Altawest

IMAGINATION IN **ENERGY**

CONTENTS

LOCATIONS

23 Altawest sites

Engineering centres

- Bourg-la-Reine - FR
- Jeumont - FR
- Puteaux - FR
- Nantes - FR
- Grenoble - FR
- Étupes - FR

Industrial sites

- Jeumont - FR
- Champagne-sur-Seine - FR
- Carquefou - FR
- Vadodara - IN
- Nantes - FR
- Elbląg - PL
- Étupes - FR

Sales offices

- Abu Dhabi - UAE
- Rio de Janeiro - BR
- Mumbai - IN
- Delhi - IN
- Kolkata - IN
- Pune - IN
- Hyderabad - IN
- Sarrebruck - DE
- Nyköping - SE

Waste-to-energy plant operations

- Pithiviers - FR
- Noyelles-sous-Lens - FR
- Chinon - FR

Biomass power plant operations

- Brignoles - FR

Altawest

ALTAWEST IS A SPECIALIST IN ENERGY MANAGEMENT TECHNOLOGIES.

As OEM and service provider to the energy and environment sectors via its portfolio of highly respected subsidiaries Jeumont Electric, Leroux & Lotz and Inova, Altawest is a key player in energy transition, acting both as industrial partner and facilities operator. With its 1,000-strong workforce and focus on innovation underpinned by a permanent R&D drive, Altawest delivers solutions with high added-value technologies that provide enhanced industrial and energy performance to its customers in over 70 countries.

ACTIVITIES

Energy **Environment** **Industries** **Oil & Gas** **Marine**

BRANDS

JEUMONT Electric – Groupe Altawest

Designs and builds power generation and conversion equipment (alternators, electric motors, power electronics, command and control systems)

L&L LEROUX & LOTZ – Groupe Altawest

Designs and builds boilers and gasifiers for waste, biomass and complex fuel processing facilities

inova – Altawest

Operates waste energy recovery units, biomass and solid recovered fuel power plants

SYLVIANA Centrale Biomasse Brignoles

Generates renewably-sourced electricity from biomass

POSITIONING

Energy and environmental efficiency: Altawest is a technology provider and installer.

- Energy transition is underway. The regulatory landscape is changing all over the world. Altawest provides the answers in a fast-moving environment with ever tighter environmental constraints. Altawest's solutions are continuously adapted and optimised to deliver reliable and cost-effective performance.
- With commercial offers backed by a continuous innovation pipeline generated by its R&D teams and benefitting from feedback gained from its large installed base and a number of showcase installations, Altawest delivers major competitive advantages to its customers in terms of energy efficiency, operational flexibility, reliability, availability and maintainability.
- Helping clients to meet the challenge of regional development, Altawest provides its expertise in the delivery of complex projects in partnership with local authorities and other actors from the public and private sectors. Altawest also designs and implements proprietary solutions in partnership with clients who face project specific challenges.

Proximity

Custom services

Technological differentiation

SUPPORTING OUR CUSTOMERS IN THEIR GROWTH

Altawest supplies its industrial and public authority clients with standard or custom products and services for the energy, environment, processing industry and marine sectors. As an active participant in the transition to more sustainable energy models, Altawest constantly adjusts to the latest regulatory changes to deliver carefully constructed solutions offering high added value and reliability that fully meet the most demanding environmental standards.

ENERGY

Altawest designs the core equipment for energy production and conversion installations: boiler islands and combustion systems, alternators and electric motors, flue gas treatment, command-control. The Altawest Group has also developed a family of sub-10MWe small capacity biomass power generators. It also operates waste-to-energy, biomass and solid recovered fuel power plants.

Able to call on the skills of a highly trained and experienced workforce and backed by its vast engineering capacity and industrial resources, the group's products and services, which include maintenance and reconstruction, accompany its clients throughout the complete lifespan of every installation.

A long-term partner to the nuclear industry, on board submarines and in power stations, Altawest specialises in the construction and renovation of rotating machines and is able to meets the very highest standards of safety, reliability and availability. The Altawest Group also provides on-site services that are delivered using authorised staff and procedures. It is developing a family of mobile emergency power systems in response to the regulations in place post-Fukushima.

