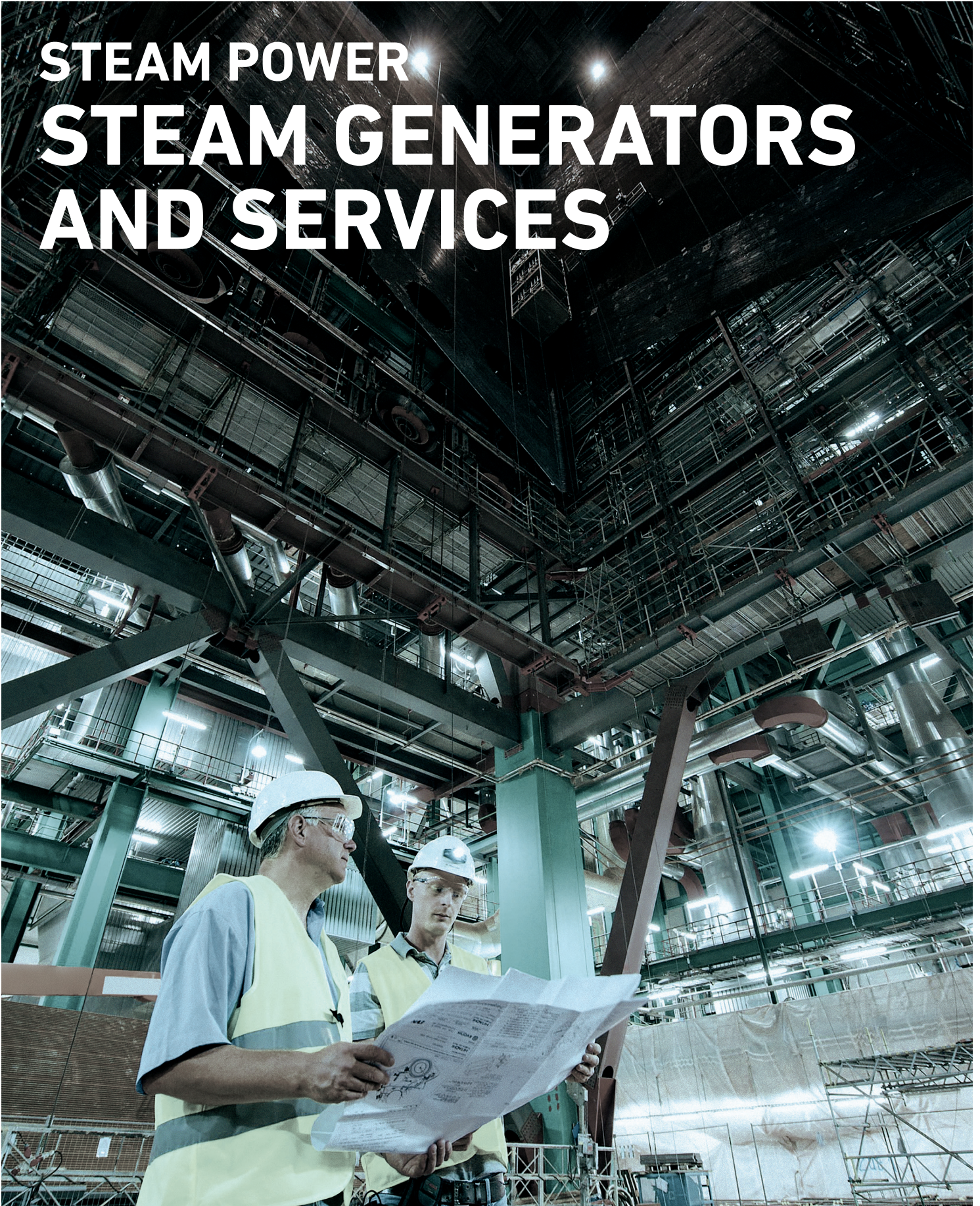


# STEAM POWER STEAM GENERATORS AND SERVICES



Mitsubishi Power is a power solutions brand  
of Mitsubishi Heavy Industries.

