RÉPUBLIQUE
FRANÇAISE
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Égalité
Fraternité

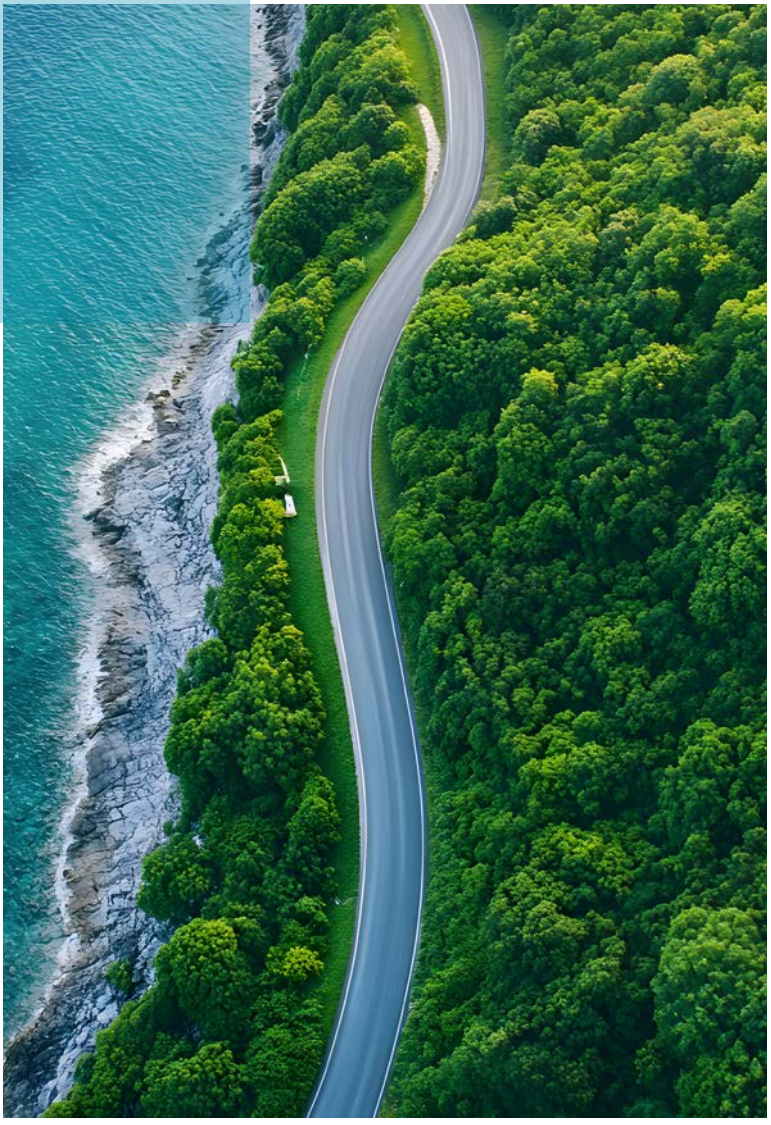
IFP Energies nouvelles



ANNUAL REPORT

2025

INNOVATING FOR
A LOW-CARBON
AND SUSTAINABLE
WORLD



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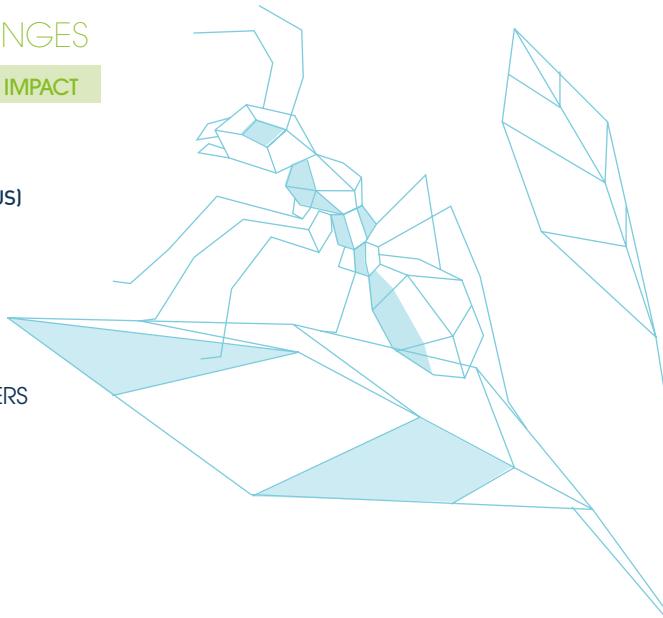
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EDITORIAL



Pierre-Franck Chevet,
Chairman and CEO

Amid geopolitical instability, economic volatility, and accelerating climate risks, the challenges linked to energy, mobility, and the environment have become central to sovereignty.
The transition to low-carbon systems is unlocking unprecedented opportunities, while creating new dependencies associated with resources, technologies, and industrial value chains.

In this uncertain context, innovation is a strategic lever for diversifying energy solutions, strengthening infrastructure resilience and creating value across territories. IFPEN's DNA lies in supporting the development and maturation of technological concepts, from fundamental research to industrial deployment. Through its research activities, industrial partnerships and training mission, IFPEN develops low-carbon solutions that reinforce the energy and industrial sovereignty of France and Europe.

As a trusted third party at the interface between science and industry, IFPEN provides expertise to support the design and implementation of public policies aimed at ensuring the responsible deployment of these solutions.

The year 2025 was marked by significant progress, with several technologies reaching the demonstration stage or achieving first industrial deployment. These achievements reflect research that is dynamic, rigorous, and firmly focused on delivering impact.

Several major milestones shaped the year:

> The launch of the construction of a demonstration unit dedicated to the production of 5-HMF, a molecule capable of replacing toxic fossil-based compounds with bio-based, non-toxic alternatives across a wide range of applications.

IFPEN develops low-carbon solutions aimed at reinforcing the energy and industrial sovereignty of France and Europe.

- The selection of two projects based on technologies developed by IFPEN and its partners under the France 2030 Carb Aero II call for projects – BioTJet™ and TAKE KAir – contributing to the emergence of a French sustainable aviation fuel industry.
- The homologation of Carboverseo™ technology by Axens, making this innovative process operational and ready to support the deployment of e-fuels.
- The inauguration of the Provence Grand Large floating offshore wind farm, using floater technology co-designed by IFPEN.

At the same time, IFPEN continued its commitment to supporting decision-makers. Our teams further advanced the assessment of natural hydrogen potential in France, providing objective insights into discussions surrounding this emerging topic.

The year 2025 also highlighted our contribution to the structuring of competitive and sovereign industrial sectors.

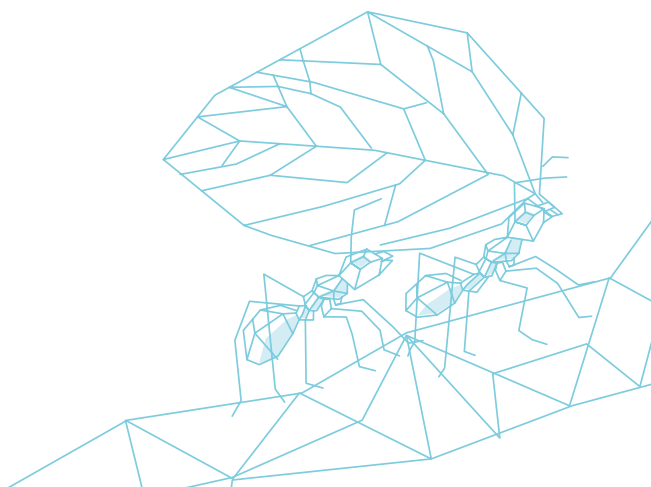
The signing, during the Paris Air Show, of the SAF component of the Strategic Contract for the New Energy Systems Sector (2024-2027) is a case in point. Having played an active role in its development, IFPEN will continue its commitment as a driving force alongside all stakeholders in the sector.

