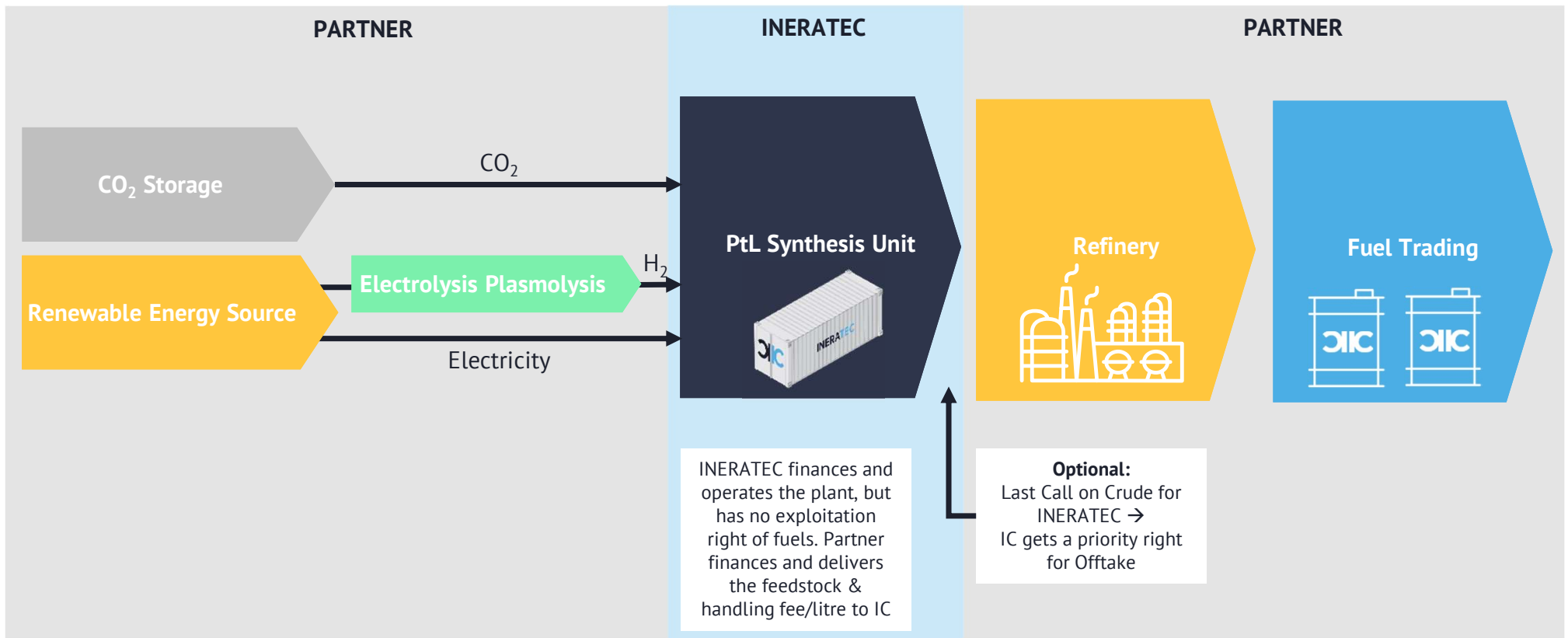
# COLLABORATION MODEL 1

## TRADING MODEL



# COLLABORATION MODEL 2

## HANDLING MODEL



# REFERENCE



PtL/GtL Project:  
Pilot plant installed  
in Finland in 2016

# REFERENCE



**PtG Project:  
Methanation pilot plant  
near Barcelona in 2018**

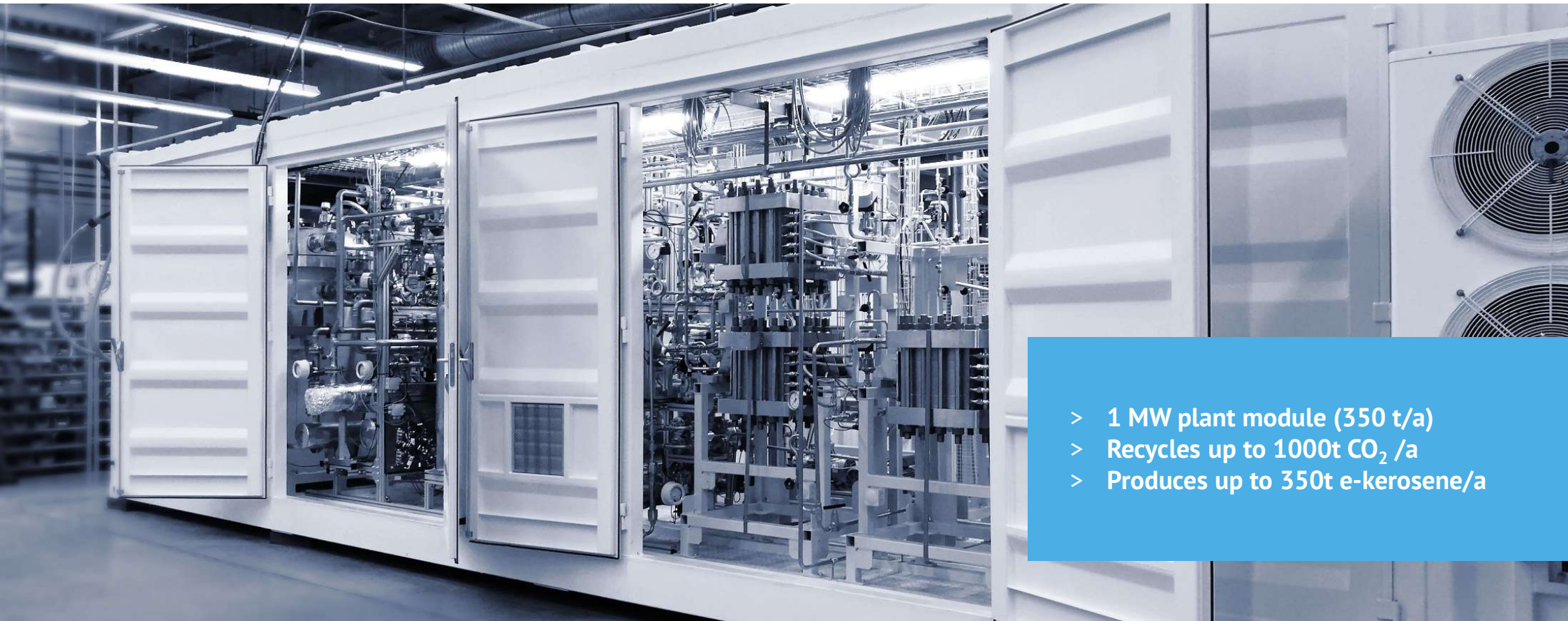
# REFERENCE



Power-to-X research site:  
PtX compound plant for  
e-kerosene synthesis

# INDUSTRIAL SCALE

## POWER-TO-LIQUID MODULE



- > 1 MW plant module (350 t/a)
- > Recycles up to 1000t CO<sub>2</sub> /a
- > Produces up to 350t e-kerosene/a

# PtL PILOT PLANT WERLTE

PROJECT START OCTOBER 2021



- > For a customer from aviation (atmosfair)
- > Focus on e-kerosene
- > CO<sub>2</sub> from biogenic source