BUSINESS CASE

Jeumont Electric equips the Flamanville and Hinkley Point EPR reactors

Jeumont Electric, whose auxiliary pumps were already approved by AREVA, has supplied five primary coolant pumps and five excitation-regulator enclosures for back-up alternators at the Flamanville EPR. These are some of the most powerful components ever delivered by Jeumont Electric for back-up generators (9MVA, 10kV at 600rpm). Jeumont Electric is also contributing significantly to the manufacture of the motors for the two reactors for the Hinkley Point EPR in England. Manufacture of these pumps will take place over several years.

SUPERCONDUCTIVITY FOR WIND POWER: ECOSWING

The Altawest Group has been examining the application of superconductivity to rotating electric machines for a number of years and is a partner in EcoSwing, a superconductor generator project for offshore wind farms funded by the European Union. Jeumont Electric built and assembled the stator for this 3.6MW generator. The turbine, the first machine of this capacity to use superconductivity, will be installed at a North Sea offshore wind farm operated by Denmark's Envision Energy.

Jeumont Electric designed and fitted special tooling to assess stators during routine maintenance of 900MW turbo-generators at nuclear power stations. This innovation, which ensures that the complex component handling operation takes place as efficiently and as safely as possible, won EDF's Nuclear Generation Division Challenge.

BUSINESS CASE

Cheves power station, Peru

Jeumont Electric supplied and installed two synchronous vertical alternators (104MVA, 16 poles, 13.8kV) and associated equipment for the Cheves hydroelectric power station in Peru. The plant on the River Huaura, which entered service in 2015, is operated by Norwegian company SN Power. It boasts an installed capacity of 168MW and annual output of 838GWh.

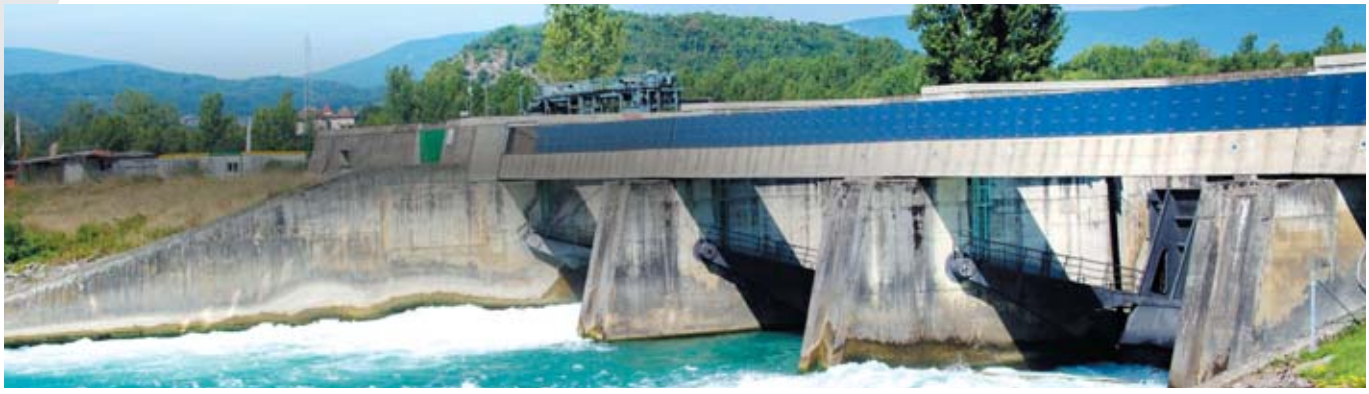
During the design phase, Jeumont Electric created a scale prototype to optimise cooling and ventilation losses, crucial in meeting the output objectives while remaining within heat tolerances.

To minimise assembly time, the rotor rim was assembled at the Jeumont Electric factory. Other components for the machines were assembled on-site under highly challenging conditions in terms of access to the site and prevailing temperatures.

JEUMONT ELECTRIC IS INVOLVED AT **80%** OF FRANCE'S NUCLEAR REACTORS

In hydropower, Altawest is involved in new power plants as well as projects to renovate and maintain existing equipment. Optimising energy generation in hydropower plants relies on the turbine-alternator installation. Output and reliability of these units are keys to the cost-effectiveness of hydropower.

A firm believer in the outstanding prospects for **marine energy** from wave power, Leroux & Lotz Technologies, designer of specialist machines, is working with other players in the sector to create the equipment needed to install the various components for turbines that, once connected to the grid, will deliver a stable and predictable supply of electricity.



