

# Heat Recovery Steam Generators



**The Power to Change the World**

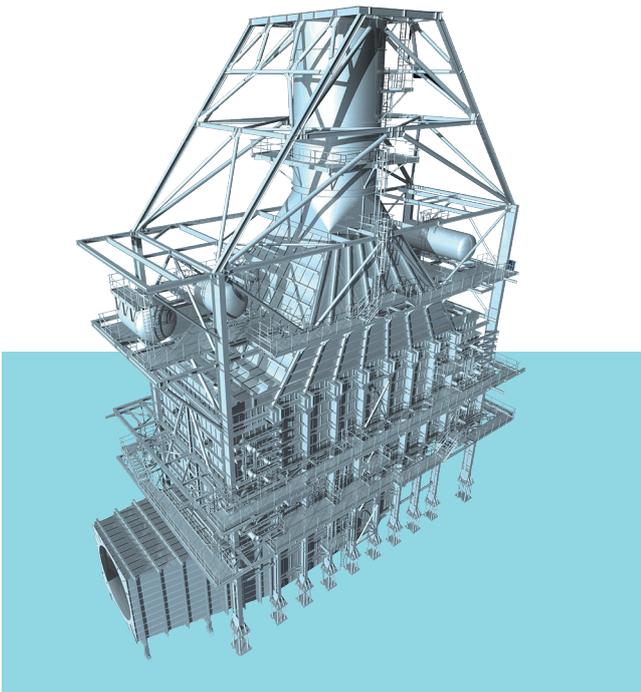
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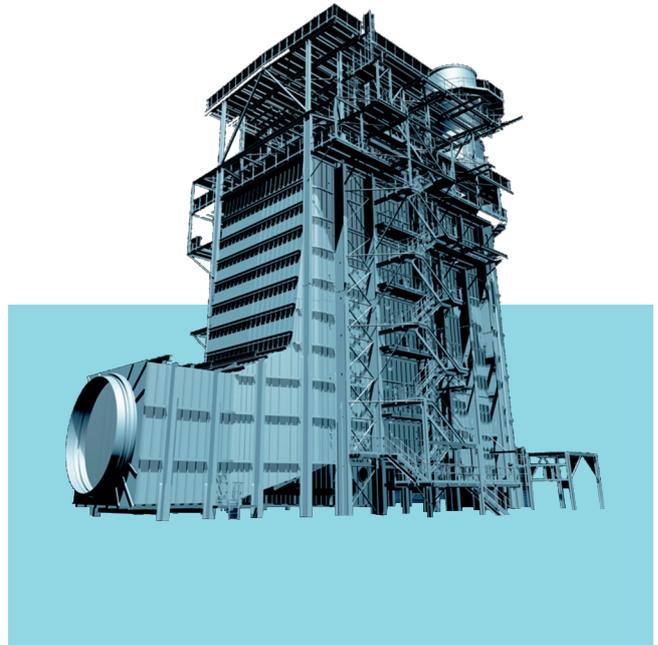
# HRSG Solutions

Both horizontal and vertical HRSG technologies are designed for cycling operation, providing optimal performance during frequent start-ups and shut-downs.

## Vertical Design



## Horizontal Design



### Vertical Once Through Boilers

- Innovative Solution developed by John Cockerill experts and Engineers
- Increased Combined Cycle Power Plant Efficiency
- HP drum replaced by small diameter separator, if any, allowing fast start-up (more power revenues)
- High cycling operation
- Less heat loss through blowdown
- Compact footprint even with Selective Catalytic Reduction (SCR) and CO Catalysts
- Better accessibility & lower maintenance costs
- Erection time, resources and costs savings (thousands of hours)
- Available in dry running mode (no by-pass stack), behind GT lower than 100 MW



# Project Flexibility & Expertise

## Wide-Ranging Applications

- Combined cycle and cogeneration plants
- Behind gas turbines from 25 MW to 500+ MW ISO and all brands of gas turbines: Ansaldo, GE, MHPS, Siemens
- Base load and heavy cycling modes of operation
- Repowering, Add-on, greenfield and brownfield projects



Oxford, Connecticut, USA

## Versatile Designs

- Vertical or Horizontal HRSGs
- Natural or assisted circulation, Once Through
- Condensing Boiler
- FLNG and industrial applications
- Single, dual, triple pressures with or without reheat
- Natural gas, refinery gas, light, heavy, and crude oil
- Certified to ASME, EN, PED, CE marking
- GOST-R, GOST-U, DNV
- Respect to local regulations & Customer needs
- ISO 9001, ISO 14001



Dunamenti, Hungary

## Tailor-Made Solutions

- Supplemental firing with up-front or interstage burners
- Deaerator feedwater tanks and subsystems
- Selective Catalytic Reduction (SCR) and CO catalysts
- Boiler housings
- Auxiliaries (dosing, sampling, and nitrogen systems)
- Sootblowers
- Fresh-air firing for special applications
- Bypass diverter damper

