



# OFFSHORE WASTE HEAT RECOVERY SYSTEMS

Energy Recovery Solutions for  
Floating Production Systems





OSX Leasing B.V. file



## Delivering Energy Recovery Solutions Around the World

### Centre of Competence for Offshore Energy Recovery

Situated in Sydney, Australia, Clyde Bergemann Australia is the competence centre for energy recovery solutions within the Clyde Bergemann Power Group. For more than 50 years we have been providing energy recovery solutions utilising the heat from turbine or engine exhaust to deliver steam hot water or hot oil for process or power generation applications.

### Hot Water, Hot Oil or Steam Production (HRSG's)

We are specialized in offering waste heat recovery solutions to cater to a wide variety of applications including hot water generation, hot oil heating and HRSG's.

### Long Lasting Robust Solutions

We have the flexibility to provide our Steel 'H'® heating surface which has been developed from coal fired power plant economiser technology or spiral finned heat recovery surface for weight sensitive applications. Our Steel 'H'® is an ideal surface for FPSO applications and power barges that are looking for low maintenance, robust, long lasting solutions on their topsides.

## 🔧 Your Benefits

- Integral bypass available
- Flexible choice of heat recovery surface
- In-house damper technology with 100 % seal
- External or internal insulation available
- Removable heat exchange bundles
- In-line fin/in-line tube arrangement reducing pressure losses on the system
- Low maintenance over the lifetime of the plant
- Global manufacturing
- Supplementary firing options available

## Steel 'H'® Heat Recovery Surface Ideal for Marine Applications

### Flexible Heat Recovery Surface

We offer Steel 'H'® heat recovery surface for onshore and offshore applications. Our Steel 'H'® has been developed over 50 years working with a variety of flue gases from clean to heavy fouling and as such includes the benefits of this experience in heat recovery technology as explained across the page.

If weight is important we can also offer lighter weight spiral finned alternatives of heat recovery in the form of in-line removable elements that are easier to handle when compared to an entire tube bank.

Our heat recovery elements can also be designed for dry running capabilities in high exhaust temperature applications.

### Proven Heat Transfer in Across Many Markets and Applications

Our Steel 'H'® heat recovery surface has been proven in coal fired power plant boilers around the world, in marine waste heat recovery applications along with thousands of industrial boiler applications. Design expertise includes erosion, corrosion, material selection advice and offshore design assistance.

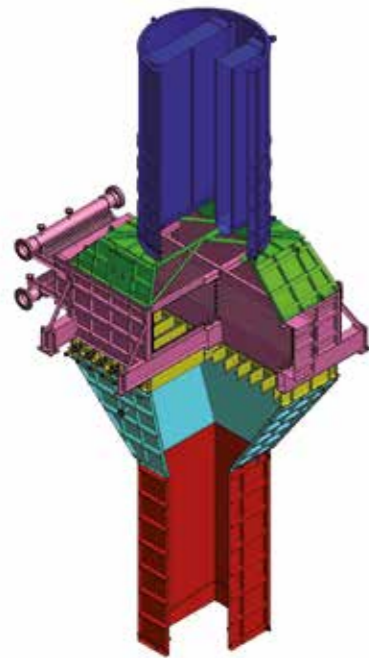
We work with major consultants across the globe supporting their pre-feed, feed study work with the latest in energy recovery solutions.

### Maximising Exhaust Gas Heat Recovery in Marine Boilers

Our Steel 'H'® in line surface is an ideal heat recovery surface for marine waste heat recovery. We have designed easy to clean waste heat units for marine boilers for 50 years.

## 🔧 Your Benefits

- In line tube/in line fin arrangement
- Effective cleaning in marine boiler applications
- Straight gas passages
- Compact size
- Fewer tubes
- Low weight
- Low pressure loss
- Long-lasting robust heating surface
- Low maintenance costs
- Removable bundles
- Flexible design
- Proven thermal performance
- Dry running capability



## Integral Bypass Solutions Ideal for Offshore Applications

## GT exhaust and bypass systems, including dampers, diverters, expansion joints, guillotines and related components

### Integral Bypass Solutions

Our integral bypass solutions have been operating successfully in the field for 25 years. Based originally on Clyde Bergemann Australia louvre damper technology we can combine the exhaust bypass with our heat recovery bank and reduce the footprint required to install a waste heat recovery unit.

### Retrofitting Made Easy

By implementing an integral bypass solution we can make the process of retrofitting a waste heat recovery unit easier. This means reducing the footprint required for installation and delivering in the largest possible pieces to minimise the number of pieces to install.