ENVIRONMENT

Altawest operates waste-to-energy, for household waste or solid recovered fuels, and biomass power plants. Its offers cover everything from supplying the core process to retrofitting existing installations and maintenance-reconstruction, operations and operational assistance, fuel preparation and making network connections.

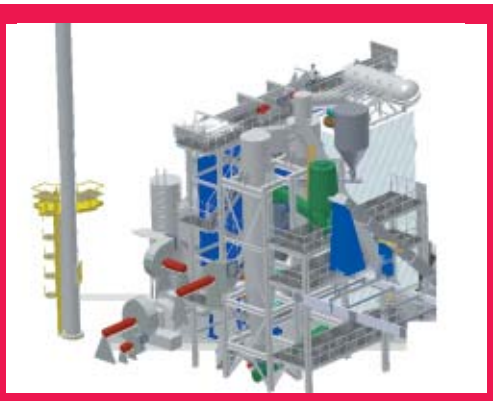
100MW/year
FROM SOLID RECOVERED FUELS IN FRANCE BY 2025
(SOURCE: ADEME)

Biomass fuels used in Altawest solutions come in a wide variety of formats: forestry waste, pellets, coppiced wood, farm waste, organic residues and sludge, waste wood, etc.

Its in-depth knowledge of a wide range of technologies enables Altawest to perfectly adapt to every type of fixed or variable fuel mix and type of project, whether for an all-new plant or a change in the type of fuel used in an existing facility.

Altawest, in its role as an equipment supplier, has accompanied the adoption of solid recovered fuels for energy generation thanks to its gasification and combustion technologies, which are optimised for this type of fuel.

Its experience as an investor means that Altawest also understands how to support the project development process, leading to faster roll-outs on the ground.



FLUIDISED BED GASIFICATION

Leroux & Lotz Technologies, with its ambitious R&D programme, is the leading French specialist in combustion and gasification technologies for renewable energy sources.

Gasification, a thermal conversion process of turning solid fuels into a synthetic gas is used at the R&D platform, a technology showcase dedicated to promoting energy transition and the circular economy.

BUSINESS CASE

SRF-fired CHP Facility for Groupe Bonnefoy

Leroux & Lotz Technologies is building a gasification CHP plant, an innovative Leroux & Lotz Technologies design, on behalf of civil engineering contractor Bonnefoy. The plant is fired by wood waste and solid recovered fuels collected from the local region. In time, the plant will generate 7.5MWe, to be fed into EDF's grid, and 12MWth to be sold to nearby industrial companies. Able to process 45,000 tonnes of waste fuel a year, the plant will help to drive the emergence of a new regional energy industry. The project underlines the economic and environmental benefits of short circuits, where regionally-sourced resources provide cost-competitive heat and power to local businesses.

Altawest is expert in combustion and gasification technologies, able to manage flue emissions at source as a function of the type of fuel employed, as well as in integrated flue gas treatment and CO_2 capture systems.

