



ENERGY: A SOURCE OF INNOVATION FOR A GREENER FUTURE

DISCOVER OUR MANY AREAS OF
EXPERTISE AND OUR SOLUTIONS FOR THE
ECOLOGICAL TRANSITION



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Enabling access to low-carbon, sustainable and competitive energy

In this magazine, we are delighted to take you into the heart of our passion for energy, a constantly evolving field that is redefining the way the world supplies itself with electricity, heat and mobility.

Throughout these pages, you will discover our vast portfolio of skills, ranging from renewable energies, such as wind and hydro power, to intelligent energy management, nuclear power, power grids and hydrogen.

Each of these technologies is crucial to shaping a cleaner, more efficient and sustainable energy future for generations to come.

Renewable energies represent major pillars of our expertise, enabling us to reduce our carbon footprint while harnessing inexhaustible natural resources.

Furthermore, energy storage is a challenge to which our teams are fully committed, in order to guarantee its continuous availability.

SEGULA is also a major player in nuclear power, a key element in the production of low-carbon electricity, enabling us to achieve a form of autonomy and energy sovereignty.

Finally, hydrogen, the energy vector of the future, is a subject in which SEGULA has been invested for over 10 years.

Our expertise in the production, storage and use of hydrogen is helping to shape a more sustainable and diversified energy landscape.

As the world moves towards a low-carbon economy, we hope this magazine will inspire and inform you about our commitment to a cleaner, safer and more promising energy future.

We hope you enjoy reading it.

David Landier,

Director of the Industries branch of SEGULA Technologies

RENEWABLE ENERGIES



WIND ENERGY

SEGULA Technologies offers a full range of engineering services in the wind energy sector, through its design offices, covering the entire project life cycle.

From the preliminary studies phase to the design and engineering of wind turbines, including the construction of wind farms, operation, maintenance, revamping and repowering, SEGULA supports its customers at every stage of the process to help them develop larger, more powerful machines.



Our expertise



Equipment reliability

Validate components in accordance with specifications

Monitor production quality throughout the supply chain

Understand degradation modes and seek solutions



Project management

Support the project from the preliminary project phase through to completion of the works

Manage the electrical connection, including up to HV level

Supervise the site and the works, ensuring that quality and deadlines are met



Maximise wind turbine profitability

Reduce the frequency and duration of maintenance shutdowns

Move from corrective maintenance to preventive and predictive maintenance to guarantee optimum performance



Design to cost

Develop a cost analysis



Develop innovative solutions

Identify partners for R&D projects

With centres of excellence located in France and Spain, SEGULA Technologies is a preferred partner of the biggest players in the sector, such as SIEMENS GAMESA, NORDEX-ACCIONA, ADWEN and General Electric WIND, for the design of wind turbines. Our geographical proximity and our ability to support our customers worldwide from different countries, close to their R&D centers, guarantee responsiveness throughout the project.

Two wind farms come on stream thanks to SEGULA

Under a framework contract with energy operator EDPR, a world leader in renewable energies, SEGULA Technologies has participated in the construction and commissioning of two wind farms in Spain: Piedrahita and El Castillo, located on the border between the provinces of Zaragoza and Teruel.

A technological challenge

Due to their location in mountainous areas, the construction of these parks represented a major challenge due to the complexity of the geomorphology and the logistics that had to be carried out via unconventional access routes. Despite this, SEGULA successfully completed the project in just one year, working closely with CRC, General Electric, Cobra and Siemens.

A project managed from A to Z

Drawing on its extensive experience in the management of renewable energy projects, SEGULA took charge of the entire project, from the detailed analysis of the documentation to the monitoring and supervision of the construction work, including the coordination of technical assistance, health and safety for all the projects associated with the construction of these two wind farms - all in compliance with EDPR's deadlines and quality requirements.

Among the main elements of the project, SEGULA designed:

- 1** **Piedrahita** wind farm (Loscos SEGULA, province of Teruel). With a capacity of 19.8 MW, this wind farm consists of five wind turbines: four GE 137 model turbines of 4,030 kW HH111.5 m (limited to 4,000 kW each) and one GE 137 of 3,800 kW HH110m.
- 2** **El Castillo** wind farm (Fombuena and Luesma (province of Zaragoza), Lanzuela and Bádenas (province of Teruel)). This wind farm has a capacity of 25.2 MW, and is made up of seven GE 137 model 4,030 kW wind turbines (limited to 3,600 kW each).
- 3** Two medium-voltage (30 kV) overhead and underground lines to carry the electricity generated by the two wind farms to the Pedregales transformer substation.
- 4** A 9km high-voltage overhead line (220 kV) between Pedregales and the Cañaseca substation, from where energy is in turn transmitted to the Muniesa connection point via an existing line.



SEGULA Technologies and Siemens Gamesa: Collaboration in Onshore Wind Energy

SEGULA Technologies is supporting Siemens Gamesa in its expansion of onshore wind power in Spain with a team of around fifty engineers with expertise in construction, industrialisation, technology, services and logistics.

