

John Cockerill Energy

The Power to Change the World



johncockerill.com/energy



John Cockerill, an international, reliable & efficient group meeting the needs of our time

Driven since 1817 by the entrepreneurial spirit and passion for innovation of its founder, the John Cockerill Group develops large-scale technological solutions to meet the needs of its time:



Preserving natural resources



Producing sustainably



Contributing to greener mobility



Fighting against insecurity



Facilitating access to renewable energy

While the world changes more and more rapidly, it also faces more and more complex challenges: diminishing resources, population growth, globalization of the economy, etc. At John Cockerill, our ambition is to combine the expertise gained from our long-standing tradition and the technologies born of our spirit of innovation to develop unique large-scale technical solutions. Solutions capable of supplementing the measures to be taken at the political, educational, economic and societal levels.

Its contribution to businesses, governments and communities consists of services and associated equipment for the sectors of energy, defense, industry, the environment, transport and infrastructures.

With over 6000 employees, John Cockerill achieved a turnover of 1.3 billion euro in 23 countries on five continents in 2018.



John Cockerill Energy is a member of the John Cockerill Group

It is from the heart of its history stretching back more than 200 years that John Cockerill Energy draws its expertise in the production of steam, which has led to it being recognized worldwide on the market for the conception and supply of heat recuperation boilers. Resolutely turned towards the future. We proudly incarnate the bold spirit of an entrepreneur and we have extended our know-how in order to respond to the needs of our times, by developing innovative solutions to encourage access to energy, just like our founder in his own time.



The power to change and improve the world in producing electricity and green hydrogen, storing them and supplying them where and when it is needed.



**Heat recovery
steam generators**



**Industrial
boilers**



**Concentrated Solar
Power energy**



**Hydrogen
Solutions**



**Storage of
energy**



**After-sales expertise
& services**

Our customers also benefit from the skills of experts in production:

- Up to the minute expertise in multi-material welding via our **Welding Center of Expertise**.
- The manufacture and maintenance of boiler parts, in particular pressurized parts, through our **specialized workshop** based in Mexico.

Heat Recovery Steam Generators

Focusing on what constitutes a key element for the performance of the electric power plants, John Cockerill Energy designs, supplies, installs and upgrades steam generators for combined cycle (gas-steam), cogeneration or dedicated plants to industry.

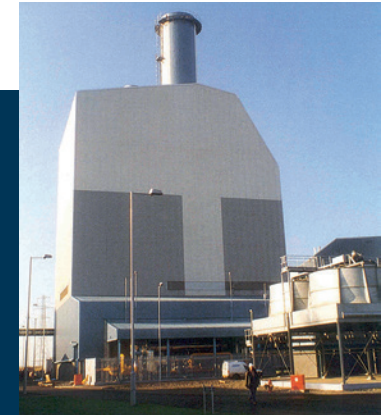
Our heat recovery steam generators can be installed behind gas turbines of all power ratings and all brands, and burning all types of fuel. They are particularly suited to operating in cycles, entailing frequent power plants start-ups and shutdowns, depending on electricity demand.

John Cockerill pursues its innovation to meet the evolving needs of combined cycle gas power plant ; fast start-up & ramp-up, flexible, frequent & heavy cycling, which help increasing intermittent renewable energy balancing.

- Horizontal and Vertical drum HRSGs
- Vertical Once Through Boilers
- Supplementary firing burners
- Selective Catalytic Reduction (SCR) and CO catalysts

Over 700 John Cockerill HRSGs installed worldwide behind gas turbines of all brands and power ratings and burning any type of fuels.

Versatile design and tailor-made solutions to meet any specific customer needs or site requirements.

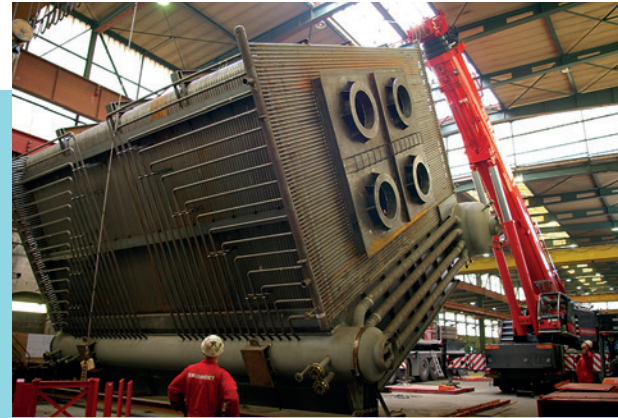


Industrial boilers

Calling on more than 200 years of expertise, John Cockerill Energy is specialized in the design, supply, assembly, supervision and commissioning of Denapak bi-drum and Denarad single-drum water tube industrial boilers for processing industries. We provide technological solutions to our clients in various sectors:

- chemical
- petrochemical
- incineration
- biomass
- food industry
- oil & gas

To assist our clients with their industrial projects, our teams create and manufacture boilers suited to their needs. Calling on know-how built up over the years, they perfect creative and constantly optimized solutions.