Training future talent represents another essential and complementary pillar of IFPEN's mission. IFP School continued to adapt its educational offering to prepare engineers and decision-makers for the challenges of the transition, including the launch of new programmes (see page 26).

Finally, the year was marked by the celebration of the twentieth anniversary of the Nobel Prize in Chemistry awarded to Yves Chauvin. This anniversary serves as a powerful reminder of the scientific excellence that underpins our actions and of the importance of managing the continuum between fundamental research and innovation in order to deliver tomorrow's technologies to industry. This approach guarantees the credibility and robustness of our contribution.

I invite you to discover, throughout this report, how IFPEN continues to pursue its mission with determination in the service of the public interest and the energy and ecological transitions.

Enjoy your reading.



WHO ARE WE?

A COMMITTED PLAYER FOR A SUSTAINABLE FUTURE

IFPEN is the French leading research, innovation, and training institute in the fields of energy, mobility, and the environment. Its teams design and deploy technological solutions to accelerate innovations for a low-carbon and sustainable world, from scientific concepts to technological solutions. Technologies (processes, equipment, catalysts, and adsorbents), software and services; its low-carbon innovations lay the foundations for the transition and foster the emergence of the industrial sectors of the future.

In response to the climate emergency, IFPEN positions itself as a key player in the ecological and energy transition. Its ambition is to develop robust, validated, and economically viable technologies to address the challenges of decarbonisation while supporting the reindustrialisation and energy sovereignty of France and Europe. As a trusted third party, IFPEN provides scientific and technical expertise to French and European public authorities to support the design and implementation of public policies.

AN AMBITION

To be a committed player in the ecological and energy transition, an institute that is open to society, creates value and employment, draws on the talent of its people, and serves as a trusted third party for public authorities.



RESEARCH AND INNOVATION SERVING INDUSTRY

Covering the entire value chain, from fundamental research to industrial deployment, IFPEN's facilities and expertise enable innovations to progress through every stage of development by combining:

- **state-of-the-art experimental facilities,** from laboratories to pre-industrial pilots;
- **expertise** in numerical simulation and high-performance data analytics;
- **environmental and life-cycle assessments;**
- **a partnership strategy** with industrial companies, SMEs, mid-sized companies and academic institutions.

TECHNOLOGICAL SOLUTIONS SERVING THE ENERGY AND ECOLOGICAL TRANSITION

ENERGY CHALLENGES: Building a low-carbon, affordable and sovereign energy mix; wind energy, natural hydrogen, geothermal energy, large-scale energy storage, process efficiency and energy systems management.

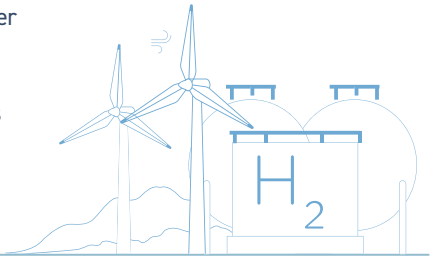
MOBILITY CHALLENGES: Decarbonising mobility by combining energy solutions and technologies with digitalisation and circularity through transport electrification, advanced biofuels and e-fuels.

ENVIRONMENTAL CHALLENGES: Reducing industrial environmental impacts; carbon capture and storage, plastics and metals recycling, bio-based products, resource management, water treatment (including PFAS, micro-pollutants and microplastics), soil carbon management and air emissions monitoring.

IFPEN develops these solutions by leveraging digital technologies and systematically integrating life-cycle and techno-economic assessments throughout the innovation process to ensure their long-term sustainability.

OUR MISSION

Innovating for a low-carbon and sustainable world



As a driver of innovation and the energy and ecological transition, IFPEN boldly imagines and meticulously designs solutions for tomorrow's world.

FROM FUNDAMENTAL RESEARCH TO VALUE CREATION

IFPEN's expertise and capacity for innovation are rooted in a fundamental research programme developed in close collaboration with leading research institutions. Its teams prepare for the future by generating the knowledge, skills, methods, and tools required to develop new products, processes, software, and services.

IFPEN actively contributes to wealth creation and employment by supporting the development of industrial sectors related to mobility, energy, and environmental technologies. Its business model is based on transferring innovations from research to the market through its subsidiaries and close partnerships with industry.

Building on IFPEN's historical expertise, hydrocarbon-related activities account for 15% of its operations and are largely self-financed. These activities, particularly in the field of eco-efficient processes, act as an "internal carbon tax," generating revenues that accelerate the scale-up of green technologies, which now account for 85% of IFPEN's activities.

Whether in emerging or mature markets, IFPEN creates companies or acquires stakes in high-potential businesses. It also supports the growth of start-ups, SMEs, and mid-sized companies through collaboration agreements providing privileged access to its scientific and technical expertise.

TRAINING TOMORROW'S TALENT

Lastly, IFP School, IFPEN's graduate engineering school, plays a vital role in preparing future generations. Every year, nearly 500 students from around the world are trained for careers in energy, mobility and the environment through programmes focused on innovation and adaptability to the major challenges of the transition.



20 YEARS SINCE YVES CHAUVIN'S NOBEL PRIZE

A LIVING SCIENTIFIC LEGACY FOR IFPEN

Twenty years ago, Yves Chauvin received the Nobel Prize in Chemistry, a milestone that continues to shape IFPEN's scientific identity. His pioneering work bridged fundamental research and industrial innovation, defining IFPEN's current approach.

Today, this distinction remains a major source of inspiration for an entire generation of researchers. It demonstrates that fundamental and applied research, combined with the collective commitment of research teams, constitute an essential continuum for addressing the challenges of the energy and ecological transitions.

GROUP FOCUS

This anniversary also holds particular significance for Axens. Yves Chauvin's pioneering work, together with the collective commitment of the teams involved, from laboratory research to pilot-scale development, gave rise to technologies that continue to shape today's industry, particularly in the field of homogeneous catalysis.

This unique connection between IFPEN's research and Axens' industrial expertise enables us to:

- deploy more efficient and sustainable processes;
- position Axens as a leader in key industrial sectors;
- accelerate the transition towards low-carbon alternative solutions.

"*He probably never imagined that our advanced ethanol-to-jet technology (Jetanol™) would one day incorporate a key building block derived from his research,*" notes Quentin Debuisschert, Chief Executive Officer of Axens.

Yves Chauvin's example illustrates how scientific rigor combined with boldness can transform the way we design tomorrow's technological solutions. At IFPEN, this spirit of innovation remains a fundamental source of motivation. What we do today, developing solutions for the energy and ecological transition, from scientific concepts in the laboratory to technological solutions, is proof that Yves Chauvin's legacy remains deeply embedded in our approach. By celebrating this twentieth anniversary, we reaffirm our commitment to pursuing scientific excellence in support of industrial sectors and a low-carbon, sustainable society."

Cécile Barrère-Tricca,
Executive Vice-President,
Innovation and Economic Development

"Twenty years on, his legacy remains a powerful source of inspiration for IFPEN researchers and for the teams within our subsidiaries, particularly Axens, which transform these advances into sustainable industrial solutions. Yves Chauvin's Nobel Prize is more than an award. It symbolizes what makes us proud: world-class research that creates innovations serving society."

Benjamin Herzhaft,
Executive Vice-President,
Research and Education



KEY TAKEAWAYS

Celebrating the twentieth anniversary of the Nobel Prize is not about looking back. It is about reaffirming a shared conviction:

- Innovation is a key lever for the energy and ecological transition.
- Every breakthrough throughout the innovation process is a building block for a sustainable future.

