



Legacy Well Re-Entry Services / Studies

Product Applications:

- ▶ Offshore Carbon Capture and Storage (CCS) projects
- ▶ Re-entering and re-abandoning legacy wells

Key Features:

- ▶ Repurpose depleted reservoirs and saline aquifers safely and efficiently
- ▶ A cost-effective alternative to drilling relief wells
- ▶ Can support repurposing of well to a monitoring well, when combined with Installation of our CO₂ monitoring solution
- ▶ Supports identification of well locations for re-entry and CO₂ storage
- ▶ Provides a methodology for re-entry and establishes the foundations for achieving an environmental and pressure-retaining barrier

Storing CO₂ in Legacy Well Formations

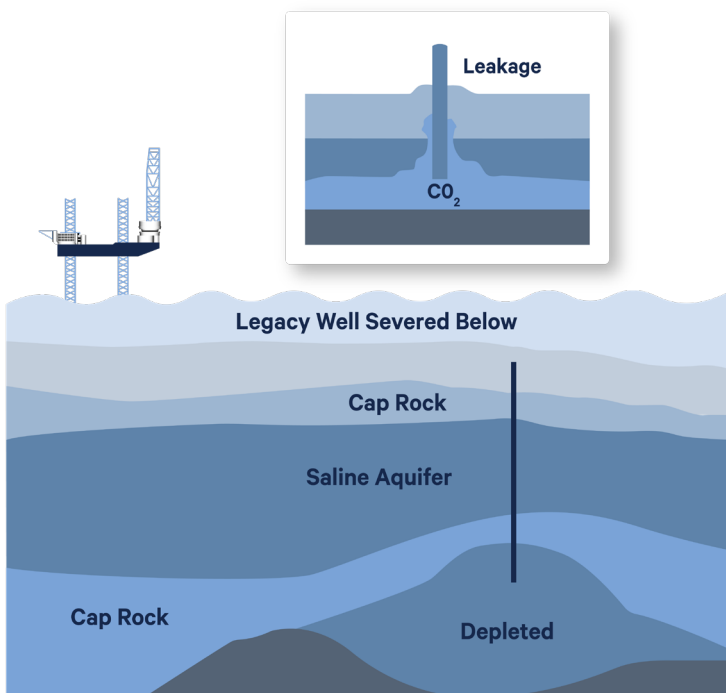
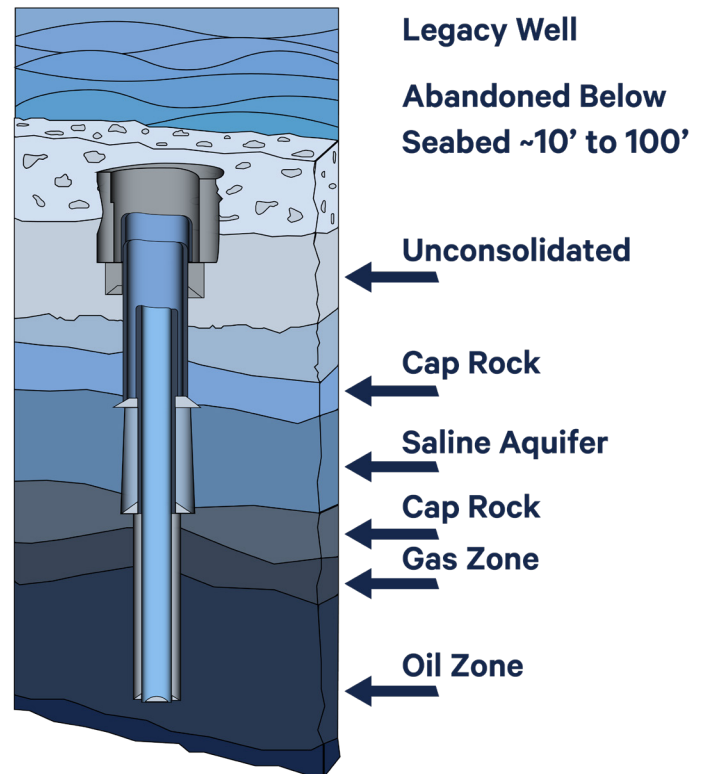
Ensuring the security of CO₂ storage formations is paramount for offshore carbon capture initiatives.

While legacy oil and gas fields offer promising storage locations with established infrastructure, the presence of legacy suspended, or abandoned wells poses a significant risk.

As illustrated in the figure below, unaddressed legacy wells may provide leakage pathways for stored CO₂, making their identification, remediation and re-entry critical to the safe deployment of offshore CCS projects. Legacy wells abandoned without adequate isolation can render otherwise viable storage sites unsuitable for CO₂ injection, while traditional remediation methods, such as drilling relief wells, are often costly and impractical, particularly in shallow saline aquifers.

