



A biobased, circular alternative for a lower carbon footprint

PRESS RELEASE

EDITORIAL



Nicolas SORDET, CEO of AFYREN

According to the latest [IPCC synthesis report](#) published in March 2023, global warming had already reached +1.15°C in 2013-2022, compared to 1850-1900. The scenario of limiting warming to 1.5°C recommended by the Paris agreement seems to be increasingly compromised, and what comes out of the report is the seriousness of the situation and the urgency to act effectively.

We all have a responsibility and a role to play. If global awareness is beginning to be raised and mobilization for the climate is gaining momentum, the pace & scale of action are not yet sufficient to limit the risks associated with climate change. The year 2022 was the hottest year ever recorded in France. Around the world, the effects of climate change are beginning to be felt and will continue to do so. But there are still many opportunities to step up climate action.

"If we want to preserve the planet, we must move now to change the game and avoid reaching a point of no return. This is the motivation behind AFYREN, which conceived and continues to develop breakthrough innovation in green chemistry."

AFYREN addresses the market for biomolecules, proposing **innovative solutions** to manufacture tomorrow's ingredients by replacing petroleum-based products with products from **natural micro-organisms**. At AFYREN, we're seeking to combine profitability with respect for the environment by building a zero-waste factory with very low CO₂ emissions, in the context of a **circular economy** and using local inputs.

Our technology is not a universal remedy; it is just one of many possible solutions to reduce the environmental impact of human activity.

By contributing to a low-carbon and circular bioeconomy, we're demonstrating that it's possible to transform our current production habits and standards.

A clear trend of increasing customer demand for more sustainable products, along with the many awards we have received since the creation of the company, have confirmed our belief that we are on the right track. Our ambition for the future is to see demand for our products drive us to a leadership position in a global market worth \$13 billion.

Consumers are aware they must consume better; it's time now for decision-makers to integrate the risks of climate change into their decisions.

Our entire team is driven by a **common desire** to commit to a project that makes sense. We want to build a useful project, rooted in the French territories but on a global scale, that will increase the positive impact our actions have on the environment.

We want to be able to tell our children that we made a difference. And we are proving that a positive transformation of industry is indeed possible!

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AFYREN'S MISSION

Innovating to contribute to a low-carbon and circular bioeconomy

AFYREN, a flagship of French Greentech, has designed, and is continuing to develop, **breakthrough innovations in green chemistry** to create a healthier and more sustainable future for all.

AFYREN was included in the FT120 (the 120 most promising French Tech start-ups) in 2020 and 2021, and received the "Efficient Solution" label from the Solar Impulse foundation, in November 2019.

Today's consumer products are still largely composed of petroleum-derived molecules. To meet the growing need of manufacturers to reduce the use of petroleum derivatives and fossil resources in their production chains, AFYREN produces biomolecules from non-food biomass¹. These are widely used in the human and animal nutrition, flavourings and fragrances, lubricants, life sciences and materials sectors.

AFYREN's CSR performance was assessed by the extra-financial rating agency Ethifinance, with a score of 78/100 for its activities in 2022 (Gold level), an increase of 6 points compared to the previous year, which highlights, on the basis of the 2021 benchmark, a level of ESG maturity that is clearly higher than what is observed for comparable companies

This production of molecules (organic acids) from renewable carbon, which is firmly in line with the circular economy, is carried out by AFYREN thanks to a technology that respects the environment and is «zero waste», using natural micro-organisms. This innovation is patented worldwide, through 10 patent families, the result of over 10 years of R&D.

As it transitioned to industrial scale production, AFYREN wanted to take some time to formulate its **purpose** (or "raison d'être," published in early 2022). This reflection is the result of consultations with employees and external stakeholders, carried out in order to define the direction of its development.

¹The raw materials used are exclusively biomass co-products, which are not used in human food.