HIGHLIGHTS

FEBRUARY

CO_2 AND HYDROGEN TRANSPORT: IFPEN AND NATRAN JOIN FORCES

IFPEN and NaTran entered a strategic partnership to accelerate to the development of innovative technologies for the safe, efficient and sustainable transport of CO_2 and hydrogen. By combining IFPEN's expertise in energy innovation with NaTran's know-how in transport infrastructure, this collaboration aims to accelerate the energy transition and address decarbonisation challenges.

MARCH

STRATEGIC PARTNERSHIP WITH PETROBRAS' R&D CENTER

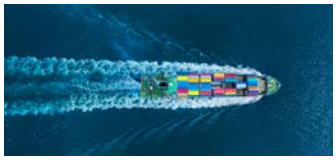


IFPEN and Petrobras' Research and Development Center (CENPES) signed a framework agreement in Rio de Janeiro in the presence of the French Ambassador to Brazil. The agreement covers a wide range of fields, including carbon capture, utilization and storage (CCUS), hydrogen, geothermal energy, wind power, water treatment, biofuels, plastics recycling and industrial decarbonisation.

ENERGY MANAGEMENT: PARTNERSHIP BETWEEN IFPEN AND SOALIS

IFPEN signed a partnership agreement with Soalis to commercialize integrated energy systems for professional customers, combining photovoltaic generation, battery storage, and innovative digital energy management and control technologies developed by IFPEN.

DECARBONISING MARITIME TRANSPORT: ASSESSMENT FOR CMA-CGM



Given the growing momentum to decarbonise maritime transport, driven by the International Maritime Organization's objective of achieving carbon neutrality by 2050 and by European regulations, IFPEN carried out a Life-Cycle Assessment (LCA) on behalf of CMA CGM. The study evaluated greenhouse gas emissions associated with alternative marine fuels, with a particular focus on methanol and ammonia.

APRIL

CARB AERO II: PROJECTS USING IFPEN TECHNOLOGIES



The French government announced the winners of the Carb Aero II call for projects, aimed at supporting the emergence of a French sustainable aviation fuel (SAF) sector. Among the selected projects, BioTJet™, led by Elyse Energy, is based on the BioTfueL® technology developed through more than ten years of collaborative research. The TAKE KAir™ project, led by Hynamics, aims to produce e_fuels and relies on the Carboverseo™ and Gasel® technologies.

ANDRA AND IFPEN STRENGTHEN THEIR SCIENTIFIC PARTNERSHIP

IFPEN and ANDRA renewed their research partnership for a further five years, building on a long-standing collaboration that has already generated several joint projects and doctoral research programmes. The renewed agreement aims to deepen scientific cooperation and foster new research projects, particularly in the field of digital tools for the multiphysics modelling of underground storage systems.

MAY

IFPEN RANKED LEADING RESEARCH ORGANISATION IN PLASTICS RECYCLING

According to a European Patent Office report on plastics recycling technologies, IFPEN ranks 14th worldwide among patent applicants and is the leading research organisation in the field. The institute is particularly recognised for its expertise in depolymerisation, solvolysis and pyrolysis oil purification technologies, where it ranks third worldwide.

JUNE

SOILS: LAUNCH OF A JOINT LABORATORY WITH VALORHIZ

The IFPEN Ressources Énergétiques Carnot Institute and Valorhiz officially launched the Sustainable Soil Carbon Lab, a joint laboratory funded by the French National Research Agency (ANR). Its mission is to advance soil analysis techniques, particularly for low-carbon soils, in order to support ecosystem restoration and the sustainable management of degraded and recycled soils.

BATTERY SECTOR: EUROPEAN SKILLS AND TRAINING DISCUSSED IN BRUSSELS

IFPEN and France Universités organised a conference at the Maison Irène et Frédéric Joliot-Curie in Brussels dedicated to strengthening skills and training programmes in the battery sector. Discussions highlighted the importance of developing competencies to support the industrial growth of this strategic European industry.



PARIS AIR SHOW: SUSTAINABLE AVIATION FUELS IN THE SPOTLIGHT

At the International Paris Air Show, IFPEN hosted a dedicated sustainable aviation fuels area within the Paris Air Lab. A major milestone was reached with the signing of the SAF component of the Strategic Contract for the New Energy Systems Sector, to which IFPEN made a significant contribution.

CONTINUED...

IFPEN EXPLAINS THE ENERGY TRANSITION ON L'ESPRIT SORCIER TV

IFPEN partnered with L'Esprit Sorcier TV, a channel dedicated to science and environmental issues, to make the challenges of the energy and ecological transition accessible to a broad audience. Through several episodes of the "Science en questions" programme, IFPEN experts provided educational insights and showcased tools and solutions that can help build the world of tomorrow. In 2025, the topics addressed included reducing dependence on critical metals, developing offshore wind energy, tackling plastic pollution, and natural hydrogen.
All episodes are available on IFPEN's website.

NATURAL HYDROGEN: STRATEGIC REPORT DELIVERED TO PUBLIC AUTHORITIES



Coordinated by IFPEN at the request of the French Directorate General for Energy and Climate (DGEC), a strategic report assessing the potential of natural hydrogen in France and worldwide was submitted to the Minister responsible for Industry and Energy. The report is intended to support public decision-making regarding exploration strategies and energy sovereignty.

JULY

PIERRE-FRANCK CHEVET REAPPOINTED CHAIRMAN OF IFPEN

By decree dated 2 July 2025, Pierre-Franck Chevet was reappointed Chairman of IFPEN's Board for a second term.

AUGUST

OPTIWITS™: A FIRST COMMERCIAL OUTCOME OF THE IFPEN/GREENWITS COLLABORATION



GreenWITS launched OptiWITS™ 1.0, the first software solution resulting from its collaboration with IFPEN. The solution optimizes offshore wind farm layouts by integrating complex design constraints while maximizing energy and economic performance through advanced wake models and optimisation algorithms.

SEPTEMBER

IFPEN AND EDF RENEW THEIR STRATEGIC PARTNERSHIP



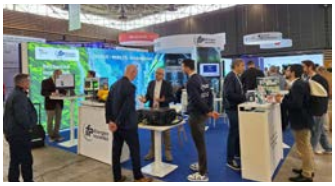
IFPEN and EDF renewed their framework agreement, consolidating a collaboration covering prospective energy modelling and a broad portfolio of technologies supporting the energy transition, including e-fuels, offshore wind energy, large-scale electricity storage, and CO_2 capture and storage.

ENERGY TRANSITION AND EUROPEAN COMPETITIVENESS

In an article published in La Revue de l'Énergie, Pierre-Franck Chevet highlighted the economic costs of climate inaction while emphasizing the strategic opportunities the energy transition represents for Europe.

OCTOBER

POLLUTEC™ 2025: SHOWCASING IFPEN SOLUTIONS



At Pollutec™ 2025, IFPEN presented a broad range of environmental solutions, including technologies for micropollutant treatment, sustainable fuels, environmental monitoring, transport environmental assessment and lithium-ion battery recycling.

PARIS INNOVATION DIRECTORS CLUB VISITS IFPEN

IFPEN welcomed 48 members of the Paris Innovation Directors Club to its Solaize site. The visit provided an opportunity to showcase projects conducted within the Carnot institutes and discuss key innovations in offshore wind energy, energy systems, CO_2 capture and hydrogen mobility.

DECARBONISING MARITIME TRANSPORT: CROSS PERSPECTIVES



IFPEN participated in a roundtable discussion on maritime transport decarbonisation organised during the Transat Café L'Or™ event. Discussions focused on the technological, economic and regulatory levers required to achieve low-carbon maritime transport.