Creative and constantly optimized solutions responding to the needs of industry.

A wide range of solutions to meet today's stringent low NOx emission requirements.

Boilers for thermo-solar power plants

Our experts design and supply thermal receivers for high power Concentrated Solar Power stations. Our central tower technology is efficient for the heating of molten salts as well as for direct steam generation. This is the most promising technology to compete with low-cost photovoltaic power, thanks to its ability to economically store high quantities of energy and so allow dispatchability and overnight electricity production.

In parallel, we have developed molten salt steam generators, an innovative concept of heat exchangers able to withstand high temperature ramps and frequent start-ups. These steam generators can also be used in parabolic trough plants.



Continuous development and innovation in order to turn this promising green sector into a competitive complement to fossil fuels.

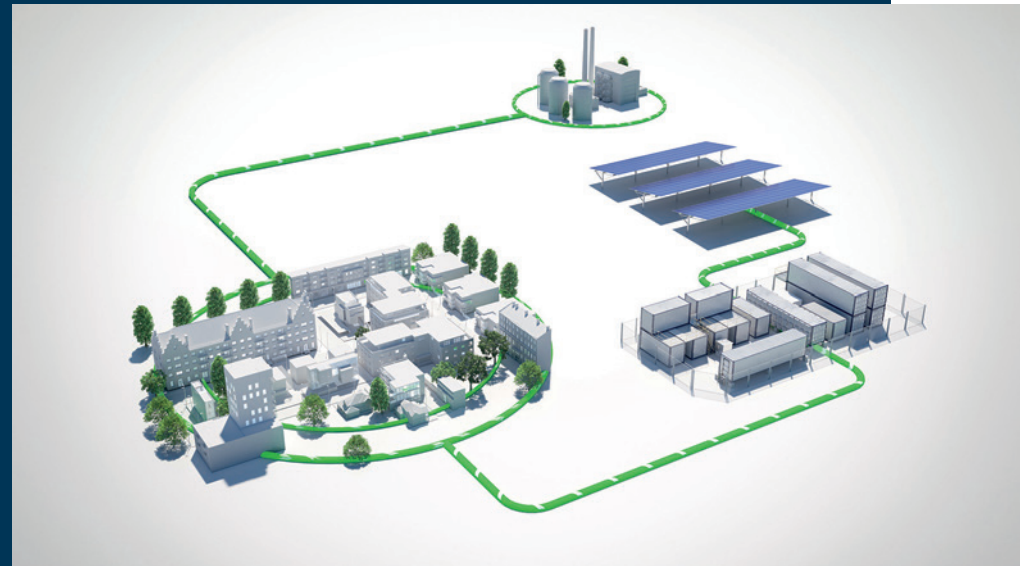
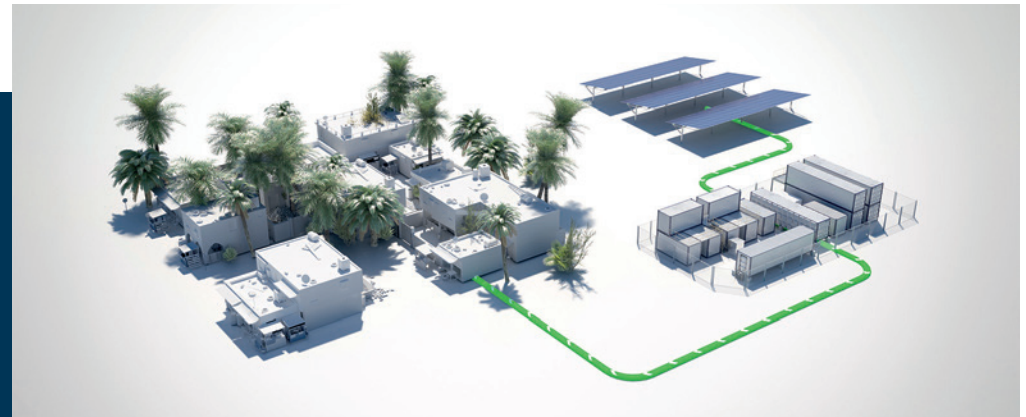
Electricity Production 24h/day.