A purpose in line with AFYREN's mission

“ We enable low-carbon, circular industry by providing biobased solutions built with our partners to benefit the environment ”



CSR materials topics

PILLAR 1 Provide sustainable, high performance, biobased solutions

- Objective 1 Place eco-design at the heart of our innovation
- Objective 2 Offer biobased, low-carbon alternatives to fossil-based resources
- Objective 3 Bring to market biobased or natural products with high societal added value

PILLAR 2 Enable a low carbon, circular and responsible industry

- Objective 1 Reduce the carbon footprint of our own activities
- Objective 2 Preserve the planet and its resources by making our activities part of the circular economy
- Objective 3 Aim for excellence in all our business operations

PILLAR 3 Create an ecosystem of partners, building for the environment

- Objective 1 Guarantee a safe, motivating and fulfilling working environment for all our employees, without distinction
- Objective 2 Become fully engaged in our operating regions as we develop the bioeconomy sector
- Objective 3 Work with our external stakeholders

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MARKETS & SOLUTIONS

Biobased organic acids for diverse markets with very high potential

The organic acids market is significant, currently representing some **18 million metric tons**, with annual growth of around 5.7%, and valued at over \$13 billion.

Currently, nearly 99% of these organic acids are petroleum-based.

The biobased organic acids supplied by AFYREN are **alternatives for manufacturers looking for sustainable ingredients**, with antibacterial, olfactory and preservative properties.

To meet growing demand, AFYREN is proposing an attractive local offering, against a backdrop of oligopolistic production. But above all, AFYREN's offering meets a triple objective, combining sustainable development, technical performance, and economic competitiveness.

AFYREN has already entered into commercial contracts for 75%² of the acids, and 100% of the fertilizer, for the annual target production of its first plant, with a total cumulative turnover of over €165³ million, to be recognised over coming financial years.

Certain sectors are demonstrating high expectations in terms of natural solutions. For sectors that are less

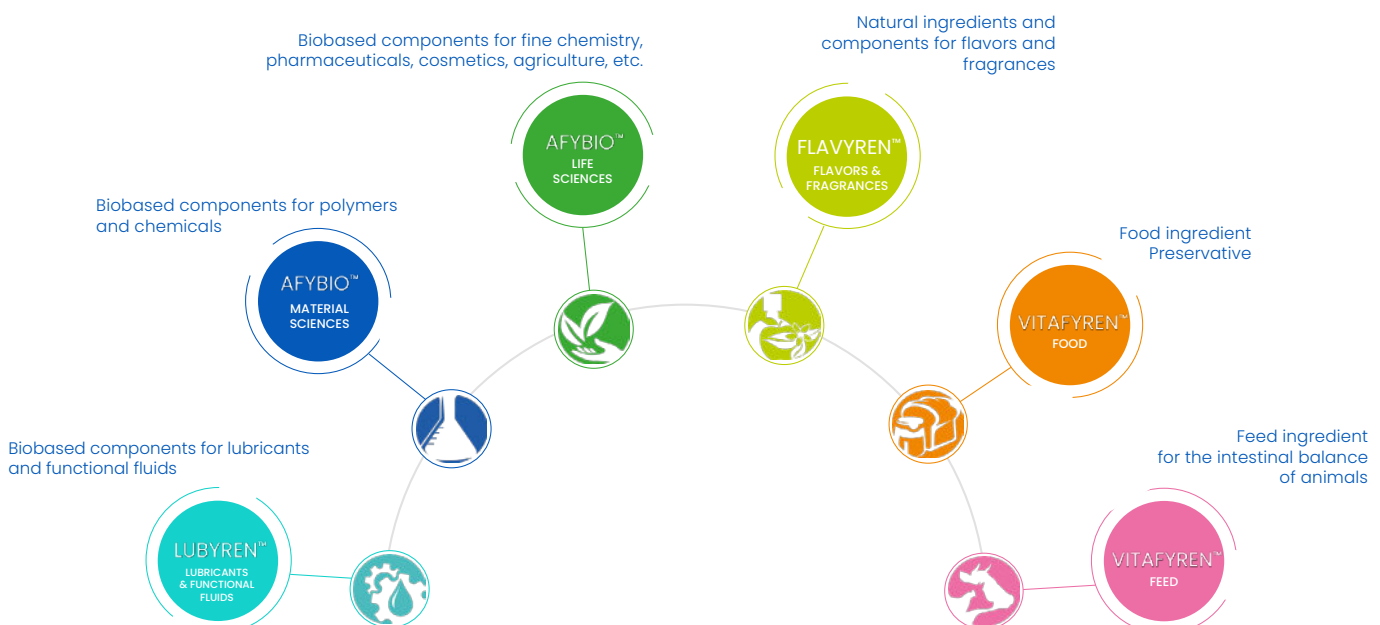
sensitive to the biobased components, the favorable carbon footprint, with a reduction in CO₂ emissions from these products, remains a decisive advantage.

