Legacy well re-abandonment for offshore CCS projects

Vertical well re-entry

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About us

Intelligently engineered

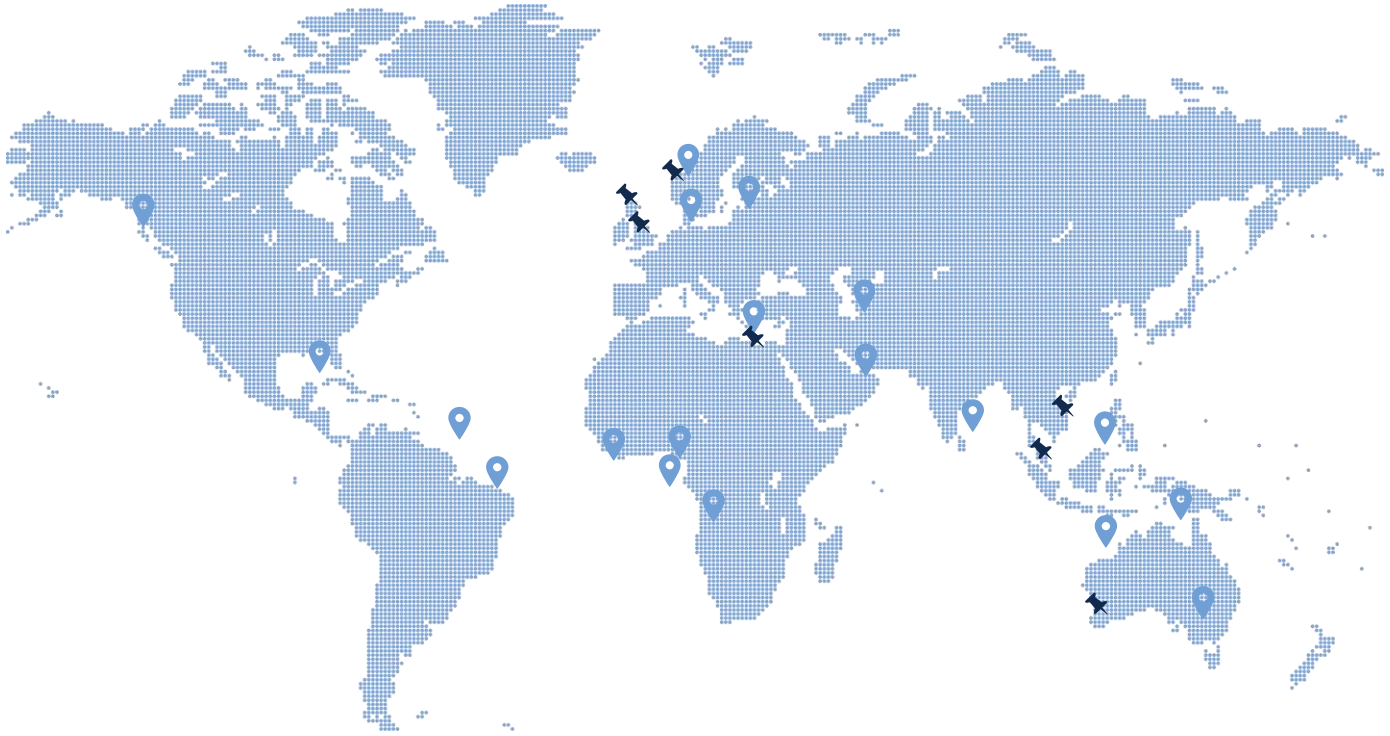
We specialise in providing equipment and solutions to the global offshore energy industry – helping clients drive efficient and sustainable offshore operations from drilling and field development, to decommissioning, carbon capture and storage, wind, and hydrogen projects.

Project locations

North Sea
Mediterranean
West Africa
Caribbean
Middle East
Australia
South East Asia
Gulf of Mexico
Canada
Caspian Sea
South America

Office locations

UK
Norway
Egypt
Australia
Malaysia
Vietnam



Shell
equinor
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ConocoPhillips
ExxonMobil
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TOTAL
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The full offshore energy ecosystem