SEGULA engineers contribute their expertise to the development and maintenance of blades, towers and nacelles for Siemens Gamesa wind turbines in the Sg5x, Sg4x and Sg3x ranges. This cutting-edge technical contribution guarantees the reliability and performance of these wind turbines. The collaboration also covers comprehensive services, including troubleshooting, repowering, overhaul and life extension projects.

These services are essential to ensure the continued operation of wind farms and maximise their profitability. They also work on utility installation and assembly processes, ensuring smooth and efficient commissioning of wind turbines.

The collaboration between SEGULA Technologies and Siemens Gamesa is a concrete example of how multi-disciplinary expertise and cooperation between key players in the wind energy sector can foster the transition to cleaner, renewable energy. This alliance also demonstrates the importance of strategic partnerships in addressing the complex technological and logistical challenges of the wind industry, thereby contributing to a more sustainable future.

General Electric calls on SEGULA to install new offshore wind turbines

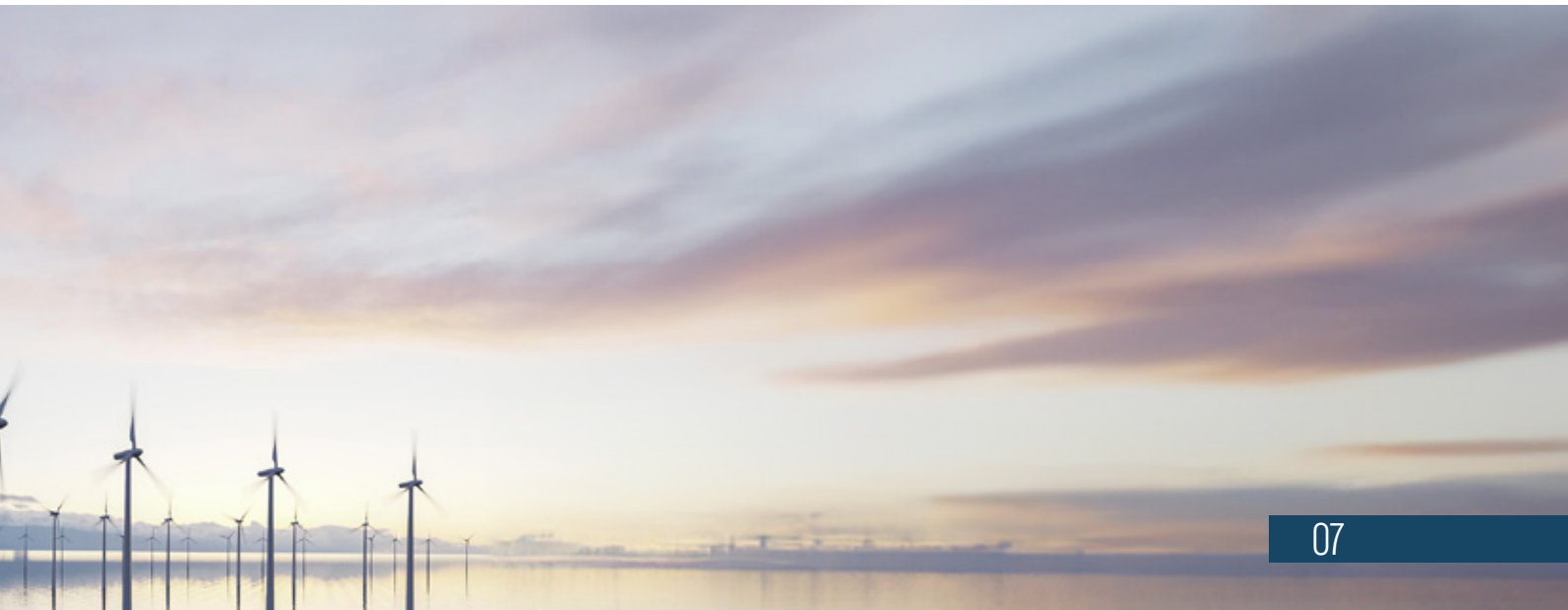
General Electric has called on SEGULA to provide Project Management Officer (PMO) expertise for the installation of the new range of Haliade-X wind turbines on the final field, as well as the installation of the nacelles.

SEGULA's expertise covers structural engineering, seismic expertise for port installations, barge design, monitoring for efficient and safe installation and continuous improvement of the installation process.

To complete the project, SEGULA provided General Electric with specialist engineers who played a key role in steering the studies required for the installation:

Structural engineer for vibration effects with seismic expertise in geology for port facilities

Engineer for barges who designed plans and lifting instructions and analysed the space available to ensure that the operation was carried out safely



HYDRAULIC

SEGULA JOINS THE ECO D'EAU COALITION

SEGULA is committed to seeking sustainable solutions to optimise water management. This is why the Group has joined the Eco-water coalition, launched by Veolia, which aims to support water conservation initiatives.

The 4 objectives are as follows:

- 1** Secure local water supplies.
- 2** Guarantee sustainable access to water for everyone.
- 3** Respect nature by leaving it the water it needs to maintain its equilibrium.
- 4** Reduce economic players' dependence on water without compromising the viability of their activities

At SEGULA, this means, among other things, innovation projects around water management, awareness-raising initiatives and the introduction of measures to reduce water consumption at our various sites.



