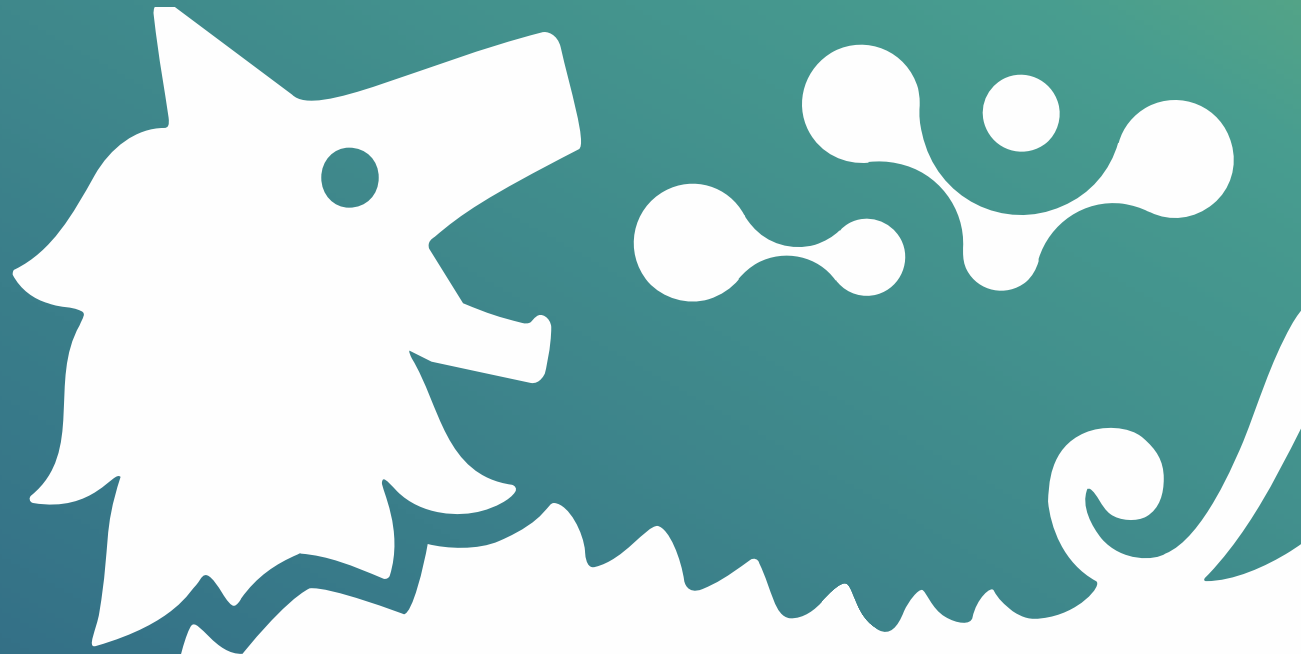


Budapest, 23 September 2024

EURO – Case anual conference

*Versalis pathways to decarbonization:
new technological platforms and synergic approach*



