

ADAPT - WEST DELTA DEEP TEMPERATURE SWING ADSORPTION UNIT



Challenge

The West Delta Deep Marine Concession is situated roughly 56 miles (90 kilometers) from the Nile Delta shoreline in water depths of 820 to 2,789 feet (250 to 850 metres). The natural gas project is estimated to contain reserves in the amount of 4 Tcf and is the first deepwater venture of its kind in the Eastern Mediterranean. In 2003 the Burullus Gas West Delta Deep (WDD) onshore terminal located at Idku in Egypt needed to ensure there was simultaneous hydrocarbon and water dewpointing prior to the exporting of gas. To achieve this DNV was awarded the contract to implement a licensed ADAPT Temperature Swing Adsorption (TSA) plant.



Expertise Provided

DNV provided the Basic Process Design Package for the plant at the FEED stage along with specialist engineering support through the detailed design, construction and commissioning stages. The TSA originally consisted of two trains of three towers of silica gel adsorbent for simultaneous water and hydrocarbon dewpointing of the gas prior to export. In 2009 the plant was updated (by up to 75% under certain conditions) with the addition of an extra adsorber tower on each train, modification of the cycle times and some associated equipment item improvements. DNV provided the Basic Process Design Package for the updated duty along with specialist engineering support.

Advantages of Adsorption versus Competing Processes

Adsorption processes have many inherent advantages including excellent flexibility with high turndown, good load-following and easy start-up and shut-down characteristics. They are also reliable and easy to maintain with no rotating machinery. The operation is simple allowing a high degree of automation and can be unmanned. The process also does not suffer from corrosion, foaming or environmental emissions in contrast to competing technologies. Adsorption is suitable for the full range of gas plant types and has applications in base load gas processing and LNG production but it is particularly favoured in gas storage and peak shaving facilities where flexible operation with high turndown and hot standby are a necessity.

Outcome and Benefit

ADAPT uses techniques which optimise the economics of the process and these include: low equipment count, guard layer, extended adsorption cycles and a heat pulse type regeneration.

Low Equipment Count

- Fewer, larger adsorber towers
- Fewer switching valves

Guard Layer

- Protection of main bed
- Lower regeneration temperature

Extended Adsorption Cycles

- Flexible cycle times
- Regeneration bed standby
- Less frequent regeneration
- Better utilisation of adsorbent

Heat Pulse Regeneration

- Single regeneration tower
- Bed not to full temperature
- Heater to pilots for majority of regeneration
- Lower fuel gas consumption

The key benefits of ADAPT include lower CAPEX (this installation resulted in savings of approximately 40% over competing technology) and OPEX, longer adsorbent life, reduced emissions, simpler operation, experienced operational support and a proven track record up to very large scale applications.