OUR EXPERTISE IN WATER RESOURCES MANAGEMENT



“Our modelling tools help to optimise the management of water resources”

Water shortages are already numerous, and could become even more acute over the next few decades as a result of climate change and human activity. Faced with this threat, SEGULA Technologies is developing 3D modelling tools to help prevent fluctuations in the quantity and quality of aquatic environments.

Explanations from Florian Poutot, Business Leader and Environmental Engineer at SEGULA Technologies.



How would you describe SEGULA Technologies' expertise in the water sector?

We are a small team with unique expertise, focusing primarily on modelling water resources.

Our approach is based on the use of data such as meteorological information, water flows and river temperatures to develop 3D models of aquatic ecosystems.

These models incorporate algorithms as well as knowledge of physical chemistry and biology.

By anticipating future changes in aquatic environments and taking into account the expected impacts of climate change, our tools enable us to make informed decisions about water management.

These models act as digital twins of observed natural ecosystems, such as lakes and rivers.

They offer the possibility of correcting a major shortcoming of traditional impact studies on hydraulic projects: not taking sufficient account of climate change in their conclusions.

In the longer term, our team is working on incorporating water evaporation modelling, which is currently in the research and development phase.

Who are these aquatic modelling solutions aimed at?

These tools are already being used in a wide range of applications. Our customers come from both the public and private sectors.

For example, as part of a hydroelectric dam project supported by the Cameroonian government, modelling was used to determine whether flooding an entire valley and its vegetation was a better option in terms of carbon footprint, rather than deforesting the valley before impounding the water.

This is because the degradation of plant matter in water emits methane. On the same site, this technology has also enabled estimates to be made of greenhouse gas production in the first few years of the dam's operation.

In France, as part of the ATARA programme, we are automating the modelling of water bodies. This is a particularly crucial issue in mountainous areas where precise water management is essential.

We are working on this programme in collaboration with teams from the Office Français de la Biodiversité and INRAE.

In Spain, our modelling tools are helping to improve the efficiency of water use in rice growing. In a completely different field, we are also deploying our models for EDF.

To operate, nuclear power stations need to be cooled by water, generally from rivers. Our tools are used to adapt nuclear energy production to high temperatures.

These examples demonstrate the vital importance of modelling for sustainable water management.

Why are these solutions set to become so widespread?

According to the United Nations, between two and three billion people worldwide suffer from water shortages every year.

Water is an essential element for all aspects of life, and it is imperative that businesses and institutions play a key role in preserving this vital resource.

Their responsibility is not only to reduce their own water consumption, but also to monitor and manage the impact of their activities on water resources.

Climate change affects not only the quantity of water available, but also its quality and the ecosystems it nourishes.

In France, for example, higher temperatures in rivers mean lower dissolved oxygen levels in the water, which has an impact on fish populations.

In this context, modelling tools are of crucial importance in anticipating these changes in aquatic ecosystems.

It is highly likely that modelling tools will play a key role in our collective quest for more sustainable and equitable water management in the future.

THE ATARA PROGRAMME: modelling tools to optimise the management of water resources

A major player in Research & Innovation, SEGULA Technologies regularly puts its expertise at the service of environmental issues. Such is the case with its ATARA program, which aims to develop water modelling tools to help both private and public decision-makers manage this threatened resource more effectively.

SEGULA Technologies' ATARA (Assistance Tool for wAter Resources mAnagement) program aims to use digital modelling to better assess the impact of human activities and climate change on water resources.

“This program is based on the development of hydrodynamic and water quality modelling tools. It applies to different scales, from the territory (1D) to the lake ecosystem (2D and 3D). Once these models have been produced, they are integrated into an application developed by our teams, which analyses and summarises the results,” explains Sébastien Bretéché, Head of Research and Innovation (R&I) at SEGULA Technologies.

In other words, ATARA offers a combination of expertise including simulation, data science, satellite imagery and monitoring to facilitate decision-making in the field.

Assessing and predicting the quality of water bodies

The ATARA program began in 2016 with an initial mission to optimise hydroelectric production at high altitude. Other experiments quickly followed, focusing on issues as diverse as agriculture, hydroelectricity, water reservoirs and biodiversity.

In 2019, for example, SEGULA Technologies will be working with the ÉCosystèmes LAcustres (ECLA) R&D cluster, which includes researchers from the Office Français de la Biodiversité (OFB) and INRAE (“ALAMODE” project). The tools resulting from the ATARA program have since been used to provide automated 1D modelling of French water bodies and their quality.

« In view of the consequences of climate change, good knowledge and forecasting of the quality of water bodies are becoming essential ».

Sébastien Bretéché.

The main challenge of the project was to bring together hydrosystem modelling tools within a web interface and to connect them to national databases, particularly meteorological and water body databases.

Our partners are now better able to predict changes in water quality, and therefore to prioritise environmental actions from national to local level.

As part of the ATARA project, SEGULA is also working with EDF to establish calculations for estimating water evaporation in dams and reservoirs.