Supporting the energy transition

Oil & Gas | Carbon Capture & Storage | Offshore wind | Green Hydrogen

All underpinned by our intelligently engineered approach

Introduction

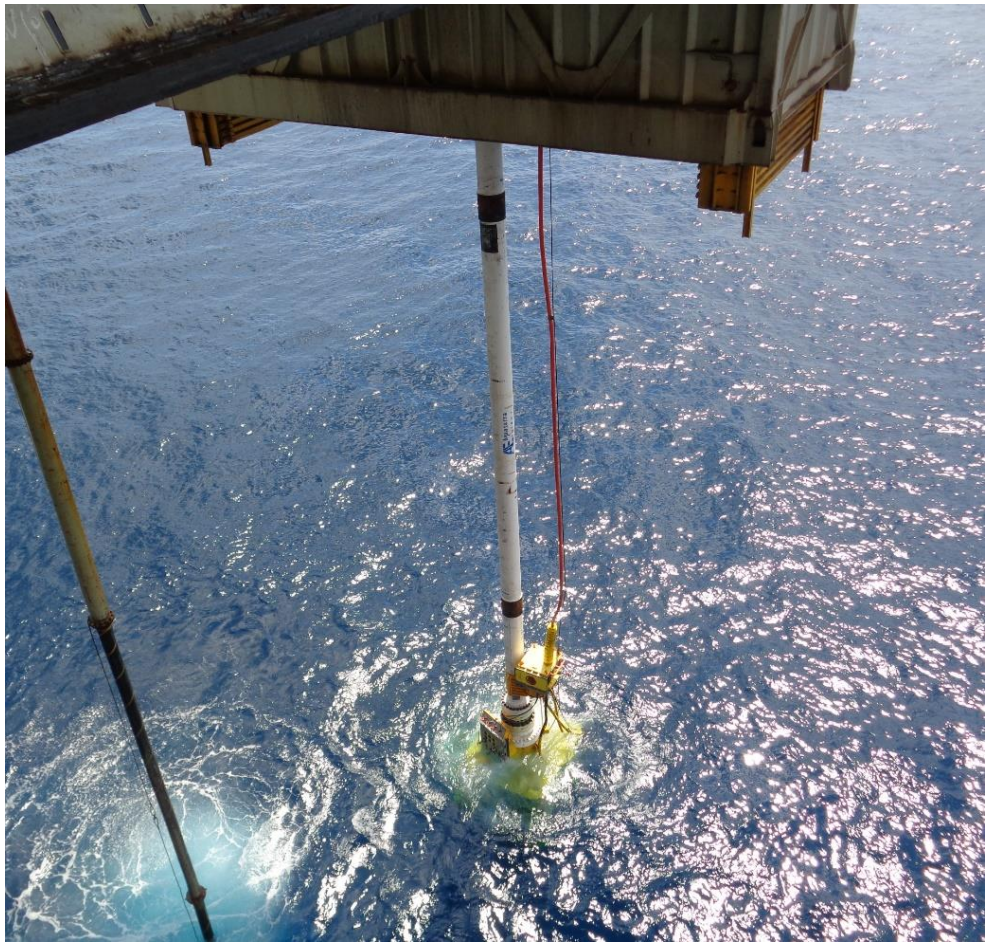
Vertical well re-entry

Legacy oil and gas fields are often considered good carbon storage locations given the extensive data available and existing infrastructure.

Many CCS projects are targeting existing O & G fields for these reasons, be it the depleted O & G reservoirs, or in many cases, the much larger saline aquafers above or below them.

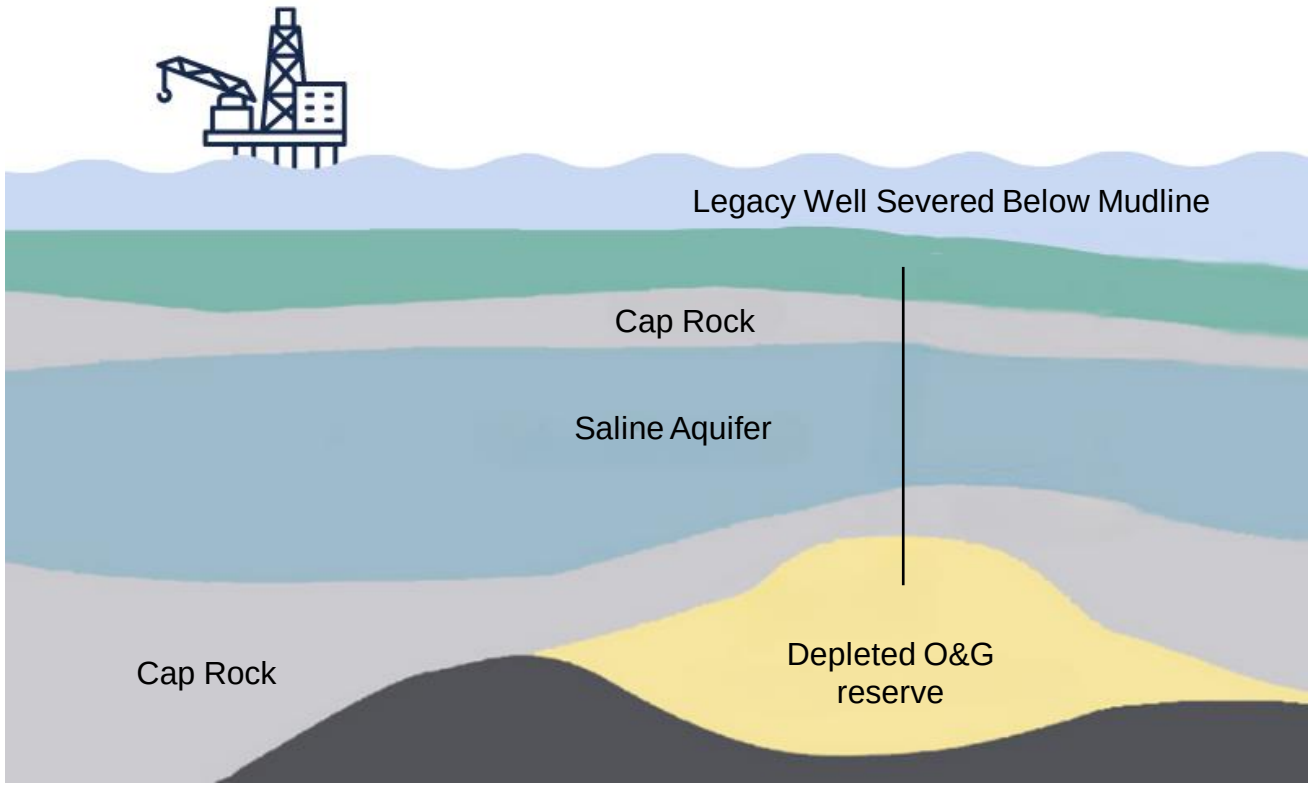
Unfortunately, production or exploration legacy wells may:

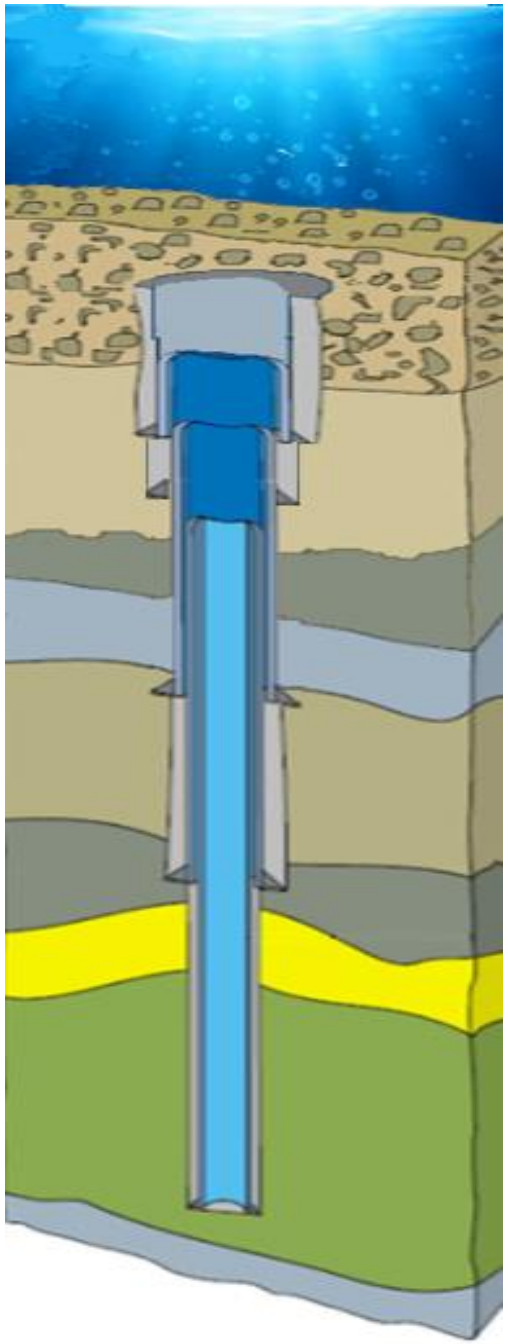
- Compromise the security of the formation that the CO2 will be stored
- Become a liability
- Reduce the economics of a storage site
- Present a costly re-abandonment issue if current O & G technics are deployed (relief/intersection well, for example)



The CCS legacy well challenge

Vertical well re-entry





Legacy Well
Abandoned Below Seabed ~
10’ to 100’

Unconsolidated Formation

Cap Rock

Saline Aquifer

Cap Rock

Gas Zone

Oil Zone

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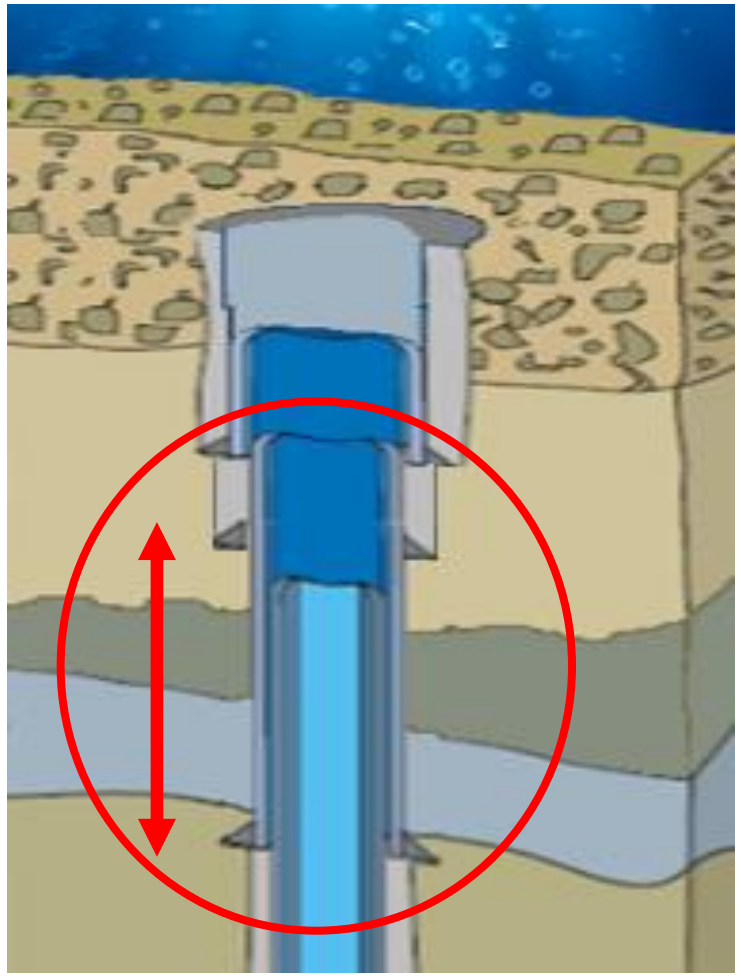
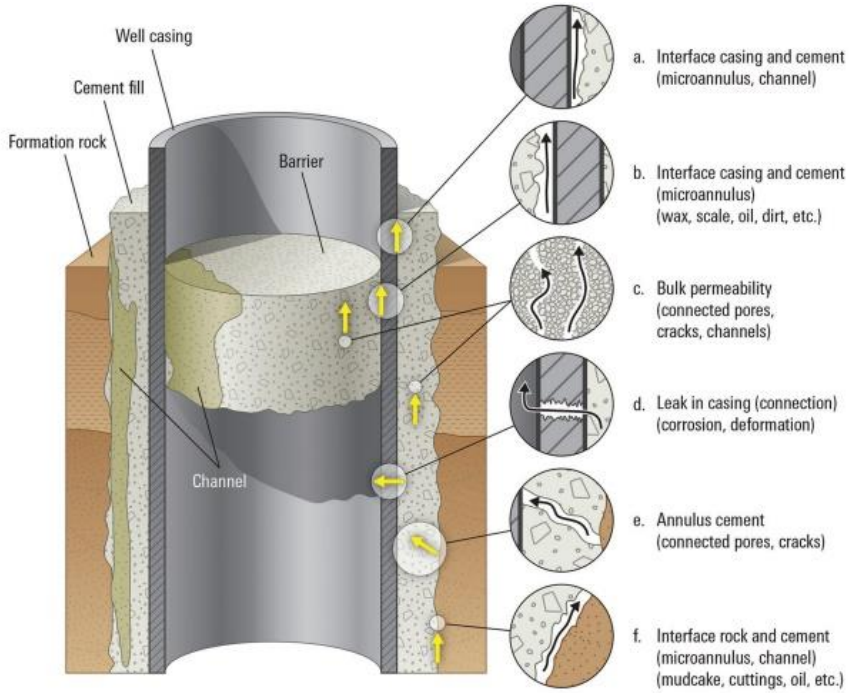
The CCS legacy well challenge