Our legacy well re-entry services specialise in facilitating safe re-entry into these wells to establish the environmental and pressure-retaining barriers that are essential for CO₂ storage readiness.

Leveraging our extensive well access equipment, engineering expertise and operational experience, including well re-entry and tieback projects, we deliver tailored solutions to unlock the potential of depleted reservoirs and saline aquifers.



Legacy Well Challenge

There are hundreds of potential offshore CCS storage sites globally that could be suitable for CO₂ storage, but they are being ruled out due to problematic legacy wells that were previously severed below mudline, plugged, and abandoned.

These formations are unlikely to have the correct well bore isolation in place to facilitate pressurisation, and therefore CO₂ injection. Current practice would see these subsurface wells treated like a well blowout scenario, where you would drill an intersection well, or a relief well, to seal off the well bore. But drilling relief wells can be extremely costly, and in some cases, might not be possible for shallow saline aquifers.

CCS at its core is a waste disposal business and costs are very important, therefore removing prohibiting barriers such as these are vital to success.

Vertical Well Re-entry

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Our services are centered around vertical well re-entry, which if achievable for your location, is much faster and cheaper than drilling a relief well.

- We can work with your teams to support locating the well centre accurately, re-enter with Aquaterra Energy specialised equipment, including our Recoverable Abandonment Frame (RAF), and safe re-abandonment that results in a secure CO₂ storage location.
- Casing strings can be logged and tested above and below during / once abandoned.
- Can be repurposed as a monitoring well if geophones and fibre optics are installed within the cement plugs for active or passive seismic.

Potential Savings:

It has been calculated that opting for vertical well re-entry, using Aquaterra Energy's RAF solution and bespoke equipment to gain access and tieback on to the well, could cost between £15-£20 million. This estimate is half the cost of drilling a relief/intersection well to intercept the legacy wellbore, which is estimated to cost £30-£40 million



Vertical well re-entry



Cost: £15-20m

Relief/Intersect well



Cost: £30-40m

Cost savings:

£15-20m

For vertical well re-entry

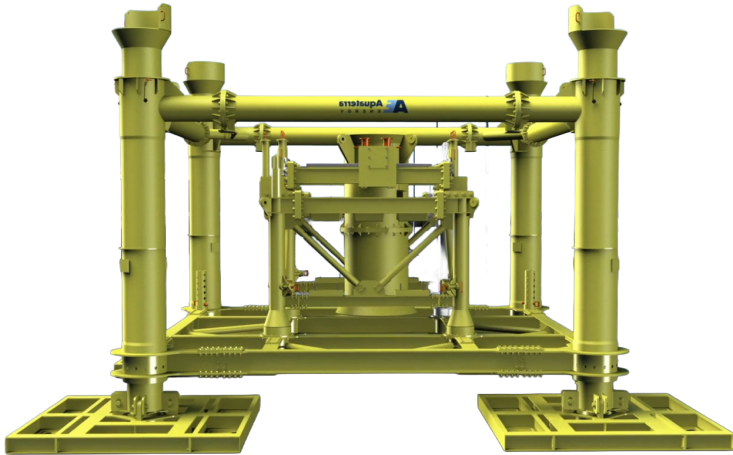
Feasibility Studies

Our legacy well and re-entry feasibility studies are the first step to help you first understand the viability and risks of re-entering and re-abandoning legacy wells in your CCS project, including those severed beneath the mudline, and those that have been explosively severed.

Our studies will support in identifying the location of wells to re-enter, but also, identify the best re-entry solution for your project. They typically include:

- Identification of the key risks and issues with re-entering previously abandoned wells.
- A methodology of locating the well.
- A review of options for re-entry, including estimated costs of each approach.
- An overview of approach for achieving an environmental and pressure retaining barrier, to allow re-abandonment activities to take place.
- Detailed step-by-step operational storyboards.
- Analysis, including a site-specific data review, VIV screening plus structural analysis.
- Drawings, procedures and equipment identification to support successful tieback operations.

Recoverable Abandonment Frame (RAF)



Protecting Legacy Well Infrastructure

The RAF accurately centralises over the well and provides independent structural support, transferring operational loads away from the existing wellhead, conductor and casing to help protect ageing infrastructure.

Flexible Installation Philosophy

Adaptable mudmat and piling configurations allow the RAF to suit a wide range of subsea environments. Installed using relatively small vessels, it enables well preparation ahead of drilling operations. A modular design supports global fabrication, simplified transport and efficient quayside assembly.