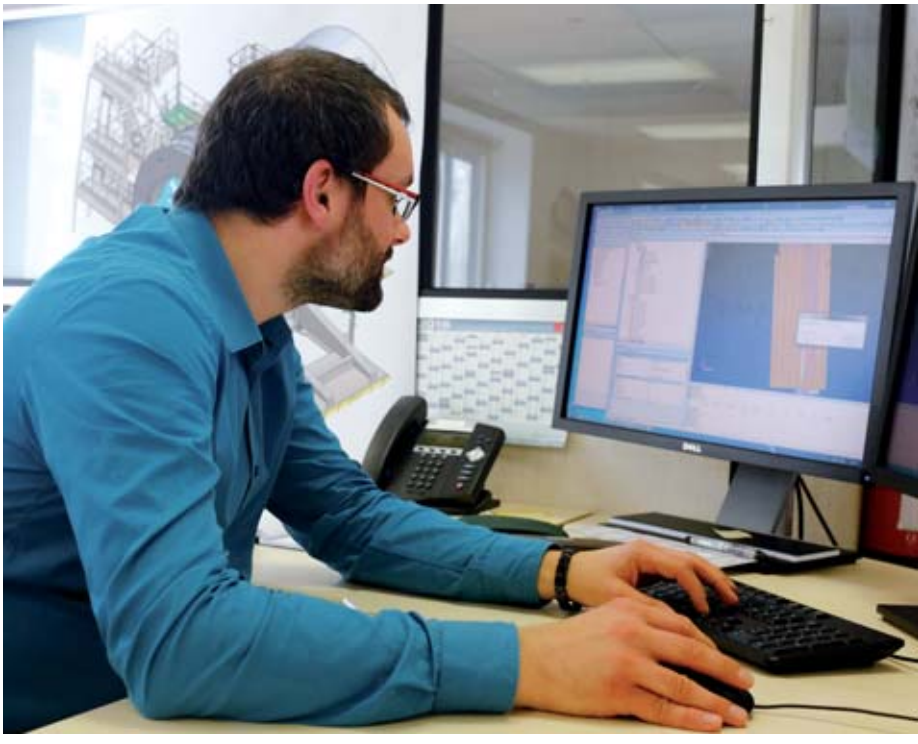
Altawest has the specialist expertise needed to operate installations in full accordance with applicable legislation and permits, including expertise in supply management, residue evacuation and optimisation of the energy generated. Altawest is certified to ISO 9001, 14001, 50001 and 18001. In addition to the Sylviana biomass plant it also operates three WtE plants that together incinerate 180,000 tonnes of waste.

Altawest continues to develop specialist solutions in response to highly specific requirements. For the marine sector, the group offers a novel system for treatment of household waste on board cruise ships. Hydrothermal oxidation, a technology patented by Leroux & Lotz Technologies, is a highly cost-effective technique to eliminate the environmental impact of this form of waste.

For sectors that generate high CO_2 emissions (cement works, steel-making, etc.), Altawest has developed a specific solution for clients generating 25,000 to 100,000 tonnes of CO_2 a year. CO_2 EnergiCapt, a product/ for heat generation plants in urban heat networks, reduces the amount of carbon dioxide emitted per kW of energy produced.

In energy storage for renewables, Altawest partnered with a number of industrial companies in the launch of the Jupiter 1000 demonstrator, which coincided with COP21. The project aims to use electrolysis to transform energy from four 40MW wind turbines into hydrogen and methane gas. The gas will then be injected into a network to be used as a storage buffer.

258,000MWh/year
GENERATED BY INSTALLATIONS
MANAGED BY INOVA OPÉRATIONS



PROCESS INDUSTRIES

Altawest designs and manufactures electric drive mechanisms and power and heat installations for processing industries such as papermaking, petrochemicals, the food industry, steel and metal industry and materials manufacturing, including cement.

For paper mills, Altawest offers expertise in combustion technologies (gasification) and the construction of energy-generating installations. The solutions deployed are designed to optimise investment and operating costs.

Full installations and standalone equipment are all designed to use process waste from paper-making, such as biomass residue, black liquor and pulp waste, as fuel.

The Altawest Group also works with **the metal and steel, cement and materials manufacturing industries.** Its products and services focus on the construction and installation of energy generation units and electric drive mechanisms used in industrial processes. Altawest is a specialist in the types of high power electrical machinery used in blast furnace blowers, for driving rollers in metallurgy or crushers for cement works, as well as specialist machines used as test beds and for energy conversion.

For the food industry, Altawest designs, installs and converts energy production units: energy supplies for the manufacture of food products, heat supplies for greenhouses, re-use of agricultural residue (olive stones, grape pips) to produce heat or electricity. The Altawest Group also provides maintenance and revamping services for heat plants.

OPTIMISED ELECTRICAL CHAIN

Jeumont Electric offers motor and drive solutions perfectly tailored to the needs of processing industries. These make it possible to optimise the complete electrical chain to deliver maximum yields while reducing environmental impact and improving interactions with the electricity grid, where required.

The use of modern high voltage switching convertors avoids undue wear to insulators in the rotating machines they are connected to. Precise machine current control can, among other factors, reduce noise and vibration as well as torque fluctuation at the transmission shaft, a feature of particular value in extending component service lives.

BUSINESS CASE

New slip ring motor for the Kufa cement works

The global cement industry has a total installed capacity of 4,000m tonnes per year, 60% in China alone. Every year sees construction of a further 20 new cement works. With each producing some 2m tonnes annually, this represents a potential market for around 60 variable speed low voltage motors and 20 variable speed high voltage motors (from 300kW to 8MW). Jeumont Electric has a long track-record of delivering all types of commonly used motors, such as slip ring motors for crushers and squirrel cage motors for pumps.

