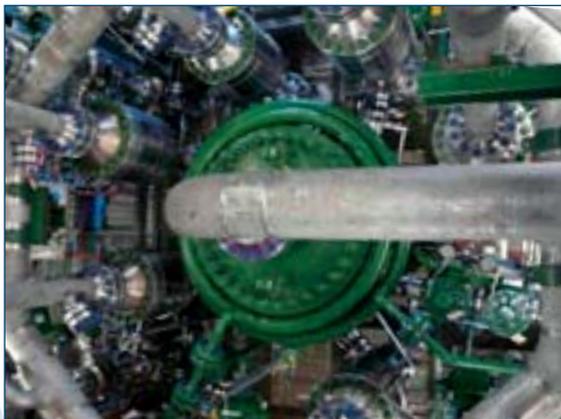


Twister for Offshore Dehydration

The Twister™ Supersonic Separator efficiently condenses and separates water and hydrocarbons from natural gas in a chemical-free, environmentally-friendly, safe, compact process with minimal operating costs as no moving parts are required in the Twister tube.

Offshore dehydration

Offshore gas fields have traditionally been developed using manned glycol (TEG) dehydration facilities. However, increasing pressure on cost, personnel safety and environment is steadily pushing unmanned concepts, such as Wet Gas Evacuation.



Twister Gas Conditioning technology offers the solution of unmanned operation for offshore dehydration facilities, which is not only a cost-effective solution but also a safe and environmentally friendly alternative, whilst eliminating many of the flow assurance risks and limitations involved with Wet Gas Evacuation. Twister can also save weight and space for offshore facilities – a Twister system comprising a Hydrate Separator and six Twister tubes designed to handle 300 MMscfd has a typical footprint of 3.5 x 3.5 metres.

Figure 1 shows a typical layout developed for an offshore application. Up to six compact Twister tubes, each with a capacity of up to some 3 million Sm³/d (105 MMscfd), can be mounted in a vertical position on a vertical liquid degassing vessel. This compact, low weight arrangement provides a gas conditioning solution for unmanned minimum facilities platforms and is a key enabling technology for de-bottlenecking existing space and weight constrained platforms.



Twister for Offshore Dehydration

Wet Gas Evacuation	Twister Offshore Dehydration
Multi-phase export limits both pipeline turndown flexibility and maximum pipeline size, thus necessitating multiple smaller diameter pipelines and eliminating future tie-in possibilities.	Incremental cost of an offshore Twister dehydration system are more than balanced by savings in pipe and onshore installations, such as slug catchers, and by space and weight savings.
The pressure drop in a multi-phase pipeline can be significantly higher compared to single-phase gas export and is also difficult to predict.	The pressure drop across a Twister system (typically 20 - 25%) is more than compensated by the reduced pressure drop in the export pipeline. Twister also enables a lower pipeline pressure.
The corrosion and hydrate management system for an offshore wet gas line needs to be extremely reliable in order to avoid sub-sea hydrate plugging which can be extremely costly to rectify and disastrous with respect to lost production.	Twister enables dry single-phase gas export to shore avoiding all risk of hydrate plugging.
Expensive CRA pipelines, costly slug catching facilities together with routine pigging and ramp-up procedures.	Avoids expensive CRA and clad steel piping allowing normal cast steel piping to be used for corrosive services. Greatly reduced need for routine pigging. No ramp up problems.
Changes in produced fluids in combination with corrosion and hydrate inhibition chemicals, may result in operational problems such as chemical contamination and scale depositions. Costly vacuum desalination facilities may also be required to manage glycol salt contamination and associated operation and control issues.	Avoids risk of contamination and scaling.

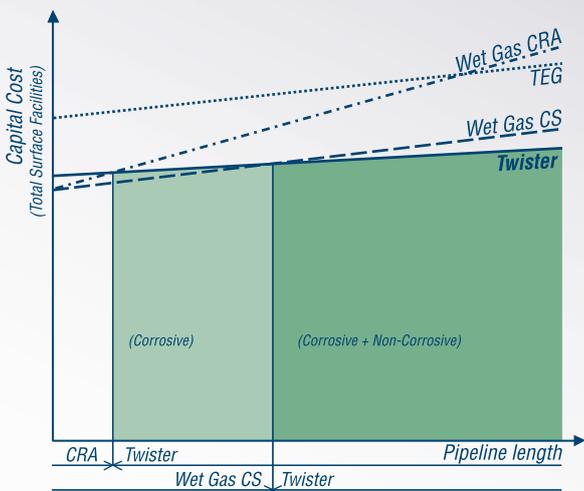
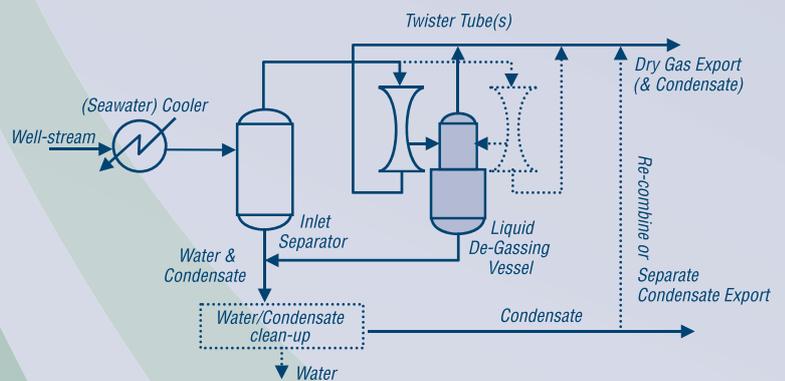


Figure 2 shows a general cost comparison of the various concepts for offshore gas developments

What is Twister?

Twister is a low temperature separation process using supersonic gas velocities, with a performance which can be optimised by improved heat integration using the cold gas exiting Twister, supplemented with air or seawater cooling if required. The inlet separator upstream of the Twister tubes is designed to remove produced liquids and prevents carry-over of slugs and solids. The following issues need to be considered when designing a gas conditioning system based on Twister technology.

- Twister is a fixed actual volumetric flow device. The gas velocity at the throat of the inlet nozzle will always be exactly Mach 1, fixing the flow through the tube. Turndown flexibility can be achieved by adjusting the operating pressure or by taking individual Twister tubes on/off line.
- Twister is a pressure ratio device. For any design pressure, the gas will expand to around 30% of feed pressure mid Twister and recompress to typically 75 - 80% of feed pressure exiting the Twister tube for dewpointing the gas. For NGL recovery applications, the gas will typically expand to around 20% of the feed pressure mid-Twister and recompress to around 50 - 65% of the gas feed pressure when exiting the tube.



Process Flow Diagram of a typical Twister System