AFYREN is positioned in 6 key sectors: food, animal feed, flavors and fragrances, lubricants, materials science, and life sciences. In all of these markets, there is a wide variety of molecules for which AFYREN could provide biobased alternatives, and their applications are highly diverse. For example, the company has just announced a partnership to supply its biobased acids for the development of a biocontrol solution for arboriculture.

To meet the needs of its customers, AFYREN offers a range of products adapted to the specific needs of each of these markets. The acids produced by AFYREN are platform molecules that can be converted into very useful derivative products in these 6 key target markets.

² Of which 71% contracted and > 5% pre-contracted (letter of intention or memoranda of understanding)

³ On the contracted part only, total volumes over the contracted period x sales price



VITAFYREN™

FOOD

VITAFYREN™ FOOD is **a range composed of 2 biobased acids** with **mould inhibition** and **preservative** properties, for the formulation of **food ingredients**.

The acids that make up the VITAFYREN™ range can be used to extend the shelf life of food (thereby reducing food waste), and after processing, in the formulation of food supplements.

VITAFYREN™ FEED is **a complete range of 5 biobased organic acids** for the ingredients and raw materials for **animal feed**.

VITAFYREN™ acids are used as building blocks for producing derivatives for animal feed, such as salts or coated salts. These raw materials serve as a basis for the development of solutions for an **optimal intestinal balance** for farm animals and domestic pets.

VITAFYREN™ meets new consumer demands for more natural and sustainable diets, and allows manufacturers to develop and label natural, allergen-free, and minimally processed food ingredients. The VITAFYREN™ range contributes to reducing the environmental impact of livestock farming, and makes it possible to anticipate regulatory changes, which, over the long term, will restrict the use of antibiotics in animal feed.

VITAFYREN™

FEED

FLAVYREN™ is **a range of 7 biobased acids**, with the lowest carbon footprint on the market, dedicated to the formulation of **flavors and fragrances**.

FLAVYREN™ acids offer a local, natural and competitive solution for producing a wide range of **fruit flavors and dairy flavors**, as well as for **creating perfumes**. They allow for the commercialisation of natural solutions, and meet the traceability requirements of the food and cosmetics industries. The AFYREN range is unique, and opens up the possibility of formulating new derived molecules that do not currently have an equivalent in natural molecules.

FLAVYREN™

FLAVORS & FRAGRANCES

AFYBIO™

LIFE SCIENCES

AFYBIO™ is **an innovative range of 7 biobased organic acids** for the life sciences.

AFYBIO™ acids can be used for **esterification processes** commonly found in the **pharmaceutical and cosmetic industries**.

In the life sciences sector (hygiene and cosmetics), manufacturers are beginning to introduce biobased materials, in order to achieve their decarbonisation goals, and to satisfy consumer' demand for sustainability and naturalness. The agricultural sector is also seeing very strong demand for more sustainable solutions for plant protection, and the latest partnership between AFYREN and Céaritis is a perfect example of this.

AFYBIO™ is **an innovative range of 7 biobased organic acids** for **materials science**.

AFYBIO™ acids can be used as a reagent in **polymer formulation**, and in manufacturing base materials for **coatings** and **adhesives**.

