Aquaterra ENERGY | INTELLIGENTLY ENGINEERED

CASE STUDY

A Jack-Up of All Trades:

Expanding P&A Possibilities Offshore



Location

North Sea

Client

North Sea Operator

Product

Decommissioning and Life Extension Analysis

Project Overview

A North Sea operator **needed to plug and abandon subsea wells at two locations** using a jack-up rig which was **originally designed for platform operations.** The wells were in significantly different water depths, with the deepest reaching 122 m, close to the operating limit of the rig.

Aquaterra Energy supplied **the subsea conversion equipment and delivered the associated riser analysis,** bringing design, analysis and operational expertise together within a single integrated team. By developing the equipment and validating the design in parallel, Aquaterra Energy created an optimised system with a larger operating envelope, reduced fatigue loading and operability up to 100-year storm conditions. The approach enabled potential rig spread-cost savings of approximately **$30 million to $50 million.**





Challenge

Subsea drilling, intervention and plug and abandonment operations are conventionally carried out using floating rigs such as semi-submersibles. However, in shallow North Sea waters, **harsh environmental conditions can create significant rig movement.** These motions transfer cyclic loads through the riser, subsea blowout preventer and well equipment, **increasing fatigue damage.**

The operator instead planned to use a jack-up rig, which **offered smaller rig motions and the potential for a wider operating window.** However, the rig was designed **primarily for platform operations and required conversion** before it could safely and effectively access the subsea wells.

The project needed to:

- Enable the jack-up rig to **perform subsea plug and abandonment operations**
- Develop a system **suitable for two significantly different** water depths
- Manage riser loads and protect the subsea well equipment from **fatigue damage**
- **Maximise** the available operating and weather window
- Deliver the required equipment and analysis within a **tight timeframe**
- Avoid **unnecessary design conservatism** and over-engineering

Solution

Aquaterra Energy used a **combined design and analysis approach,** allowing the conversion equipment and riser system to be developed alongside the supporting engineering analysis. This created an **agile development cycle** in which analysis findings could inform design decisions at an early stage, **reducing the risk of late changes and operational delays.**

Our in-house project management, operations, analysis, design and procurement teams worked closely together to deliver a **cohesive, analysis-led solution within the required timeframe.**

Designing out delays before offshore execution

The analysis identified that a lateral restraint would be required immediately below the blowout preventer. Recognising this requirement early allowed design work to begin without waiting for the wider analysis programme to finish, **helping to protect the offshore schedule from delays.**

The integrated approach also meant the restraint and wider conversion system could be designed around the actual operational requirements rather than conservative assumptions. This **avoided unnecessary over-engineering and reduced cost** for the client.





Creating a larger operating window

Aquaterra Energy completed comprehensive riser analysis to **reduce unnecessary conservatism, maximise fatigue life and establish a larger operating envelope.** The study also produced **operational recommendations designed to maximise rig uptime** during the plug and abandonment campaign.

Results

Using the converted jack-up instead of a conventional semi-submersible rig gave the operator potential rig **spread-cost savings in the region of $30 million to $50 million.**

The optimised system provided operability up to and including 100-year storm conditions, **creating a significantly improved weather window compared with the conventional semi-submersible approach.** This allowed the plug and abandonment work to be **completed successfully on challenging, ageing wells with minimal rig downtime** caused by weather.



A system designed to perform without unnecessary cost

By integrating analysis, design and operational planning, Aquaterra Energy reduced design conservatism while protecting the fatigue life of the well equipment. Early identification of the lateral restraint requirement also helped avoid delays and ensured the system was ready for the offshore campaign.

Key results included:

- Potential rig spread-cost **savings of $30 million to $50 million**
- Operability up to and including **100-year storm conditions**
- **A larger operating window** than the conventional semi-submersible approach
- **Reduced fatigue loading** on the riser, blowout preventer and well equipment
- **Minimal weather-related rig downtime**
- **Early identification and design** of the required lateral restraint
- Successful plug and abandonment operations **across two challenging** well locations

Subsea conversion, intelligently engineered

Discover how Aquaterra Energy's integrated conversion, riser analysis and offshore expertise can expand operating windows, reduce fatigue risk and deliver significant rig cost savings.