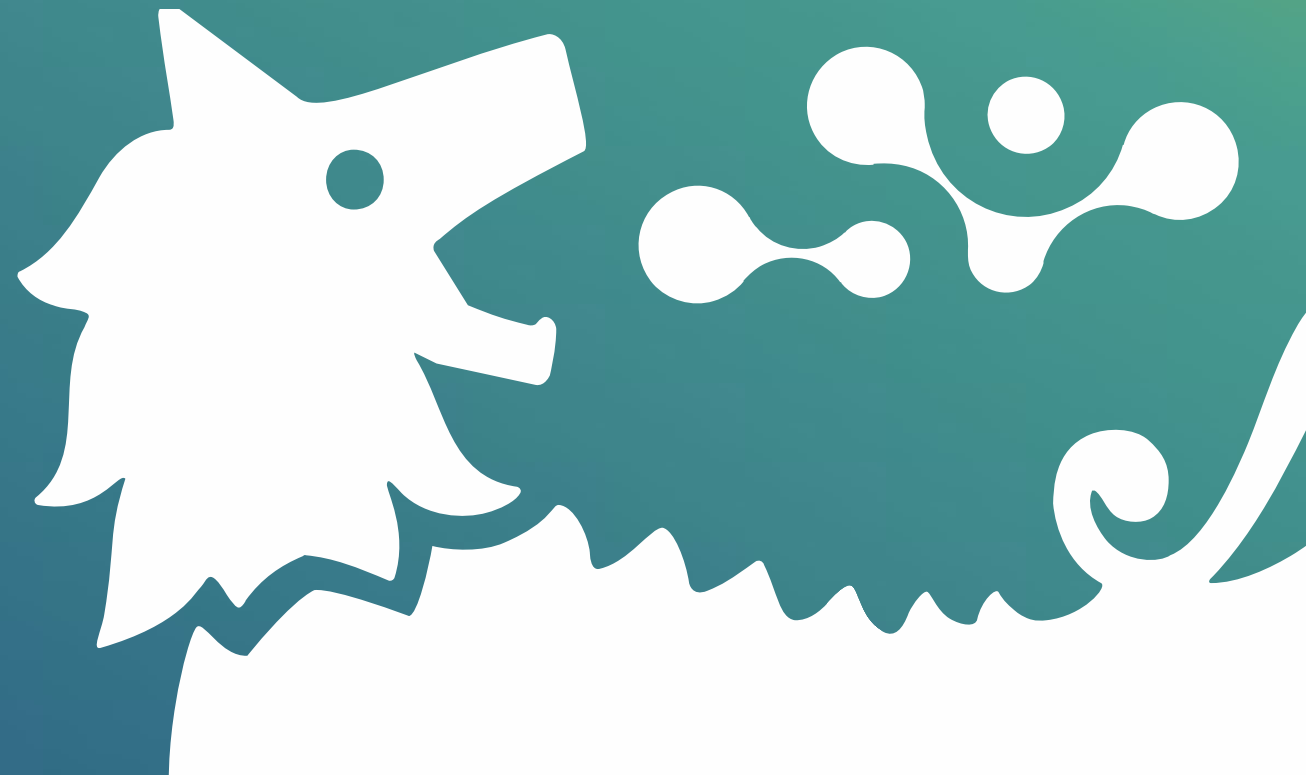


Copenhagen, October 25th 2023 - 5th Future of Biofuels

Proesa[®]: Versalis technology to enhance 2G Ethanol production





versalis

VERSALIS


OUR CHEMICAL COMPANY

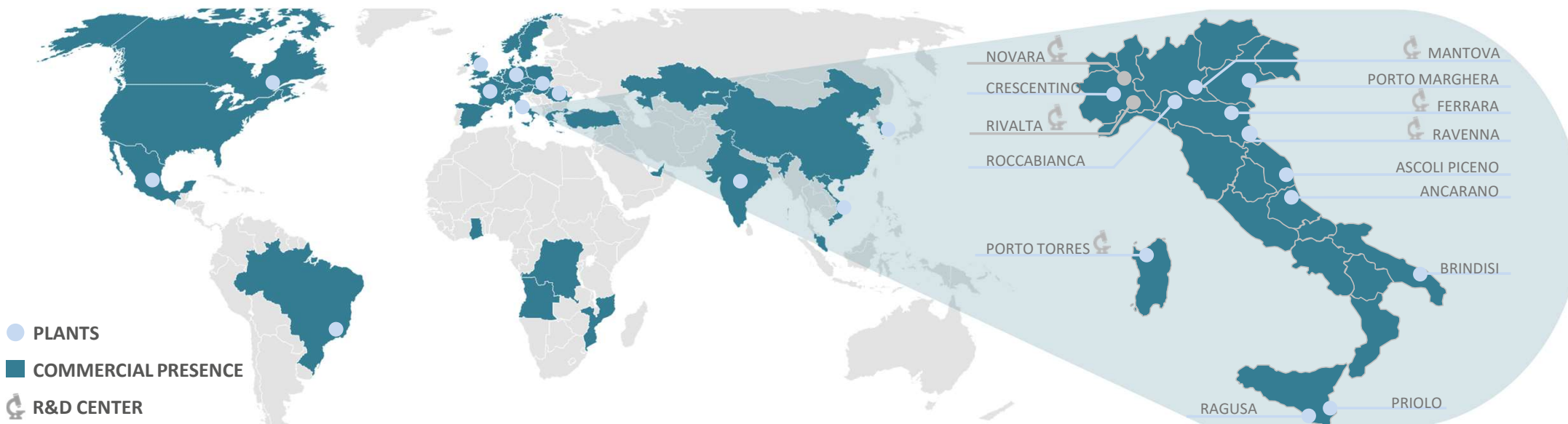





 ~ 7.100 employees

 **22 PRODUCTION SITES**
12 in Italy, 4 in EU, 6 extra EU

 **6.200 MLN€**
revenues 2022

 **6 RESEARCH CENTERS***
(400 people)



-  PLANTS
-  COMMERCIAL PRESENCE
-  R&D CENTER

PRODUCT PORTFOLIO

- 
INTERMEDIATES
- 
POLYETHYLENE
- 
STYRENICS
- 
ELASTOMERS
- 
COMPOUNDING & MOULDING
- 
BIO-CHEMICALS

We are both an established producer and a reputable licensor, leveraging on our proprietary technologies