These estimates make it possible to quantify water losses and therefore to develop solutions for better use.



Improving rice field irrigation with the RISO project

In Spain, SEGULA Technologies teams are leading the RISO project, in partnership with the University of Cordoba and the Flumen Institute of the Polytechnic University of Catalonia.

The project provides the ATARA program with new modelling and monitoring tools for rice field management. In particular, it makes it possible to anticipate rice growth and define future water requirements.

“Rice production is affected by a number of factors, including the weather, water level and temperature, nutrient content and salinity levels,” explains Jordi Prats, Doctor of Environmental Engineering and R&I SEGULA pilot in charge of the RISO project.

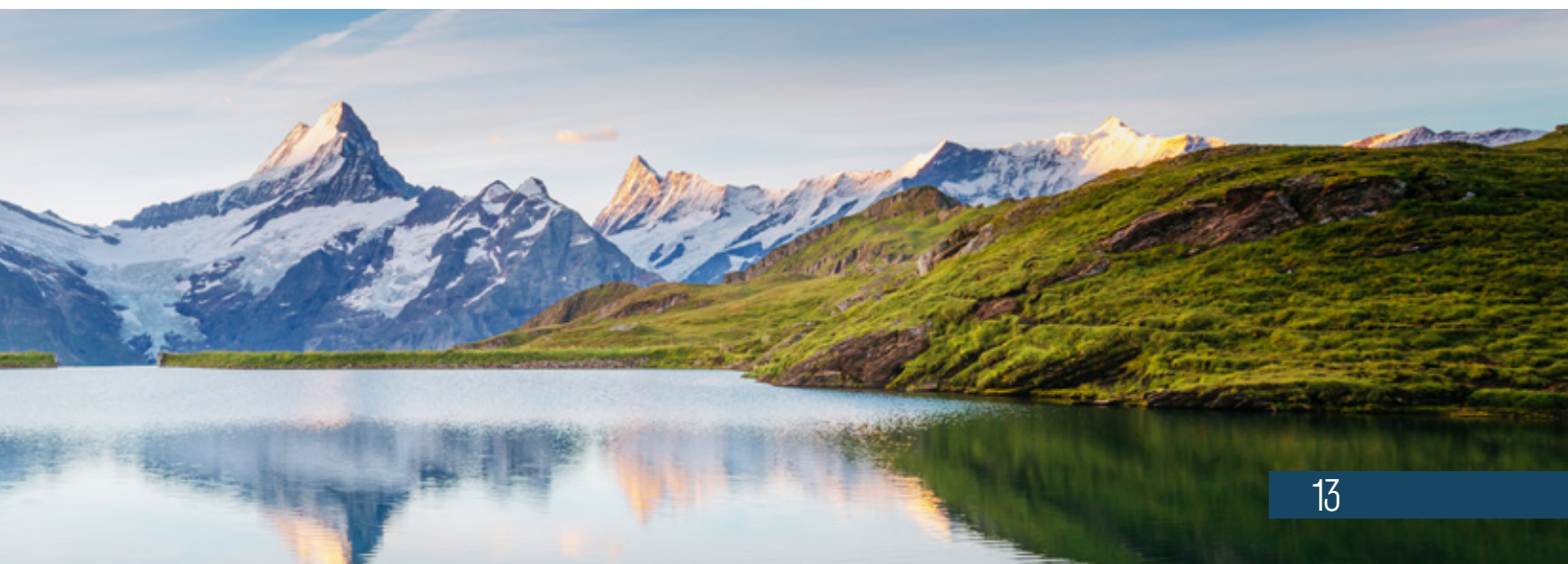
“To help farmers optimise their work, we are developing a solution based on the instrumentation of rice fields using measuring stations and satellite images. This information will then be transmitted to farmers, either directly or via associations and local authorities”.



This will enable us to meet a number of challenges, including increasing rice production, improving its quality, limiting methane emissions and optimising water use.

“The world has realised that extremely complicated situations await us in terms of water management. Faced with this challenge, modelling tools such as those in our ATARA program can provide concrete solutions. We urgently need to deploy them before it’s too late.”

The next milestone for the RISO program is that it can be used by farmers in 2024. These growers are currently being monitored by the SEGULA teams, who are identifying their needs in order to optimise the development of the tool.



ENERGY STORAGE

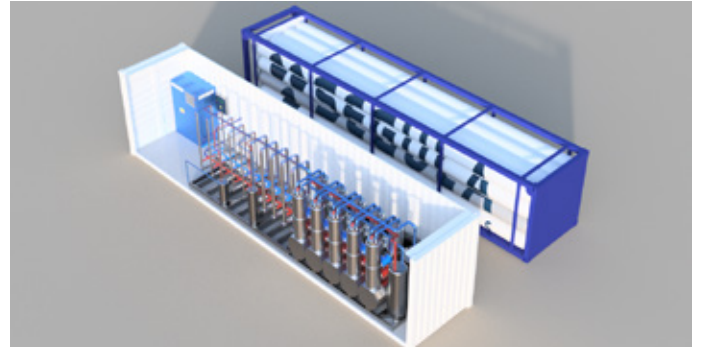
Energy storage is an essential element in our society, which is increasingly focused on renewable energy sources. It plays a crucial role in the transition to a more sustainable and environmentally-friendly future. It consists of accumulating energy produced at a given moment for use at a later date, thus making it possible to compensate for the fluctuations inherent in intermittent energy sources, such as solar and wind power.

