



# Foster Wheeler Condensers and Feedwater Heaters

High Quality Steam Components





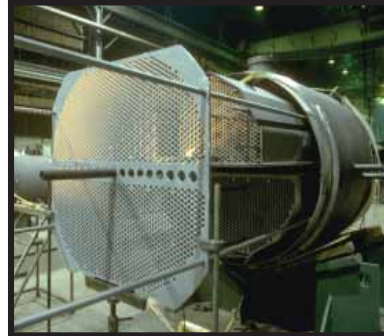
A HISTORY OF EXCELLENCE IN  
THE DESIGN AND FABRICATION  
OF CONDENSER AND FEEDWATER  
HEATER EQUIPMENT

# SAFELY DELIVERING COST-EFFECTIVE, TECHNICALLY ADVANCED SOLUTIONS

Foster Wheeler has been designing and manufacturing feedwater heaters and steam condensers for over a century. In fact, feedwater heaters and steam condensers were the first products offered through the Wheeler Condenser & Engineering Company, which was founded in 1891.

Today, our Company continues to offer high quality steam condensers and feedwater heaters to meet the needs of our clients in the power generation, chemical, petrochemical and marine engineering industries.

Our condensers and feedwater heaters have a track record and reputation of being well designed and highly reliable for all applications such as in combined cycle, nuclear, or thermal oil (gas/coal) steam plants.



# HIGH QUALITY FW CONDENSERS - A TIME



## FW Condenser Highlights:

- Proven by over 300 Condensers
- Operating at combined cycle, coal, oil/gas, and nuclear plants worldwide
- Ranging from 50 - 1400 MWe
- Rectangular single, double or triple shell designs
- One or two passes
- Single, double, or triple pressure zones
- Down flow, axial flow or side inlet design
- 10 - 12 months D&S delivery
- Available for all types of steam turbine

## Foster Wheeler Condenser Project Highlights



### Vung Ang

**Start-up Year:** 2012  
**Customer:** Lilama Corporation  
**Location:** Vun Ang, Vietnam  
**Plant Capacity:** 2 x 600 MWe  
**Plant Type:** Subcritical PC Power Plant  
**Condenser Type:** Downflow



### Samsun Power Plant

**Start-up Year:** 2011  
**Customer:** Metka, SA  
**Location:** Samsun, Turkey  
**Plant Capacity:** 1 x 145 MWe  
**Plant Type:** Combined Cycle Power Plant  
**Condenser Type:** Axial