# Customer-Oriented Solutions

## Reliable - Experienced - Trusted

- Professional relationship with Customers
- HRSGs designed, engineered and supplied to meet specific client needs or site requirement, such as specific thermal performances, sound and/or emissions requirements, special certifications, limited footprints, seismic areas, innovative solutions, ...
- Skilled Engineers, Project Managers\*, Supply Managers, Technical Field Advisors ...
- Highly-responsive, Customer-oriented from Sales Teams up to Warranty Teams
- Efficient, accurate project planning using advanced scheduling tools
- Rigorous Quality Management, in-house, on-site, and throughout the supply chain (using tracking system)
- Systematic Return on Experience (REX) for continuous improvement on products & services

\*John Cockerill Project Managers are credentialed Project Management Professionals (PMPs®) certified with the Project Management Institute (PMI).



Trust John Cockerill Energy teams to provide the best customer service while addressing every project need.

## Specialized manufacturing

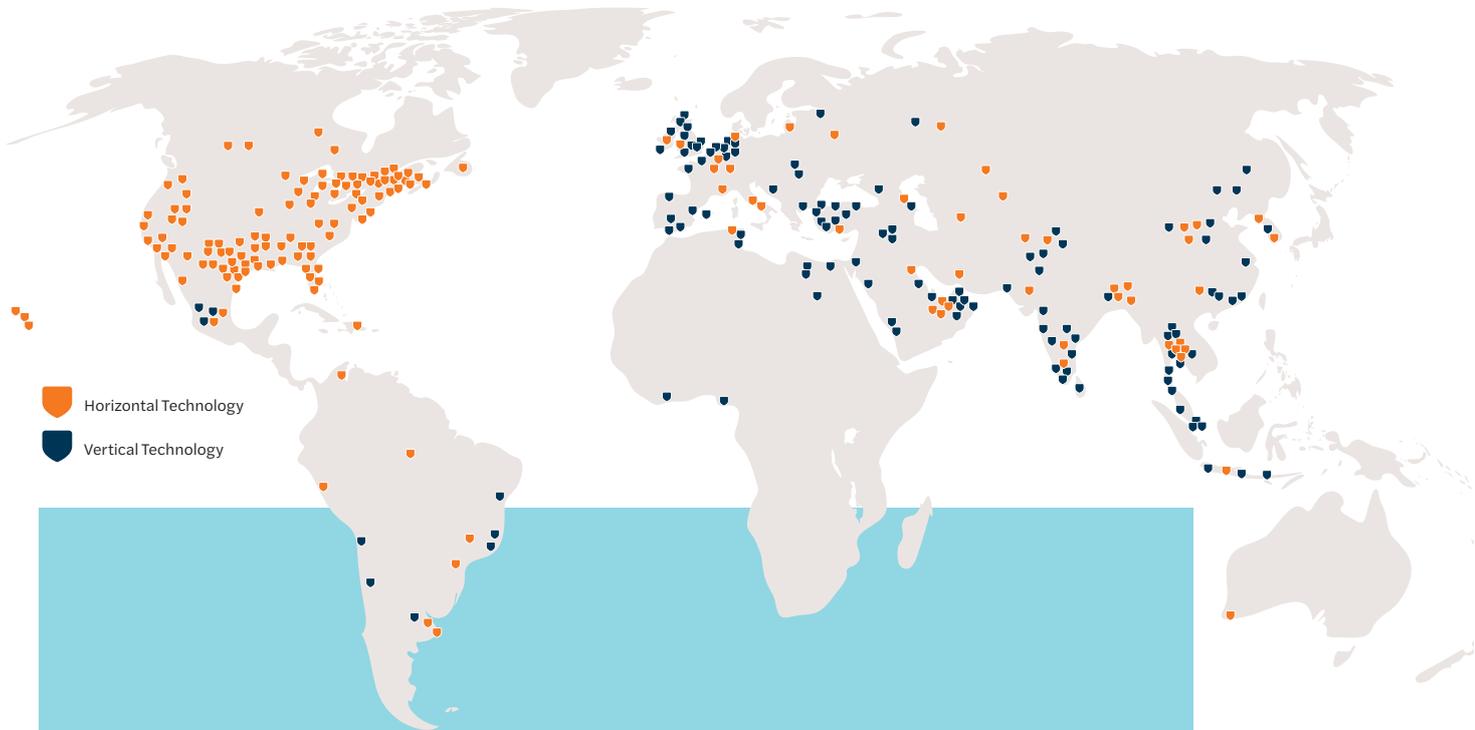
Our customers also benefit from the skills of top level experts in specialized manufacturing:

- 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



# Worldwide Project Excellence

## John Cockerill Energy HRSGs around the globe



### Internationally Recognized

- Nearly 700 John Cockerill HRSGs installed worldwide
- Proactive, dedicated Account Managers in all regions worldwide
- Addressing contract-specific needs: engineering, consortium, turnkey, sourcing, special equipment
- Financing solutions through: world-class banks, Export Credit Agencies ...