REMORA: the innovative energy storage solution

The REMORA project stands out by proposing an innovative energy storage solution based on isothermal air compression, a process developed and patented by SEGULA Technologies. The solution helps to maximise the use of renewable energies by storing excess energy for later use. It is a non-polluting, environmentally responsible solution, thanks to the support of robust, standard technologies that give it a lifespan of at least 30 years.

Initially developed to store energy at sea, REMORA technology now also offers large- and small-scale onshore energy storage solutions, including:

REMORA STACK: a modular solution using containers installed outdoors, aimed primarily at industrial sites or eco-neighbourhoods with a need for energy autonomy.



REMORA HOME: a domestic energy storage solution for individuals, enabling them to store energy in their own homes for use when the need arises.

REMORA's development does not stop with prototypes. Pilots are currently being prepared for specific industrial applications, with the aim of verifying the effectiveness of the technology and preparing for its industrialisation, in anticipation of an identified market.

With its various variations, REMORA offers an economical, ecological and versatile response to the energy storage needs of the future.



Gigafactories: SEGULA Technologies supports the industrial deployment of its client ACC in France and Europe



SEGULA Technologies is assisting the high-tech company Automotive Cell Company (ACC) with the deployment of its electric vehicle battery gigafactories in France, Germany and Italy.

The Group is applying its experience in industrial strategy and performance, and its wide range of skills, to the design, start-up and production launch of ACC's various R&D sites, pilot plants and gigafactories. The very first French gigafactory is currently under construction in Billy-Berclau (France).

The European automotive market is electrifying rapidly, and the need for batteries to equip vehicles is growing. According to the European Commission, demand will increase 12-fold between 2018 and 2030. This represents a revolution for the sector, which is now relying on reindustrialisation and the development of a battery ecosystem sized to ensure the necessary production on the European continent.

This challenge has been taken up by ACC, a company operating in the world of battery technology for electric vehicles, which has selected SEGULA to support its plans for three gigafactories dedicated to the production of cells and modules for electric vehicles.

Created in 2020, ACC is the fruit of an initiative led by Stellantis and TotalEnergies - with its subsidiary Saft - joined by Mercedes-Benz and strongly supported by France, Germany and the European Union. The company is experiencing very rapid growth.

Solid experience for a new project

For the past two years, the global engineering group SEGULA has been involved in setting up ACC's R&D centre in Bruges (France) and their pilot site in Nersac (France), through a collaboration involving some fifty engineers. It is now supporting the capacity deployment of European gigafactories, starting with the one located at Billy-Berclau in Hauts-de-France. SEGULA's engineering services are closely involved in this XXL project. SEGULA's scope of intervention covers the entire factory of the future, with support for the industrialisation of the entire cell and module production process.

"This is a highly complex project, embodying the industry of the future, and one in which we are proud to be involved," comments Franck Vigot, President of SEGULA Technologies' Worldwide Automotive Division. "Our experience in industrial launches, acquired in the service of emblematic players in all sectors throughout the world, is a major asset for this project. Our collaboration with ACC, which we have been supporting for the past two years, now positions us as a key player in the Gigafactory launch. We look forward to sharing it over the coming years with all the engineers and experts who will be working on this extraordinary plant, which is a first in France."

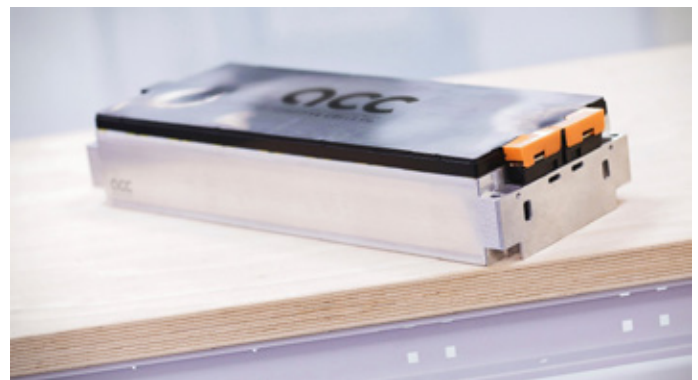
"SEGULA Technologies no longer has much to prove in terms of its ability to successfully support manufacturers in their development, and we are delighted to be able to count on the support of this French group for the launch of our plants. Having them at our side gives us even greater leverage to speed up the commissioning of our gigafactories, as time is a key factor in our competitiveness. The expertise of SEGULA's consultants, the tools they make available to us, and their responsiveness are essential assets that we are already putting to good use. We share the same ambition for the project, and the same desire to apply the highest standards of operational excellence, and I have no doubts about our ability to put together an outstanding industrial project" comments Yann Vincent, CEO of ACC.