In the materials science sector (construction, automotive, packaging, manufacturing, etc.), manufacturers are starting to introduce biobased materials in order to reach their decarbonisation objectives, and meet consumer demands for sustainability and naturalness.

AFYBIO™

MATERIALS SCIENCE

LUBYREN™ is **a range of 3 high performance biobased acids**, for the formulation of **lubricants and functional fluids**.

These acids can be used as a **component in the manufacture of high performance lubricants and functional fluids**. Industrial lubricants are traditionally used in the operation of **hydraulic and braking systems**, in **turbines, compressors** and **industrial refrigeration systems**.

AFYREN's acids provide an alternative to the petroleum-based or palm oil-derived acids that are currently used in lubricant formulations, and help in significantly accelerating efforts to reduce greenhouse gas emissions and industrial carbon footprints.

LUBYREN™

LUBRICANTS & TECHNICAL FLUIDS

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TECHNOLOGY

7 biobased organic acids from an innovative fermentation technology for global applications

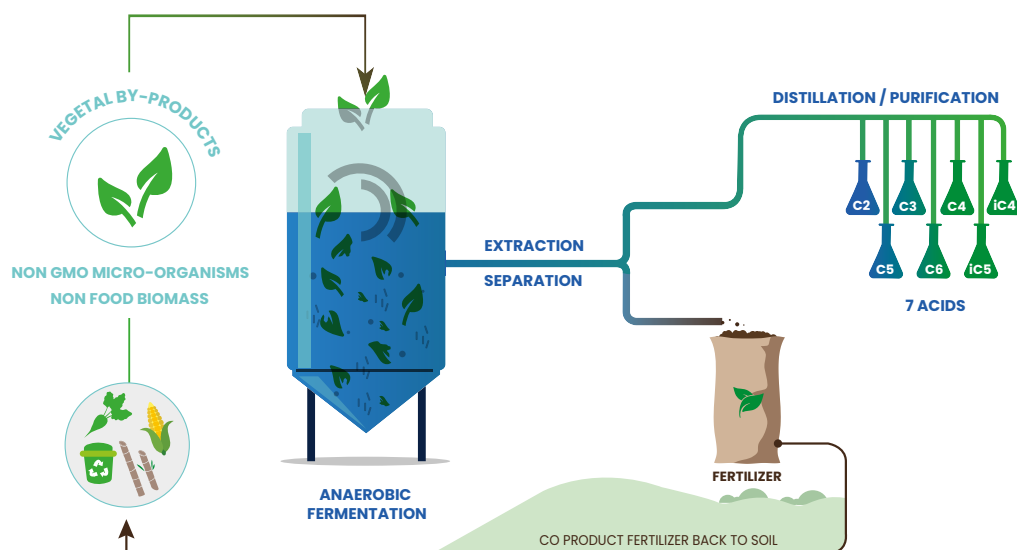
AFYNERIE® is an **innovative, environmentally friendly** anaerobic fermentation technology, based on natural and **NON-GMO microorganisms**. This worldwide-patented technology (10 patent families) is the result of over ten years of R&D.

The technology is based on the 12 principles of [green chemistry](#) and makes it possible to use different types of biomass that do not compete with food sectors (for example, co-products from the sugar industry), while moving towards zero waste.

AFYNERIE® therefore makes it possible to produce high-quality 100% biobased organic acids⁴ from renewable raw materials, thanks to a fully dedicated process that follows a segregated biobased chemistry approach (unlike the mass balance approaches often found on the market).

The unique biotechnological process developed by AFYREN is a biomimetic process, based on natural microorganisms, that makes it possible to obtain pure molecules that meet market specifications.

⁴The biobased content of our products is verified according to EN 16785



AFYREN's "Drop-in" approach allows it to offer molecules that are already familiar and present on the market, and which meet the usual specifications and regulations. This strategy allows AFYREN to address global and diversified markets. These manufacturers can now opt to reduce their environmental impact, without degrading the performance of their products, thanks to these 100% biobased molecules.