Jeumont Electric replaced a slip ring motor (3,400kW, 12 poles, 6.6kV, 50Hz) used to drive the cement works' primary crusher on behalf of the end client, Southern Cement State Company, based south of Bagdad in Kufa, Iraq. As site access was impossible, reverse engineering was carried out from plans alone. Jeumont Electric was able to develop a cooling system identical to the one used by the original machine.

OIL AND GAS

Altawest continues to consolidate its upstream and downstream presence across the oil and gas sector. Altawest delivers specific tailored solutions that deliver the reliability and safety required in this complex and fast-changing market.

Upstream, in exploration and production, Altawest provides electric drive solutions and alternators for gas compression stations. Altawest is also a respected name in offshore and subsea, known for designing, manufacturing and installing special armouring, profiling and spiralling machines. These machines are used either to produce flexible pipes and umbilical links, and for handling, laying and testing flexible and rigid pipelines and umbilical links.

Downstream, for end-user and retail activities, Altawest offers an unrivalled array of modular units covering the manufacture of petroleum products, residue refining, lubricant manufacture and waste oil recycling. The Altawest Group also provides electrical, mechanical and thermal energy production and conversion units for chemical and petrochemical installations, and provides a full equipment maintenance and reconstruction service.

97 countries
USE MOTORS OR ALTERNATORS FROM JEUMONT ELECTRIC

BUSINESS CASE

Turnkey project on Zirku island

Zakum Development Company (ZADCO), a subsidiary of the ADNOC oil company, operates a major industrial processing base on the island of Zirku, 140 kilometres north-west of Abu Dhabi. The 125MW base originally ran third-party machines, turbines and alternators. Jeumont Electric was appointed in 2013 to start work replacing 5 turbo-generators (25MW, 11kV, 3,000 rpm, 2 poles, water-cooled) and associated excitation systems. These machines were installed in a highly corrosive offshore environment and are exposed to temperatures that can reach 55°C. The entire turnkey project, including equipment supply, installation and commissioning, was managed by Jeumont Electric.

INNOVATIVE FUNCTIONAL MODULES

In Thailand, Leroux & Lotz Technologies successfully commissioned lubricant and grease production lines, respectively 40,000 tonnes and two times 5,000 tonnes annually, on behalf of Idemitsu, one of the industry's global leaders. Leroux & Lotz Technologies designed new functional modules for this 76,000 square metre plant, delivering outstanding performance in terms of limiting production losses and product contamination in a format that is easy for workers to use.

MARINE

Altawest designs, builds and maintains power generation and electric propulsion systems for commercial and naval vessels. A world leader in the naval market, the Altawest Group supplies command-control equipment for new and refitted vessels.

Naval vessels and cruise ships are both extremely restrictive environments. The premium on available spaces and obligation to minimise vibration and noise demand compact and silent-running machines, for reasons of strategic necessity or passenger comfort. Altawest provides its shipping and naval clients with the reliability and extended autonomy that characterise its propulsion units and on-board energy production systems. In order to guarantee the lifespan and availability of fleet assets, Altawest also provides maintenance services during planned periodic interventions for maintenance and upgrades.

51 submarines

WORLDWIDE ARE FITTED WITH EQUIPMENT MANUFACTURED BY JEUMONT ELECTRIC

PERMANENT MAGNET MOTOR

Jeumont Electric is a pioneer at the forefront of the design and manufacture of permanent magnet motors. Innovative, ultra-compact and extremely fast, these are used for auxiliary (small piloted alternators used to power voltage regulators) or high added value military applications. With over 30 years' experience in rare-earth magnets, Jeumont Electric is confident in the longevity and reliability of its equipment.

BUSINESS CASE

Jeumont Electric, partnering with the government of Australia

Jeumont Electric is a key partner in the Australian government's Sea 1000 programme, working with DCNS - Naval Group. The project is designed to oversee construction of 12 new submarines to replace the existing fleet of 6 Collins class vessels. Jeumont Electric is involved in the entire propulsion pack lifecycle, including logistics support. Propulsion packs will comprise permanent magnet asynchronous motors coupled to electronic power converter enclosures.