# Turnkey HRSG Solutions

## Field Experience

- Engineering of HRSGs with accessories
- Versatile, dynamic management of HRSG turnkey projects
- Global sourcing options
- Local content optimizing
- Transport and logistics worldwide
- Local manufacturing when required
- Experienced On-site Technical Field Associates work closely with installation team for optimized site assembly
- Full range of Commissioning and Performance testing
- Quick and easy access to Project design team for trouble shooting and installation support

Erbil, Kurdistan, Iraq



King's Lynn, United Kingdom

## Global After-Sales

Wide range of technical services and advices to modernize, repair or overhaul boilers of all power ratings and from all boiler manufacturers

### Technical Expertise

- Inspections and condition assessments
- HRSG Dry Ice Cleaning
- Remaining Life Time Assessment (RLTA)
- Boiler Stress Evaluator
- Qualified supervision to follow implementation of revamp work or on turnkey basis solution
- Trainings: maintenance and inspections, process, water chemistry, life time extension

### Revamping & Repair

- Re-engineering of any existing designs from any boiler manufacturer
- Pressure parts improvements on recurrent failures, including retubing and heat exchanger replacement
- Engineering and installation of specific equipment on any boiler in operation, e.g. adding SCR, burners, a lift, sootblowers

### Engineering Services

- New performances Calculation with GT upgrades
- Seismic design, piping behavior analysis
- Cycling capability analyses and upgrades

### Spare parts

# Easy construction, durable performance

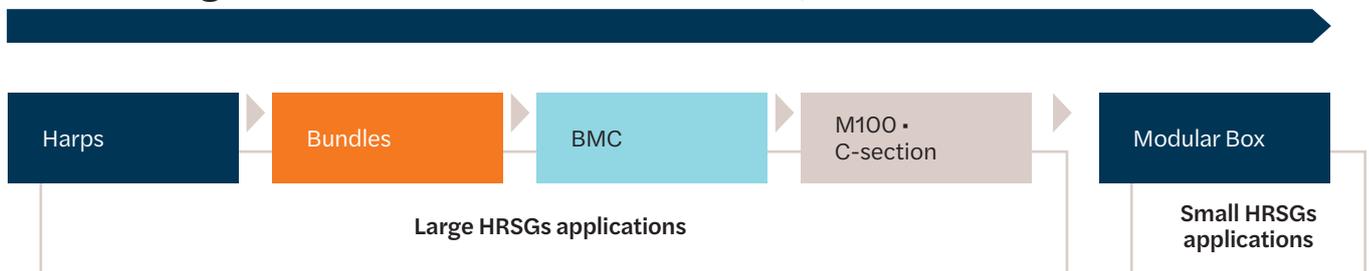


John Cockerill Energy modular designs (shop fabrication maximized as per Customer needs), such as the M100, help to minimize field labor construction works and meet challenging deadlines



Modules for a vertical HRSG

## Heat exchangers increased level of prefabrication by:



## Options for every project

- Wide range of adaptable modular choices
- Designs to meet any logistical or scheduling requirements
- Enhanced shop assembly of pressure parts, casing, and structural steel
- Shop assembly may comprise: full casing assembly, including bellow seals, structural steel frame
- Single-wide HRSG shop assembly may also include: drums, large-bore piping and valves

# The Power to Change the World

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 times.

It is from this 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 and its mastery of project management 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.

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



Heat Recovery Steam Generators



Solar Tower Receivers & Steam Generators



Industrial Boilers



Energy Storage



Hydrogen



After-Sales



Welding Expertise Center

## John Cockerill Energy Worldwide:

Belgium – USA – Canada – Mexico – China

Avenue Greiner, 1  
BE 4100 Seraing  
Belgium

Tel.: +32 4 330 24 44

hrs@johncockerill.com

5300 Knowledge Parkway  
Erie, PA 16510  
USA

+1 814 897 7000

energy.llc@johncockerill.com

Camino a Los Gututiérrez 17 Salinas  
Victoria  
65500 N.L. México

+52 81 8237-1490

energy.mexico@johncockerill.com

Baoxin Industry Park,  
Shengnan Road,  
Wuzhong Economic Development  
Zone, Suzhou, Jiangsu Province,  
China

Tel: +86 512 66599375

hydrogen@johncockerill.com

Zoning De Hulst  
2830 Willebroek  
Belgium

+32 3 860 08 50

industrial.boilers@johncockerill.com

73 Water St N, Suite 602  
Cambridge, ON N1R  
7L6 Canada

+1 226 220 8705

hrs@johncockerill.com

[johncockerill.com/energy](http://johncockerill.com/energy)