AFYREN's range of 7 organic acids is unique, as the petroleum-based acids on the market are obtained through specific processes, leading to the production of a very limited number of acids per production line. Manufacturing a portfolio of several of them thus requires investing in multiple production units. For certain customers who use several types of acids, AFYREN's technology is a real advantage.

The innovative and sustainable nature of the AFYREN model has been recognised by multiple distinctions, notably including:



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BENEFITS

Efficient, innovative, and sustainable solutions



Based on a circular and low-carbon bioeconomy model, the solutions provided by AFYREN offer client companies the same performance as existing conventional products, while responding to economic, social and environmental challenges.

ECONOMIC

Cost of production competitive with petroleum-based products

- With more naturality and with a limited carbon impact, the economic benefit is higher for AFYREN's customers, and the **supply chains are secure**.
- AFYREN's activities also allow for the **diversification** and **securing** of additional income from the sale of sugar products for sugar manufacturers.
- With its partners both upstream as well as downstream, and notably its partners in the AFTERBIOCHEM project, AFYREN is fully committed to the **development of the bioeconomy**, a future-facing sector that contributes to more **sustainable industry**, and which is an integral part of Europe's economic development strategy.

SOCIAL

Creating of non-relocatable industrial jobs

- AFYREN's first plant is located in a former petrochemical platform that is undergoing conversion in the Grand Est region, which has suffered numerous redundancy-plans over recent decades. This project therefore contributes to the **reindustrialisation** of France.
- AFYREN contributes to the creation of non-relocatable jobs, as close as possible to the sources of raw materials, and to the economic development of the areas where it operates.

ENVIRONMENTAL

Reduction of CO₂ emissions and circular economy (recovery of co-products)

A reduction in the carbon footprint of the generated products, and local supply

- An LCA study carried out on the basis of pre-industrial⁵ data shows that AFYREN's biobased acids on average have a **carbon footprint 5 times lower** than those of equivalent fossil-based products. On this basis, AFYREN's production (16,000 tonnes of biobased acids) therefore offer the market low-carbon solutions saving over 30,000 tonnes of greenhouse gas emissions every year (as compared to the use of petroleum-based products).

A circular economy approach to conserving resources

- Diversification of the raw materials used, allowing for **local recovery** of biomass by-products, therefore limiting waste in the sectors concerned, and respecting natural resources.
- An optimised manufacturing process that consumes very little water, and only generates a single by-product as residue: a natural fertilizer that is rich in potassium, and can be used in organic farming, completing the circle with a return to the soil.

⁵ Analysis carried out by Sphera with pre-industrial data; the study needs to be updated.

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INDUSTRIAL PRODUCTION

Bringing locally-based solutions to the global challenges of decarbonising industry



AFYREN intends to meet the global demand for biobased carboxylic acids, while remaining faithful to its unique model: providing biobased products, derived from local biomass, with a reduced environmental footprint, and within a short circuit. In its industrialisation strategy, AFYREN has chosen to locate its factories as near as possible to available biomass deposits and to its markets in France and internationally.

This approach allows AFYREN to sell biobased acids produced within a short distance to customers, significantly reducing their environmental footprints. It also has the benefit of securing supplies and delivery capacities.

AFYREN's industrial development is based on the replication of its efficient, **low carbon**, **zero waste**, and **short circuit model**.

- AFYREN's researchers have found ways to adapt the **fermentation** and production process to any local biomass; it is not dependent on the by-products currently being used.
- **The zero waste model** can be replicated, with co-products left over from AFYREN's process recovered for use as a high value fertilizer. Like the first plant, subsequent factories will be optimized to operate within a closed circuit, **consuming very little water**.
- AFYREN'S "Build and Operate" strategy provides for simple replication. IT architecture, management systems, and the **culture of operational excellence** are fully transferrable.

AFYREN NEOXY, a first plant born from AFYREN technology and know-how

AFYREN NEOXY is based on the CHEMESIS platform at Carling Saint-Avold, in Moselle. Opened in 2022, it is dedicated to the production of AFYREN's 7 100% biobased organic acids. AFYREN plans to gradually increase volumes, to eventually producing 16,000 tonnes of carboxylic acids, a world first.