GREEN CHEMISTRY: LAUNCH OF EUROPE'S FIRST 5-HMF PLANT

Building on a collaboration initiated in 2021 between IFPEN and ResiCare, a Michelin Group subsidiary, the project entered a new phase through CERISEA*, expanding its scope to the European level. Construction of a demonstration plant dedicated to 5-HMF production was launched, with IFPEN supporting both industrial scale-up and process optimisation.

NOVEMBER

TAP 2025: A BROADER VISION OF TRANSPORT IMPACTS

The TaP 2025 international conference, held at IFPEN's Rueil site, brought together experts and researchers to discuss the environmental impacts of transportation. For the first time, the scope of discussions was broadened to encompass a wider range of environmental and societal impacts such as noise, soil and water.

YVES CHAUVIN THESIS PRIZE 2025



The 2025 Yves Chauvin Thesis Prize was awarded to Nicolas Fintzi for his work in fluid mechanics applied to complex flow phenomena encountered in numerous industrial separation processes.

DECEMBER

CLEANWASH™: DEMONSTRATOR COMPLETED AND FIRST RESULTS CONFIRMED

Following five years of development, the CleanWash™ demonstrator has been successfully completed. This technology captures plastic microfibers directly at the outlet of professional textile washing facilities. Successfully tested in a 5àSec dry-cleaning facility in Vénissieux, with support from CTTN-IREN, the system demonstrated its effectiveness by removing more than 80% of microfibers.

* This project has received funding from the Circular Bio-based Europe Joint Undertaking (CBE-JU) under Grant Agreement No. 101214076.

BUILDING A LOW-CARBON, AFFORDABLE, AND SOVEREIGN ENERGY MIX

IFPEN develops technological solutions to produce low-carbon energy, optimize the integration of renewable energy sources, harness subsurface resource potential, and support the decarbonisation of the energy and chemical industries. From electricity grid flexibility and subsurface modelling to industrial process efficiency, its research spans the entire value chain of the energy transition.

ENSURING ELECTRICITY GRID STABILITY

The rapid growth of intermittent renewable energy sources, particularly solar and wind power, combined with the gradual phase-out of dispatchable fossil-based generation, is making electricity grid management increasingly complex worldwide. In this context, flexibility solutions, including electricity storage and advanced energy management systems, are becoming essential to ensure the stability, reliability and balance of power systems.
Drawing on its strong scientific and technical expertise, the IFPEN Ressources Énergétiques Carnot Institute is developing large-scale electricity storage technologies and deploying digital Energy Management System (EMS) solutions to support the operation and optimisation of electricity networks.

NOÉ

AN INNOVATIVE SOLUTION FOR OPTIMIZING ENERGY SELF-CONSUMPTION

In the context of volatile energy prices and rapid expansion of solar power, IFPEN and Soalis have partnered to bring NOÉ (Nouvelle Optimisation Énergétique) to the market, an intelligent energy management solution combining photovoltaic generation with battery storage. Designed for companies, the solution optimizes self-consumption, improves energy management and can reduce electricity costs by up to 50%.

"This partnership marks the culmination of several years of research by our teams into advanced optimisation algorithms applied to energy management. Combining intelligent battery control with photovoltaic generation, this is one of the first solutions of its kind available on the market. It maximizes self-consumption while addressing the growing constraints facing electricity grids."



Yannick Peysson,
Energy Storage and Management Programme Manager



DEVELOPING SUBSURFACE MODELLING TOOLS

The subsurface plays a key role in supporting the ecological and energy transition, whether for carbon capture and storage, geothermal energy, hydrogen, or climate–soil interactions.
IFPEN develops subsurface modelling and simulation solutions ranging from R&I tools that support innovation projects to industrial software marketed through engineering studies and software licensing. These activities are fully aligned with national research priorities.
As part of this effort, IFPEN has initiated a sovereign consortium bringing together France's leading research and higher education organisations in subsurface modelling and simulation. The initiative aims to strengthen collaboration, foster scientific excellence and enhance collective capabilities in support of the ecological and energy transition.

DID YOU KNOW?

Research on the integration of artificial intelligence and digital technologies into geoscience methodologies continued to advance through numerous collaborative projects with industrial partners within the TELLUS community.

Learn more:

www.tellus-digital.net

"As a human-scale SME, partnering with a leading national research institute is a real recognition of our agility and our capacity to innovate. Together, we are accelerating the energy transition and actively contributing to the development of a more resilient and sustainable model."



Didier Taillandier,
Head of Soalis

EXPLORING AND CHARACTERISING SUBSURFACE RESOURCES

In 2025, interest in natural hydrogen accelerated significantly. IFPEN further strengthened its position as a leading player in the field by coordinating a comprehensive report for the French Directorate General for Energy and Climate (DGEC) on the current state of knowledge and the assessment of France's natural hydrogen potential. Published in June 2025 and submitted to the French public authorities, the report also identified and formalized the needs of this emerging industrial sector, providing a valuable foundation for its future development.

NATURAL HYDROGEN

Industrial projects and European momentum

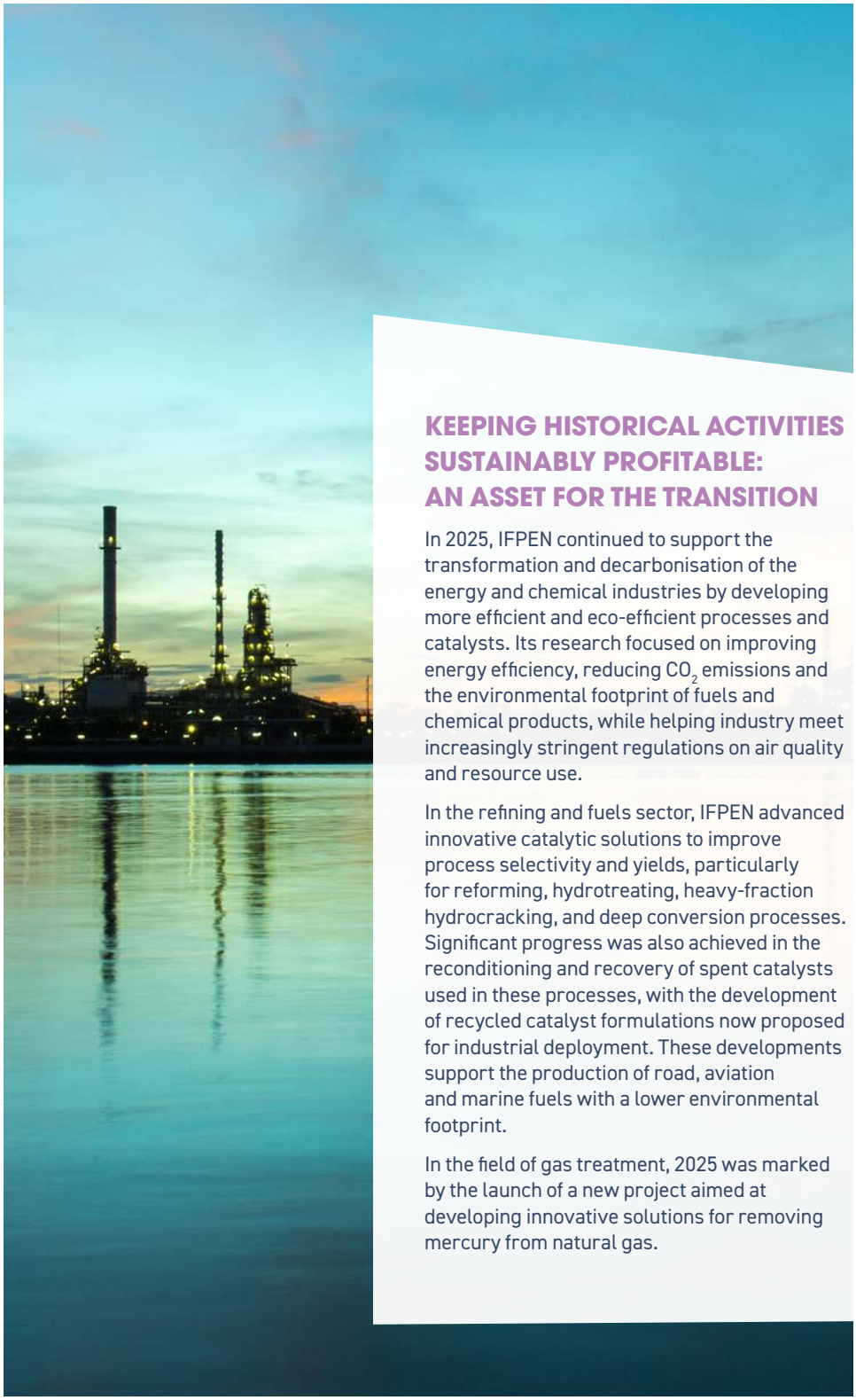
In 2025, IFPEN further consolidated its position as an international leader in natural hydrogen through the launch of two industrial studies: one assessing the resource potential of a European area, and another analysing samples from an exploratory well in the United States. The year was also marked by the creation of a Joint Industry Project (JIP) with Vinci Technologies and three industrial partners. At the European level, IFPEN maintained a strong presence by submitting a project dedicated to natural hydrogen exploration, another focused on hydrogen storage in mined caverns, and a proposal in response to the European Commission DG GROW call for projects on the mapping of natural hydrogen resources and the development of a regulatory framework for natural hydrogen in Europe.