Phenol & Derivatives

- Cumene (Zeolite-based)
- Phenol & Acetone
- Acetone to IsoPropylAlcohol
- High selectivity Cyclohexanone e KA-oil

DMC & Derivatives

- DMC & Derivatives via CO & MEOH*
- DPC*

Proprietary Catalysts

- Titanium Silicalite
- PBE-1® & PBE-2® Zeolites-based

Polyethylene

- LDPE/EVA

Renewable based production technologies

- PROESA® (Crescentino plant)
- Matrìca (P.to Torres plant)

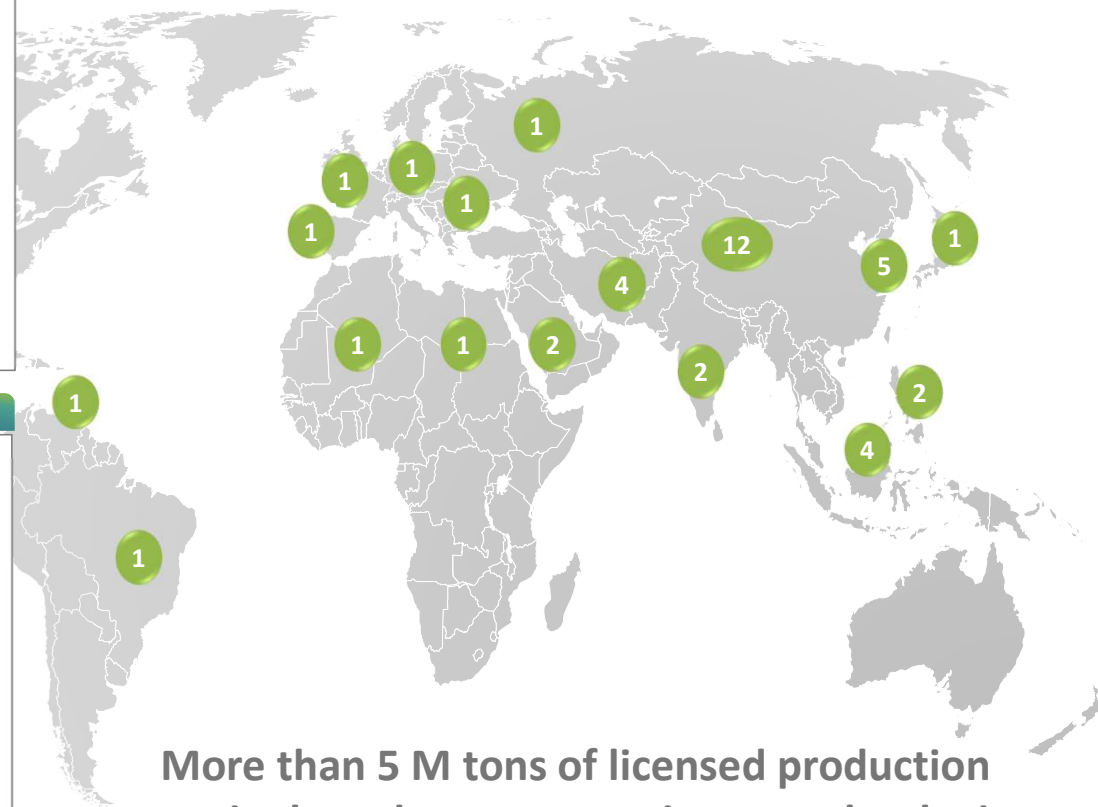
Elastomers

- e-SBR
- s-SBR
- high cis BR
- low cis BR
- NBR
- TPR
- EP(D)M
- HSL
- XSBR

Styrenics

- Ethylbenzene (Zeolite-based)
- Styrene
- GPPS
- HIPS
- EPS suspension
- ABS cont. mass
- SAN