versalis

VERSALIS AT A GLANCE

ENI'S CHEMICAL COMPANY



~ 8.000 EMPLOYEES



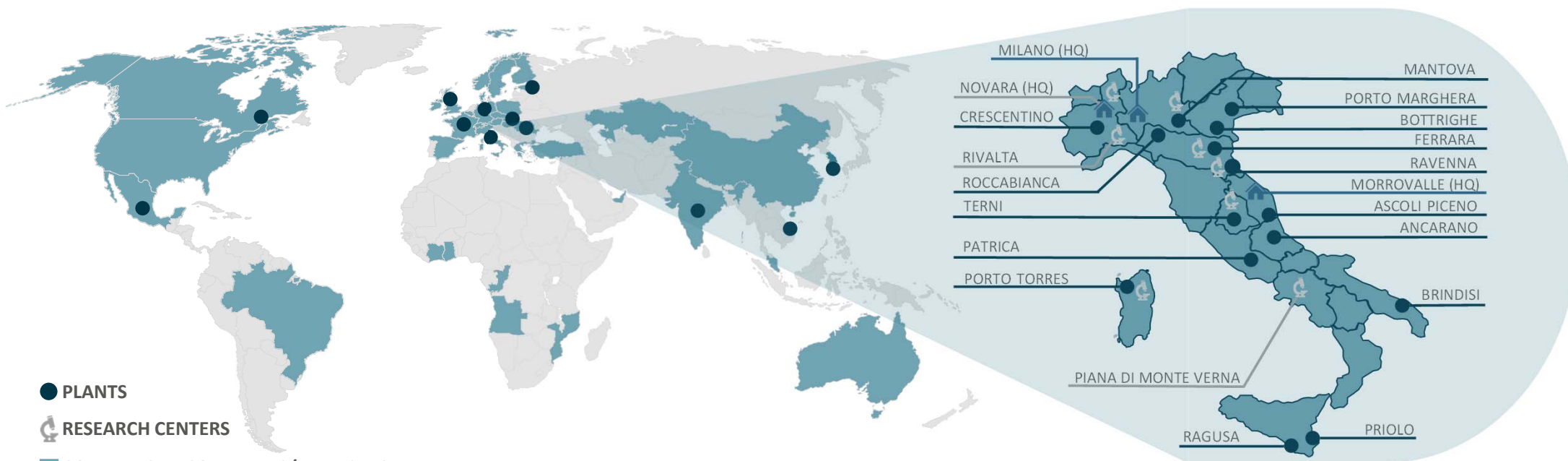
26 PRODUCTION SITES



5 BUSINESS UNITS



7 RESEARCH CENTERS



TECHNOLOGY PORTFOLIO



INTERMEDIATES



OILFIELD
CHEMICALS



POLYETHYLENE



STYRENICS



ELASTOMERS

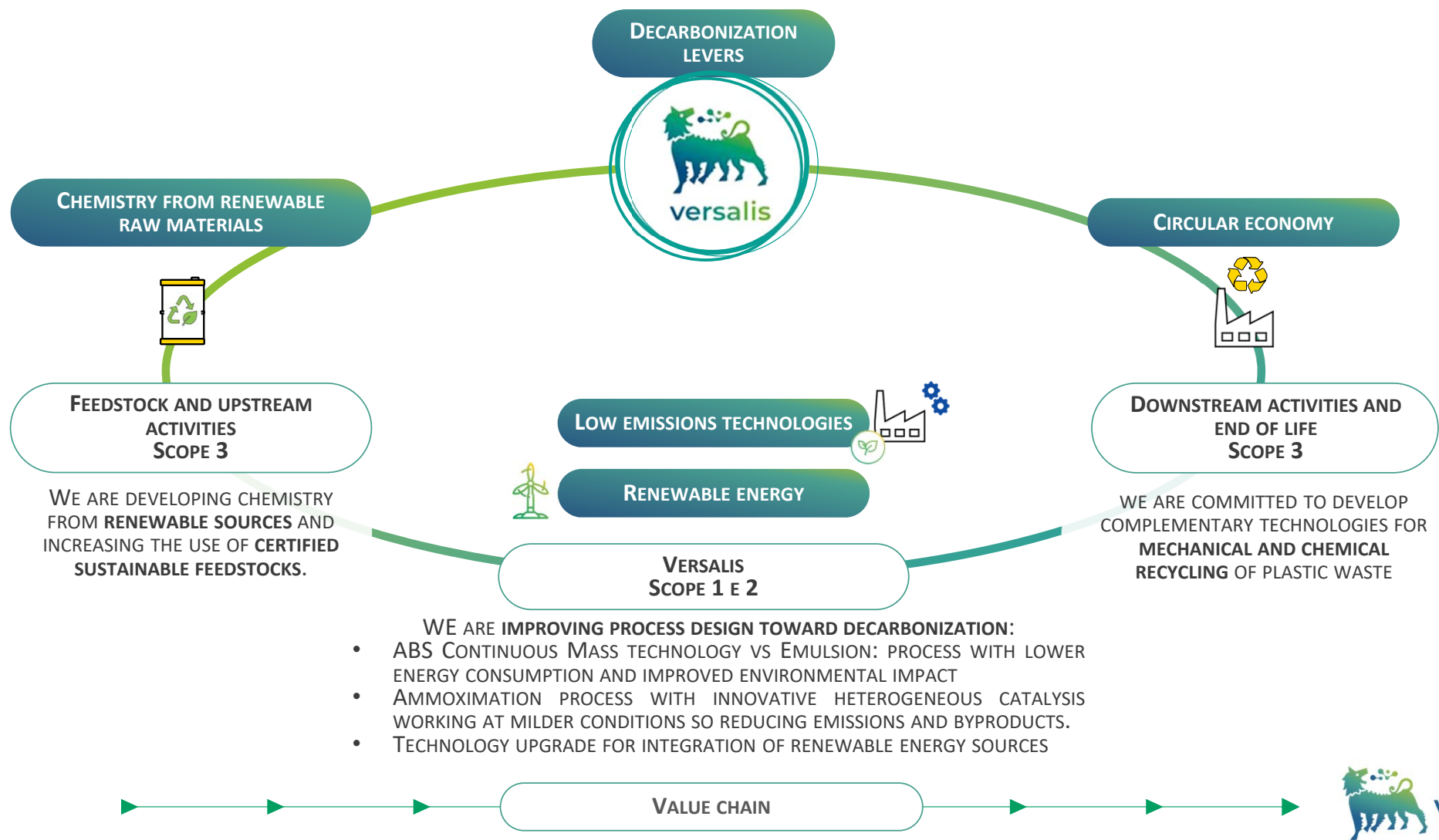


COMPOUNDING
& MOULDING



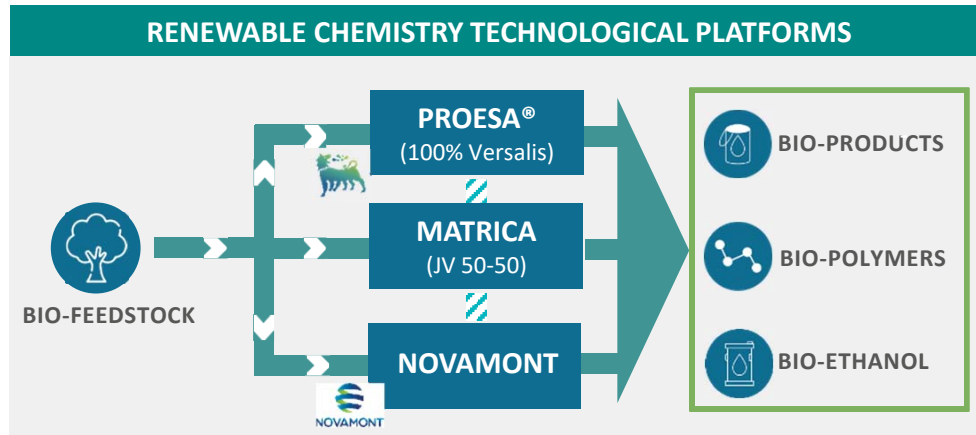
BIO-PRODUCTS

DECARBONIZATION LEVERS

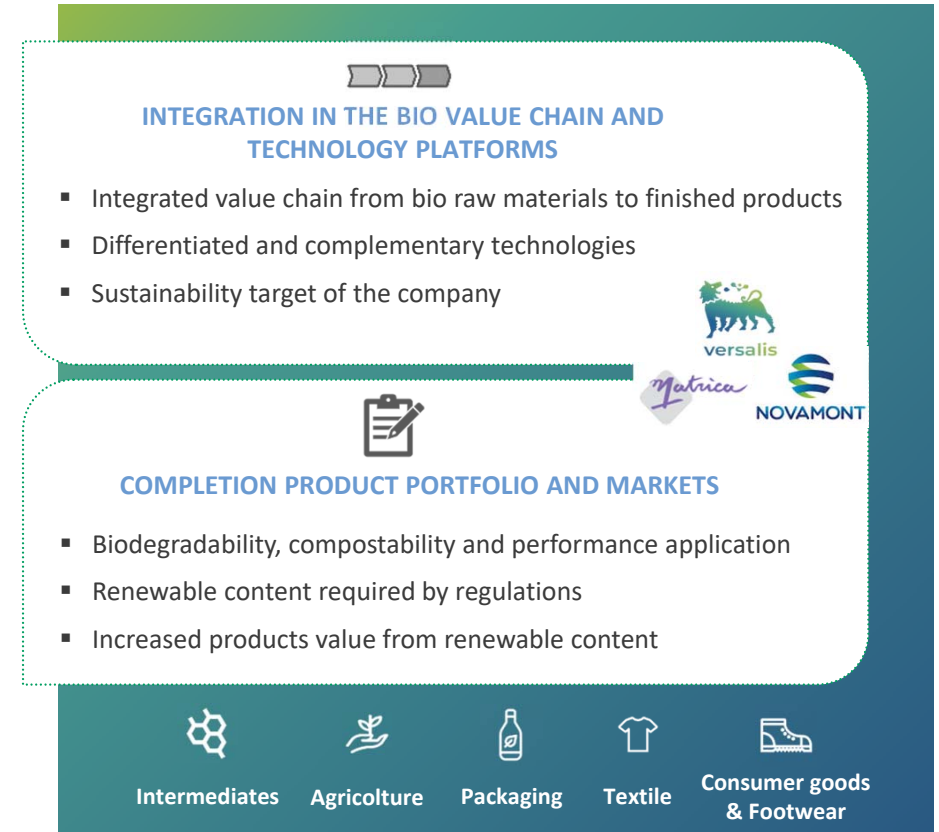


CHEMISTRY FROM RENEWABLE SOURCES

LEADERSHIP THROUGH INTEGRATED VALUE CHAINS

