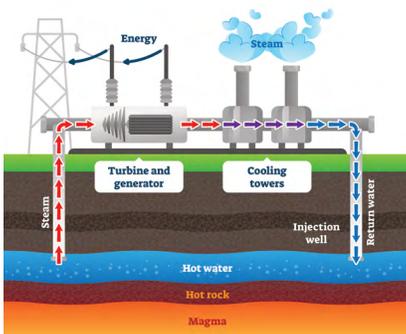


## Application note

# Steam flow measurement in a geothermal power plant

### Benefits:

- Accurate
- High reliability
- Compliance with regulations
- Easy to operate
- No downtime for maintenance
- No periodic calibration needed
- Reliable
- Very low OPEX



Geothermal energy

### Summary

Geothermal power plants use hydrothermal resources that have both hot water (from brine) and steam which is used to drive turbines connected to electricity generators for power generation.

With a separator in place to segregate water and steam, the latter is transported to the steam turbines while water feeds the heat exchangers.

Geothermal steam flow measurement is crucial as it feeds multiple power plants. The amount of steam used must be reported to the Bureau of Land Management (BLM), who require periodic reports to confirm that the amount of steam used is accurately monitored.

A geothermal power generation facility in the US West Coast wanted to improve its steam flow measurement, after previously using Annubar to increase plant efficiency and reduce downtime.

The customer contacted Panametrics to evaluate the available options.

### Application

- Medium: steam
- Temperature: 333.31 °F (167.4°C)
- Pressure: 95.14 psig (6.56 barg)
- Pipe: 36" and 42" Carbon Steel
- Flow rate: 626,000 lb/hr (283.95 ton/hr)

### Challenge

**Accuracy** – Measurement of steam in geothermal plants is problematic because of the type of natural components present in the source steam causing buildup on all surfaces in contact with the fluid. Consequently, frequent (every 2-3 weeks) and time intensive Annubar cleaning operations must be performed. This takes several hours and results in unwanted down-time. In addition, on a daily basis, the Annubar is hit with highback pressure bursts to help clean the orifices and there is a noticeable difference in flow readings before and after the burst. Therefore, changes in flowrate readings between cleaning operations must be taken into consideration.

**Compliance Regulations** – The customer must account for every moment the flowmeter is down so the reporting was very time consuming.

Overall the customer recognized that its process was too time consuming and inefficient. Team members were spending too many man-hours maintaining the old flowmeter and writing reports for the BLM.

The client knew there had to be a better way. After successfully using portable ultrasonic flowmeters on their water lines, the customer was encouraged to take a 'leap of faith' in this direction.

## Solution

Engaging closely with the customer, Panametrics and its local Channel Partner after several technical meetings provided the required confidence to invest in ultrasonic technology.

Opting for Panametrics' XGS868i ultrasonic flow meter with T5 transducers, the customer's engineers were delighted that the new technology provided accurate data, but even more pleased that they could eliminate Annubar cleaning operations and significantly reduce BLM reporting. The maintenance crew now has more time to address other issues at the facilities and the engineer dealing with the BLM spends less time explaining the upsets.

The customer has improved its steam flow accuracy, increased reliability, reduced its labor costs, improved the technology and is now in full compliance with the regulations, with the BLM approval.

The customer expects to save 'dozens of thousands of dollars a year per measurement point' on top of the trouble-free operations.



Panametrics, a Baker Hughes business, provides solutions in the toughest applications and environments for moisture, oxygen, liquid and gas flow measurement.

Experts in flare management, Panametrics technology also reduces flare emissions and optimizes performance.

With a reach that extends across the globe, Panametrics' critical measurement solutions and flare emissions management are enabling customers to drive efficiency and achieve carbon reduction targets across critical industries including: Oil & Gas; Energy; Healthcare; Water and Wastewater; Chemical Processing; Food & Beverage and many others.

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