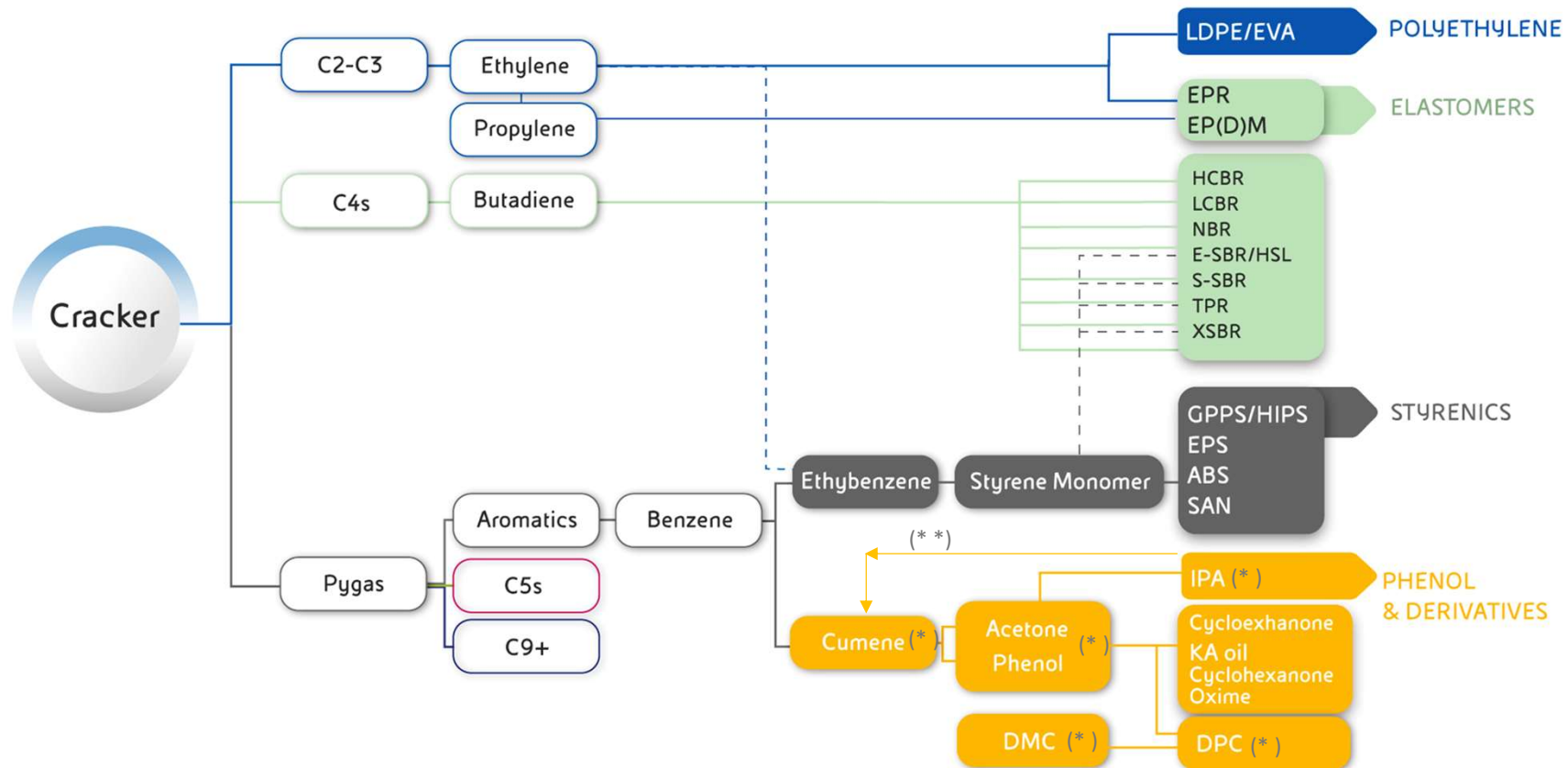
More than 50 licensees worldwide



More than 5 M tons of licensed production capacity based on our proprietary technologies



Focus on conventional feedstock/pathways technologies to specialties



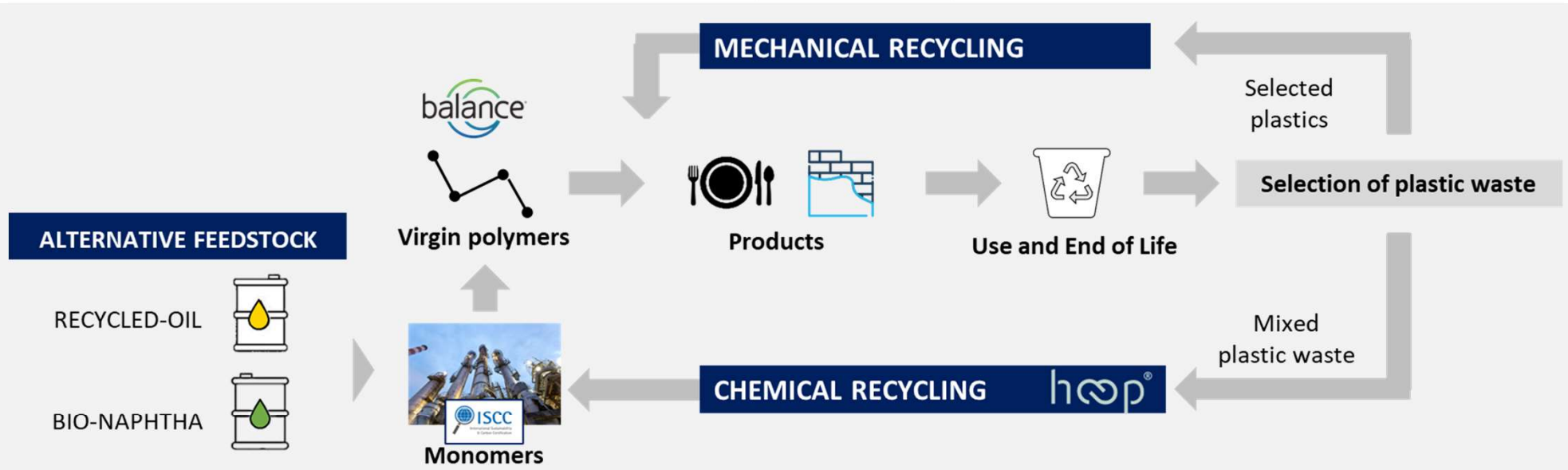
(*) Licensing through Lummus Technology LLC