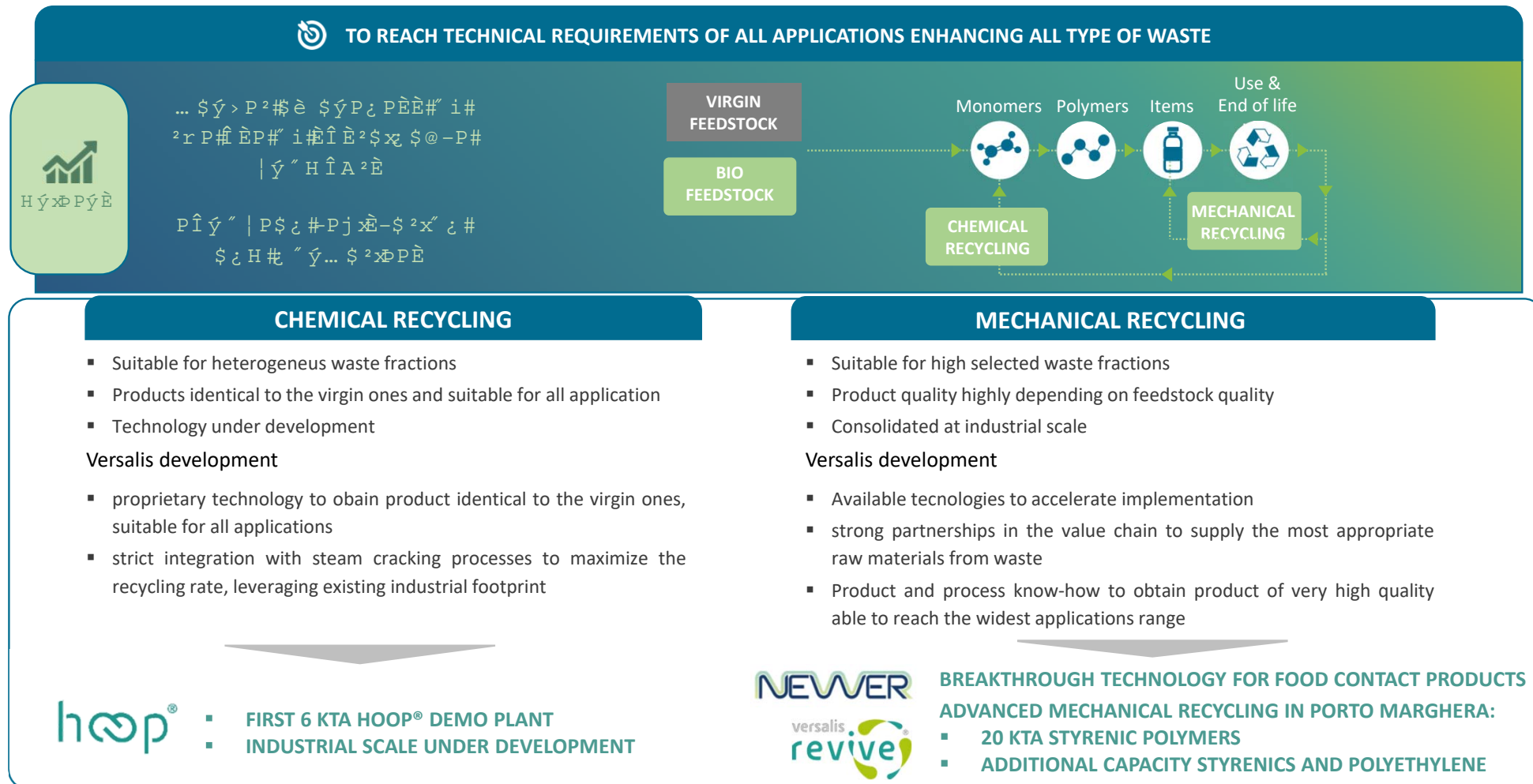


- The **acquisition of Novamont**, a leading player in the circular bioeconomy sector and in the **market for biodegradable and compostable biochemicals and bioplastics**, represents a great opportunity to accelerate the decarbonisation strategy of product portfolio.
- The operation will allow the integration of a **unique and complementary technological platform** and the development of multi-product chains with high added value to decouple the use of natural resources from economic growth in the logic of doing more with less.