**Mitsubishi Power Europe GmbH**

MOVE THE WORLD FORWARD  RD **MITSUBISHI  
HEAVY  
INDUSTRIES  
GROUP**

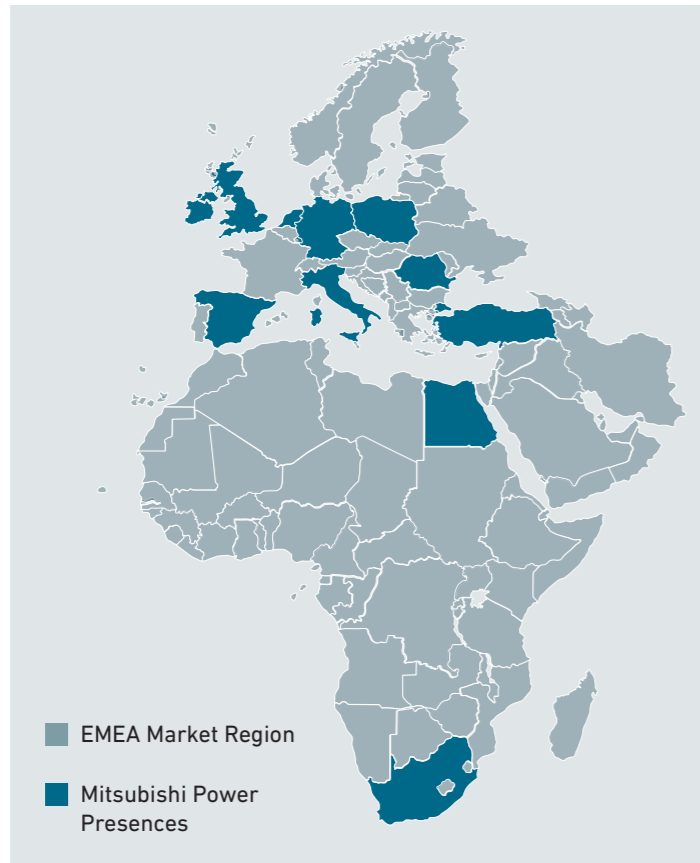


## EXTENSIVE EXPERIENCE

A 100-year track record in power plant business, Mitsubishi Power has superior products, a highly motivated workforce and the support of a Japanese parent company with a wealth of experience.



Some 1,200 specialists including technicians, engineers and commercial experts design, construct and maintain our power plants. We are able to supply key components such as utility steam generators, turbines and highly efficient environmental engineering equipment. We are further developing new storage technologies and are able to provide proactive, reliable, high quality services.



Our greatest strength is the ability to meet a wide range of customer requirements – all from one highly experienced source. Thanks to its extensive experience and know-how, Mitsubishi Power ranks as one of the market technology leaders in power plant construction. We are able to adopt uniform operations, to react fast and to fully utilize the resources of our globally operating parent company. Our satisfied clients represent over 370,000 megawatts of power plant capacity. Since the 1970s we have installed 180,000 MW in coal-fired, 43,000 MW in lignite-fired and 140,000 MW in oil & gas-fired. We develop, construct and supply steam generators for over 1,100 MWe unit outputs involving 300 bar+ pressures, 600 °C live steam temperatures and reheater temperatures up to 620 °C for all available fossil fuels. These range from coal / lignite to problematic fuels (e.g. gases from coke ovens / steelworks, refinery residues).

## HIGHLY EFFICIENT COMPONENTS

Mitsubishi Power Europe, as an Original Equipment Manufacturer (OEM), stands for state of the art and dependable components. We pride ourselves in being at the forefront of advanced technology development. Our extensive in-house research and verification facilities allow us to promote proven and class-leading technologies to the thermal generation market.



We have extensive expertise and a long track record in flue gas cleaning. We supply the corresponding turnkey components, when needed. Together with our shareholders, we also constantly research into new processes to boost the efficiency of flue gas cleaning systems. With regard to the new BREF emission limits for large combustion plants, we provide effective solutions and technologies for upgrading existing power units and in particular to address mercury abatement.

For over 75 years, our parent companies have been supplying highly efficient 250 to 1,380 megawatt (MW) steam turbines. The components (turbine and generator) are ma-

nufactured in Japan. Extensive research and refinements together with improved design and manufacturing technology ensure they represent the best-in-class in the world.