A first in the French industrial landscape, and a field of opportunities


The Billy-Berclau gigafactory is the first industrial stage in ACC's roadmap, which, with the completion of its three European sites, aims to have an installed capacity of 120 GWh by 2030.

This first project is a giga in name only: its dimensions are unprecedented. For example, the first building will house an assembly line 650 m long, 100 m wide and 13 m high, with a production capacity of 13 GWh.

The Gigafactory ACC in Billy-Berclau is a first in the French industrial landscape, and an unprecedented field of opportunities for skilled people looking for innovation and challenges.



ELECTRICITY NETWORKS





Collaboration with RTE in electricity transmission

The electrical energy sector is undergoing major change, driven by the energy transition, the rise of renewable energies and growing demand for electricity. At the heart of this transformation, the French operator RTE is facing a number of challenges, not least the modernisation of its ageing network by replacing worn-out components with new ones, while maintaining the continuity and reliability of the power supply.

In this context, SEGULA provides engineering, maintenance and rehabilitation services for RTE's cables and substations. These assignments include programmes to replace equipment such as disconnectors and circuit breakers, and to rehabilitate transformers. These operations require sound electrical and technical knowledge, which is why SEGULA provides its client with several members of its teams to carry out these assignments:

1 BUSINESS MANAGER
Responsible for planning and coordinating maintenance and engineering projects.

2 Project Manager
Responsible for planning and coordinating maintenance and engineering projects.

3 Monitoring Technician
In charge of monitoring electrical installations and equipment to ensure they are operating at optimum efficiency.

4 Maintenance Technician
Specialised in the preventive and corrective maintenance of electrical components.



5 Database Manager
Responsible for collecting and analysing data relating to operations.

6 Asbestos Technician
Specialist in the management of materials containing asbestos, crucial to the safety of operations.

7 Works supervision activity Control
monitors and controls the execution of works, guaranteeing safety and production quality.

SEGULA and its teams are making a significant contribution to the energy transition by providing important support to RTE. As the electricity sector continues to evolve, this is a promising collaboration.

SEGULA signs a contract with Enedis for an electrical network connection engineering service

SEGULA is working with Enedis to provide project managers for electricity network connection operations in the Ile-de-France and Languedoc-Roussillon regions.

SEGULA is involved in a number of key projects, including the connection of electricity networks for private homes, charging stations for electric vehicles, and the connection and security of sites for the 2024 Olympic Games.

A significant proportion of these assignments also involve connecting renewable energy installations, such as photovoltaic panels, to the electricity grid. SEGULA's teams are responsible for project management, from receipt of the customer's request through to commissioning.

These activities illustrate SEGULA's commitment to initiatives linked to the energy transition and the development of electricity infrastructures on a national scale. It also opens up promising prospects for this type of service in other regions, and strengthens the Group's position for a more sustainable future.

SEGULA also offers services in electrical automation and evacuation networks for hydraulic power stations.

Our expertise covers replacement of equipment in evacuation stations, replacement of transformers, renewal and resizing of evacuation stations, resizing of an electrical network within a refinery by replacing the transformer and installation of high-power equipment.

The Engineering Group also relies on its design offices for electrical, structural and civil engineering studies. SEGULA has demonstrated its expertise in these activities for established players such as EDF Hydro and Total.



HYDROGEN

H₂
Hydrogen

0 **ZERO**
emissions

MORE THAN 10 YEARS OF EXPERTISE

Green hydrogen, a clean and promising source of energy, is at the heart of global concerns about reducing carbon emissions and the energy transition. SEGULA is committed to the energy transition and is developing innovative solutions to accelerate decarbonisation. The Group has already been working on hydrogen-related projects for around ten years, supporting carmakers and equipment manufacturers in the development of reliable and sustainable solutions.



SEGULA focuses its research and studies on green hydrogen, covering the entire chain (R&I studies, production, transport, use and storage):

- Research into clean production methods: improving the efficiency of electrolysis methods, recovering hydrogen from biomass, capturing and recovering hydrogen produced by industry, compressing and purifying hydrogen using innovative technologies and, finally, the feasibility, design and engineering of hydrogen production plants and hydrogen generators.

- The search for alternative storage solutions: hydrogen is a gas that requires a lot of storage space, so it has to be chemically bonded or compressed. Existing solutions are costly, so SEGULA is constantly improving existing solutions such as physical adsorption, chemical bonding, compression and liquefaction technologies. In addition to taking into account the costs of the hydrogen supply chain, SEGULA has undertaken a great deal of work on hydrogen-related technologies, such as fuel cells, electrolyzers and battery systems.

SEGULA has extensive resources at its disposal to bring its hydrogen projects to fruition, including software for sizing complete hydrogen production chains, test benches, test protocols, and a multi-battery energy management tool for managing failure problems by combining several batteries.

A hydrogen production, storage and utilization site project in Germany

The Wetterau region in central Germany is interested in moving towards carbon neutrality. Therefore, SEGULA Technologies offered a study with a concept to build a hydrogen site combining the production, storage and use of hydrogen from local resources. The engineering Group is able to manage the entire project, including equipping the HGVs and providing technical support services in collaboration with universities and regional players.