(**) under development

Versalis circular model



LINE OF PRODUCTS BASED ON POLYETHYLENE, STYRENICS AND ELASTOMERS WITH RECYCLED CONTENT UP TO 75%



BIO ATTRIBUTED
BIO ATTRIBUTED
 FROM BIO-NAPHTHA PRODUCED BY VEGETABLE OILS

BIO-CIRCULAR ATTRIBUTED
BIO-CIRCULAR ATTRIBUTED
 FROM BIO-NAPHTHA PRODUCED BY ORGANIC WASTE / RESIDUES

CIRCULAR ATTRIBUTED
CIRCULAR ATTRIBUTED
 FROM R-OIL PRODUCED BY WASTE (CHEMICAL RECYCLING)



Focus on renewables to chemicals : our integrated technology platforms

BIOMASSES



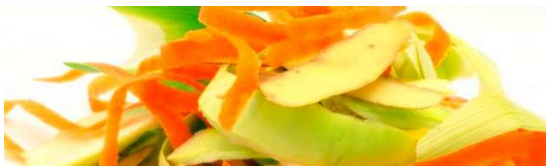
Lignocellulosics residuals



Oily seeds



Guayule



Wastes/by products from agri-food industry

PLATFORMS

Proesa® CRESCENTINO



PORTO TORRES



PARTNERSHIPS



PRODUCTS

- Bio – fuel
- Bio – chemicals
- Bio – herbicides
- Cosmetics
- Intermediates for bio-plastics and bio-fibers
- Natural rubber



VERSALIS APPROACH TO LICENSING



OPERATING REFERENCE PLANT

To support project development and ensure continuous improvements



GLOBAL LICENSING STRATEGY

To support licensees worldwide directly or through our partnerships



FULL SERVICE LICENSING OFFERED TO OUR GLOBAL CUSTOMERS

- Technology package and basic engineering
- Proprietary equipment
- On site training, technical support and plant start-up

Selective approach & commercial cooperation framework in the licensing of specialty products

Focus on PROESA® technology

RENEWABLE FEEDSTOCK



Non-food Biomasses

BIO-BASED CHEMICAL INTERMEDIATES



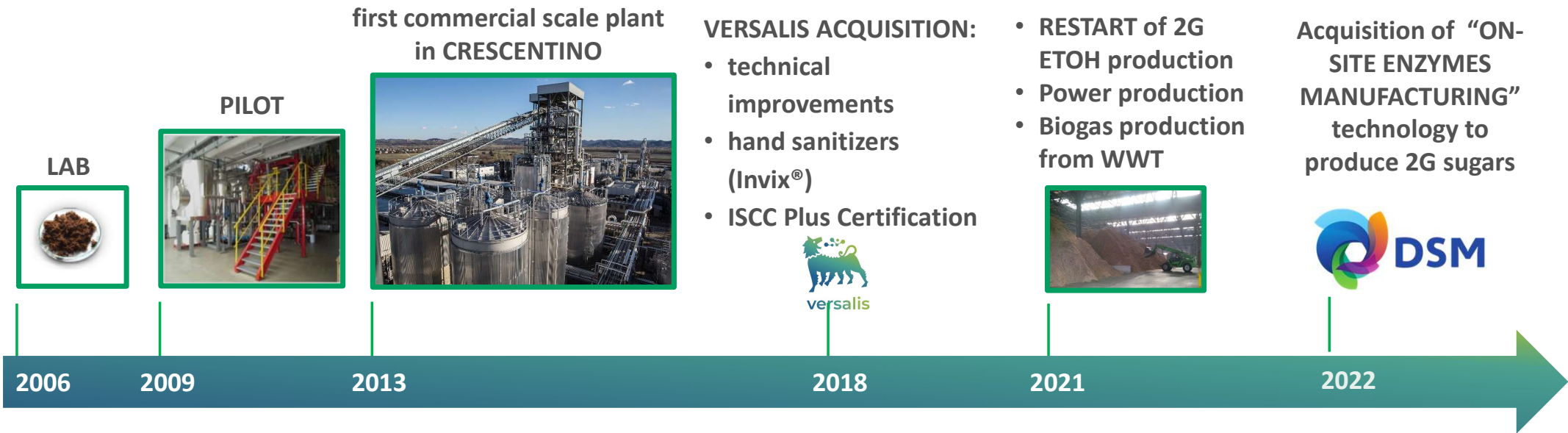
PROESA® Technology

DECARBONIZED PRODUCTS



PROESA® technology platform allows to build a **sustainable value chains** in areas where environmental impact is high and fossil products can/must be replaced with same or even better performances

The technology development to date ...