COMPLEMENTARY SOLUTIONS FOR CIRCULARITY

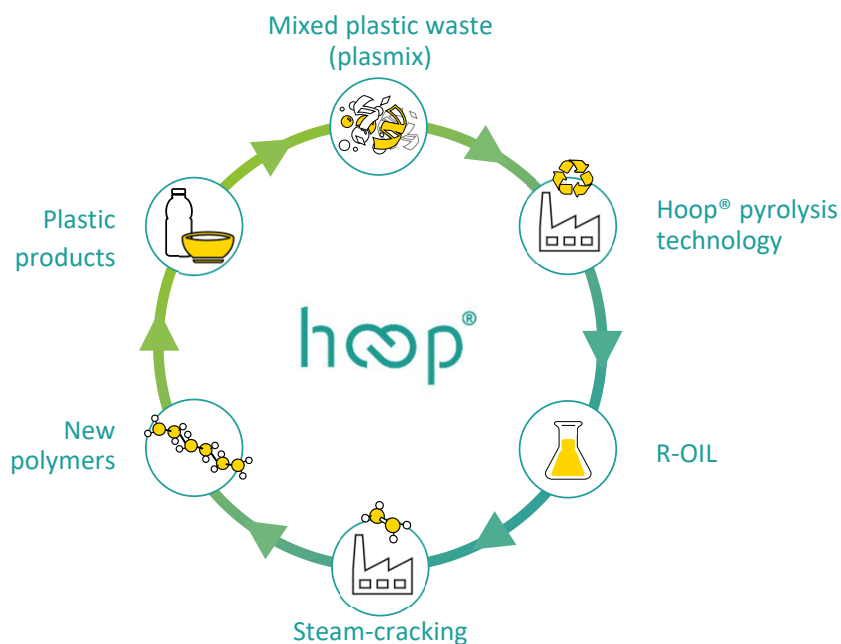
VERSALIS TECHNOLOGIES FOR PLASTICS RECYCLING



VERSALIS HOOP® TECHNOLOGY

Technology platform for advanced plastic chemical recycling

Hoop® is a pyrolysis technology that transforms mixed plastic waste, not mechanically recyclable, into a raw material to produce new plastics, with characteristics identical to those derived from virgin raw materials



DEMONSTRATION PLANT IS CONFIGURED AS “FIRST OF ITS KIND”

PROJECT UPDATES

- Hoop® technology awarded funding of the third call of **Innovation Fund of European Commission (SC-HOOP® Project)**
- **Demo plant construction started**, and is scheduled to be complete by the end of 2024 with capacity of **6.000 ton/y of feedstock input**
- Versalis sign an agreement with **Technip Energies** aimed at integrating Versalis' Hoop® and Technip Energies' Pure.rOil™ and Pure.rGas™ purification technologies by developing a **technological platform for the advanced chemical recycling of plastic waste**

