



# ...simply everything!

Our full life cycle services and our world-leading, high quality technology qualify Mitsubishi Electric as the ideal partner for your power generation project.

## Services: PLAN PHASE

We understand that you need to be sure of the technology choices and the veracity of total plant erection costs (process equipment, construction and engineering – up to successful first electricity generation).

Mitsubishi Electric's Global Power Generation Competence Centre can help with:

- El&C deliverables' design work: from grid connectivity through MCCs through field sensors
- Preparing budgetary / AFE-grade cost estimates for El&C scope, incl. preliminary bills of material
- Preparing RFIs and RFQs, incl. pre and post-award evaluation and validation of technical designs
- Evaluating vendor RFI / RFQ responses and optimising price / performance ratio of the offers
- Consulting: design of buildings, control-room and rack-rooms, HVAC, etc. through to participating in/chairing HAZOPs during process, safety and control design reviews
- Preliminary Project Execution Plans: ensuring effective and timely information exchange, plus execution clashes for critical works

## Services & Technology: BUILD PHASE

As EPC or SI involved in the erection of a new power generation asset, we know that your key concerns are to control risk, keep costs under control AND to ensure the plant starts up smoothly, safely and on-time. Our technologies, coupled with our more than 25 years' experience with providing turnkey El&C solutions, allow us to assure you of:

- "On time, within budget" project delivery, without risks to scope, schedule and cost creep
- Proven project delivery methodology – many successful energy projects delivered to the exacting VGB standards



Burner Mgmt & Safety instr. systems



SAP/Enterprise connectivity



Asset Management



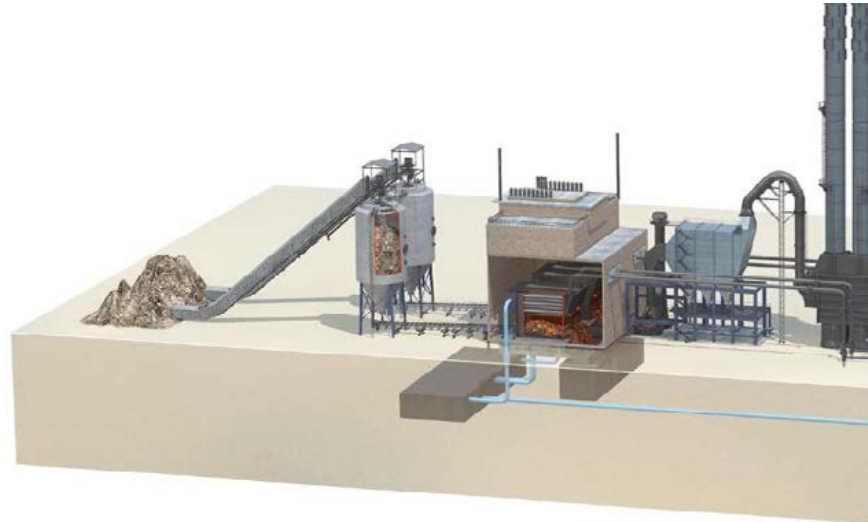
HVAC



Gen Protection & Synchro-closing



Programmable logic control (PLC)



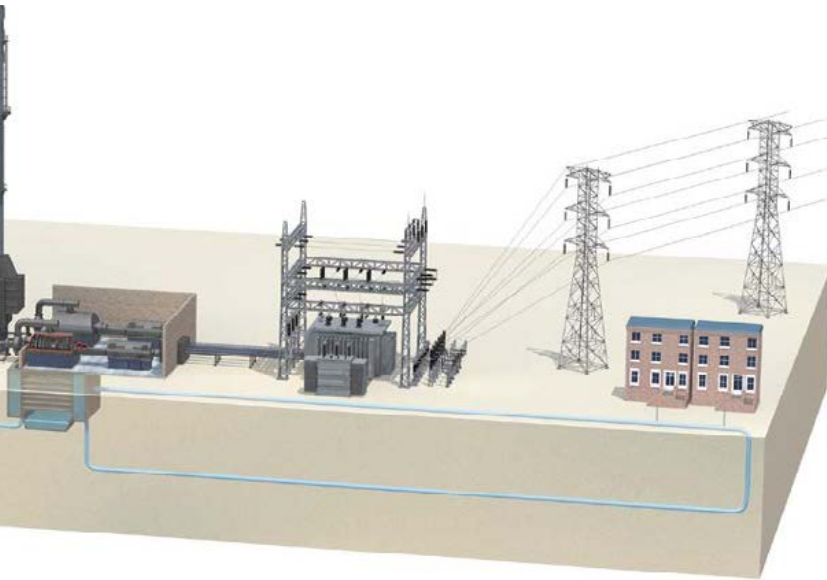
- Highest engineering quality: by application of reusable DCS typicals, meticulous change management, plus clearly defined roles and interfacing responsibilities
- Partner Automation SIs get our "packaged knowledge" via a rich library of VGB-certified control, safety and operability functions – significantly reducing risk, time and cost
- High efficiency: Online engineering by simultaneous multiple engineering teams
- Mitsubishi Electric provides process simulation to warrant rigorous, off-line validation of Control and SIS operation before commissioning
- Plant start-up with pre-trained operators (all start-up sequences, interlocks and process conditions are simulated and rehearsed in a safe environment)