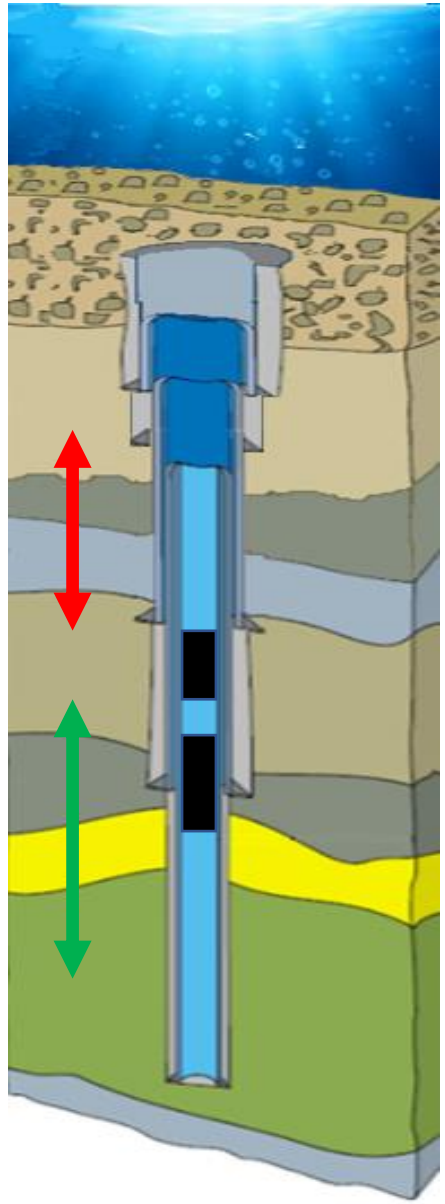
Vertical well re-entry



Saline Aquifer – has not been isolated during the exploration drilling or abandonment phase.

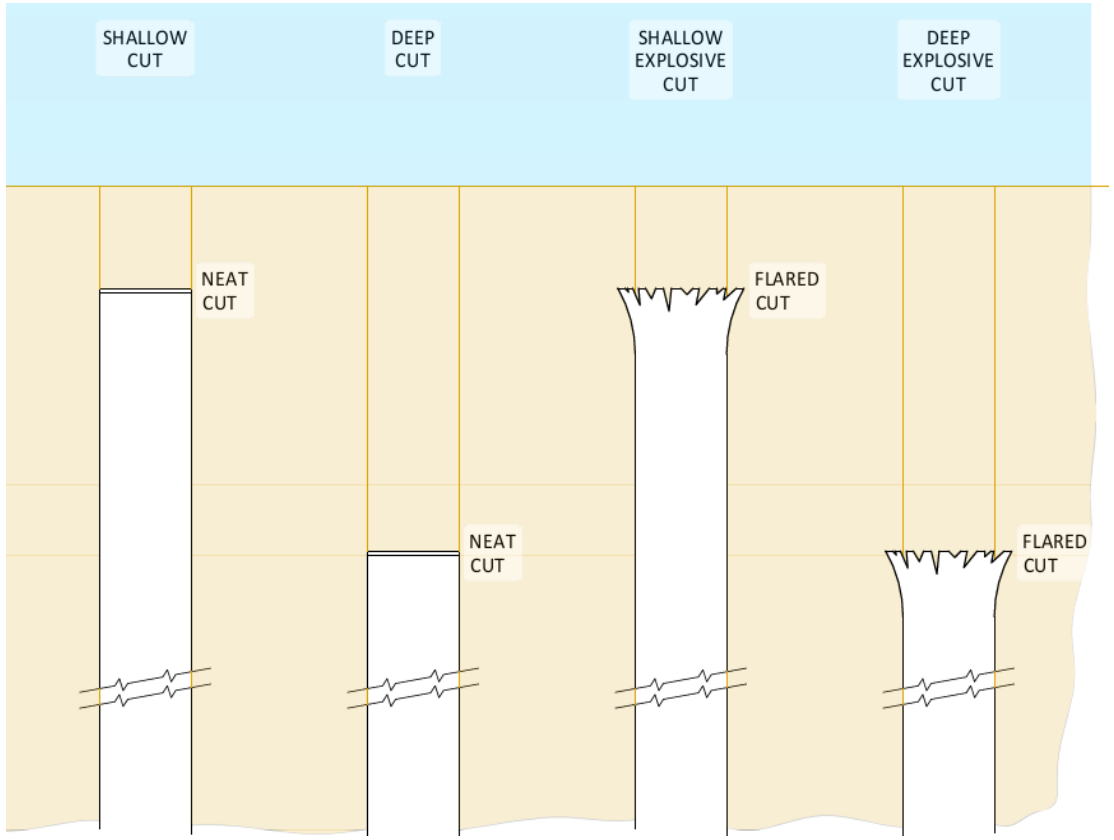
This legacy well may need to be re-abandoned so that the CO2 storage site can reach its full economic potential.

