

# Oil Review

Oil · Gas · Petrochemicals

## Middle East

VOLUME 24 | ISSUE 4 2021

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# Addressing the issue of liquid loading

Upwing Energy outlines its new subsurface artificial lift technology which alleviates liquid loading and extends productive well life.

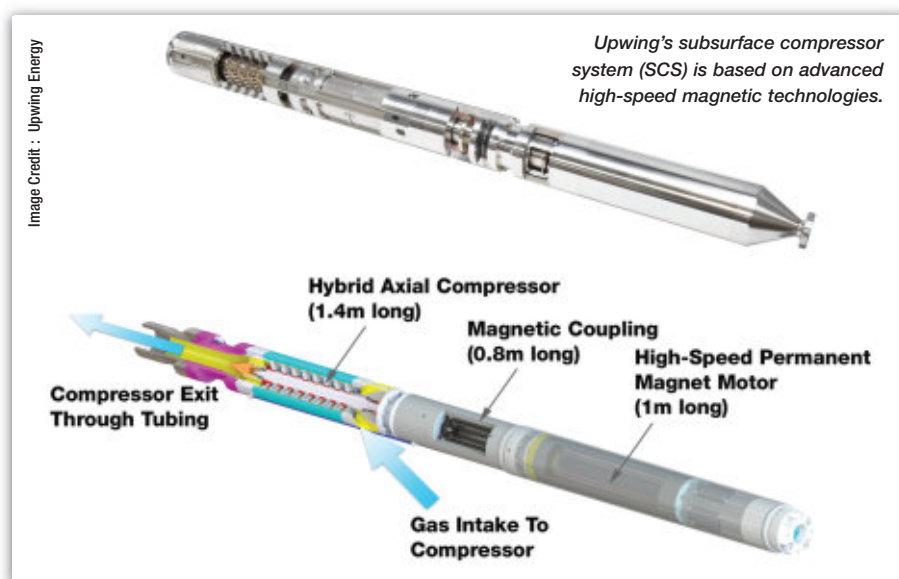
**N**ATURAL GAS PRODUCERS in the Middle East are growing increasingly concerned about the persistent problem of liquid loading, which is negatively affecting productivity. Accumulation of liquids in the well creates blockages and backpressure that reduces gas velocity, causing a falloff in production and potentially leading to premature abandonment.

Various artificial lift solutions, such as surface compressors and electric submersible pumps (ESPs), have been employed to remove liquids and increase production with less than satisfactory results. A promising new patented downhole artificial lift technology has been developed and demonstrated by Upwing Energy, a US-based technology and service company. Upwing's subsurface compressor system (SCS) is based on advanced high-speed magnetic technologies. According to Upwing's CEO Herman Artinian, the Upwing SCS has been designed to provide reliable performance in the downhole environment by eliminating the common points of failure in conventional ESPs.

Artinian explains that the hermetically sealed downhole tool consists of a high-speed permanent magnet (PM) motor, a shaftless magnetic coupling between the motor and compressor, and passive non-contact magnetic bearings with electronic dampers. The hybrid axial wet-gas compressor is driven by the high-speed PM motor. Torque is conveyed from the motor to the compressor with no mechanical shaft or seals, eliminating the need for a motor protector to isolate the motor from downhole fluids. This "protector-less" architecture, according to Artinian, eliminates a frequent source of vulnerability for conventional downhole artificial lift systems.

The system also includes a sensorless wide-frequency variable speed drive (VSD) at the surface that controls the downhole motor at speeds of up to 50,000 rpm.

The Upwing SCS lowers the bottomhole well pressure, increasing the velocity of the gas stream, removing liquids from the vertical and horizontal sections of the well. The



lowered backpressure from liquid loading increases gas production, which in turn accelerates liquid unloading. Once the liquid is carried upward by the gas stream, the lower pressure at the compressor intake and the higher temperature at the compressor discharge prevents vapour condensation and enhances the carry-over of liquids to the surface by the gas stream.

"Upwing's unique downhole turbomachinery can maximise gas and condensate production, recoverable reserves, gas-in-place recovery efficiency and liquid unloading at the same time," says Artinian. "All of these benefits can be realised in any type of formation and wellbore geometry in both the onshore and offshore environments regardless of where the well is within its life span."

Modelling tools make it possible to evaluate and predict the outcome of conventional wells with the SCS. This is due to better understanding of the conventional reservoir, existing verified models and available historical data. Operators can insert the SCS compressor maps into their reservoir models and verify the incremental improvement in production and recoverability.

As Upwing continues with its trials, the results are being verified with comprehensive in-house models that incorporate the SCS tool, reservoir, wellbore and top-side equipment. For conventional reservoirs, these modeling tools can predict results fairly closely. SCS gas well simulations and trials have shown gas production increases ranging from 20 to more than 200% and increased recoverable reserves ranging from 20 to more than 70%.

"It is significantly more cost effective to increase production and reserves of existing conventional wells than drilling new unconventional ones," says Artinian. "Using simulation modeling tools developed by Upwing Energy, we have demonstrated that reducing liquid loading with the SCS to extend the life of a conventional liquid loaded well would require 96% less capital expenditure than drilling a new unconventional well, and produce 28% more gas and condensate within the initial 10 years."

Upwing Energy has experienced significant interest from the Middle East, North Africa and Southeast Asia, where most of the gas wells are starting to face liquid loading issues, and is working on putting together trials in these regions. ■