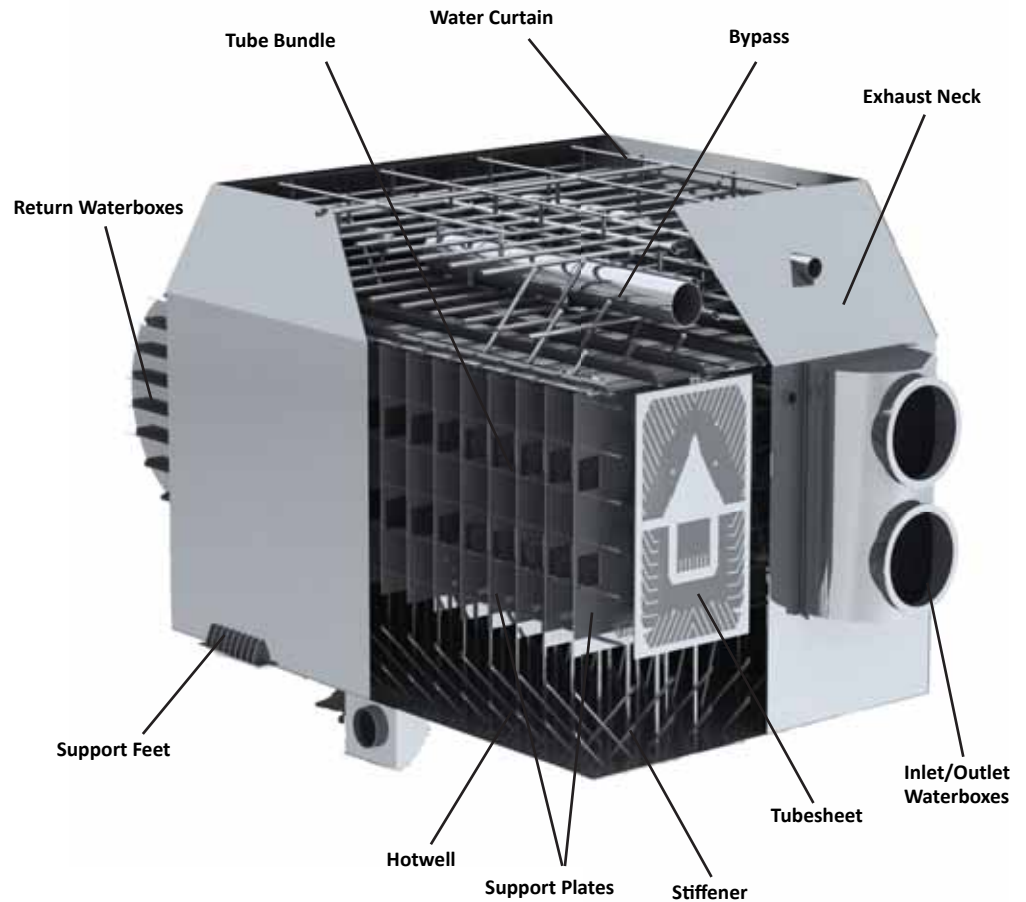
### GTCC KOUDIET

**Start-up Year:** 2011  
**Customer:** Iberdrola Ingenieria  
**Location:** Koudiet, Algeria  
**Plant Capacity:** 1 x 145 MWe  
**Plant Type:** Combined Cycle Power Plant  
**Condenser Type:** Axial

# TESTED PROVEN PRODUCT

## Conservative Mechanical Design Features:

- Compensates for thermal expansion while simultaneously minimizing obstructions in high velocity steam paths
- Maintains the centerline relationship between turbine and condenser to prevent turbine damage
- Prevents destructive tube vibration by optimizing full-size tube support plates
- Prevents tube joint leakage and condensate contamination with appropriate pressure boundaries
- Simplistic design results in competitive pricing and high availability over a long and predictable service life
- Strategic pattern of the tube bundles minimizes pressure drop, while maximizing surface utilization for optimum reheating and deaeration



### Navoi Power Plant

Start-up Year: 2011

Customer: Initec Energia, S.A.