IMPROVING THE TECHNO-ECONOMIC PERFORMANCE OF WIND ENERGY

IFPEN and its subsidiary GreenWITS support the development and optimisation of wind farms with the aim of improving their performance throughout their entire life cycle, from design to operation and maintenance. The year 2025 marked a major milestone for GreenWITS with the market launch of its first product derived from IFPEN's research and innovation, OptiWITS™, dedicated to optimised wind farm design. Further advancements were made to ScanWITS™, a solution for monitoring wind farm performance during operation.

At the same time, work on advanced wind farm control progressed through the CAP project, supported by ADEME under the France 2030 investment plan through the DEMO-TASE call for projects. The objective is to build a comprehensive solution for the intelligent management and optimisation of wind farm operations.





KEEPING HISTORICAL ACTIVITIES SUSTAINABLY PROFITABLE: AN ASSET FOR THE TRANSITION

In 2025, IFPEN continued to support the transformation and decarbonisation of the energy and chemical industries by developing more efficient and eco-efficient processes and catalysts. Its research focused on improving energy efficiency, reducing CO_2 emissions and the environmental footprint of fuels and chemical products, while helping industry meet increasingly stringent regulations on air quality and resource use.

In the refining and fuels sector, IFPEN advanced innovative catalytic solutions to improve process selectivity and yields, particularly for reforming, hydrotreating, heavy-fraction hydrocracking, and deep conversion processes. Significant progress was also achieved in the reconditioning and recovery of spent catalysts used in these processes, with the development of recycled catalyst formulations now proposed for industrial deployment. These developments support the production of road, aviation and marine fuels with a lower environmental footprint.

In the field of gas treatment, 2025 was marked by the launch of a new project aimed at developing innovative solutions for removing mercury from natural gas.

MOBILITY CHALLENGES

DECARBONISING MOBILITY

BY COMBINING ENERGY SOLUTIONS, TECHNOLOGIES AND CIRCULARITY

IFPEN contributes to the decarbonisation of mobility by developing technologies, processes, and digital tools covering the entire value chain: sustainable fuels, electrification, batteries and environmental assessment. Its research addresses the industrial, economic and environmental challenges facing road, air, and maritime transport, while supporting public policies and regional stakeholders.

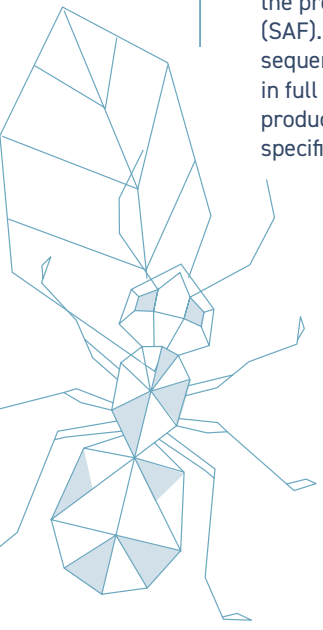
LOW-CARBON FUELS

IFPEN develops technologies that enable renewable feedstocks to be integrated into existing fuel production chains, providing a rapid pathway to reduce emissions from road, aviation, and maritime transport.

In 2025, a major milestone was reached with the industrial implementation of a version of the Vegan® process dedicated to the production of sustainable aviation fuels (SAF). Based on an innovative catalyst sequence, its first industrial application in full SAF configuration successfully produced jet fuel meeting current industry specifications.

IFPEN continued its work on advanced biofuels and e-fuels produced from biomass waste and residues, CO_2 and hydrogen generated from low-carbon electricity, with particular attention to the specific needs of the aviation and maritime sectors.

The year 2025 was marked by significant milestones, including the successful qualification of the Carboverseo™ process for e-fuel production (see page 19) and the finalised development of the Ethanol-to-Jet process for sustainable aviation fuel (SAF) production.



"Developed after several years of research at IFPEN and commercialised by Axens, the Vegan® technology converts used cooking oils and animal fats into biofuels. Already in operation at TotalEnergies' La Mède biorefinery, as well as at five other sites worldwide, it enables the production of renewable diesel and sustainable aviation fuel (SAF), representing a major French innovation for decarbonising transport. But this is only the beginning. IFPEN's teams continue to improve the performance of the process while developing the next generation of advanced biofuels through the Futurol® and BioTfuel® technologies, as well as e-fuels. The objective is clear: to build a sovereign and sustainable low-carbon fuels industry in France."



Emmanuelle Guillon,
Conversion and Distillates Programme Manager



"Axens has homologated the Carboverseo™ technology, developed by IFPEN in collaboration with SMS Group. This innovative process, based on the Reverse Water-Gas Shift (RWGS) reaction, converts CO_2 into carbon monoxide (CO), a key intermediate to produce e-fuels. Carboverseo™ is an essential technology for decarbonising the transport sector. Drawing on IFPEN's expertise in catalytic process development, the technology was successfully scaled up in a remarkably short timeframe by a highly committed team of engineers and technicians- a major achievement in meeting the aviation industry's growing demand for sustainable fuels. Now fully operational, Carboverseo™ is ready to support the large-scale deployment of e-fuels, providing a robust and scalable solution for converting CO_2 into valuable products."



Jean-Philippe Héraud,
Synthetic Fuels Production through Thermochemical Pathway Programme Manager

ELECTRIFYING MOBILITY THROUGH AFFORDABLE AND COMPETITIVE SOLUTIONS

IFPEN is contributing to the development of electric mobility by designing powertrain and energy conversion solutions tailored to industrial and economic requirements. In 2025, a collaborative project funded by Bpifrance and led by Valeo was launched to industrialise a new low-voltage electric powertrain featuring a two-speed transmission. IFPEN is responsible for demonstrating the benefits of a specifically adapted version of this solution for an affordable and sustainable electric vehicle (ASEV).

As part of a broader approach promoting battery repairability and reuse, IFPEN's patented rapid battery state-of-health diagnostic methods were deployed through the ISSTOGRAM project*, funded by Bpifrance and led by the Savoy Group. That same year, a first version of an AI-based diagnostic algorithm using machine learning was delivered for the battery cells integrated into the removable battery pack of La Bagnole™, with the objective of making it available on vehicle assembly and disassembly lines.