This ambitious project is a response to the pressing need to reduce CO₂ emissions, particularly in the mobility and construction sectors, which are major consumers of energy. At the heart of the project is the production of green hydrogen from local renewable energy sources, including wind turbines and a photovoltaic plant.

The hydrogen produced will be stored and used onsite. In addition, new storage systems can be implemented to meet a range of needs, from electric mobility to local heat supply.

SEGULA Technologies is able to manage the entire project in collaboration with universities and regional players. The Engineering Group's remit includes carrying out feasibility studies, seeking subsidies, building the necessary infrastructure, fully commissioning the project and retrofit decommissioned combustion vehicles into full operating hydrogen fuel cell trucks.

The Wetterau project embodies the vision of a cleaner, more sustainable future. "By bringing together renewable energy production, green hydrogen supply and energy storage systems on the same site, we are ensuring autonomy in terms of use: logistics, fleet of company vehicles, etc. Looking to the future, the rural conurbation is a pioneer in sustainable technologies" Dr. Stephan Wagner, Technical Lead Hydrogen Systems at SEGULA Technologies.

Completion of this cutting-edge project will help to meet one of the major challenges of the 21st century.



SEGULA Technologies develops an electrolyser test bench and test protocols for a Canada-Germany project

“3+2 Hyer” is an international project aimed at developing a real-time prognostic model for calculating and assessing the lifetime and performance of an electrolysis plant under dynamic conditions, and determining its failure probabilities.

As the project’s industrial partner, the SEGULA Technologies engineering group is responsible for the design and installation of the test facility, the integration of the cell and diagnostic tools, the development of test protocols and the validation of measurement results.

If the electricity used to produce it comes from renewable sources, hydrogen can be used as a CO₂-neutral and competitive source of energy by industry, transport, businesses and households. However, its production requires an efficient, durable and reliable electrolyser.

With the Canadian-German project “Development of models to increase the efficiency of electrolysers” (3 + 2 Hyer), funded by the German Federal Ministry of Education and Research, international partners are developing new hardware and software solutions with the aim of reducing the costs of electrolysers during their production and operating phases.

The project team is working on a diagnostic model supported by artificial intelligence aimed at calculating the lifetime of an electrolyser and its performance under dynamic conditions in order to provide an optimised technical and economic operating strategy.

This model will improve the performance, lifetime and reliability of the electrolyser.

To develop this model, SEGULA Technologies is designing a customised test bench with the corresponding infrastructure.

The National Research Council of Canada (NRC) and the Institut de recherche sur l’hydrogène (IRH) of the Université du Québec à Trois-Rivières will develop the cell, while Pulsenics Inc, a Toronto-based start-up, will develop the cell’s electrochemical characterisation tool.

SEGULA Technologies is not only testing the stack under different operating conditions to obtain real data on the ageing process at different power levels, but is also optimising the electrolyser’s operating strategy with the help of its scientific partner, the Centre for Energy Technology (ZET) at the University of Bayreuth.

Based on the data collected, a digital twin will then be developed and optimised at the University of Victoria’s Institute for Integrated Energy Systems and at the NRC.

“In the field of alternative propulsion systems, our experts have been successfully developing, integrating and testing fuel cell systems for many years. For us, exploring the field of hydrogen production is another logical step in the transition to renewable and sustainable technologies and brings us closer to sector coupling,” adds Holger Jené, Managing Director of SEGULA Germany.

“The results of this research project can be used in all sectors, industries and countries, and serve as a basis for the further decarbonisation of our energy consumption.”

SEGULA has also invested in hydrogen test bench in France, with the aim of training engineers in fuel cell technology and operation, as well as testing systems for light mobility applications.



SEGULA tests green hydrogen mobility for municipal technical services in Badevel (Doubs)

As part of the “Living Lab Badevel H2-Bois “* project, SEGULA Technologies is working with the municipality of Badevel (in the Montbéliard region), which is aiming to become a sustainable town demonstrator by carrying out various experiments, including hydrogen-powered mobility.

Since 2022, SEGULA Technologies has been participating in the Badevel municipality's project to transform municipal utility vehicles (two to three vehicles for green spaces and deliveries) into “green” vehicles. Employees from the Brognard site are working on this project, with expertise in energy sizing, instrumentation, fuel cells, electric powertrains, IT and project management.

The local authority called on SEGULA to carry out a technical and economic feasibility study on converting its commercial vehicles into hybrid electric/hydrogen vehicles. Now finalised, the study shows that the council's electric vehicles could be converted into hybrid vehicles with hydrogen storage at 350 bars.

The Engineering Group is also tasked with proposing instrumentation for the test vehicle, so that its energy system can be sized according to usage requirements. Sensors placed on the vehicle will be used to collect data on its actual consumption in order to optimise it (data such as currents, voltages, temperature and humidity readings, etc.).

*Launched as part of the France 2030 “Intelligent and Sustainable Territories” project, funded by the Caisse des Dépôts (Banque des Territoires), the Bourgogne Franche-Comté region and supported by the commune of Badevel.

NUCLEAR



“SEGULA Technologies is a historic and key player in nuclear engineering in France”.