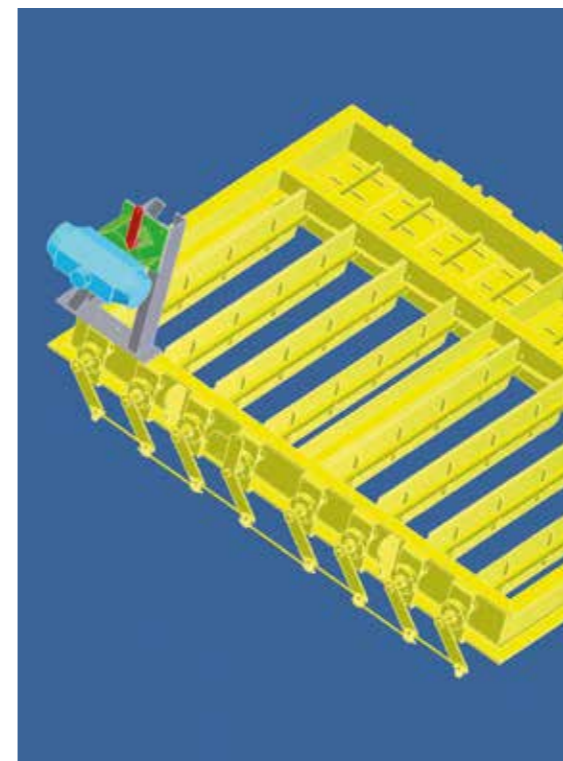
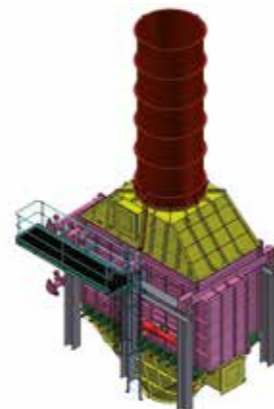
Our integral bypass solutions can be delivered in as little as three pieces for lifting into place. These are outlet transition/stack (silencer), main heat recovery bank and inlet transition/damper.

### Long Lasting Robust Solutions

We have the flexibility to provide our Steel 'H'® heating surface which has been developed from coal fired power plant economiser technology. This is an ideal surface for FPSO applications that are looking for low maintenance, robust, long lasting solutions on their topsides.

### 🔧 Your Benefits

- Proven technology over 25 years – low technology risk
- Vertical retrofit solutions
- Simple installation – few connection points
- External or internal insulation available
- Modular construction

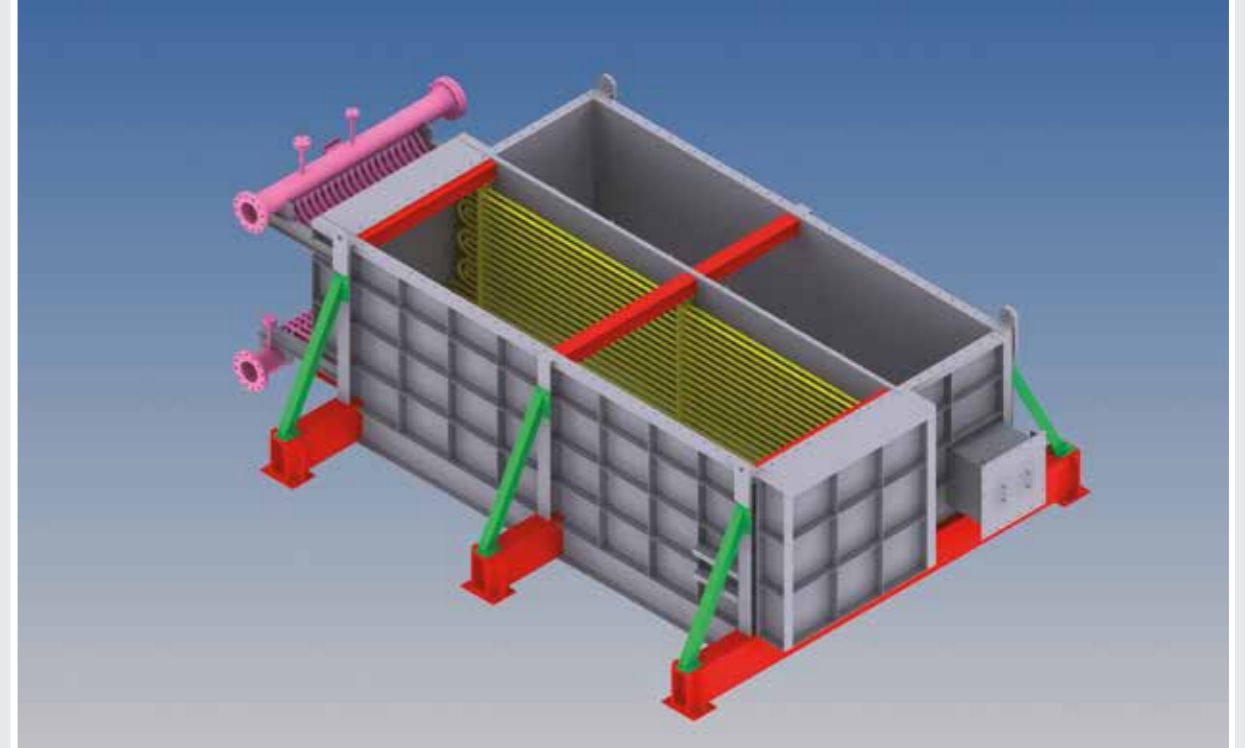


### One-stop solutions

Clyde Bergemann Power Group offers custom inhouse designs for GT exhaust systems. The following summary outlines the benefits of working with us to engineer a complete waste heat solution.