# PtL PILOT PLANT HAMBURG

PROJECT START IN 2021

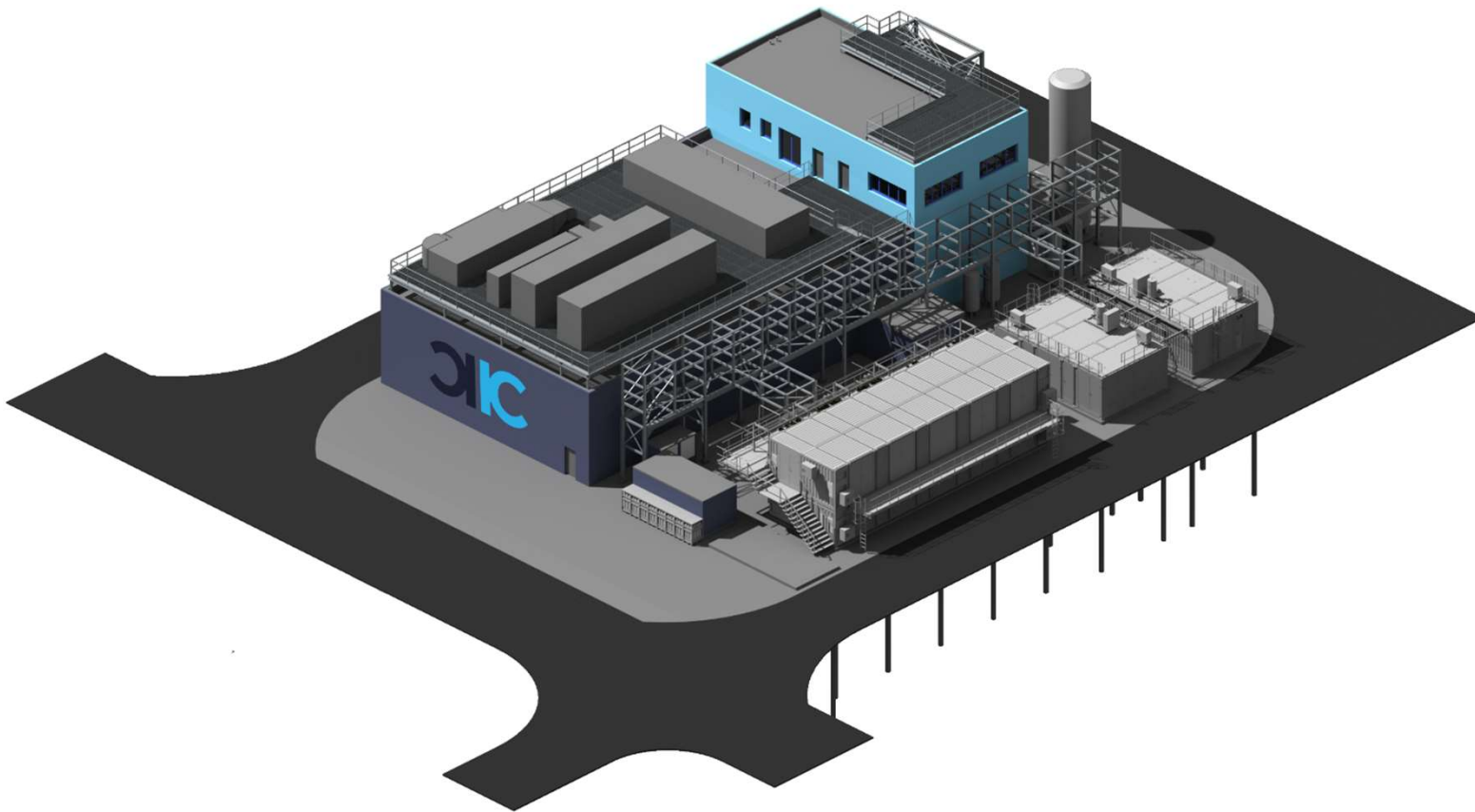
0.2022



- > For a customer from chemical industry (H&R)
- > Focus on e-chemicals/ waxes
- > CO<sub>2</sub> from industrial off-gas

# PtL PIONEER PLANT FRANKFURT HOECHST

PROJECT START IN 2022



- > World's largest Power-to-Liquid plant
- > Investment: € 30 M
- > Production capacity up to 3500 T/a (Liters 4.35 M)
- > Focus on aviation & shipping
- > Recycles up to 10,000t CO<sub>2</sub>/a

# ACKNOWLEDGEMENTS OF FUNDING

13.10.2022

KOPERNIKUS P2X  
LEITPROJEKT H2MARE

POWERFUEL

GLAMOUR

KEROGREEN

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of Education  
and Research

Supported by:



Federal Ministry  
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and Climate Action

on the basis of a decision  
by the German Bundestag



European  
Commission

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