

Case study: Argentina

Magnefficient PMM delivered 92% efficiency, reduced power costs

An operator in Argentina was challenged to reduce lifting costs and improve energy efficiency in their marginal, mature field. During seasonally cold conditions, regulatory mandates required operators to provide natural gas to the local grid for heating, limiting the amount of gas available to generate power for the field. With more than 1,000 wells using electrical submersible pumping (ESP) systems to maintain production, the power limitations during the winter forced the operator to shut in wells, significantly impacting overall field economics.

The majority of the wells were slimhole applications, making it challenging for traditional ESP systems with induction motors (IM) to reach the needed 200 horsepower. This required tandem motor connections, connecting three to five motors in each system. Due to the high downhole temperatures, often above 170°C (338°F), the operator had to regularly de-rate the motors to avoid failures, resulting in inefficient ESP operations and higher power consumption costs per well.

Interested in testing permanent magnet motors (PMM) as a solution to alleviate these issues and improve efficiency, the operator reached out to Baker Hughes. Baker Hughes recommended its new **Magnefficient™ permanent magnet motor**, which can achieve the same horsepower as the existing tandem induction motors with a smaller motor—helping to expand operational flexibility and reduce power consumption. Three Baker

Hughes ESP systems featuring the 3.75 in Magnefficient PMM were deployed for the trial. With a shorter motor, the systems could be assembled 2.3 times faster, reducing nonproductive time (NPT) and related costs. At less than half the length of the existing ESP systems, the PMM-powered ESPs were faster and easier to install. By eliminating the need for tandem motor connections, the systems were not only more reliable, but also able to be set closer to the producing zones.

Compared to the traditional IM offering, the Magnefficient PMM increased the overall system efficiency by more than 26%, and allowed the operator to achieve an average 23% reduction in power costs.

Pleased with Baker Hughes' performance, the operator commented, "The Magnefficient PMM has generated energy savings between 15-26%, depending on the equipment installed." The operator plans to deploy five additional units. These power savings will free up generated power that can be used for additional production, directly adding to the operators' bottomline.

Challenges

- Restricted power capacity limited the ability to maintain production
- Mature field using water flood methods for secondary recovery efforts
- Forced to regularly de-rate the motors, resulting in low efficiency and high power consumption

Results

- Reduced power costs by 23% by decreasing energy losses in the motor and cable
- Assembled ESP system 2.3 times faster, reducing NPT and associated costs
- Eliminated the need for tandem motors, cutting the ESP system length in half and eliminating the reliability concerns associated with tandem motor connections
- Increased ESP system efficiency by more than 26%