Our firing systems and associated components cover a wide range of solid, liquid and gaseous fuels. The system parts are optimized for both bituminous and brown coal pulverized fuel firing systems.

Minimum emissions and maximum flexibility are features of our new burner generation which incorporates numerous patents. Pulverizers (for grinding and drying bituminous coal, brown coal and lignite) have been part



of Mitsubishi Power Europe's scope of delivery and production for many years now. Our trade references with burners for gas / oil fired plants and alternative fuels (e.g. blast furnace gases and refinery residues) are also based on a lengthy track record on a commercial scale.

Mitsubishi Power is a one-stop shop for all your thermal power needs.



# INDUSTRIAL BOILERS

Mitsubishi Power can build upon its own comprehensive technologies for industrial boilers and decentralized power solutions.

Our wide range of capabilities stretch from the chemical / petro-chemical industry to steel production, from the automotive industry to municipal clients. We also offer industrial boiler modernization, including conversion of fuels, optimization of firing systems, repair and replacement of components and increase of boiler efficiency. Our boilers and burners can handle a variety of fuels including oil, gas, coal, biomass, blast furnace gas, coke oven gas, carbon monoxide.

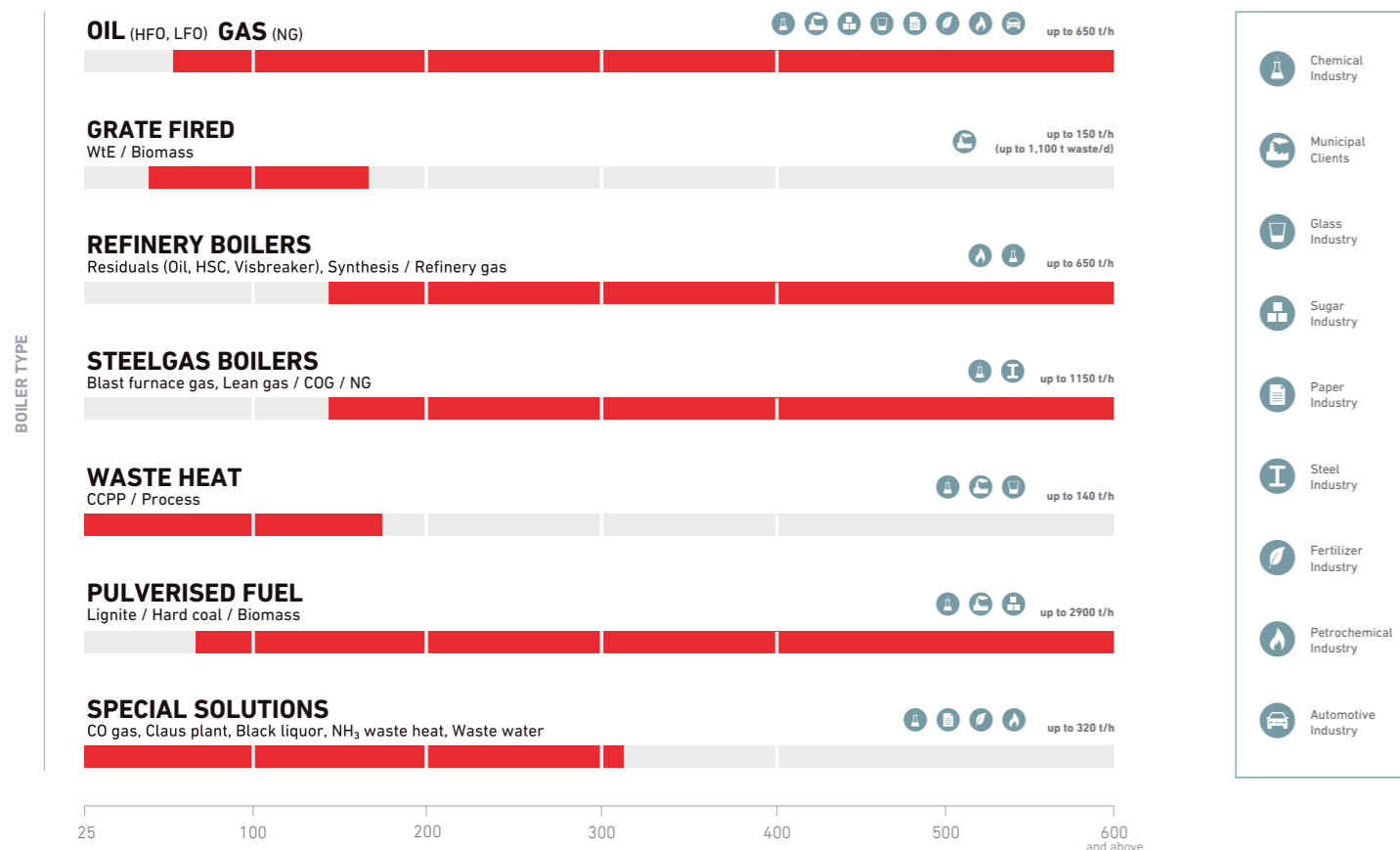


# THERMAL WASTE TREATMENT

Environmentally friendly combustion requires special concepts and measures, whether it be for domestic waste, municipal waste, industrial waste, refuse-derived fuel (RDF) and biomass fuels of all kinds. According to waste-management concepts, the reutilisation of waste, through energy conversion in the thermal unit, is preferable to its environmentally harmful disposal in landfills.



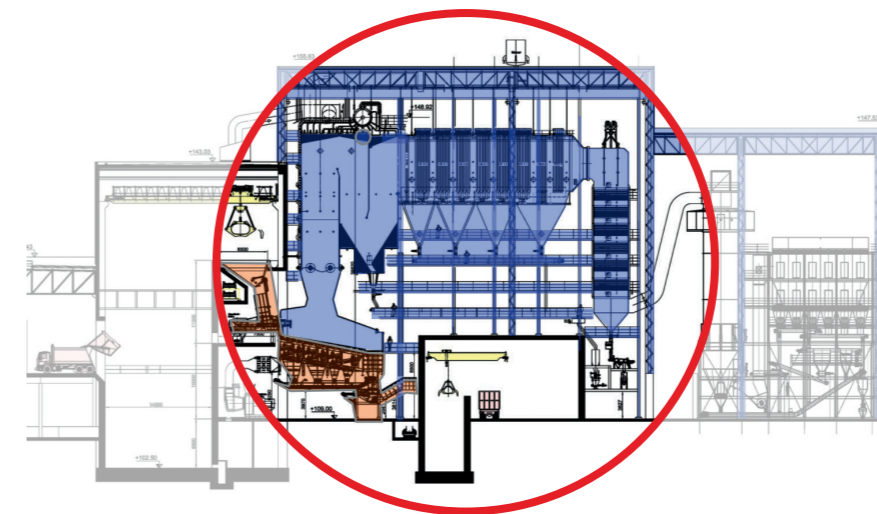
## BOILER SIZE / BOILER TYPE (FOR INDUSTRIAL APPLICATIONS)



Mitsubishi Power has been working in thermal waste treatment for more than 50 years and offers integrated solutions worldwide that are always optimally matched to customer-specific requirements for solid waste materials up to 140 MWth and steam parameters up to 500°C – 100 bar.

Our range of services includes engineering, installation, commissioning,

maintenance and servicing. As a one-stop shop, Mitsubishi Power supplies complete systems right from waste feeding devices through to the emission of flue gases from the steam generator. Even after handing over the plants, we remain on hand to support our customers. Our service takes care of everything including maintenance, repair, optimization and modernization.