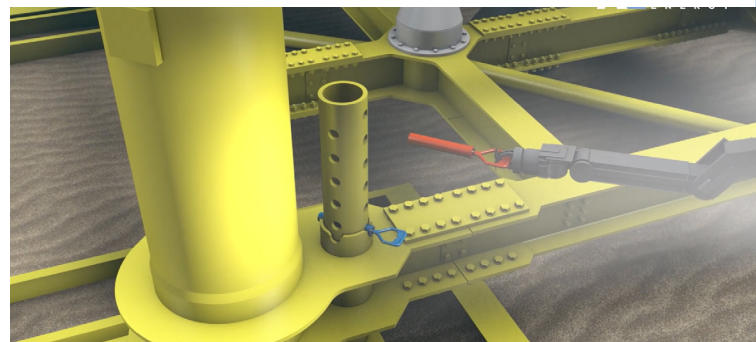
Deepwater Applications

For deepwater operations, the RAF provides independent structural support for modern subsea BOP systems, transferring vertical and lateral loads away from the wellhead. This reduces fatigue accumulation and helps protect ageing well infrastructure. Unlike conventional tethering approaches, the RAF isolates the well before the BOP is installed, providing protection from the outset.

Aquaterra Energy's Recoverable Abandonment Frame (RAF) is an innovative subsea structure that's been designed **to enable the safe and efficient vertical re-entry of legacy wells** where well location, casing condition and structural integrity may be uncertain. The system establishes a stable, adjustable interface around the well, allowing operators to conduct re-entry and abandonment activities while minimising loads on existing well infrastructure.

Key Features:

- Movement mechanism enables accurate centralisation over the well centre, accommodating location uncertainty and installation tolerances.
- Load isolation, preventing operational forces from being transmitted into existing casing and conductor systems.
- Enables the establishment of the environmental barrier, supporting circulation while preventing sediment and debris ingress.
- Protection of corroded well casings, by supporting intervention equipment and avoiding additional loads
- Pressure-retaining barrier capability with pressure containment up to 10,000 psi and the ability to establish multiple barriers for abandonment activities.
- Milling conduit support to assist with drill string loading and stabilisation during initial re-entry operations.
- It's reusable and can be redeployed across multiple wells or locations, with flexibility for different seabed conditions.



Related Products and Services

CO₂ Monitoring Platform

Our offshore CO₂ monitoring solution combines field-proven technology with a patent-pending integrity monitoring approach to verify storage site performance during and after injection. Providing continuous monitoring and early leak detection, it helps operators maintain confidence in long-term CO₂ storage integrity.

Riser Systems for CCS

Our high-pressure drilling, completion and workover riser systems are qualified for the low-temperature conditions associated with CCS operations. Combined with our field-proven well re-entry and tieback expertise, they support both CO₂ injection and legacy well intervention activities.

Tieback Engineering & Tooling

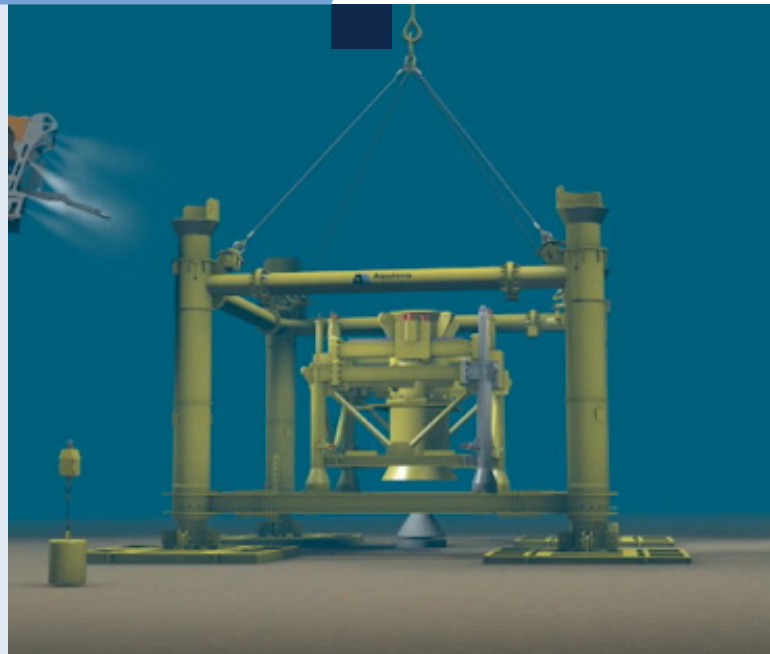
Drawing on decades of tieback engineering expertise, we deliver cost-effective solutions that reduce operational risk and rig time. Specialist tieback tooling is available through our Aquaterra Express rental service.

Sea Swift CCS Platforms

Designed for offshore CCS developments, Sea Swift platforms can be adapted to support CO₂ injection infrastructure and associated process equipment. Monopile, conductor-supported and jacket designs are available to suit a range of storage projects and well configurations.

About Aquaterra Energy

Designed for offshore CCS developments, Sea Swift platforms support efficient CO₂ injection infrastructure through early-stage studies, topside optimisation and tailored design. Monopile, conductor-supported and jacket configurations are available to suit a range of storage projects and well layouts.



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