### 🔧 Your Benefits

- Over 31,000 MW of successful projects at more than 300 installations to reference from
- Complete systems, including ductwork, dampers, expansion joints, diffusers, stacks, silencers, and other components
- In-house damper technology with 100% seal
- External or internal insulation available
- Simple site installation, reduced man hours on site – Modular Single Lift construction
- Robust design ensuring low maintenance costs
- Global manufacturing capabilities to minimise delivery times



## Manufacturing Locations Around the World

## Selection of our References

### Design expertise in Australia

Our waste heat recovery solutions are designed from our works in Sydney, Australia. Clyde Bergemann has the flexibility to offer local content in most regions around the world.

We have been designing waste heat recovery solutions for more than 50 years having the benefit of both onshore and offshore experience to draw from.

### Global supply

Having the flexibility to offer manufacturing to satisfy local content or speed up delivery the Clyde Bergemann Power Group is well placed to offer many solutions for supply points around the world.

Clyde Bergemann has experienced strong growth over the past 20 years and has established state of the art manufacturing facilities in North and South America, Northern Europe, China, India and South Africa.

### ISO9001 qualified workshops around the globe

Clyde Bergemann Power Group has highly qualified workshops located around the world. Quality, environment, health and safety form part of the core culture of the group in which we work.

## 🔧 Your Benefits

- Global supply network
- Flexible choice of manufacture to satisfy urgent delivery requirements
- Accredited quality systems to satisfy ASME 'U' stamp or ASME 'S' stamp requirements
- Local content supply – with locations in Europe, China, SE Asia, India, the Pacific, Africa and the America's we can supply local content from most regions around the world
- Large network of fabrication – 1300 employees globally
- Proven design to suit offshore requirements such as ABS, DNV, Lloyds
- Capabilities in-house to comply technically with all recognised specifications around the world

Client	Type of WHRU	Heat recovered MW	Turbine/ compressor/ engine	Operating location
Solar Turbines Inc	2 x 200 TPH hot water units @ 120 °C 1 x 195 TPH hot water units @ 120 °C	7.1 MW 6.8 MW	2 x Taurus 60 1 x Taurus 60	Wandoo 'B' offshore platform Australia
Prosafe Production; A BW Offshore Company <small>*please see picture of installed base on vessel on the front page</small>	3 x 210 TPH hot water units @ 135 °C	13.56 MW	3 x Solar Titan 130	FPSO – Cidade de Sao Mateus Brazil
Modec International	3 x 231 TPH hot water units @ 145 °C	17.7 MW	3 x LM2500 + G4	FPSO – Tupi MV22 Brazil
Modec International	3 x 195 TPH hot water units @ 120 °C	17 MW	3 x LM2500 + G4	FPSO – Guara Brazil
OSX1 Leasing B.V	1 x 155 TPH hot water units @ 150 °C	15 MW	1 x Solar Mars 100	FPSO – OSX1 Brazil
SBM Offshore	3 x TPH hot water units @ 130 °C	20 MW	3 x LM2500+	FPSO – Cidade de Paraty Brazil
DSME	3 x 195 TPH hot water units @ 120 °C	5.38 MW	3 x Solar Mars 100	Chevron Wheatstone offshore platform Australia
SBM Offshore	4 x 195 TPH hot water units @ 120 °C	16.5 MW	4 x LM2500	FPSO – OSX2 Brazil
Modec International	4 x 251 TPH hot water units @ 120 °C	11.8 MW	4 x LM2500 + G4	FPSO – Cernambi Sul Brazil
SBM Offshore	3 x 830.8 TPH hot water units @ 130 °C	24.8 MW	3 x LM2500 + G4	FPSO – Cidade de Ilhabela Brazil

Clyde Bergemann is represented in over 40 countries worldwide.



● Clyde Bergemann Headquarters ● Clyde Bergemann Companies ● Clyde Bergemann Associates



### Clyde Bergemann Australia

Pty Limited  
33-35 Redfern Street  
Wetherill Park NSW 2164  
Australia

Tel.: +61 2 9757 7400  
Fax: +61 2 9757 7499

Internet: [www.cbpg.com](http://www.cbpg.com)  
eMail: [info@au.cbpg.com](mailto:info@au.cbpg.com)

For information about the Clyde Bergemann companies and contact details please visit  
<http://www.cbpg.com>