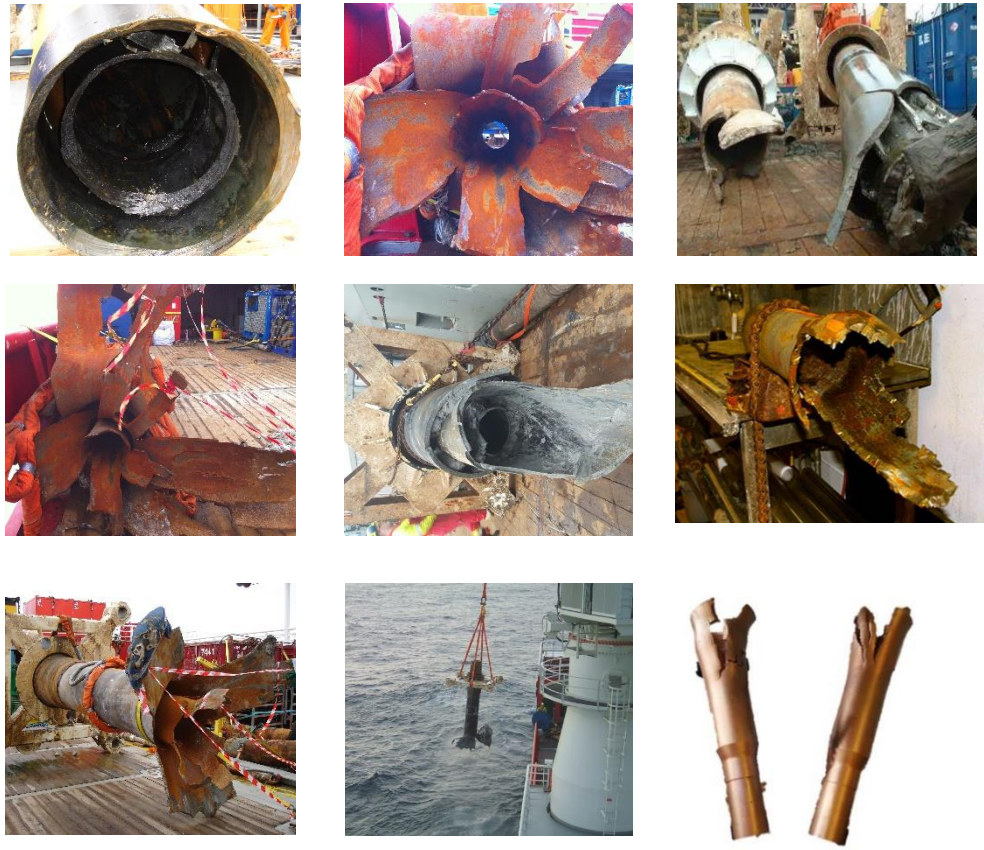




What we can expect to find

Vertical well re-entry



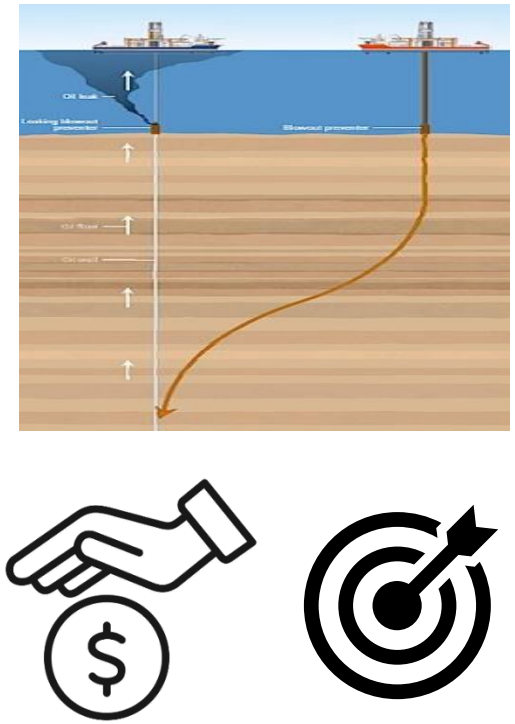


Re-abandonment options

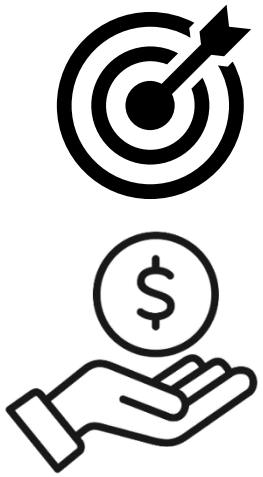
Vertical well re-entry

Do Nothing

Relief Well



Vertical Re-Entry

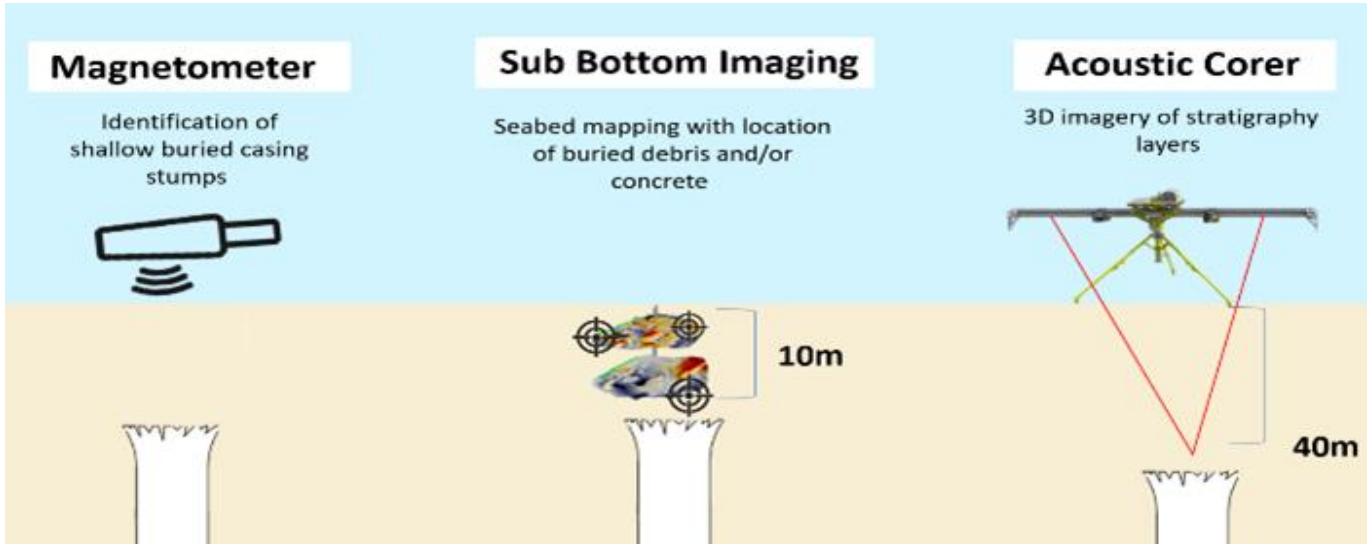


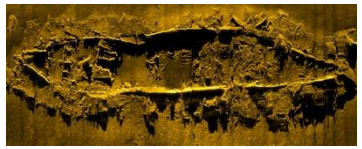
Core principles to vertical well re-entry