BIOMASS VERSATILITY

Biomasses used at **commercial scale**:

- ▶ **Hardwood woodchips**
- ▶ **Wheat straw**
- ▶ **Arundo Donax**

STRATEGIC PARTNERSHIPS

Partnerships built with **leaders** in fields of:

- ▶ **Enzymes solution (integrated/outsourced)**
- ▶ **Yeast manufacturing (propagated at site)**
- ▶ **Engineering (experience on OSBL integration)**

IP TOTALLY IN-HOUSE

The **process design** of the whole biomass to Ethanol section is fully **provided and guaranteed** by Versalis



Versalis 2G ETOH industrial scale plant: up and running



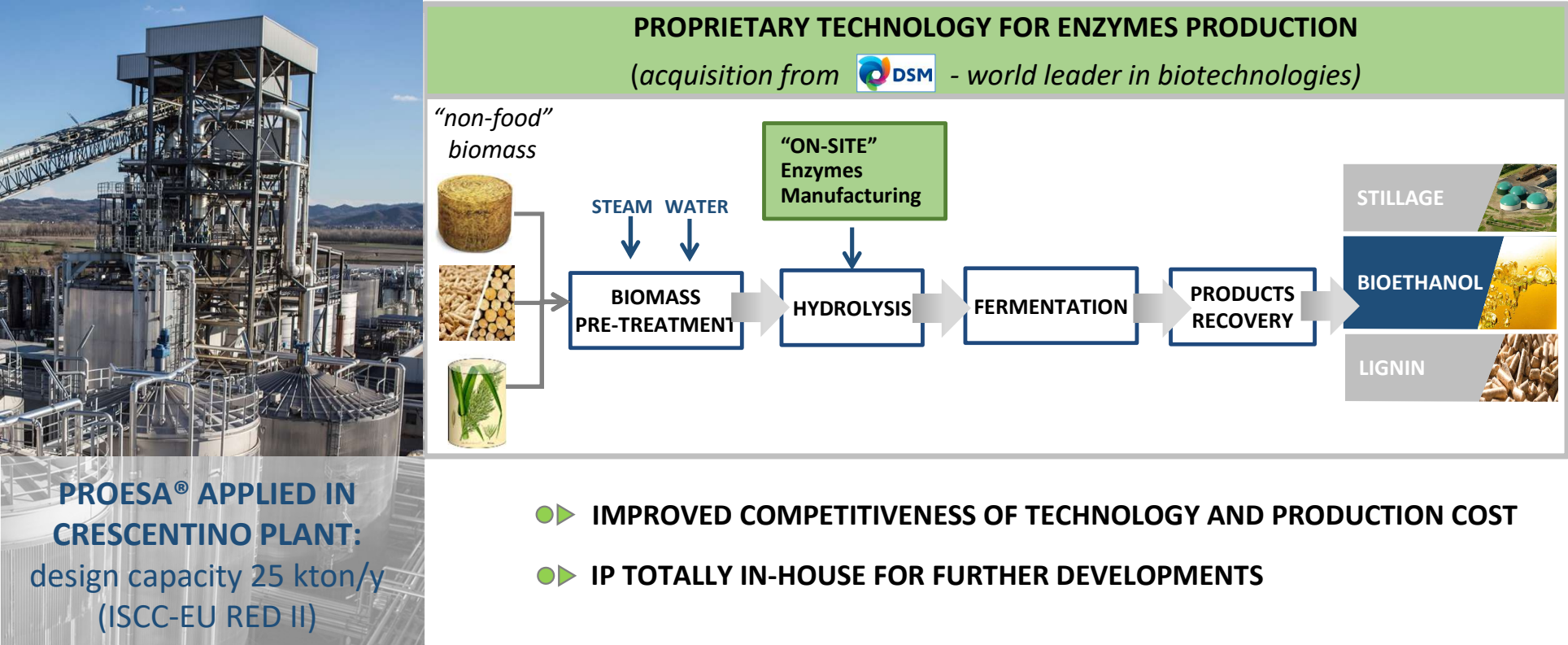
Bioethanol plant up and running at Crescentino

The production of bioethanol from lignocellulosic biomass is now up and running at Crescentino (Vercelli). The plant, which was acquired in 2018, has been overhauled thanks to major investments and has started the production of advanced bioethanol, in compliance with the European legislation for the development of renewable energy RED II, as it is derived from raw materials that do not interfere with the food chain. The bioethanol, produced using Proesa® technology, one of the world's most innovative industrial-scale biomass chemistry technologies, is ISCC-EU certified and will be used to formulate gasoline with a renewable component.

