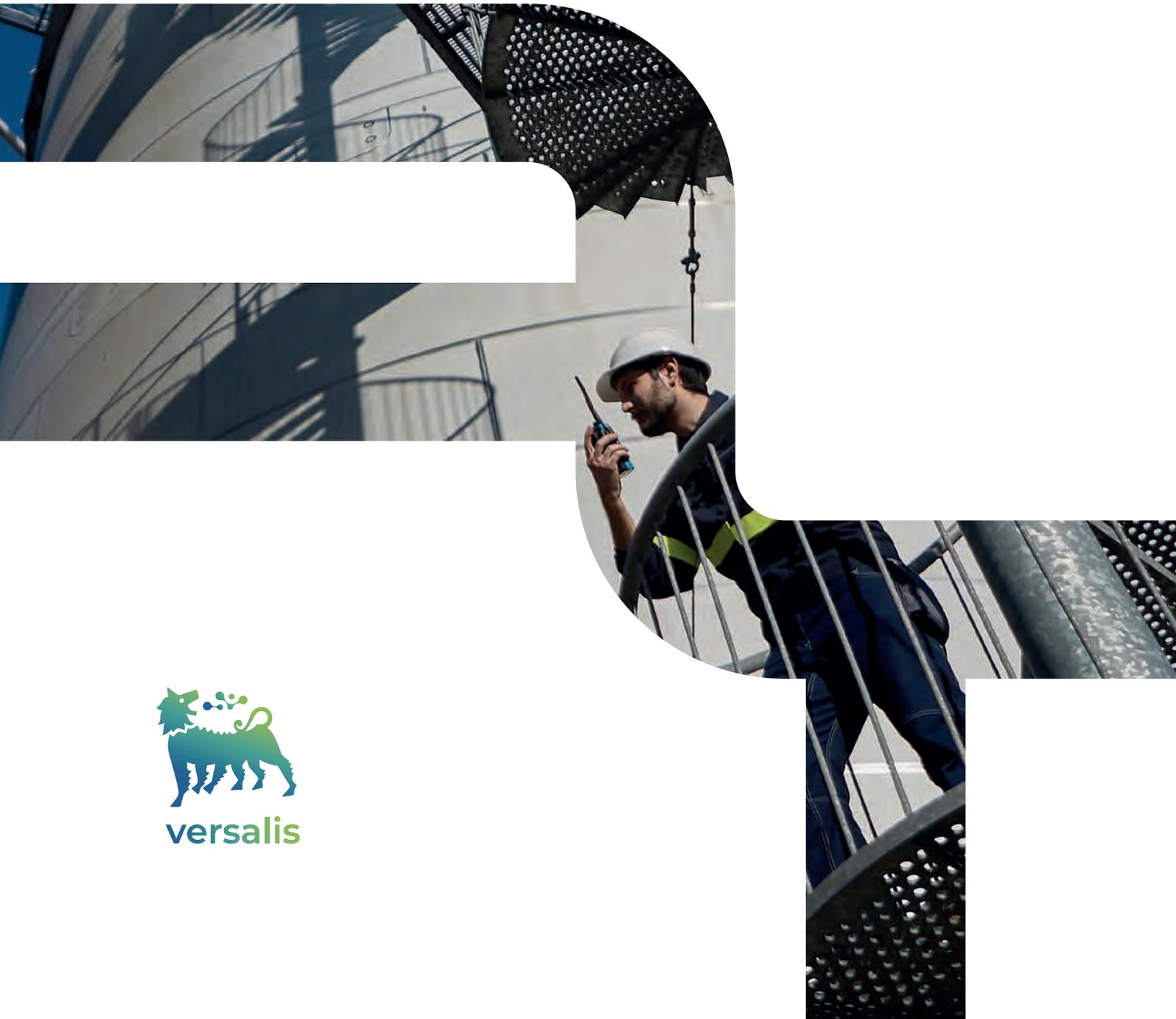


CRESCENTINO

Where chemistry  
is fuelled by  
renewable sources



Versalis is Eni's chemical company operating internationally in the fields of basic and intermediate chemicals, plastics, rubber and chemistry from renewable sources.

It is committed to the development of technologies for recycling plastics and high added-value products. It considers sustainability and circularity to be strategic drivers for the transformation path undertaken.

The Crescentino plant specialises in the **production of 'advanced' bioethanol** from second-generation sugars.



## Unique technology for renewable and sustainable production

The site is the world's first example of the industrial application of **Proesa® technology (Production of Ethanol from Biomass)**, a process that makes it possible to produce bioethanol defined as 'advanced' in that it is obtained from lignocellulosic biomass not in competition with the food chain.