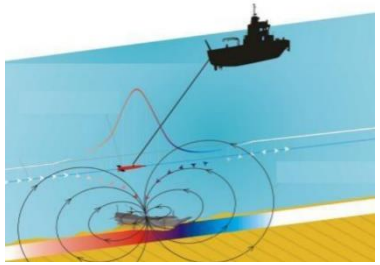
Vertical well re-entry

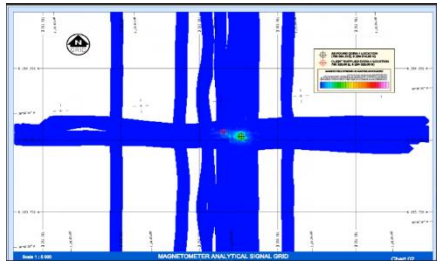
Locate the well

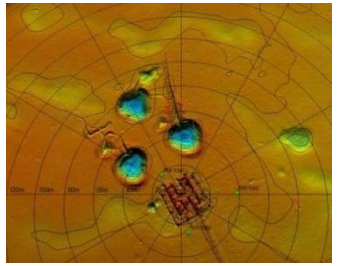
Vertical well re-entry

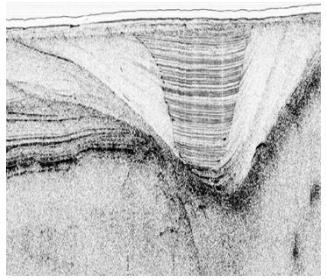


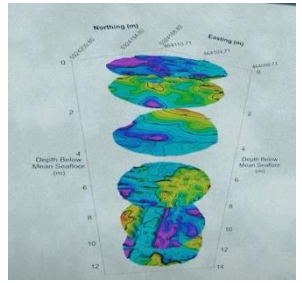


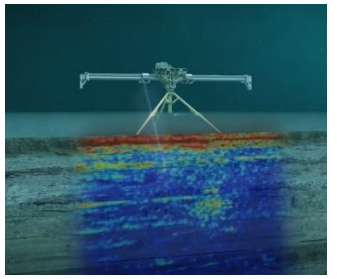








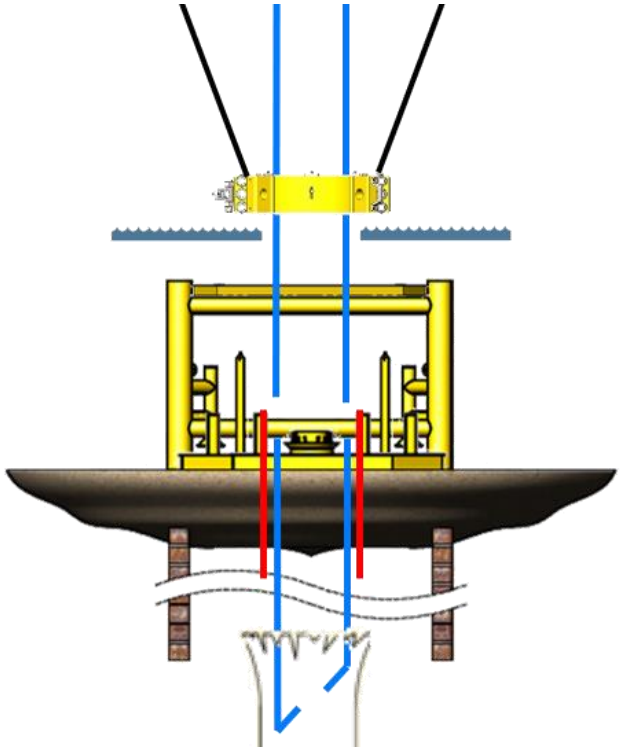


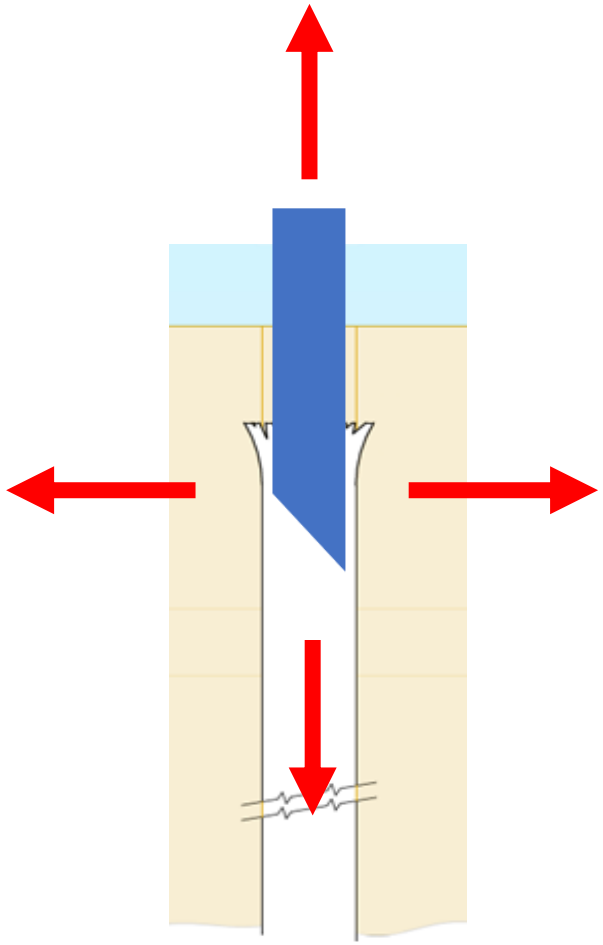


Environmental barrier

Vertical well re-entry

- Compromised legacy well not designed to be re-entered
- Excavation conduit, milling conduit and/or environmental barrier need to be established and tied back to surface to allow well clean up and further strings to be installed
- Supports milling, drilling and fluids/cuttings transportation
- Legacy well must be protected from any loading generated by these strings – support frame to house the subsurface and seabed to surface strings that transfers loads into the seabed will be required