- Industrial unit located in Italy, based on PROESA® technology
- Includes ethanol section, power generation, biogas generation integrated with WWT
- Plant capacity:
 - ~ 25 kt/y (bio-ethanol)
- Lignin (co-product) used in a Biomass Power plant
- Green energy excess sold to the grid
- Zero liquid discharge
- Flexible to produce hand sanitizer from 1G sugars



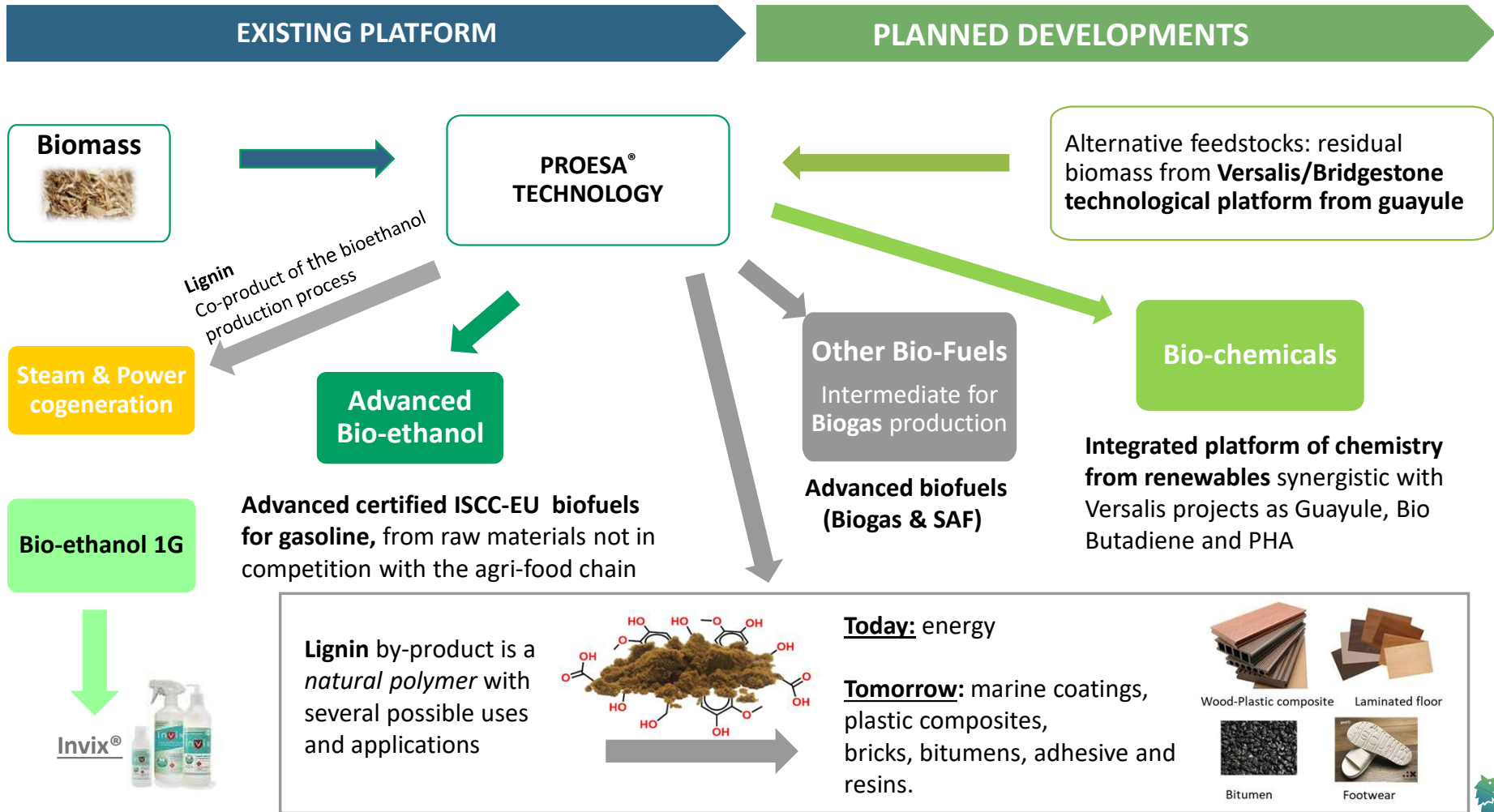