Battery Energy Storage

Currently, renewable energy is becoming the new standard. However, the growing presence of solar or wind energy is accompanied by a major issue : the intermittency. The battery can solve the problem and bring additional services related to the quality of supply like voltage or frequency regulation. Seen from a strictly financial viewpoint, the battery can also help commercial and industrial if their regulations include a penalty on their peak of consumption. Lastly, the battery is the solution in remote areas by installing complete off-grid solution.

John Cockerill Energy is convinced that some technologies of battery have a real potential on the market. Due to this hypothesis, the group take an agnostic position technologically and currently works with partners in Lithium, Flow and NaS batteries. We act as an EPC integrator: our teams managed the study of the business model engineering, the supply and the construction of solutions. For sure, we propose also a long term service agreement. All of the systems offered are controlled by a reinforced and evolving Energy Management System (EMS) to optimize the assets.

In our John Cockerill's Storage team, we are focusing on defining the best parameters of a project to reach the most profitable and reliable global business case.



John Cockerill Energy built Europe's largest industrial pilot plant of batteries hybridization at its headquarters in Belgium. It consists of 2MWp photovoltaics coupled with 2 types of flow batteries, one type of Lithium-ion batteries and a provision of one sodium sulfur battery for a total of 5.4 MWh of energy storage. The installation is managed by an Energy Management System (EMS) which optimizes the bill reduction by determining the best moment to charge or discharge the batteries.



Integrating intermittent renewable energies, supplying electricity on demand, securing the grid safety, reducing bills, and even ensuring the full autonomy of any region by supplying non-connected areas.

Hydrogen

Hydrogen is a key element to reach our goal to decarbonize the world global economy and favor the energy transition. As a carrier, it allows to transport large amounts of energy and has the ability to be stored over long periods of time, therefore bringing flexibility in our energy consumption.

John Cockerill has developed a wide range of solutions addressing the challenges of the Industry, Mobility and Energy sectors. As a result, we can propose full integrated projects from the high voltage from the main or local grid to the final delivery of hydrogen at the required flowrate, pressure and purity. Our offer can also be more specific in the fields of production, storage and distribution of green hydrogen with the supply of Electrolyzers, Purification units, Dedicated fuelling stations, or Energy Management Systems for example.

Our electrolysis and purifying equipment is manufactured, assembled and tested in our own and modern workshop. This ensures the best quality and the capacity to handle large orders over our full range of units from a few kW to 1500MW single stack.

The increasing availability of price competitive renewable energy and the optimized Capex and Opex of John Cockerill' solutions open new opportunities for affordable mass hydrogen production.



A player capable of responding competitively to the growing demand of the market for the production of green hydrogen.

World leader in large size electrolyzers.

More than 1000 references across the world, within various sectors : Chemical, Glassmaking, Steelmaking, Non-ferrous, Energy, Mobility, Semi-conductors...

Global After-Sales

Energy expertise & services

Our customers are our partners. At their side, we guarantee them solutions adapted to their expectations, including in the event of a problem. John Cockerill Energy's teams offer all the technical services associated with the products they design in order to analyze and understand our customers' needs, think along with them about the most relevant solutions, anticipate, identify and solve problems, modernize their installations... And innovate together.

- Technical expertise (Inspection, CO₂ cleaning, RLTA ...)
- Revamping and repair (re-engineering, improvements ...)
- Engineering and executing services (calculation of performances, feasibility study, seismic design analysis ...)
- Spare parts
- Trainings



Your trusted partner of our customers for a sustainable approach to equipment.

A tailor-made support.


Specialized manufacturing

Our customers also benefit from the skills of top level experts in specialized manufacturing:

- Up to the minute expertise in multi-material welding via our **Welding Center of Expertise**
- The manufacture and maintenance of boiler parts, in particular pressurized parts, through our **specialized workshop** based in Mexico



| Expertise and Proactivity.



Together, we all work to facilitate access to green energy!

It is from a knowledgeable mix of tradition and innovation that we draw our own energy.

And it is across the whole world that John Cockerill Energy makes its mark through its technological know-how, its mastery of project management and its professional financing solutions thanks to our Belgian, American, Canadian, Chinese and Mexican teams and our recuperation boiler licensees, Wuxi, S&T and Larsen & Toubro which respectively cover China, South Korea and India.

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Resolutely turned towards the future, we proudly incarnate the bold spirit of an entrepreneur and we have extended our know-how in order to respond to the needs of our times, by developing innovative solutions to encourage access to energy, just like our founder in his own times.



Heat Recovery Steam Generators



Solar Tower Receivers & Steam Generators



Industrial Boilers



Energy Storage

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After-Sales



Welding Expertise Center

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