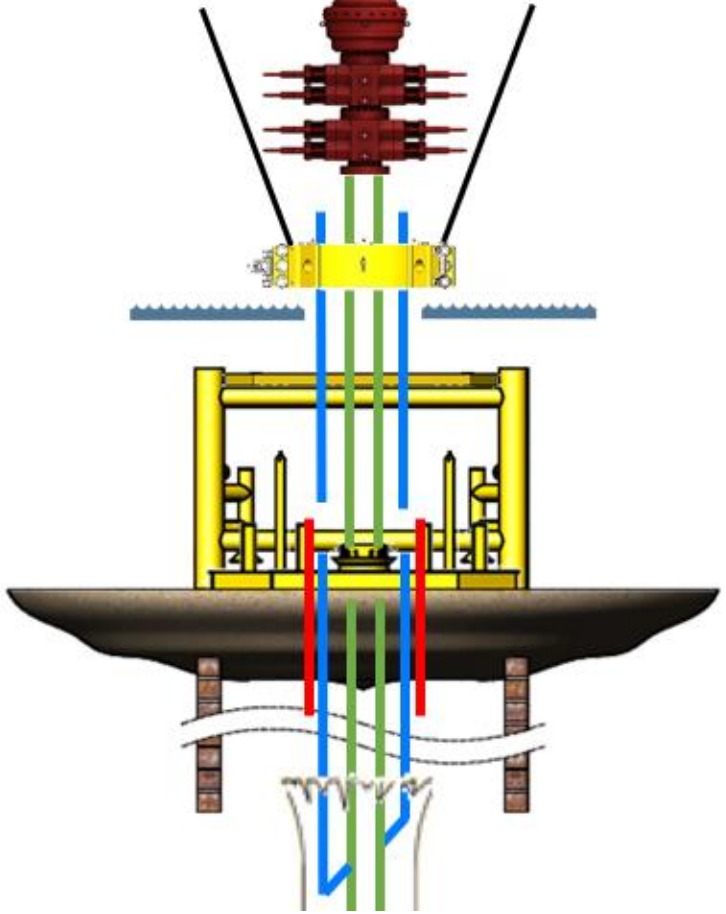




Installation PCE & Re-Abandonment

Vertical well re-entry

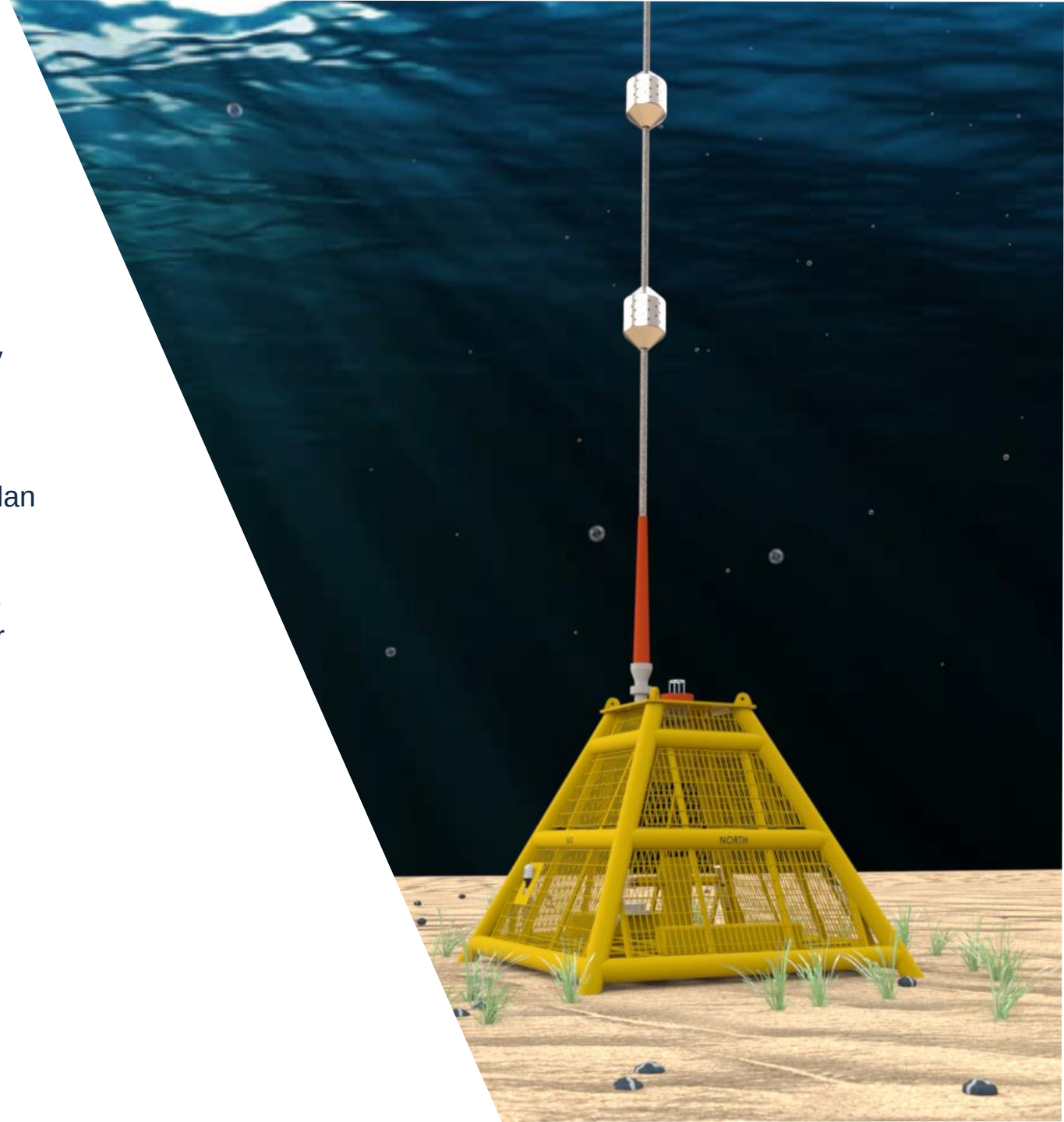
- At this stage common techniques and equipment from O & G service companies can be utilised to log/survey, milling and clean up and then install a pressure retaining tie back string
- Metal to metal gas tight casing overshots can be used onto the 9 5/8th of elastomeric or lead casing patches dependent on pressure and re-abandonment requirements
- In this example the CO2 storage location, the saline aquifer, can now have the exploration well re-abandoned in this case section milling and then cementing to fully isolate any leak paths



Monitoring Well MMV

Vertical well re-entry

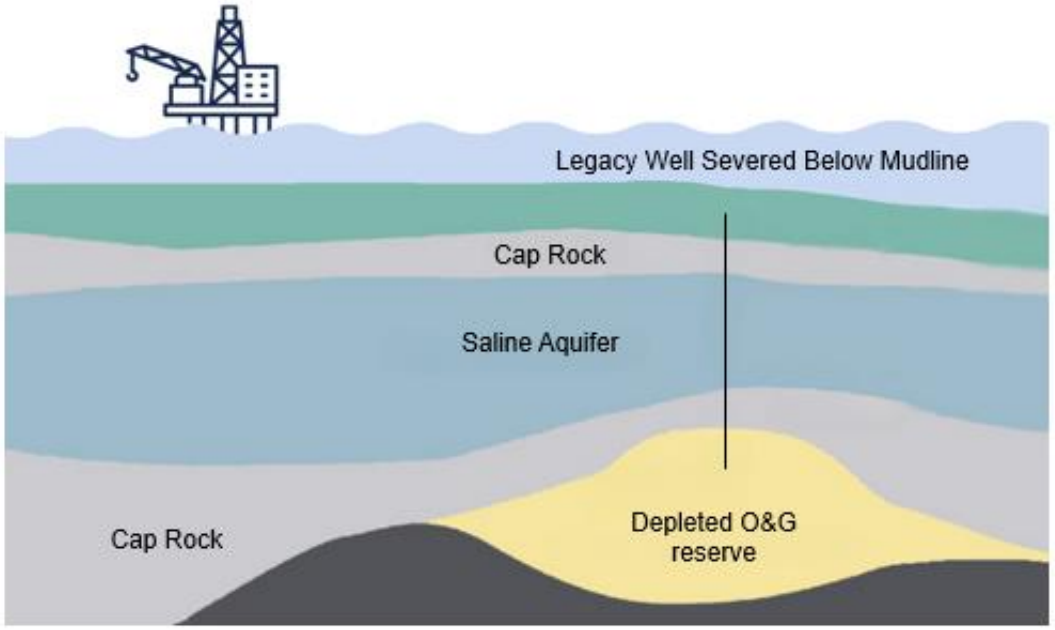
- There is an opportunity during the re-abandonment phase to install fibre optics and/or geophones to re-purpose the legacy well as a monitoring well
- Monitoring wells are useful and sometimes essential MMV systems to confirm that CO2 injection is going according to plan or provide a warning if CO2 is entering an area it should not
- Monitoring wells can utilise both active or passive subsurface seismic and temperature gauges (via the fibre optic cable) for leak detection



Key takeaways

Vertical well re-entry

- Every CCS site is going to have unique challenges from legacy wells, existing infrastructure and geological weak spots
- CCS at its core, is a waste disposal business and costs are very important – removing prohibiting barriers such as these are vital
- Cross industry solutions can be deployed to support the subsurface detection and mapping of legacy wells, supporting vertical well re-abandonment
- All loading must be isolated from the legacy well during the re-abandonment
- Vertical well re-entry should be considered as a viable option to improve overall project costs and support large scale deployment of offshore CCS developments
- Vertical well re-entry also offers a way of repurposing for long-term monitoring to ensure site integrity



Thank you.

Questions please

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