AFYREN NEOXY, a unique biorefinery in Europe:

A "Zero Industrial Waste" plant based on the circular economy

- Optimal utilisation of by-products (molasses and pulp) from sugar beet, a key European crop.
- An optimised process that also makes it possible to recover AFYREN's only by-product, transforming it into a fertiliser that can be used in organic farming, completing the circular process.
- Virtually non-existent water consumption, thanks to a process that uses the water that is naturally present in the biomass, and operating within a closed circuit.

A low-carbon plant

- CO₂ and greenhouse gas emissions are divided by 5, compared to traditional methods of production of carboxylic acids of fossil origin.
- Short circuits: Carling Saint-Avold, in Moselle, is a strategic location, set in the heart of Europe, equidistant from the Company's customers and

suppliers and facilitating cross-border trade, at a maximum distance of a few hundred kilometres. This proximity allows AFYREN NEOXY to offer secure, low-carbon delivery to its partners.

A plant that contributes to regional development

- Located at the Chemesis platform, a former petrochemical platform, the AFYREN NEOXY plant is contributing to the revitalisation of the region. The plant illustrates the renewal of French industry, in line with the challenges of our world, both in terms of the products provided as well as the means of producing them.
- AFYREN NEOXY also represents a source of job creation in the Grand Est region: some 60 direct jobs, and up to 200 indirect jobs in the industrial and construction/engineering sectors (production, maintenance, quality control, safety etc.).

Financing in line with the challenges of a flagship biorefinery in Europe

AFYREN has raised more than €80 million in total funding from public and private sources. This is the fruit of an industrial joint venture between AFYREN and the BPI France's SPI fund (49% of the capital), financed by the Programme Investissement d'Avenir (Investment for the Future Program), and the European Investment Bank. AFYREN NEOXY has brought together **12 key European players** in the bioeconomy around an innovative European project aimed at developing the first bio-refinery of its kind in Europe. The project, AfterBiochem (Anaerobic Fermentation & Esterification of Biomass for Producing Fine Chemicals), focuses on creating **new sustainable value chains** from **renewable and non-food raw materials**, leading to the market launch of a range of new high added value products. The project is supported by the European Commission and the public-private partnership "European Joint Undertaking Bio Based Industry" (BBI-JU), which is subsidising this project to the tune of **€20 million**. It is also supported by:





A second plant project in Thailand in partnership with a world leader in the sugar industry

In 2023, AFYREN signed a memorandum of understanding with Mitr Phol, **a leading Thai producer of cane sugar** and its derivatives, with a view to setting up a second biorefinery in Thailand. The project will take the form of a joint venture, owned 70% by AFYREN and 30% by Mitr Phol.

At full capacity, it is set to produce 28,000 tonnes of biobased products, and generate a turnover of approximately 60 million euros per year.

A strategic market

AFYREN's project in Thailand will address the Asian market, which alone accounts for **25% of the world market for carboxylic acids**.

This is a growing market, largely driven by the dynamism of the food and animal nutrition sectors.

A meaningful partnership

- In social terms, the project is set to create 80 direct jobs, and 280 indirect jobs.
- In environmental terms, the project will benefit from direct access to raw materials, with a **reduced environmental footprint**.
- In industrial terms, this new project allows Mitr Phol to strengthen the circular and sustainable model of its business by utilising its sugar cane by-products, which are still under-used. In addition, the plant will be able to benefit from access to renewable and low-carbon electricity and steam, produced by biomass cogeneration.

Keeping the territorial approach

With a strategic location in the heart of Southeast Asia, AFYREN will be able to export part of the production of its new plant to other Asian countries, while maintaining its short circuit strategy. AFYREN will be able to support its regional and international customers as closely as possible, via a **local and secure supply**.

A third plant already planned

AFYREN is working on analysing various scenarios for the company's third plant. The company is notably studying the presence of biomass deposits and major commercial markets for acids. These scenarios include an AFYREN NEOXY extension project, or a project at a new site in North America.

