



APPLICATION REPORT

Power Generation

Fuel gas skid for a CCGT power plant

- Fuel gas management for a combined cycle gas turbine (CCGT) power plant
- Complete fuel gas system from one source, incl. fuel gas conditioning, pressure reduction, quality and flow measurement, flow computing, safety functions, etc.
- Accurate, reliable and maintenance-free flowmeter acc. to OIML R137 as core element

1. Background

A utility company operates a 150 MWel combined cycle gas turbine (CCGT) power plant as part of an integrated solar combined cycle plant (ISCC) in northern Africa. This plant is the backbone of the local energy supply and allows for highly efficient and reliable power generation, even when the solar power source is not available.

2. Measurement requirements

Next to the gas turbine the duct burners are the main consumers of fuel gas at the CCGT. The fuel gas properties for the supply of the plant with its turbine needs to meet certain requirements of pressure, temperature, cleanliness, heating value and must be free of hydrocarbon liquids and therefore needs to be properly managed and monitored. This requires the fuel gas (basically natural gas) to be conditioned, pressure regulated and measured. Fuel gas conditioning and supply in the desired quality is the application area of engineered fuel gas systems. They comprise a mechanical skid with pipes, valves and instrumentation as well as the associated flow computers and controls.

The project EPC required a complete fuel gas skid designed in accordance with the local regulations. This also included a flow metering solution for custody transfer (CT) flow measurement of gases according to OIML R137 and domestic standards of the local metrological body.

Great store was set by the flow instrumentation that guarantees high accuracy, reduced maintenance and high plant availability. A local technical and service support was also of the essence for the utility company. That said, only a full-scope provider was to be considered who could supply the complete fuel gas system from a single source ranging from engineering to project management, calibration and testing ending up with installation and commissioning.

KROHNE

3. KROHNE solution

As a full scope supplier of metering solutions, KROHNE provided a complete fuel gas skid with all essential components such as filtering, pre-heating, pressure reduction/drying, GC, process instrumentation, flow computers and further controls. In this way, the system features the requested fuel gas conditioning capacity, enables the required pressure reduction from the grid pressure to the feed pressure to the plant and complies with all CT metering requirements.



Fuel gas skid with ALTOSONIC V12 ultrasonic gas flowmeter

Core element of the fuel system are the two calibrated 16" metering sections (600 lbs) for a natural gas flowrate of 1.94 MMSFC/D. Being equipped with ALTOSONIC V12 ultrasonic gas flowmeters, pressure and temperature transmitters, SUMMIT 8800 flow computers and associated pipework, the whole fuel skid was delivered as a pre-assembled and calibrated solution.

The ALTOSONIC V12 complies with multiple standards for CT flow measurement and billing of natural gas such as AGA 9, OIML R137, MI-002. It has a track record in CT flow metering applications in various industries – from oil and gas to power generation to hydrogen. The ultrasonic gas flowmeter along with all other sensors mounted on the skid are connected to the SUMMIT 8800, a certified flow computer designed for CT applications. It processes all key instrumentation data and measurement values. In this way, the actual flow rates are corrected to standard conditions, the energy content of the natural gas is accurately calculated and the fuel gas quality is reliably determined.

4. Customer benefits

The fuel gas solution helps the utility company keep plant efficiency and availability at high levels. The operator complies with all CT requirements and is also enabled to monitor gas quality. As natural gas is not always received in an equally constant quality, deviations in fuel gas quality (e.g. contamination) can now be made visible by the fuel skid. The fuel gas skid came pre-assembled and ready-to-operate, which saved the customer a great deal of installation time and commissioning effort.

KROHNE provided the complete fuel gas solution including engineering, instrumentation, pipe sections, flow computers, accessories, drawings, test, documentation, certificates and commissioning from one source. With decades of experience in process instrumentation, metering systems, calibration and system integration, KROHNE was selected as the partner of choice for this project. As a full scope supplier KROHNE provides pre-tested and calibrated systems on skids such as fuel systems for the supply of CCGT power plants, duct burners, air heaters or process heaters.

5. Solution and products used

Custody transfer metering systems for gases

- Metering solution for natural gas, incl. flow metering skid, metering control cabinets, sampling and analyser systems, supervisory and validation software

ALTOSONIC V12

- Ultrasonic flowmeter for custody transfer (CT) measurement of gases
- OIML R137 (class 0.5), MI-002, AGA9 etc.

SUMMIT 8800

- Flow computer for custody transfer (CT) measurement



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
application@krohne.com

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