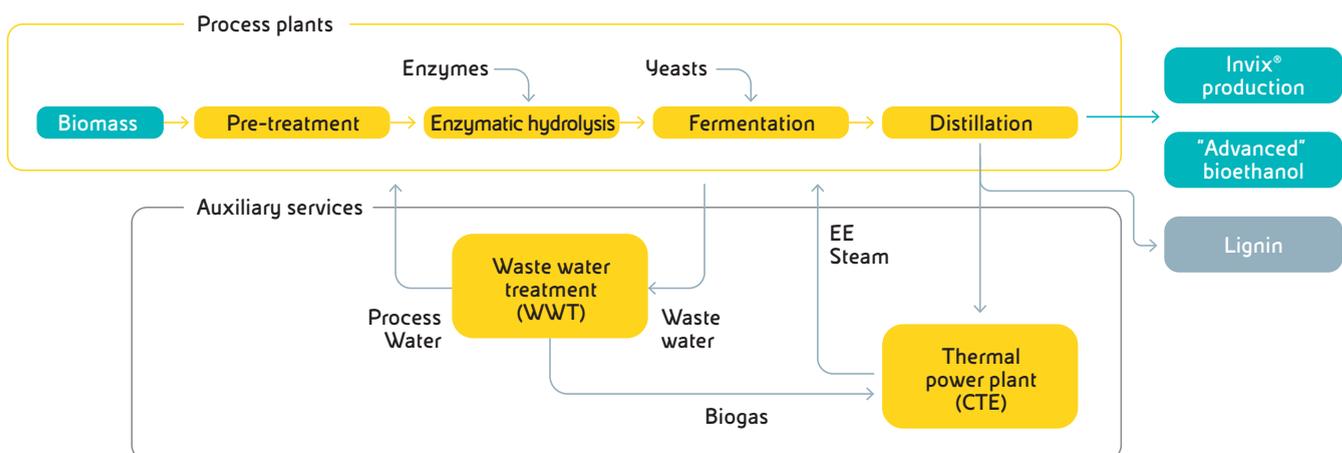
Bioethanol is used in the formulation of petrol with a renewable component to serve sustainable mobility. The system is powered by biomass found in areas close to the plant, promoting a short **supply chain** by supporting **local producers**.

In response to the Covid-19 pandemic scenario, the site has started the production of Invix® **hand and surface disinfectant**, a bioethanol-based medical device authorised by the Ministry of Health.



## The production cycle

The heart of the technology is the section of the plant known as the pre-treatment section, which uses **steam and pressure peaks** alone to break down the fibres that make up the lignocellulosic biomass, making the cellulose and hemicellulose it contains accessible to the enzymes. Enzymes, through hydrolysis, reduce cellulose and hemicellulose to simple sugars (glucose and xylose), making them available to the yeasts which, in the fermentation section, produce ethanol. The ethanol is then recovered in the **distillation section** and finally concentrated with molecular sieves to achieve the desired degree of purity.



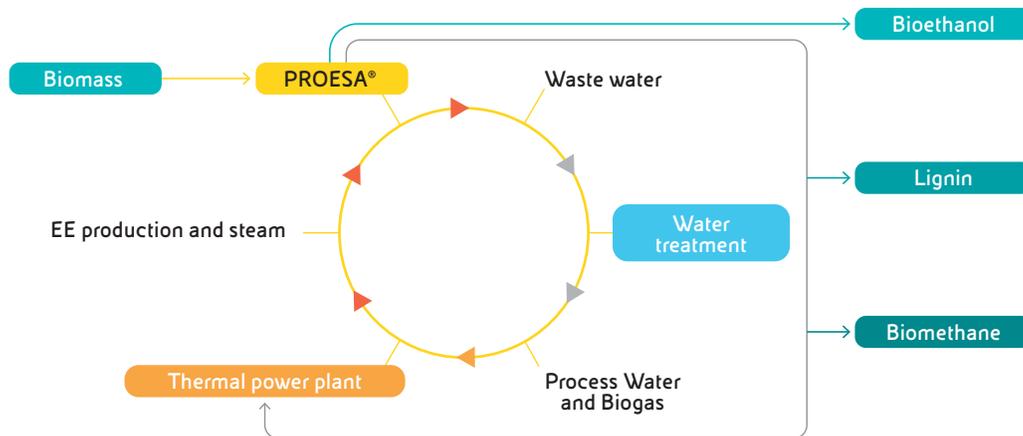
## Circularity of the whole process

The Crescentino plant perfectly interprets the concepts of renewable and sustainable production:

- **process water**, with the exception of a small residue of saline concentrate, is purified and fully reused;
- **biogas** obtained from water treatment with a high organic content is used for internal steam production and potentially exported as biomethane;

- **lignin**, a natural polymer co-produced together with bioethanol, can be used as a fuel for biomass boilers, but it can also be used in a variety of industrial applications thanks to its antifouling, anti-corrosive, stabilising and anti-oxidant properties.

In addition, thanks to the biomass thermal power plant, the site is **energetically self-sufficient**.



## Opportunities and possible developments

The research centres at Rivalta Scrivia (Alessandria) and Novara are working to pursue further developments in the production of a **full range of renewable products-base on fermentation** such as bio-oils for the biorefineries, fully biodegradable polymers (PHA polyhydroxyalkanoates), intermediates for biopolymers and biochemicals, all from second-generation sugars produced with PROESA® technology. They are also experimentally developing lignin in new market applications.

## Commitment to training and research

The main resource of the Crescentino plant is the people who look after its operations on a daily basis, enabling the company to achieve its objectives with a primary focus on **safety and environmental sustainability**, thanks to their expertise and professionalism.

Continuous training enables us to maintain **the highest quality standards** to ensure sustainable production with maximum safety for employees and the surrounding community.

The site is supported in its activities by the **research centres in Novara and Rivalta Scrivia**.

### → CERTIFICATIONS OBTAINED IN 2021

- **ISO 9001:** Quality management system.
- **ISCC-EU:** Managing the traceability and sustainability of bioethanol production, defined as 'advanced' by the European RED II regulation.



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