

# Dual ESPs Avoid Deferred Production of More than 2 Million Barrels in Offshore Wells

Backup ESPs maintain production and enable optimal use of one available rig

## CHALLENGE

- Reduce deferred production caused by ESP failure.
- Minimize drilling delays caused by diverting the only available rig to perform ESP workovers.

## SOLUTION

Install primary and backup ESPs in the same string to enable production to continue in case of primary ESP failure.

## RESULTS

- Produced more than 2 million barrels of oil from nine wells over five years that would otherwise have been deferred until elective workovers could be performed.
- Increased cash flow by USD 15 million in just one well using the backup ESP.
- Significantly decreased drilling disruptions because of the ability to optimize elective and failure workover planning.



## Minimize production losses caused by limited availability of workover rig

An offshore field near Qatar has six production platforms with more than 50 wells produced using ESPs. A single workover rig is used to conduct the operator’s drilling program and to conduct ESP workovers on production wells. When an ESP system fails, production in the well is typically lost for several months until a rig becomes available. The rig costs USD 120,000 per day, and a typical ESP workover totaled between USD 3 million and USD 5 million. When workovers are eventually possible, the ongoing drilling program is often delayed, as it requires use of the same rig.

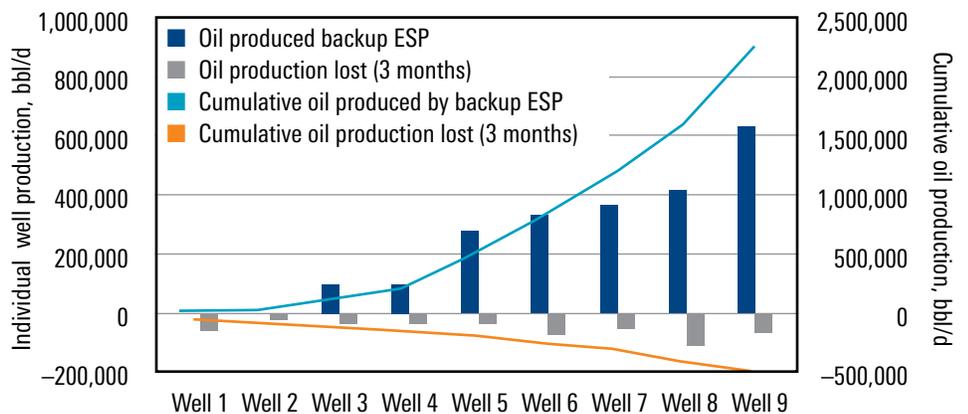
The operator required a solution to increase production uptime, reduce the number of ESP workovers, and minimize disruption to drilling activities.

## Install backup ESPs to increase production and optimize rig usage

Schlumberger suggested installing two separate ESP systems in select wells, with one designated as the primary and the other as the backup. Backup systems can be configured and deployed in different ways to work best with the characteristics of each well. The first backup ESP system installed in the field was a dual-bypass type where the lower ESP was suspended below the upper ESP bypass system. Following the success of the first system, several more were installed.

When the primary ESPs eventually failed, backup ESPs were switched on immediately, enabling oil production to continue at the same rate until the workover could be completed. The backup ESPs allowed the operator to plan workovers around the rig’s availability, minimize disruption to the drilling schedule, reduce periods of deferred oil, and extend the overall run life of the ESP system.

**Oil Production from Backup ESPs Compared to Potential Lost Oil Production During Three-Month Deferment**



The blue bars represent the individual production of the backup ESPs installed in nine wells, and the corresponding blue line represents the cumulative production of more than 2 million barrels of oil that would have otherwise been deferred until a workover could be performed. The gray bars represent production the operator estimates would have been lost without the backup ESPs, assuming a three-month lag between primary ESP failure and the earliest date a workover could have been performed on each well. In addition to the 500,000 bbl of oil (represented by the orange line) the operator estimates would have been lost from these nine wells, even more production would have been lost due to drilling delays caused by the lack of an available rig.

## CASE STUDY: Dual ESPs minimize deferred production and drilling delays

A further improvement was the introduction of a dual-pod system as an alternative to dual-bypass completions. Like the bypass systems, the pods enable the installation of primary and backup ESPs but have the added advantage of protecting the production casing from the corrosive fluids produced as a result of H<sub>2</sub>S and CO<sub>2</sub> in the wells.

### Produce more than 2 million additional barrels of oil using backup ESPs

Backup ESPs in these nine wells have enabled 3,564 days — nearly 10 years — of additional cumulative production and produced more than 2 million additional barrels of oil over a five-year period. The operator estimated that without the ability to determine the optimal time to schedule a workover, each well that had to be shut off would have lost an average three months of production until the workover rig became available to get it back online. Since the backup ESPs ensured no production was lost, the operator could perform a workover either sooner or later, depending on the needs of the operation overall.

Because the initial dual-ESP program proved so successful, this field now has 47 wells with dual ESPs — the largest number of Schlumberger backup ESP systems operating in one field worldwide. Schlumberger ESPs have produced more than 200 million barrels of oil from this field so far.

### Backup ESP Production

	Production Rate, bbl/d [m <sup>3</sup> /d]	Backup ESP Operation, days	Backup ESP Production, bbl/d [m <sup>3</sup> /d]
Well 1	414 [66]	233	96,462 [15,336]
Well 2	396 [63]	239	94,644 [15,047]
Well 3	599 [95]	606	362,994 [57,711]
Well 4	1,195 [190]	348	415,860 [66,116]
Well 5	717 [114]	872	625,224 [99,403]
Well 6	280 [45]	40	11,200 [1,781]
Well 7	753 [120]	440	331,320 [52,676]
Well 8	697 [111]	13	9,061 [1,441]
Well 9	358 [57]	773	276,734 [43,997]
Total	5,409 [861]	3,564	2,223,499 [353,508]

*More than 2 million additional barrels of oil has been produced by just nine of the backup ESPs in this field over a period of five years.*

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