INTEGRATION OF PROESA® WITH ON-SITE ENZYMES MANUFACTURING TECHNOLOGY



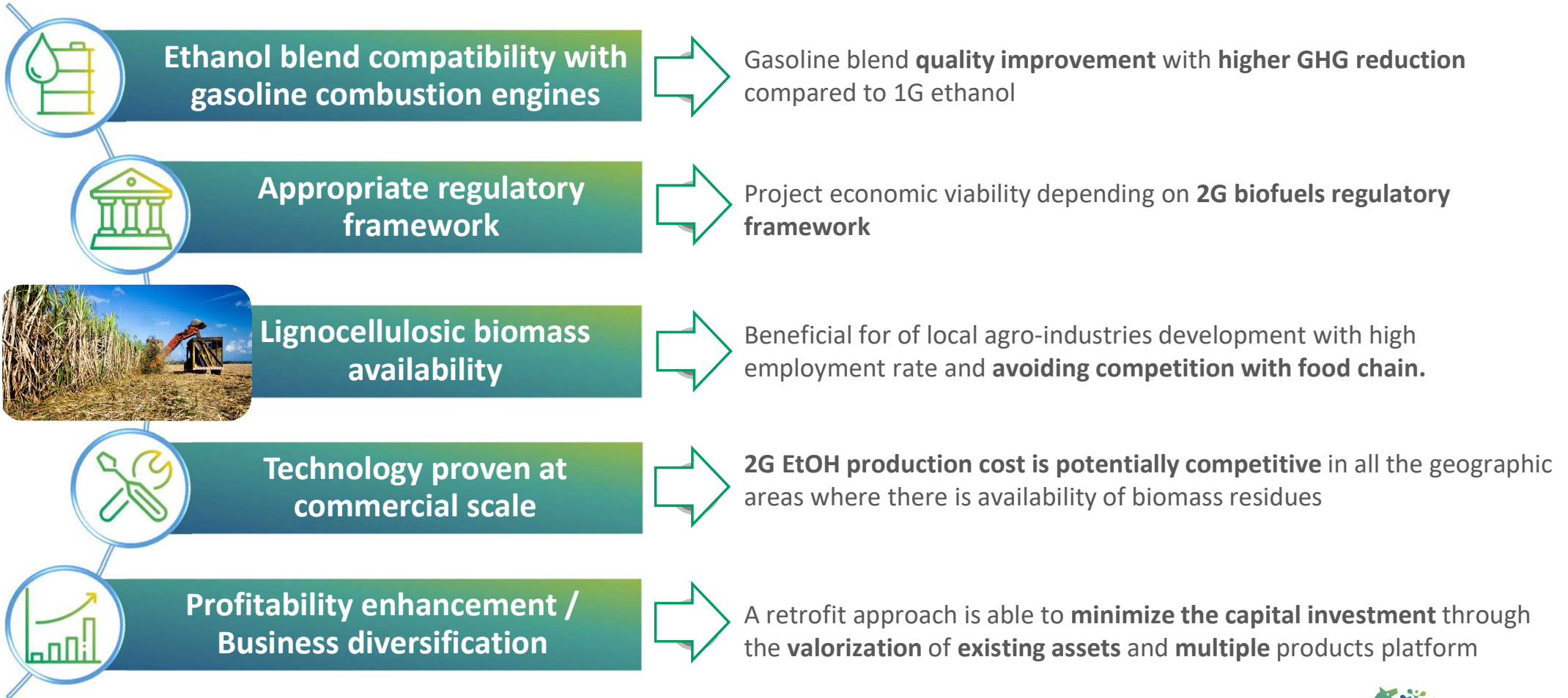
The acquisition includes the entire know-how, patents and strains for enzyme productions – for application in Crescentino plant as well as in the licensing activities



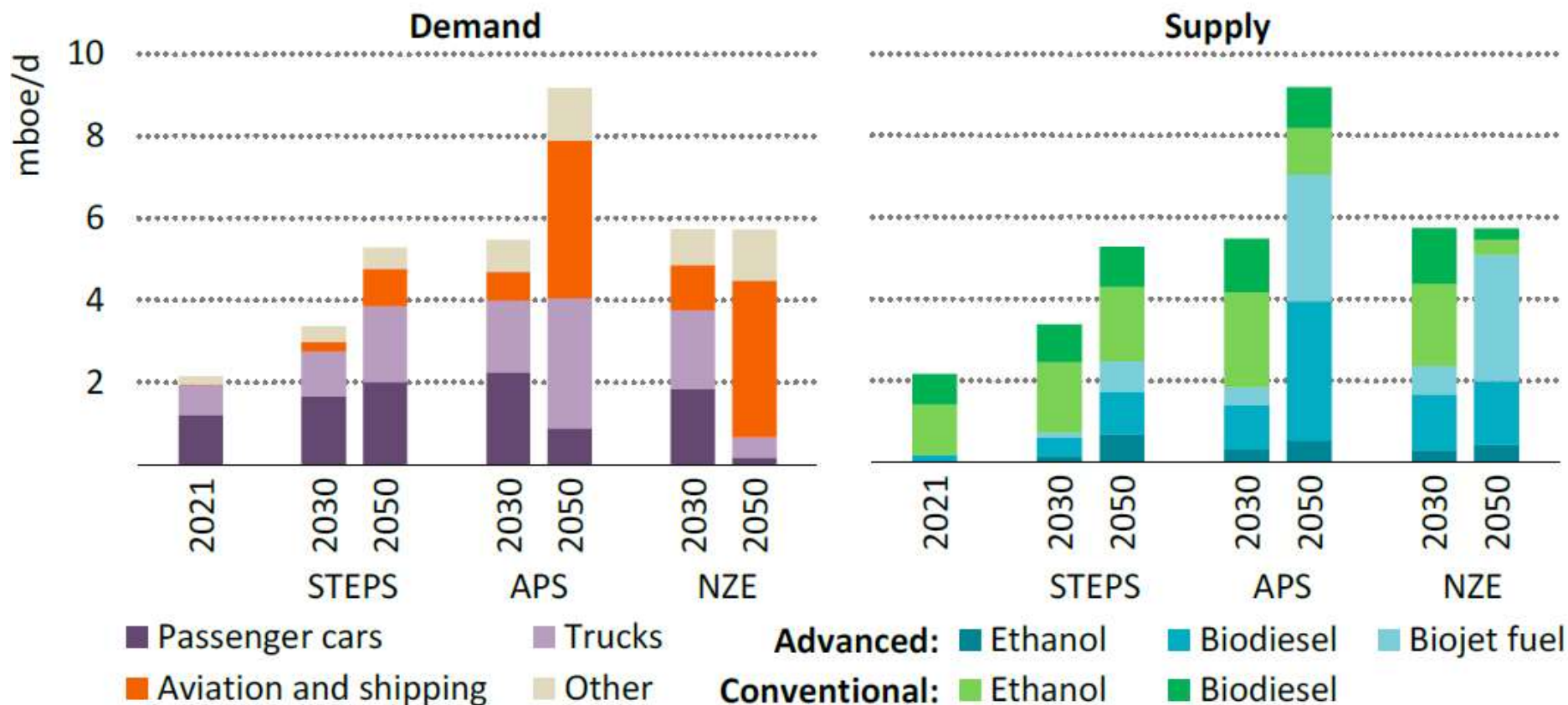
PROESA® is conceived as a versatile technology platform