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DEVELOPMENT STRATEGY

Meeting the new expectations of manufacturers driven by global awareness

The AFYREN story began in April 2012, after several years of research work by Jérémy Pessiot, a researcher and PhD in microbiology and chemistry. The arrival of Nicolas Sordet in 2014 accelerated AFYREN's economic development. The challenge for these two co-founders is to take things further and transform the start-up into an **industrial success**.

Several years of R&D were required to refine the technology and progress through the various stages. Following the first proofs of concept at the laboratory scale and scale-up phases both at the pilot level in 2014 and then at the pre-industrial scale at the end of 2017, AFYREN clearly defined its industrial project at the end of 2018.

A fundraising round of **€21 million**, and the creation of a joint venture (JV) with the investment fund "Sociétés de Projets Industriels" (SPI), managed by Bpifrance, and subscribed to by the Future Investments (PIA) as well as the European Investment Bank, permitted the creation of the joint venture AFYREN NEOXY. With this funding in place, AFYREN had the means to achieve its ambitions, and was able to begin construction of the AFYREN NEOXY plant in 2020. **AFYREN NEOXY opened on September 29th, 2022** and immediately began its industrial commissioning. For its first plant, AFYREN advocated a resolutely territorial approach, by choosing a location that ensures both a local supply chain for raw materials, as well as and proximity to its main European customers.

In 2021, AFYREN went public on Euronext Growth® in Paris, raising approximately **70 million euros**, with the aim of accelerating its industrial development. The company ultimately aims to significantly increase its installed capacity, to reach a production capacity of **72,000 tonnes of biobased acids per year** by 2027, notably with the construction of the plant project in Thailand, and an additional project: the extension of AFYREN NEOXY, or a project for a new site on the American continent. At the same time, AFYREN continues to invest in R&D, in particular to extend its portfolio of products to be supplied, beyond the **7 organic acids** already developed.

"This is a new page in the history of AFYREN. With the support of our investors and these new resources, AFYREN will be able to increase our industrial capacities, and over the next few years we intend to become a leader in the production and sale of biobased products".

Nicolas SORDET & Jérémy PESSIOT, Co-founders of AFYREN

As of early 2023, the AFYREN group has over 100 employees, including 60 at the AFYREN NEOXY plant in Saint-Avold, in the Grand Est, and some 45 based at the Lyon and Clermont-Ferrand sites, half of whom are entirely dedicated to Research & Development activities.

Governance

AFYREN's Board of Directors

AFYREN has filled its board of directors with first-rate experience members, and have held numerous directorships, notably in the chemical sector. From the very beginning of the company, AFYREN's co-founders wanted to place prominent importance on sustainable development, which is at the heart of the value offering of the AFYREN project. CSR was integrated very early on in the operational strategy of the company, with the appointment of a CSR Director in the Executive Committee of AFYREN from 2021.

With the establishment of a remuneration committee, an audit committee, and a CSR committee attached to its board of directors, AFYREN has effective governance tools to support it in its development.

Management Team



**Nicolas
Sordet**

CEO & Founder



**Jérémy
Pessiot**

MD, CTO & Founder



**Maxime
Cordonnier**

CFO



**Fabrice
Orecchioni**

COO



**Joachim
Merziger**

CCO



**Caroline
Pétigny**

CSO

AFYREN in brief

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100% BIOBASED ORGANIC ACIDS
for a market of 18 million tons

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PATENT FAMILIES

16 000 t/an

OF INSTALLED PRODUCTION CAPACITY

150 M €

OF FUNDING RECEIVED

~€80 million for the first AFYREN NEOXY factory
and ~€70 million for the development of future international
plants (IPO)

>100

EMPLOYEES BY THE END OF 2022

3 sites in France

80%

REDUCTION IN CARBON FOOTPRINT

78/100

EXTRA-FINANCIAL CSR RATING

+20%

**OF AFYREN'S BUDGET INVESTED IN R&D
EACH YEAR**





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