April 2025

Plant Productization: A Lever for Innovation and Safety in the Green Hydrogen Industry

In brownfield projects, such as AM Green's Kakinada project currently under execution in India, the design of Clear100+ is adapted to the existing constraints, implementing additional control measures to ensure safety.

In a world where the energy transition must accelerate, green hydrogen plant productization emerges as a strategic approach to combine efficiency, safety, and sustainability. Jérôme Hocquet, Safety HSE in Design Expert at Rely, sheds light on the advantages of this method, particularly in terms of safety, Environmental and Health aspects, and its key role in ensuring the longevity of industrial projects.

"If you think safety is expensive, try having an accident." This quote, often used by Health, Safety, Environment (HSE) professionals in the industrial sector, perfectly illustrates the importance of anticipation and prevention when it comes to safety in design. But how can these aspects be integrated from the earliest stages of plant design? One of the main answers lies in productization, an approach that standardizes processes and equipment while allowing for continuous improvement and flexibility.

The Product Approach: A New Paradigm for Safety

For Jérôme Hocquet, HSE in Design Expert at Rely, one of the main benefits of this method is its ability to integrate Health, Safety, Environmental considerations from the earliest phases of a project. "Thanks to our product approach, we can address HSED issues right from the design phase and revisit them easily to incorporate feedback and lessons learned. This allows us to tackle risks at their root, rather than designing systems that merely control or mitigate them," he explains.

A concrete example? Reducing operating pressure in electrolyzers. In collaboration with its technology partner John Cockerill Hydrogen, Rely's team successfully lowered the pressure from 30 to 15 bars without compromising performance. "This approach promotes inherent safety by reducing hazards at the source rather than adding costly and complex layers of protection" adds Jérôme.

Another example of innovation implemented to enhance the inherent safety of our standardized Clear100+ plant: apart from the stacks, we install all process equipment—specifically those through which pressurized hydrogen flows—outdoors. I am particularly referring to separators. This approach allows us to eliminate any risk of hydrogen accumulation in an enclosed building. To achieve this, we leverage the expertise of an EPC contractor inherited from one of our parent companies, Technip Energies, in designing outdoor plants for the Arctic, a region of the world with extreme weather conditions.

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Integrated and Evolving Safety

Productization is not limited to standardization. It also enables continuous product improvement through structured feedback loops. "We integrate feedback from our clients and lessons learned from project execution to enhance our products. This learning cycle is essential to ensure increasingly safe and efficient installations," emphasizes our expert.

This approach draws inspiration from sectors like nuclear energy, where the standardization of reactor designs has improved safety across generations. In the case of green hydrogen plants, productization offers a similar framework: standardized yet evolving installations, where each generation benefits from the technical advancements and feedback of its predecessor.

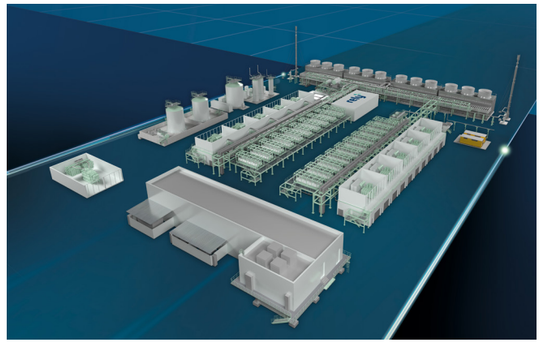
This methodology is particularly valuable in a context where safety regulations and expectations are rapidly evolving. "We operate within a strict regulatory framework, such as the Seveso III directive in Europe, but our approach goes beyond minimum requirements. We aim for a high standard that covers most regulatory contexts while remaining adaptable to local specifics," explains Jérôme.

Regarding safety, our approach is to go beyond the minimum requirements of the regulatory frameworks.

A Strategic Imperative for the Hydrogen Sector

Safety is not just a legal obligation or a matter of reputation; it is also a key factor for the social acceptance of new technologies. *"If one of the first green hydrogen installations experience major incidents, it could slow down—or even jeopardize—the entire sector,"* warns Jérôme. To ensure the sector's longevity, it is therefore crucial to demonstrate that installations are safe and reliable from the moment they are commissioned.

Although productization is better suited for greenfield projects, all the thinking and many principles developed for the product can be transposed and adapted for brownfield projects, such as AM Green's Kakinada project currently under execution by Rely in India. *"In a greenfield project, we can seize the opportunity to directly use our Clear100+ plant, thus integrating inherent safety principles from the outset. As for brownfield projects, where we must work with existing infrastructures often designed to older less stringent standards, we adapt the design of our Clear100+ plant to these specific constrains, implementing additional control measures to ensure safety,"* explains Jérôme Hocquet.



Thanks Rely's product approach, all HSED issues of the Clear100+ plant are addressed right from the design phase, and risks are tackled at their root.

An Initial Investment for Long-Term Gains

Plant productization represents a strategic investment to launch the industry. *"We invest approximately 20 to 30% more time and effort in HSED studies compared to more mature projects, such as refineries or LNG facilities. This effort is necessary to lay the groundwork for future standards,"* emphasizes Rely expert. This investment translates into in-depth studies, close collaboration with clients, and continuous innovation in the design of installations.

Beyond financial considerations, safety is also a matter of responsibility. *"At Rely, safety is part of our DNA. It is not just a regulatory requirement or a client demand; it is a core value. We design our products to be not only high-performing but safe and sustainable, contributing to a responsible energy transition,"* he concludes.

Integrating feedback from our clients and lessons learned from project execution is essential to increase safety and efficiency of installations.

A Model for the Future

By standardizing designs, integrating feedback, and placing Health, Safety and Environmental topics at the heart of the design process, plant productization provides a solution to the complex challenges of modern industry. It not only reduces risks and optimizes costs but also strengthens stakeholder confidence in emerging technologies like green hydrogen and Power-to-X.

In a global context where the energy transition is a top priority, Rely productization approach represents a model for the future. It demonstrates how innovation, when paired with a responsible vision, can transform challenges into opportunities, become a strategic enabler to meet the dual demands of sustainability and safety and ultimately, bridge the gap toward a decarbonized industry.

Jérôme Hocquet
HSED Expert - Rely

After having occupied various HSE positions within Technip Energies, Jérôme Hocquet currently serves as HSE Design Expert in Rely, playing a key role in Green Hydrogen and Power-to-X projects. He leverages over 25 years of experience in Safety, Risk Assessment, and Risk Quantification across the Nuclear, Oil & Gas, Petrochemical, and Chemical industries, with expertise in consequence analysis and advanced modeling tools such as PHAST, SAFETI or FLACS.