WATER

Altawest, via the international expansion of its Jeumont Electric subsidiary, is well-placed across various water industry markets: irrigation pumping, drinking water distribution and desalination. Jeumont Electric offers a family of reliable solutions to respond to the threat of the “40% global water deficit by 2030” predicted by UN experts, delivering maximum energy efficiency and compatible with the needs of fast-growing markets.

IMPROVING MOTOR PERFORMANCE

Jeumont Electric, in partnership with universities from France and around the world, is constantly improving the performance of its synchronous and asynchronous motors. As an example, Jeumont Electric's motors have halved in size over the past 30 years.
The techniques used include finite element modelling, used to improve electro-mechanical, thermal and mechanical performance.
Jeumont Electric develops new types of motor, especially asynchronous, using its JEGSY wafer rotor technology that provides enhanced rotor cooling, avoiding all risks of electrical earth faults and making maintenance simpler where an incident does occur. Widespread production industrialisation in recent years ensures that R&D efforts are matched by machines that deliver ever greater levels of mechanical precision. Finally, greater use of new materials such as magnetic sheets with enhanced thermal conductivity and insulators that deliver better stability enable Jeumont Electric to provide products with ever-higher levels of performance and reliability.

Irrigation uses pumps with energy yields significantly boosted by drive units developed by Jeumont Electric. The same is true of desalination techniques, all of them very energy-intensive, for which optimised yields are key to managing costs.

BUSINESS CASE

Irrigation in Tunisia

SP4 is a new pumping station in Kerker, in Tunisia’s Mahdia governate, built to increase irrigation water transit capacity to the Mahdia and Sfax regions to 2,200 litres/sec. It is sited alongside the previous pumping unit, which it will replace in time. Water is pumped 10 kilometres up to a 5,000 cubic metre reservoir before being channelled to Sfax.

Two 1,100 liters/sec pumps work at full capacity, with a third on stand-by. Jeumont Electric supplied the asynchronous motors from its new JEMAC range.

10% annual
GROWTH IN THE DESALINATION PLANT MARKET IN THE YEARS UP TO 2025

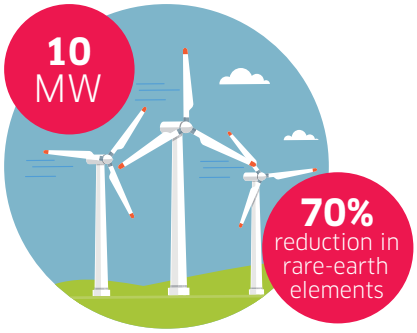
FLAGSHIP PROJECTS, SHOWCASES FOR OUR EXPERTISE

Altawest has grown predominantly through organic growth, capitalising on its client base. Every project is run with the aim of satisfying our clients. This means that Altawest is constantly able to innovate by delivering custom solutions that most accurately meet our clients' technical and cost targets.

The four projects showcased here each demonstrate the technological expertise of Altawest Group companies, an ability to innovate and mastery of complex and regionally significant projects.

JEOLIS: A PARTNERSHIP WITH ADEME

Partner in the European large wind turbine project



Jeumont Electric devotes a significant share of its R&D efforts to work on new types of rotating machines, and it was retained as a participant in the 2012 public consultation organised by ADEME as part of the call for interest for large wind turbines. The upshot was project JEOLIS, which led to the development of an innovative wind turbine generator: a smaller, compensating synchronous machine that uses fewer magnets, and therefore less rare-earth elements, than an alternator with conventional magnets.

The technology, intended for use in the electrical systems of large 10MW wind turbines, offers advantages including optimised electrical performance at all wind speeds, greater strength and enhanced reliability.

This technology is suitable as a replacement for the current generation of on- and off-shore wind turbines as well as for new wind farms. It can be fitted as a like-for-like replacement for existing generator systems during renovations or refits. The technology also has applications in the hydropower sector. The first installed units, at the Portel Plage wind farm, have already clocked up several thousand hours of operation.