Lastly, after three years of development, the GENOPTAIRE project, commissioned by the French Defence Procurement Agency (DGA), delivered its software platform together with its first applications for the optimised energy management of military platforms.

* Project selected under the France 2030 call for projects "Support for investment projects to manufacture tomorrow's road vehicles and their components in France."



SCALING UP STRATEGIC MATERIALS

In the field of batteries, IFPEN continued its efforts to secure access to critical raw materials and support Europe's reindustrialisation. A key milestone in 2025 was the completion of strategic investments, including the construction of a dry room dedicated to the manufacturing of battery cells and electrochemical qualification of battery materials.

Significant progress was achieved in both high-performance cathode active materials and lithium extraction technologies, attracting strong interest from industrial partners for larger-scale testing.

For high-performance NMC (nickel–manganese–cobalt) cathode active materials, precursor synthesis reached a major milestone with the production of specification-compliant materials delivering performance comparable to the best products currently available on the market. Particularly promising results were obtained for ultra-high-nickel compositions (up to 96%), and an initial pilot-scale demonstration at IFPEN successfully validated the industrial feasibility of the process. In the field of lithium extraction, a new generation of adsorbent materials delivered a lithium capacity improvement of around 20%compared with the previous generation co-developed with Eramet, confirming the strong innovation momentum behind these strategic technologies.





MEASURING, MANAGING, AND INFORMING MOBILITY DECISIONS

In response to the climate, public health and economic challenges associated with transport, IFPEN develops digital tools to assess and reduce the environmental impact of mobility. These solutions support informed decision-making by public authorities and industry through multicriteria environmental assessments, including emissions and air quality, as well as socio-economic analyses such as life-cycle assessment (LCA) and total cost of ownership (TCO) evaluations across different transport technologies.

In 2025, the PLANET Air platform, dedicated to the environmental assessment of transport and the monitoring of road transport-related air quality, continued to expand. Research focused on evaluating the impact of infrastructure changes on transport emissions. The platform also continued to integrate the results of the European OLGA (airports)* and MAGPIE (ports)** projects.

Several new projects were also launched under the France 2030 investment plan, focusing on digital service platforms and frugal artificial intelligence applied to mobility, further strengthening IFPEN's network of industrial and institutional partnerships.

DID YOU KNOW?

The MOBIDEC Priority Research Programme and Equipment (PEPR), co-led by IFPEN and Gustave Eiffel University, entered its first operational year in 2025. Five projects selected under the programme's first call for proposals were launched by the end of the year.

Building on the momentum of MOBIDEC, IFPEN is also a member of the Premat-Mat Sci-Ty consortium and submitted a new project proposal in 2025.

* Grant Agreement No. 101036871
** Grant Agreement No. 101036594

REDUCING INDUSTRIAL IMPACTS
TO PROTECT THE ENVIRONMENT

In response to the major environmental challenges associated with climate change, natural resources management and circular economy, IFPEN develops technological and scientific solutions to support the transformation of industrial systems. Its research focuses on: sustainable valorisation of biomass, advanced materials recycling, industrial decarbonisation, preservation of air, soil, and water resources.

SUSTAINABLY VALORISING BIOMASS

IFPEN develops processes for converting biomass into bio-based products. This research is part of a biorefinery approach aimed at maximizing the value of renewable resources while replacing fossil-derived molecules. Several major milestones were achieved in 2025. Operations on the BioButterfly pre-industrial demonstrator, commissioned at Michelin's Bassens site to produce bio-butadiene, were successfully completed. The technology is now undergoing industrial homologation by Axens in preparation for commercial deployment.

In parallel, the consortium led by Michelin, in which IFPEN is a partner, secured European funding for the CERISEA project*. It aims to build the first production unit for 5-HMF, a key intermediate for the bio-based chemicals industry. Located at the Péage-de-Roussillon chemical platform and operated by ResiCare, a Michelin Group subsidiary, the unit is expected to enter service by the end of 2026.
Further research also explored new production pathways for bio-based molecules, including high-value-added intermediates and specialty enzymes for the flavour and fragrance industry and fine chemicals.

"CERISEA is a landmark European project designed to help 5-HMF, a 100% bio-based molecule, reach the decisive stage of industrial deployment. Involved from the outset, IFPEN plays a key role in this scale-up by leveraging its expertise in process development, industrial validation and engineering alongside its industrial partners. By helping to build a fully integrated European value chain, CERISEA demonstrates how public research and innovation can accelerate the emergence of a high-performance, competitive and sovereign bio-based chemicals industry."



Noémie Dos Santos Tabbakh,
Biomass-to-Chemicals Programme Manager



* This project has received funding from the Circular Bio-based Europe Joint Undertaking (CBE-JU) under Grant Agreement No. 101214076.

ACCELERATING PLASTICS CIRCULARITY

IFPEN is strongly committed to developing advanced plastics recycling solutions that complement mechanical recycling and support a high-performing, sustainable circular economy. In 2025, the PROPRE experimental platform*, located at the Solaize site, reached a major milestone with the progressive commissioning of its shared facilities dedicated to the chemical and physico-chemical recycling of plastics. This semi-industrial platform successfully validated the deformulation of large volumes of flexible PVC supplied by two European manufacturers.

DECARBONISING INDUSTRY: CARBON CAPTURE, UTILISATION AND STORAGE

Carbon, capture, utilisation and storage (CCUS) technologies are essential to achieving international climate objectives. IFPEN plays a leading role in developing and demonstrating these solutions. Industrial-scale validation tests of the DMX™ carbon capture process were successfully completed in early 2025, confirming the technology's robustness and reliability under real operating conditions. These results enabled the preparation of the reference documentation required for industrial qualification.

At the same time, Chemical Looping Combustion (CLC) technology reached a major milestone with successful large-scale validation on a semi-industrial demonstrator.

In the field of CO_2 storage, following the completion of the EVASTOCO$_2$ project dedicated to assessing France's geological storage capacity, IFPEN continued to act as a trusted third party by further advancing its work on site characterisation, storage capacity assessment, and long-term storage integrity. Its teams also continued to contribute actively to the technical assessment and evaluation of CO_2 storage sites across France.

* Funded under the 2021–2027 State-Region Plan Contract (CPER).

ADDRESSING CLIMATE, SOIL, AIR, AND WATER INTERACTIONS

IFPEN develops an integrated approach to understanding the interactions between climate, soil, air and water to better assess and reduce the environmental impacts of human activities. In 2025, significant progress was made in greenhouse gas monitoring with the first flight of an airborne version of the Flairbox™, developed in collaboration with TIDAV for atmospheric emissions monitoring. At the same time, the Flair technology entered its pre-industrial development phase.

Research on soils also gathered momentum with the creation of the Sustainable Soil Carbon Lab, a joint laboratory established with Valorhiz and funded by the French National Research Agency (ANR). The laboratory aims to improve soil analysis techniques, particularly for low-carbon soils, to support ecosystem restoration and the sustainable management of degraded and reclaimed soils.

In the field of water, IFPEN continued to develop solutions to mitigate emerging pollutants, particularly PFAS and microplastics. Results obtained during industrial-scale tests, especially in the professional textile laundering sector through the development of the CleanWash™ process-demonstrate IFPEN's ability to translate research into practical solutions that protect the environment.



FOCUS ON

SUPPORTING INNOVATIVE COMPANIES

For more than thirty years, IFPEN has pursued a policy of supporting technological innovation among French SMEs and start-ups, helping to strengthen their competitiveness while fostering job creation and economic value.

Open Innovation embodies the strategic shift undertaken by IFPEN in recent years to boost the SMEs' and start-ups' technological innovation by involving them in its research activities and building partnerships. The objective is to enhance business competitiveness, support company's growth, and generate jobs and economic value across the regions.
In 2025, IFPEN engaged with more than 150 innovative start-ups and SMEs, confirming its growing role as a trusted partner for industrial innovation.
These collaborations are supported by a well-established network of regional and national partners-including competitiveness clusters, accelerators and incubators, technology transfer offices (SATTs), funding agencies and investment funds, which identify and refer high-quality projects aligned with IFPEN's areas of expertise and strategic priorities.