- Pre-commissioning checks using simulation reduce interlock clashes which might prevent start-up, reduce start-up time

All together these allow Mitsubishi Electric to proclaim the quickest possible commissioning time and generation of "first energy" – resulting in:

- faster achievement of design production rates
- faster time to revenue
- faster positive project cash flow

# Integrated solutions for power generation



LV Switchgear



Inverters &amp; VSDs



Distributed control system



HV Switchgear



Measurement &amp; instrumentation



MV Switchgear

## Technology Portfolio: ALL YOU NEED

Mitsubishi Electric's unremitting quality standards guarantee your plant the maximum uptime and highest throughput and financial performance. Our solutions cover the full EI&C scope:

- Plant Instrumentation, incl. CEMS package
- Highly robust control and automation
- Highest quality – the only DCS that is TÜV certified to strictest VGB R170 A, B and C standard
- Hacker-proof systems: cyber security as core design basis (our PMSXpro DCS, Controllers)
- Electrical (LV, MV and HV) – from MCCs, to grid connection
- Variable Speed Drives – about 10% additional energy savings via OEC technology, and regenerative energy recovery
- Safety Instrumented System (SIS) – up to SIL3
- Generator Supervision and Protection – all needed ANSI digital protections, plus generator AVR and auto synchro-closing to the grid
- Turbine control – integrate with package controllers, or use our high-availability PLCs with pre-configured turbine management schematics
- Condition based asset management of rotating / non-stationary equipment and field sensors via HART
- SCADA supervision of balance of plant equipment
- Power factor (PF) correction
- Substation Automation Systems (SAS) incl. RTUs with all commonly used protocols for latest and legacy IEDs

## Technology & Services: OPERATE PHASE

Continued, reliable and safe operation of the generating asset is key to ensuring ongoing plant profitability and meeting investors' ROI expectations. Mitsubishi Electric's automation and control technologies assure optimal utilisation and availability of the plant, through:

- Continuous asset management, via condition monitoring as predictive maintenance enabler
- Peace of mind with safe, reliable plant operation based on a high-availability DCS, with own system health self-diagnostics
- Optimised production – enhanced control schemes to ensure maximum power production under all loading conditions
- Continuous improvement cycles: all control modifications can be fully validated before implementation
- Non stop auto-deviation surveillance of the production asset's key operational and financial performance via clear management dashboards, for quick identification of negative drifts
- Change-managed improvements – ensures adherence to ISO-900x and corporate / regulatory compliance measures
- Centralised monitoring and calibration of field sensors reduce engineering costs and ensure accurate, optimal regulation of the plant
- Auto calculation of specific utilisation and consumptions (e.g. fuel, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>) with long term trends to detect creeping deterioration
- Peace of mind 24x7 Support, with annual maintenance visits, extended warranty, legacy product survey and risk assessment, repair services



## Global service and support

As with any activity, maintaining the quality and operational function of your equipment is essential. Downtime from any operational failure is never good news. In today's tough business conditions returning to full production as soon as possible is critical. At Mitsubishi Electric we aim to deliver industry leading levels of service and support that will provide cost savings, improved machine availability and system uptime to our customers and minimise implementation risk.

We provide a professional on-site service through our System Service Team and Service Agent network and offer a tailored range of service contracts for single and multi-site companies, on an annual or project basis called our 3 Diamond Service.

- Dedicated technical support
- 24/7 on site engineer call-out availability
- Annual maintenance visits
- Extended warranty
- Technical manual library
- Multi-vendor product support
- Commissioning service
- Repair services

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