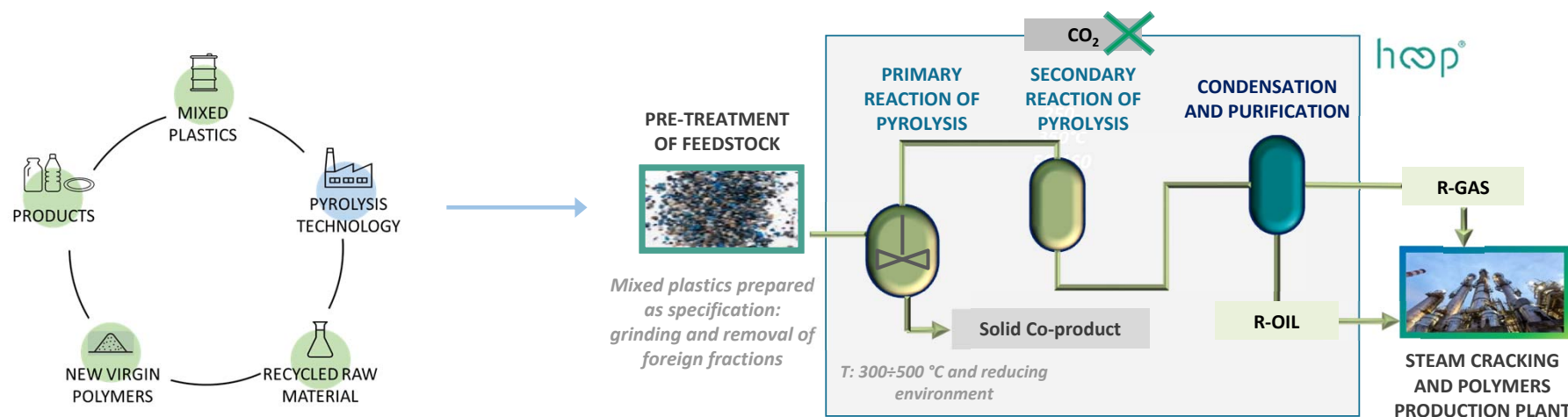


Funded by the European Union
Emissions Trading System
Innovation Fund



HOOP® – TECHNOLOGY DEVELOPMENT

Versalis launched in April 2020 a co-development agreement with the Italian company Servizi di Ricerche e Sviluppo (SRS) for the implementation of a technology for recycling of plastic materials and integration in petrochemical plant , starting from the consolidated experience of SRS on the pyrolysis of mixed plastics to produce fuels



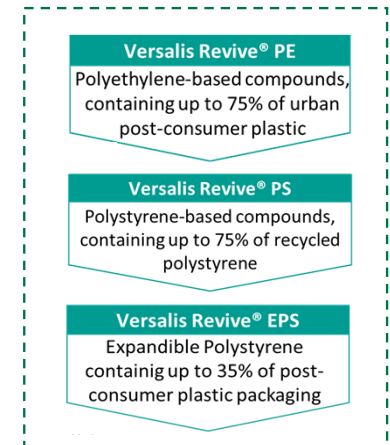
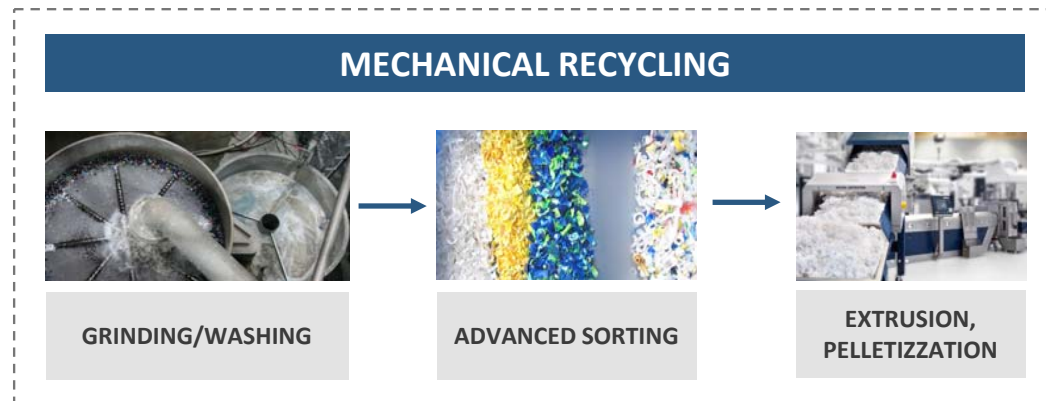
HOOP® TECHNOLOGY TARGETS