SYLVIANA, A BIOMASS POWER PLANT IN SOUTHERN FRANCE

A project of regional importance

The Inova Var Biomasse power plant, a company owned 65% by Altawest and 35% by Caisse des Dépôts, is the result a project submitted during the CRE4 tender round held by the French Energy Regulation Commission (CRE) in 2010. It represents a €90m investment, with 80% backed by Caisse d'Épargne Provence-Alpes-Corse, Caisse d'Épargne Côte d'Azur and Bpifrance. Sylviana is a local project, both in terms of its use of an available resource, biomass, and the energy that it generates which delivers energy transition locally.

The plant generates 168,000 MWh annually, equivalent to the energy needs of 60,000 local households. 180,000 tonnes of biomass are needed every year for the boiler to operate, avoiding the emission of 138,600 tonnes of CO_2. It contributes to job creation and the restoration of regional forests through creating demand for local forestry species that are unsuitable for use as timber.

168,000
MWhe EVERY YEAR

180,000
TONNES OF BIOMASS EVERY YEAR

138,600
TONNES OF CO_2 AVOIDED EVERY YEAR

REJECTS FIRED GASIFICATION FACILITY FOR ESKA GRAPHIC BOARD (NETHERLANDS) SITES

Alternative fuels to power industrial processes

Eska Graphic Board, the world's leading manufacturer of high quality / graphic board, produces over 250,000 tonnes of graphic board from 100% recovered and recycled paper.

By recovering energy from the plant's pulper waste, the gasification solution from Leroux & Lotz Technologies delivers annual savings of 18 million cubic metres of natural gas, equivalent to the annual consumption of 11,000 Dutch households.

Fitting the gasification unit has optimised the installation's energy yield. Between 25,000 and 28,000 tonnes of waste from the pulper are recovered each year by the gasifier, generating the steam needed to power the machines used to manufacture the company's graphic board.

The turnkey gasification plant delivered by Leroux & Lotz Technologies comprises a complete boiler island – gasifier, waste heat boiler and flue emission treatments – and includes fuel storage and preparation. Leroux & Lotz Technologies also supplied the optimised command-control system used to pilot the installation.

This example of a Leroux & Lotz Technologies' complete gasification system for the paper industry highlights a capacity to develop cost-effective and sustainable energy production solutions for industrial sites.

18
MILLION CUBIC METRES OF GAS SAVED

25,000
TONNES OF WASTE PAPER REJECTS UTILIZED PER ANNUM

35%
OF GAS IN FRANCE SOURCED FROM GASIFICATION PREDICTED BY 2050

INNOV'ENERGY, FRANCE'S FIRST R&D PILOT FACILITY FOR CIRCULATING FLUIDISED BED GASIFICATION

An R&D installation focused on environmental and energy performance

The Innov'Energy R&D facility is an outstanding technology showcase that fulfils a triple function:

- world-class research and experimental tool for optimising the energy and environmental performance of all fuel mixes;
- tool for fuel qualification, testing and training for site operators;
- substitute fossil-fired heating for the company's Nantes industrial site.

The facility is able to operate alternately in combustion or gasification modes, with either bubbling or circulating fluidised bed.

Built at a cost of €3m, it is part of an ambitious R&D drive at Leroux & Lotz Technologies over the past decade that has seen it emerge as France's leading specialist in combustion and gasification technologies for renewable energy sources. By the year 2050, 35% of gas used in France could be sourced from gasification. The Leroux & Lotz Technologies pilot facility operates using the widest possible range of inputs, from clean or contaminated biomass to all types of non-hazardous waste, including various categories of agricultural residues and solid recovered fuels. The site, which has already attracted a number of visits and requests for further information, is set to make a lasting contribution to the circular economy and energy transition.

ALTAWEST GROUP COMPANIES

FROM TECHNOLOGICAL PROWESS TO OPERATIONAL EXPERTISE

Altawest

ELECTRICAL EQUIPMENT

JEUMONT Electric
Groupe Altawest

www.jeumontelectric.com

- Jeumont Electric
- Jeumont Electric Maintenance
- Jeumont Electric India
- Jeumont Drives Systems
- Jeumont Electric GmbH

THERMAL AND PROCESS EQUIPMENT

L&L LEROUX & LOTZ
Groupe Altawest

www.lerouxlotz.com

- Leroux & Lotz Technologies
- Leroux & Lotz Eurobiomass

PROJECT DEVELOPMENT AND OPERATION

inova
Altawest

www.inova-groupe.com

- Inova Opérations
- Inova Énergie
- Inova Var Biomasse

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