IFPEN INCUBATOR

In 2025, the IFPEN Incubator significantly renewed its project portfolio with the integration of the five winning projects from the 2024 Internal Innovation Challenge: an illustration of research-driven ideas into industrial solutions.

70%

Over the past ten years, 70% of the projects incubated have been transferred to IFPEN's R&I business units or, in some cases, directly commercialized, as MAGELLAN®.

THE IFPEN OFFERING

To support these partnerships, IFPEN offers innovative companies a comprehensive and flexible portfolio of services, tailored to deliver results and accelerate innovation in collaboration with SMEs and start-ups.

R&I Assessment

Identify and prioritize innovation opportunities around the technology.

Define an R&I roadmap to unlock these opportunities.

Proof of Concept (PoC)

Assess the technical and commercial viability of a technology or solution.

Boost & Link

Co-develop or enhance a technology or process, with the generation and protection of intellectual property.

Technical Services

Techno-economic assessments, preparation of technical specifications, and access to IFPEN's testing facilities.

SUCCESS STORY

MAGELLAN®: From an Employee's Idea to a High-Impact Innovation

As droughts become more frequent, the shrink–swell phenomenon affecting clay soils is causing structural damage to an increasing number of buildings. To address this growing challenge, IFPEN and Solinjection, a subsidiary of the Talensis Group specializing in ground remediation, have developed and deployed an innovative solution.

Around thirty pilot projects have already been carried out on individual homes located in some of France's most exposed regions, including Provence-Alpes-Côte d'Azur, Occitanie, Île-de-France, Centre-Val de Loire and Grand Est. Their objective is to provide an effective and operational solution to the growing issue of buildings damaged by soil movement and cracking. MAGELLAN® has also been selected by the Drought Initiative, led by France Assureurs, the Caisse Centrale de Réassurance and the Mission Risques Naturels, confirming the relevance and robustness of the solution in addressing both insurance and climate resilience challenges.



MAGELLAN® originated from one of the winning IFPEN's Internal Innovation Challenge projects.

IFP SCHOOL

TRAINING THE LEADERS OF THE TRANSITION

Training is one of IFPEN's core missions and is delivered through IFP School, the graduate school for energy innovation and sustainable mobility.

Its academic programmes are organised around four areas of expertise: Powertrains and sustainable mobility, Energy economics and management, Energy and chemical processes, Georesources and energy.

To keep pace with the rapidly evolving skills required for the energy and environmental transitions, IFP School continues to adapt its academic offering in close synergy with IFPEN's research and innovation activities, as well as its industrial and academic partners.

In 2025, the School made significant investments in updating and renewing its programmes, securing the associated accreditations and certifications, while launching several new courses for the 2026 academic year.

These include new specialised engineering programmes in subsurface technologies for sustainable energy, electric powertrains, offshore wind energy, and electricity and digital technologies, as well as a Mastère Spécialisé® in Energy and Carbon Management, developed in partnership with INSTN.

These developments reflect the School's ambition to cover the full spectrum of energy transition technologies while maintaining strong expertise in its traditional fields.

At the same time, IFP School continued to modernise its teaching methods by strengthening its experiential learning approach and expanding the use of digital tools through its on-campus Lab e·Nov™, including virtual reality, generative artificial intelligence for education, and the development of MOOCs.



IFP SCHOOL AWARDED THE DD&RS LABEL

In June 2025, IFP School was awarded the Sustainable Development and Social Responsibility (DD&RS) label. Granted for a period of two years, this certification recognises and reinforces the School's long-standing commitment to socio-ecological transformation.

The DD&RS label is awarded by CIRSES based on a common framework for higher education institutions structured around five pillars: strategy and governance, education and training, research and innovation, environmental management, and social policy.

"*We can be extremely proud of receiving this demanding certification. It is the result of a collective effort by IFP School's faculty and administrative staff, building on the corporate social responsibility approach developed across IFPEN. We are now determined to build on this achievement and continue the progress already made,*" said Pascal Longuemare, Dean of IFP School.

FOCUS ON

NEW *OFFSHORE WIND PROJECT DEVELOPMENT* PROGRAMME

In 2025, IFP School launched four new specialized engineering programmes and a Mastère Spécialisé® to train the professionals who will drive the industries of tomorrow.
"*Creating the Offshore Wind Project Development Programme was a truly collaborative endeavour. Approved by the French Engineering Accreditation Commission (CTI) in October 2024 and launched in September 2025, the programme was developed in record time. The complementary expertise of IFPEN and IFP School teams was a cornerstone of this success. Research not only helped shape the curriculum but researchers themselves also took part in delivering the courses, while benefiting from feedback and experience shared by industry professionals. This win-win model perfectly illustrates IFPEN's ability to build strong bridges between research and education*", said Emmanuel Persent, Head of the Offshore Wind Project Development Programme.

INCLUSION & STUDENT WELL-BEING: NATIONAL RECOGNITION

IFP School ranked second in the 2025 Focus Inclusion ranking of French engineering schools with fewer than 1,000 students, published by ChooseMyCompany, and was awarded the HappyAtSchool® label. This distinction recognises the School's ongoing commitment to providing an inclusive, supportive and academically demanding learning environment, where every student can thrive, feel heard, and benefit from dedicated support. It also highlights the strong emphasis placed on student well-being, a key factor in fostering both academic excellence and personal development.

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IFP School at a glance

18 Master's-level programmes (equivalent to a 6-year higher education qualification), including **9** taught in English

50 % of students are international, representing more than **40** countries

16 000 alumni active in more than **100** countries

415 students in the 2025 cohort.

For more information: www.ifp-school.com

IFPEN IN FIGURES

1,523
TOTAL FTE*
for 2025

including
1,074
RESEARCHERS AND R&I TECHNICIANS

** Full-time equivalent*

205
PHD STUDENTS, POST-DOCTORAL RESEARCHERS AND PLACEMENT STUDENTS

36
WORK-STUDY STUDENTS

€117.6 million
BUDGET ALLOCATION

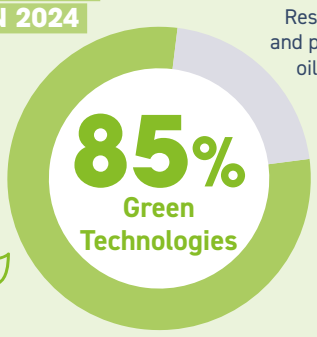
€162.1 million
OWN RESOURCES

€288.4 million
OPERATING EXPENSES
including
€245.1 million
FOR R&I

SHARE OF GREEN TECHNOLOGIES IN R&I IN 2024



15%
Responsible and profitable oil and gas





FRANCE 2030

IFPEN co-leads the **MOBIDEC** (Digitalisation and Decarbonisation of Mobility), **B-BEST** (Bio-based Products – Sustainable Fuels) and **SPLEEN** (Decarbonisation of Industry) **PEPRs***. IFPEN is also involved in **four other PEPR-SNAs**** (Batteries, Recycling, Low-Carbon Hydrogen and TASE) and participates in **six exploratory PEPRs**: SousSol, OneWater, FairCarboN, NumPEx, Maths-Vives and DIADEM.

** Programmes et équipements prioritaires de recherche = Research and Equipment Programmes*

*** PEPRs supporting France's National Acceleration Strategies*

2 CARNOT INSTITUTES

THE IFPEN TRANSPORTS ÉNERGIE CARNOT INSTITUTE
(since 2006)

THE IFPEN RESSOURCES ÉNERGÉTIQUES CARNOT INSTITUTE
(since 2019)

ISO 9001 certification for its R&I activities and **ISO 50001 certification** for its activities devoted to energy efficiency.