Faced with the economic and environmental challenges facing players in the energy sector, the nuclear industry is currently benefiting from a fair wind. Nuclear energy expert Mohamed Karcouche looks at SEGULA Technologies' strengths and prospects in this market.



What does the nuclear energy market represent for SEGULA Technologies today?

With several hundred employees who are experts in the nuclear industry and several decades of experience in this market, SEGULA Technologies is a historic and key player in nuclear engineering in France.

Our teams work directly in the power plants, providing the technical added value that is essential to our customers. We can be involved in both one-off projects and long-term assignments.

Our assignments cover the various links in the nuclear power plant design and operation chain: design, manufacture, construction, commissioning and operational monitoring.

Our relationships with clients such as EDF, Framatome and Orano are based on transparency, quality and respect for procedures.

Ultimately, this approach enables us to be responsive and close to their needs. In fact, I tend to say that we see ourselves more as a partner than just a supplier to our customers.

How are you going to support the growth of this energy in the future?

The current economic and international crisis has highlighted the advantages of nuclear energy. I'm thinking in particular of its ability to produce constant electricity, its low greenhouse gas emissions, its role in economic sovereignty and its controlled cost.

Today, nuclear power also seems to be a form of energy that is well accepted by the public and by governments. So we need to support its development by preparing for tomorrow's nuclear energy today.

Our experts in the field are interested in emerging technologies such as fusion energy (ITER). We plan to play a key role in its development and we already have assignments underway for clients pioneering this new form of nuclear power.

Although we are not yet working on the creation of small modular reactors (SMRs), this is another approach that we intend to support in the future. Finally, our ambition is also to deploy our energy internationally.

At present, we are mainly present in France, but we are planning to deploy our nuclear expertise abroad in the next few years.

OIL & GAS

Against a backdrop of energy transition, SEGULA Technologies is positioning itself as a partner to the oil and gas industry.

The Group offers its expertise to support its customers through this crucial transition, providing them with innovative solutions and more sustainable approaches.



DESULFURATION OF MARINE FUELS: a way to combat marine pollution

Environmental concerns and the need to reduce emissions of hazardous pollutants have led the shipping industry to incorporate pollution control systems to improve air quality and reduce ocean acidification.

Regulations have been introduced by the International Maritime Organisation (IMO) to limit sulphur oxide emissions from ships, leading to significant changes in the sector. Against this backdrop, SEGULA Technologies is developing SOxLOW, a continuous treatment solution for installation on board ships.

This is a desulphurisation system for marine fuel oils, which are heavy refinery products commonly used as fuel for marine engines.

The aim of SOxLOW is to develop an alternative solution for the desulphurisation of marine fuel oils, making it possible to reduce the SOx emissions resulting from their combustion, without changing the engine and while maintaining the use of heavy refinery fractions, both in and outside the SECA zone.

The aim is to limit all pollutant emissions during the pre-treatment of fuel oil and its combustion. Chemistry is at the heart of the desulphurisation process, ensuring that sulphur is effectively extracted from marine fuels.

Process knowledge is essential to design and implement these systems effectively, while ship expertise is needed to ensure the adaptability of these technologies to the complex marine environment.

Desulphurisation and analysis technology

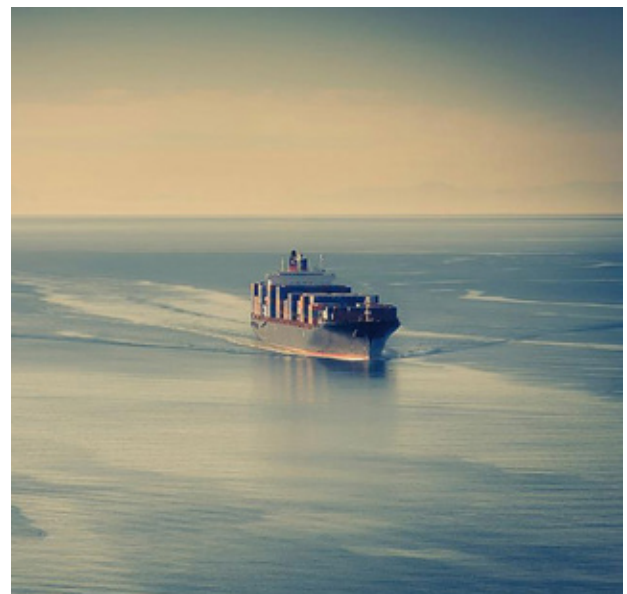
The success of the SOxLOW project is based on sulphur compound analysis methodologies developed by SEGULA Technologies and its partners.

These methods are specifically adapted to marine fuel oils so that the effectiveness of the system developed can be assessed.

A positive impact on the environment

The adoption of desulphurisation systems such as SOxLOW would have a number of advantages. Firstly, the possibility of adapting this system to existing ships means that the entire maritime industry can gradually reduce its environmental footprint.

In addition, the aim would be for the solution to work with all types of heavy fuel oil, making it versatile and practical for the industry as a whole.





WORKING TOGETHER TOWARDS ENERGY TRANSITION



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