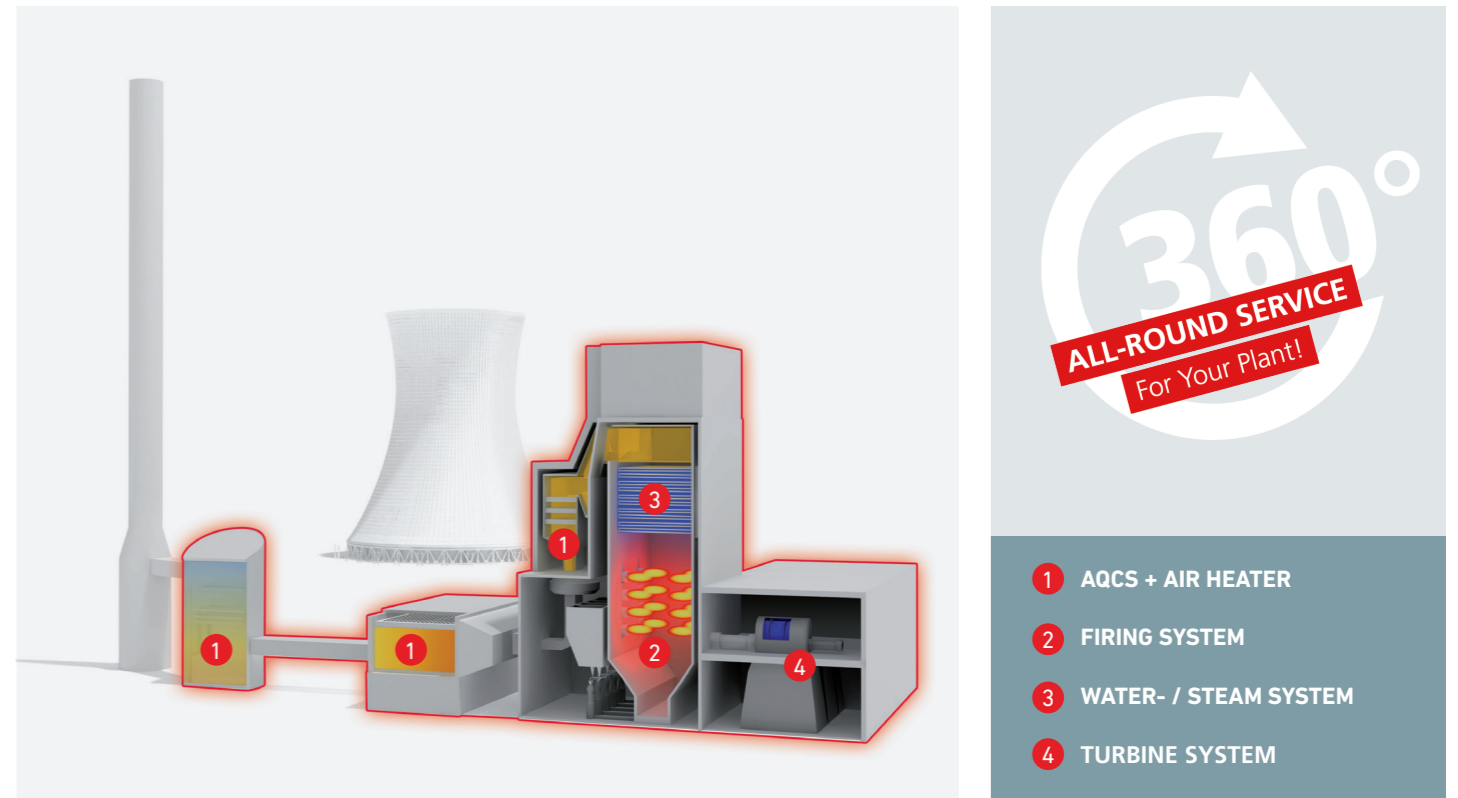
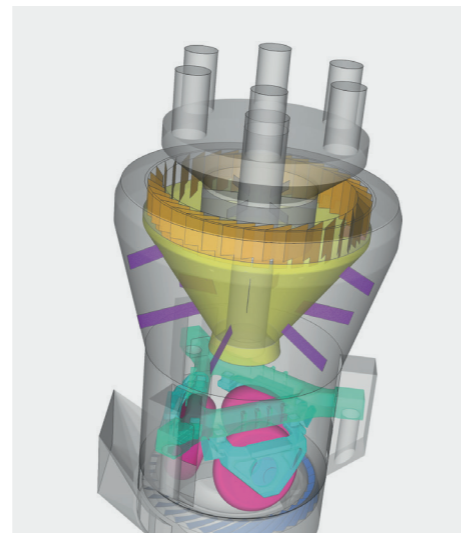
### OUR SCOPE OF DELIVERY INCLUDES:

- Waste feeding device
- Combustion grates
- Ash and slag removal facilities
- Combustion air supply
- Steam generator
- Cladding
- Fire-resistant refractories and heat protection insulation
- Ignition and auxiliary firing systems
- Heating surface cleaning system
- Steelwork, stairways and platforms
- Combustion control system
- Electrical and automation technology



# PLANT OPTIMIZATION

Whether large power plants or small industrial steam generators: many power plant operators must modernize or renovate their plants if they want to operate them in an environmentally friendly and profitable manner in the coming years.