PATENTS

152 FIRST PATENT APPLICATIONS FILED

Of which **134** IN THE FIELD OF GREEN TECHNOLOGIES

Chemical or biological plastics recycling

Period 2010-2019

1st LEADING GLOBAL RESEARCH CENTER

Source: EPO*

Hydrogen technologies

Period 2011-2020

2nd GLOBAL RESEARCH CENTER

Source: EPO* and IEA**

Low-carbon technologies

Period 2000-2019

4th GLOBAL RESEARCH CENTER

Leader in the fields of CCUS and alternative fuels

Source: EPO* and IEA**

Electric networks

Period 2011-2022

9th PATENT FILER

Leader for stationary storage

Source: EPO* and IEA**

* European Patent Office ** International Energy Agency

SUBSIDIARIES AND SHAREHOLDINGS

Central to IFPEN's development policy, IFPEN group brings together leading industrial players worldwide and young innovative companies. The stature and profile of the former, combined with the promising potential and dynamism of the latter, reflect the capacity of this policy to create value and jobs. IFPEN's portfolio of subsidiaries and shareholdings is held either directly or indirectly via its subsidiary IFP Investissements, which is itself 100% owned by IFPEN.

Eco-energies & mobility

- 75% GreenWITS
- 24% DRIVE QUANT
- 18% la Cie des Mobilités
- 11% K-Ryole
- 8% so sponge
- 6% Tec E Mouv

Oil and gas processes & products, biomass, water, CO_2, materials recycling

- 99% Axens
- 16% nacre
- 10% BioTJet

Consultancy & software in the field of geosciences

- 100% BeicipFranlab
- 100% TECHI advantage

Training

- 62% IFP Training

THE EXECUTIVE COMMITTEE

AS OF 1 JULY 2026

GENERAL MANAGEMENT



Pierre-Franck Chevet
Chairman and CEO



Cécile Barrère-Tricca
Executive Vice-President, Innovation and Economic Development



Benjamin Herzhaft
Executive Vice-President, Research and Training

COMEX MEMBERS



Emmanuel Manceau
Director of the Energy Systems Business Unit



Raphaël Huyghe
Director of the Energy Products Business Unit



Arnaud Baudot
Director of the Chemistry for Industry Business Unit



Gaëtan Monnier
Director of the Mobility Business Unit



Nathalie Alazard-Toux
Director of the Industrial Development Business Unit



Pascal Longuemare
IFP School Dean and Director of the Training Business Unit



Florence Delprat-Jannaud
Scientific Director



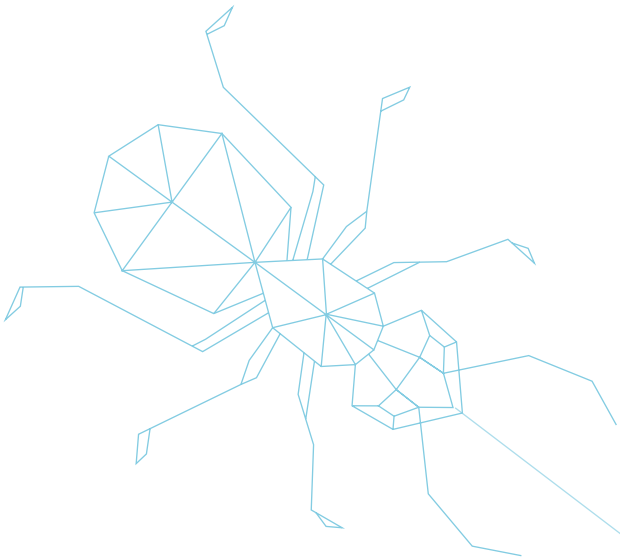
Anne-Karine Feyel
Human Resources Director



Dominique Humeau
Director of the Digital science and technology division, Digital Office and Information Systems

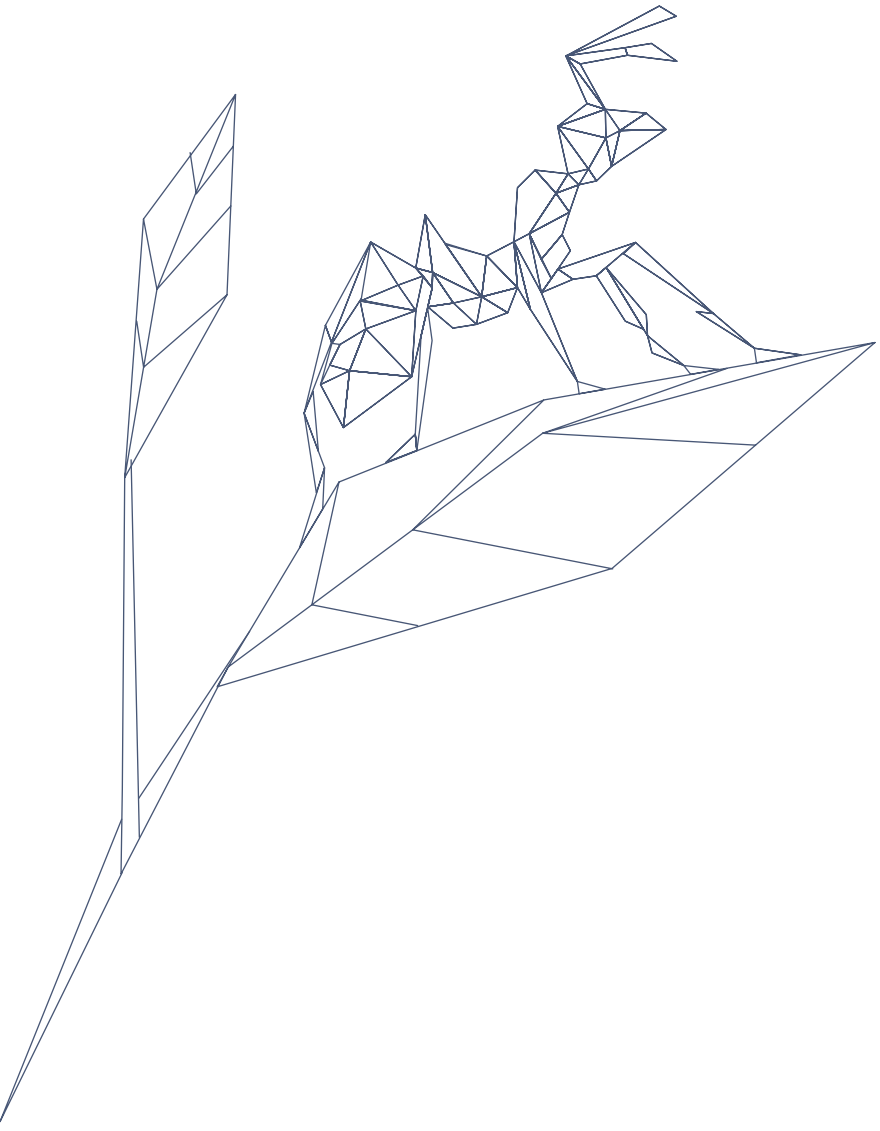
IFPEN's main strategic directions and annual activity programme are approved and monitored by the Board of Directors, which is assisted by several consultative bodies: the Scientific Board, four Industrial Committees, the Stakeholders' Committee and the IFP School Advisory Board. A list of the members of each of these bodies is available at **www.ifpenergiesnouvelles.com**

TO KEEP UP TO DATE WITH THE DAILY NEWS AT IFPEN



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Editors: IFPEN • **Design & Layout:** La P'tite Fève • **Printing:** recycled paper • **Photo credits and illustrations:**
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