DIRECT ELECTRICAL HEATING

Warming to a world of reliable oil and gas production | May 2012

Untreated, hydrates and wax can block pipelines and prevent reliable production. Direct electrical heating (DEH) is one solution to manage these risks and lower production costs.

Aggregation of remote offshore oil and gas fields will contribute to Woodside's future growth. In many cases, these fields could be cost-effectively developed with subsea pipelines to existing facilities. The ability to tie back these fields at low cost could save investment in new production facilities.

Managing risk of hydrate formation or wax precipitation in cold and deep water presents a significant challenge. Short pipelines can be insulated, however, fluids in longer pipelines ultimately cool down to the surrounding seawater temperature. Long pipelines require elaborate flow assurance measures to prevent pipeline blockages.

The conventional method of preventing blockages in large scale gas developments is to inject mono-ethylene-glycol (MEG). In our world-scale developments, this approach comes with some significant disadvantages:

- The size and cost of MEG treatment plant would be among the largest in the world.
- MEG plants can be difficult to operate and are sensitive to changes in water chemistry and corrosion product contamination.
- MEG plant is sized to meet expectations of produced water. Uncertainty drives either large MEG plant or limits production rates and incorrect sizing may affect ultimate recovery.

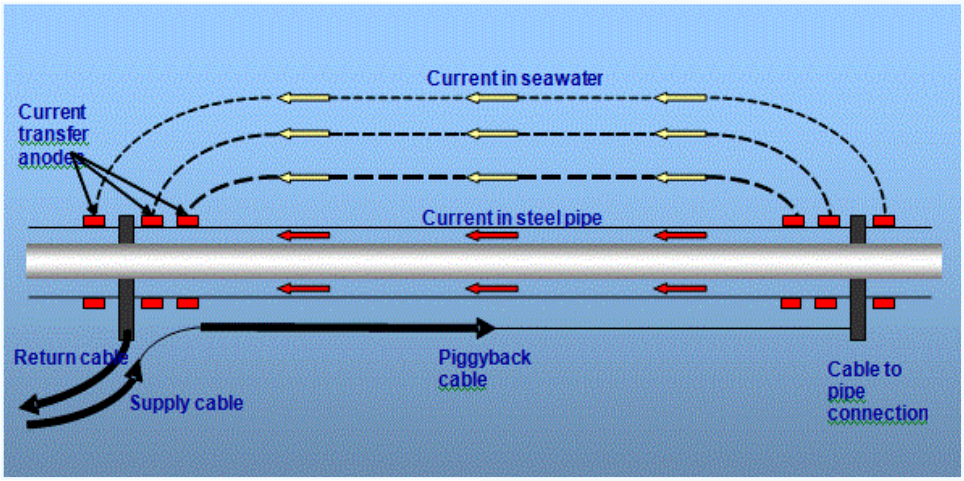
DEH technology is an alternative flow solution to MEG that offers the potential for simpler production, lower capital and operating costs and more flexibility to varying produced water rates.

What's the future?

- The proposed Browse LNG Develoment has adopted DEH as the preferred hydrate management strategy for future subsea tie-backs.
- DEH technology verification is being undertaken as a long term activity with an expectation that it will support future subsea developments.

QUICK FACTS

- Traditional hydrate and wax management is capital and labour intensive. Methanol or Mono Ethylene Glycol is used to prevent blockages.
- Current best practice combines traditional methods with DEH to provide a hydrate management strategy.
- DEH significantly reduces operating costs compared to traditional methods.
- DEH can handle a range of process conditions such as increasing water production without further additional investment. Traditional methods are not so accommodating.
- In future a total DEH solution is envisaged as a chemical-free, cost effective and reliable hydrate and wax management solution.



Direct Electrical Heating Schematic