Location: Navoi, Uzbekistan

Plant Capacity: 1 x 160 MWe

Plant Type: Combined Cycle Power Plant

Condenser Type: Downflow



### GTCC Pilar

Start-up Year: 2010

Customer: UTE Electroingenieria

Location: Pilar, Argentina

Plant Capacity: 1 x 210 MWe

Plant Type: Combined Cycle Power Plant

Condenser Type: Downflow



### GTCC Blenod

Start-up Year: 2009

Customer: General Electric Energy France

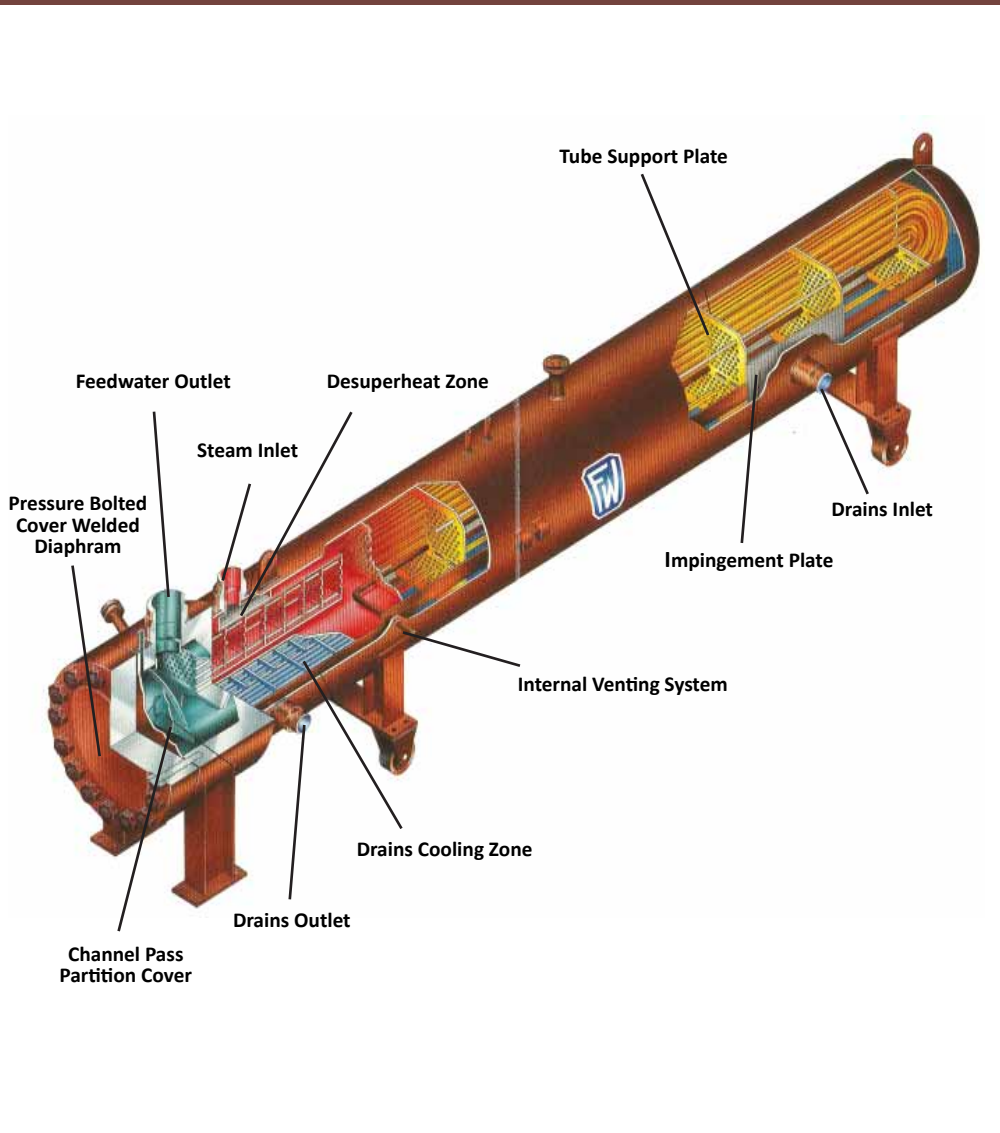
Location: Blenod, France

Plant Capacity: 1 x 145 MWe

Plant Type: Combined Cycle Power Plant

Condenser Type: Downflow

# FW FEEDWATER HEATERS - BUILT TO LAST



## FW Feedwater Heater Highlights:

- Proven by over 1,000 references
- Operating at both thermal and nuclear plants worldwide
- Plant sizes from 50 - 1600 MWe plant capacity
- Vertical or horizontal designs for both LP and HP units
- 'U' Bent or Straight Tube Designs
- 8-10 months D&S delivery

## Foster Wheeler Feedwater Heater Project Highlights



### Valle 1 & 2

**Start-up Year:** 2011  
**Customer:** UTE Valle  
**Location:** San Jose del Valle, Spain  
**Plant Capacity:** 2 x 55 MWe  
**Plant Type:** Solar Thermal Power Plant  
**FW Scope:** Design and supply of 6 LP and 4 HP feedwater heaters



### GemaSolar

**Start-up Year:** 2011  
**Customer:** UTE CT Solar Tres (Sener-Cobra)  
**Location:** Sevilla, Spain  
**Plant Capacity:** 1 x 17 MWe  
**Plant Type:** Solar Thermal Power Plant  
**FW Scope:** Design and supply of 2 LP and 3 HP feedwater heaters