Key success factors for 2G EtOH industrial projects



Advanced biofuels: a key role in decarbonization of transport



Source: IEA World Energy Outlook 2022; APS = Announced Pledges Scenario, STEPS=Stated Policies Scenario, NZE = Net Zero Emissions Scenario

According to IEA, a large contribution to decarbonization will come from **advanced biofuels**. Regardless the different scenarios, the **cellulosic ethanol** supply is expected to grow in the next decades.

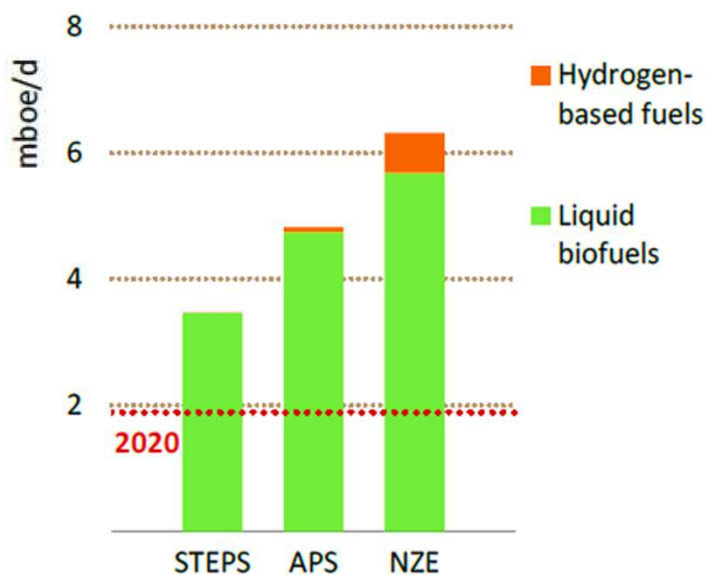


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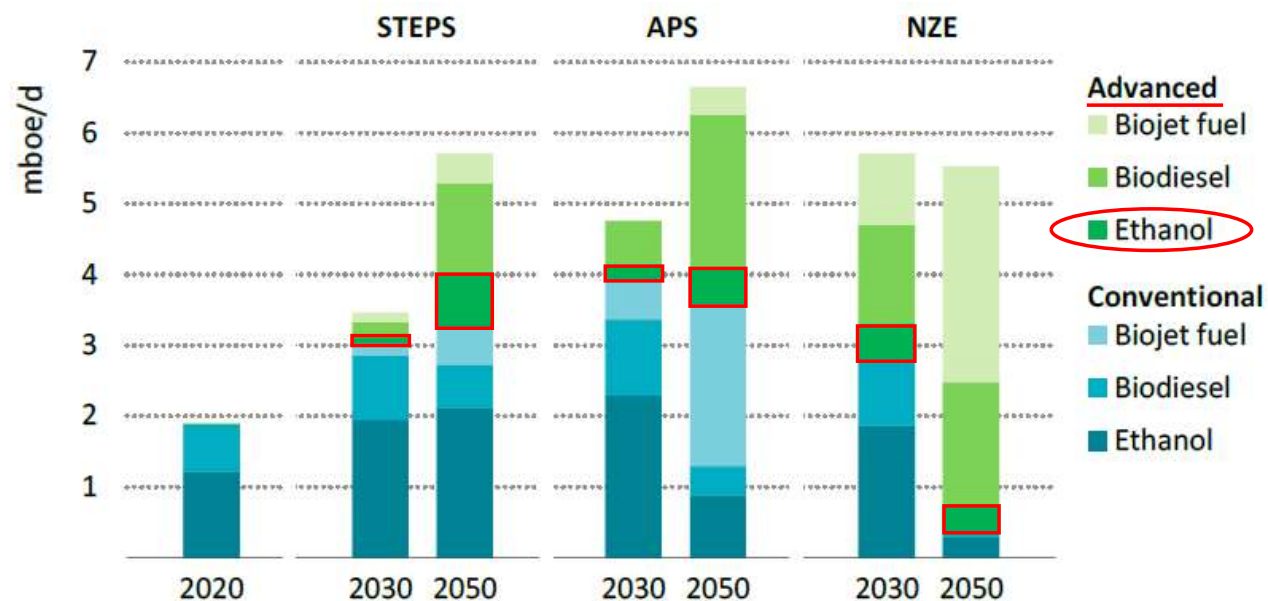
BACK-UP

Advanced bioethanol: a key role in decarbonization of transport

Low emissions liquid fuel demand @2030



Liquid biofuel demand by type and scenario



Source: IEA World Energy Outlook 2021; APS = Announced Pledges Scenario, STEPS=Stated Policies Scenario, NZE = Net Zero Emissions Scenario

According to IEA, a large contribution will come from **advanced biofuels**. In relation to the different scenarios, the **cellulosic ethanol** demand could vary from 8 MTA up to 40 MTA in 2030 and from 32 MTA up to 64 MTA in 2050.