



## Total Life Cycle Investment: Changing how we think about Well Head Gas Flow Meters

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In a time when large capital ventures are realising the need to consider total life cycle operational costs, reviewing lower maintenance flow meter technology may see a decrease in the expected operational expenditure on large Coal Seam Gas (CSG) projects.

### Orifice Plate Flow Meters

Historically, Origin's CSG wellheads have been most commonly fitted with orifice plate flow meters and vortex meters. This technology is simple and is known to perform satisfactorily in CSG well head applications. The meters are a small capital outlay; \$1,500 to \$3,000 for an Orifice plate and multivariable transmitter (MVT) and up to \$2000 for a turbine meter.

These meters can expect 5-10% accuracy. An Orifice Plate & MVT has a lower turndown than a vortex flow meter, being 10:1 to 30:1 respectively.

### Challenges to flow metering CSG wellheads

Two features of CSG wellheads make flow metering difficult:

- 1) Dynamic changes to the flow profile over a well's life
- 2) CSG is saturated with water and can contain calcium carbonate and coal fines

Neither the orifice plate nor turbine can address both of these feature characteristics.

Orifice plates have poor turndown and regularly need changing out to match Beta ratios to flow rates. Vortex meters are susceptible to scaling and have difficulty accurately metering wet gas.



Vortex Meter scaling at the [Talinga Gas Processing Plant](#), the largest Origin operated coal seam gas (CSG) plant in Australia. Calcium Carbonate is clogging the instrument, setting inside like concrete.



## Ultrasonic Flow Meters

Facing these issues, we decided to take a look at Ultrasonic flow meters (USMs) as a solution. USMs are the 'rolls royce' of flow metering. They are used just about everywhere custody transfer of gas occurs. They achieve very high accuracy and very large turndowns. They often also feature smart diagnostic features.

In the past these meters have been far too expensive to be considered in CSG wellhead applications. They are also criticised as not being suitable for wet gas applications.

However, due to maturing technology and potential bulk orders, Origin has established an arrangement with most well-known suppliers to procure Ultrasonic flow meters suitable for CSG Wellhead applications for approximately \$5000 each.

### The benefits of UFM's for flow metering CSG Wellheads

Advances in the the USM technology used in bio-gas applications, suggest these meters may be capable of measuring wet CSG at the wellhead. Also USMs do not require a pressure drop to function, which minimises potential scaling of the meter. Its expected that USM technology would meter CSG Wellhead gas to an accuracy of 1.5% with a turndown of 30:1.

Ulstrasonics ultimately require no maintainance. They do not require inspections as smart diagnostics can detect scaling on the probes. The extra capital expenditure required at the start of the project could be considered a worthy investment if you look at the expected OPEX costs below:

- 1) Orifice Plates will require changing between 6-8 times during the life of every well
- 2) Vortex Shedder bar Inspections and Cleaning (conservative estimate that 10% of wells would be exposed to scaling)

### Bottom Line

Ultrasonic gas flow meter are becoming more acceptable and more economic. Though Ulstrasonics may slightly inflate project budgets up front, it is likely that the long-term benefits will surpass the upfront spend and Operators may be thankful in the years that follow.