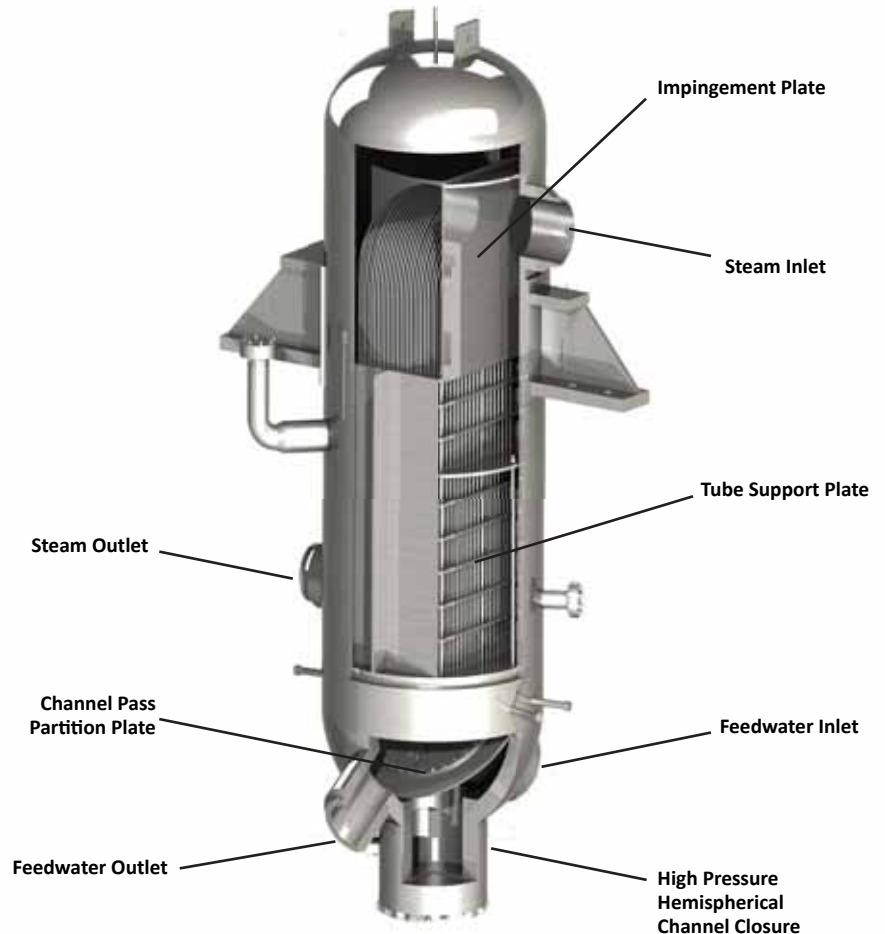
### Samcasol I & II

**Start-up Year:** 2009, 2010  
**Customer:** UTE Samcasol I & II (TSK + Maessa)  
**Location:** Caceres, Spain  
**Plant Capacity:** 2 x 50 MWe  
**Plant Type:** Solar Thermal Power Plant  
**FW Scope:** Design and supply of 3 LP and 2 HP feedwater heaters

## Feedwater Heater Design Features:

- Independent desuperheating zone closures
- Baffle configuration and spacing based on conservative mass velocity criteria
- Fully enclosed self-venting drains sub-cooling zones
- Liberal sub-cooling zone entrance areas to permit low approach velocities which prevent flashing of saturated drains
- Internal, centrally located venting arrangement to provide a positive means of continuously venting condensing zone
- Channel cover configurations for all nozzle layouts
- Fully automated tube-to-tubesheet welding procedures
- Finite element stress and vibration analysis for all operating conditions
- Hydraulic or conventional tube expansion assuring consistently reliable tube joints

## Vertical Design Feedwater Heater



### Andino Power Plant

Start-up Year: 2009

Customer: Cobra/Suez Energy Andino

Location: Mejillones, Chile

Plant Capacity: 2 x 165 MWe

Plant Type: CFB Power Plant

FW Scope: Design and supply of 8 LP and 6 HP feedwater heaters



### Alcudia Power Plant

Start-up Year: 2009

Customer: Endesa

Location: Alcudia, Spain

Plant Capacity: 4 x 125 MWe

Plant Type: PC Power Plant

FW Scope: Design and supply of 2 HP feedwater heater



### La Robla Power Plant

Start-up Year: 2009

Customer: Union Fenosa

Location: La Robla, Spain

Plant Capacity: 1 x 150 MWe

Plant Type: PC Power Plant

FW Scope: Design and supply of 1 LP feedwater heater



We offer a full range of steam generator equipment, aftermarket products and services to the power, industrial, and waste-to-energy sectors. Our global manufacturing and engineering network can deliver cutting-edge products and expertise, quickly and cost competitively with best-in-class quality. Established in 1891, our experience comes from over a century of designing, servicing, and continually improving steam generating equipment.

#### Steam Generators

- Circulating Fluid Bed
- Pulverized Coal
- Oil & Gas
- Supercritical Steam
- Solar Power
- Package
- Grate & MSW
- Metallurgical Waste Heat
- Heat Recovery Steam Generators

#### Auxiliary Equipment

- Feedwater Heaters
- Condensers
- Biomass Gasifiers

#### Steam Generator Services

- SCR and SNCR Systems
- Low NO<sub>x</sub> Combustion Systems
- Replacement/Upgraded Parts
- Construction Services
- Modernizations

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