- 1 AQCS + AIR HEATER
- 2 FIRING SYSTEM
- 3 WATER- / STEAM SYSTEM
- 4 TURBINE SYSTEM

## THESE CHALLENGES INCLUDE, FOR EXAMPLE

- Stricter emissions limits
- Operational flexibility
- Fuel flexibility
- Lifespan extension
- Digitalization

The engineers at Mitsubishi Power Systems have a holistic approach to the assessment and evaluation of plant optimisation solutions. Based on our extensive experience and references in energy plant construction, we can present tailor-made measures for each customer's plant. These measures range from preparatory studies, conversions and installation of components to repairs and delivery of spare parts.

## OUR KNOW-HOW COVERS A WIDE RANGE OF FUELS FOR VARIOUS BOILER TYPES:

- Lignite
- Bituminous coal
- Gas
- Oil
- Biomass
- Waste
- Steel gases
- Refinery residues

## TECHNOLOGIES FOR PLANT OPTIMIZATION

- Firing Systems
- Utility and industrial scale boilers
- Air Quality Control Systems (ESP, SNCR, FGD)
- ORC and waste heat recovery systems for cold end optimization
- Heat extraction and storage for CHP
- Expert systems
- Gas turbines for CCGT retrofit and topping

## OPERATIONAL ASSESSMENT (PLANT OPERATING)

- INPUT**
- Plant documentation, maintenance records, tube failure reports
  - Operational Data
  - Measurements (e.g. fuel, mill, flue gas)
  - Customer feedback

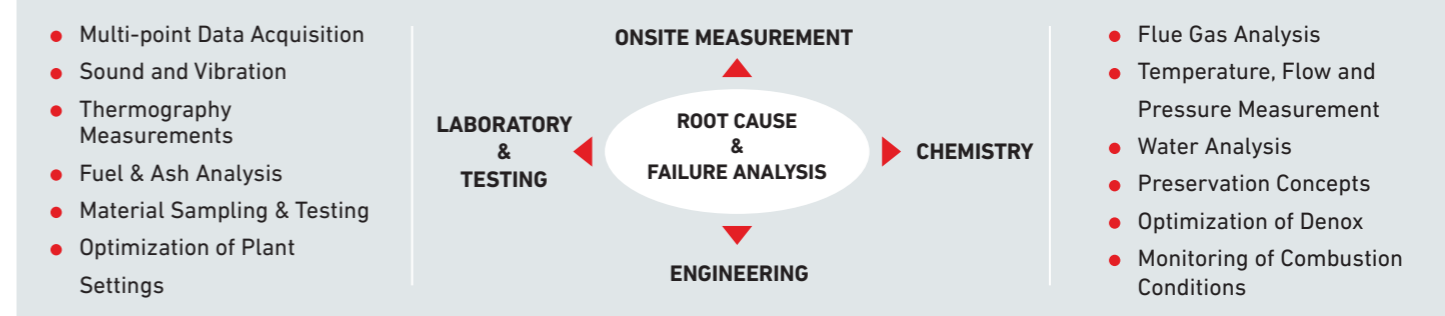
- OUTPUT**
- Thermal recalculation
  - Comparison to original design gap analysis
  - Compliance with latest safety standards and emission guidelines
  - Plant optimization proposal (state of the art), price indication
  - Support with plant specific RoI evaluation

## MECHANICAL ASSESSMENT (PLANT NOT OPERATING)

- INPUT**
- Plant documentation, maintenance records, tube failure reports
  - Visual inspection
  - Testing and inspections (NDT, tube samples)
  - Customer feedback

- OUTPUT**
- Visualisation of problem areas, correlation with operational assessment
  - Lifespan assessment and forecast
  - Plant optimization proposal (state of the art), price indication
  - Support with plant specific RoI evaluation

## MITSUBISHI POWER HAS A UNIQUE COMBINATION OF ANALYTICAL CAPABILITIES: Laboratory, OEM & Service Engineering, Commissioning & Operation Experience





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