MAXIMUM MATERIAL RECOVERY (% C THAT REMAINS IN THE CYCLE AND IS NOT LOST AS CO ₂)	PROCESS YIELD > 80% ONE SINGLE LIQUID PRODUCT WITH QUALITY SIMILAR TO FOSSIL RAW MATERIAL
FLEXIBILITY ON RAW MATERIAL/FEEDSTOCK	CONTINUOUS MONITORING OF RAW MATERIAL FED. HIGH MATERIAL RECOVERY IN EXISTING PLANTS (CRACKING), WITHOUT CHANGES IN THE CURRENT PRODUCTION STRUCTURE
MINIMUM ENVIRONMENTAL IMPACT	REDUCTION OF EMISSIONS >1 TON CO₂ PER TON OF PLASTIC COMPARED TO WASTE TO ENERGY POSSIBLE INTEGRATION WITH RENEWABLES ENERGIES SOURCES REDUCTION OF THE ENV. IMPACT OF THE ENTIRE VALUE CHAIN (LCA)



MECHANICAL RECYCLING AT VERSALIS

SELECTED MONOMATERIAL PLASTIC WASTES



FEATURES

- Suitable for **high selected** waste fractions
- Product quality highly depending on **feedstock quality**
- **Consolidated at industrial scale**
- Breakthrough **proprietary decontamination system** under development

VERSALIS STRATEGY

- Available technologies to **accelerate** implementation
- **Strong partnerships** in the value chain to supply the **most appropriate raw materials** from waste
- Process development to obtain very **high quality products** to reach the **widest applications range**



BREAKTHROUGH TECHNOLOGY FOR FOOD CONTACT PRODUCTS

ADVANCED MECHANICAL RECYCLING COMPLEX IN PORTO MARGHERA:

- **20 KTA STYRENIC POLYMERS**
- **ADDITIONAL CAPACITY STYRENICS AND POLYETHYLENE**



BACK-UP

Q&A

- “In addition to energy efficiency and technology improvements, what other actions the chemical industry can pursue to enhance the decarbonization of products ? “
- “Considering the different technologies available for plastic recycling, which is in your opinion the most sustainable and competitive one ?”
- “What are the enablers for a full scale and widespread development of new recycling technologies?”

LOW EMISSIONS TECHNOLOGIES – EFFICIENCY AND DECARBONIZATION

TECHNOLOGY DEVELOPMENT



IMPROVE PROCESS DESIGN TOWARDS DECARBONIZATION

Technologies development aim to reduce process direct CO₂ emissions with a view to sustainability and decarbonization:

- **ABS Continuous Mass technology** vs Emulsion: process with lower energy consumption and improved environmental impact
- **Ammonoximation process** with innovative heterogeneous catalysis replacing the former homogenous one, working at milder conditions so **reducing emissions**. Improved environmental impact due to the avoidance of byproducts.
- Technology upgrade for integration of **renewable energy sources**

CCUS

CARBON CAPTURE USAGE AND STORAGE

CO₂ capture and storage (CCS) represent currently available and effective solutions to **decarbonise the "hard to abate" sectors** such as chemical industry.

Possibility of utilization of captured CO₂ would maximize sustainability and circularity of such industrial value chain.

Versalis - in synergy with ENI's activities for CCUS - is **exploring initiatives for Carbon capture** in its industrial plants and launched specific research activities for CO₂ usage with the aim to convert **CO₂ to new chemicals**.

BREAKTHROUGH



CRACKER OF THE FUTURE

Decarbonization of chemical industry will rely on development of **new innovative technological solutions** of efficient production processes.

Versalis has been working since 2021 with others partners of chemical industry in the consortium **"Cracker of the Future"** for the development of innovative technology to **electrify steam-powered cracking process**, which is the heart of the petrochemical industry and in which most of the direct emissions of the sector are concentrated.

