



EXPRO[®]

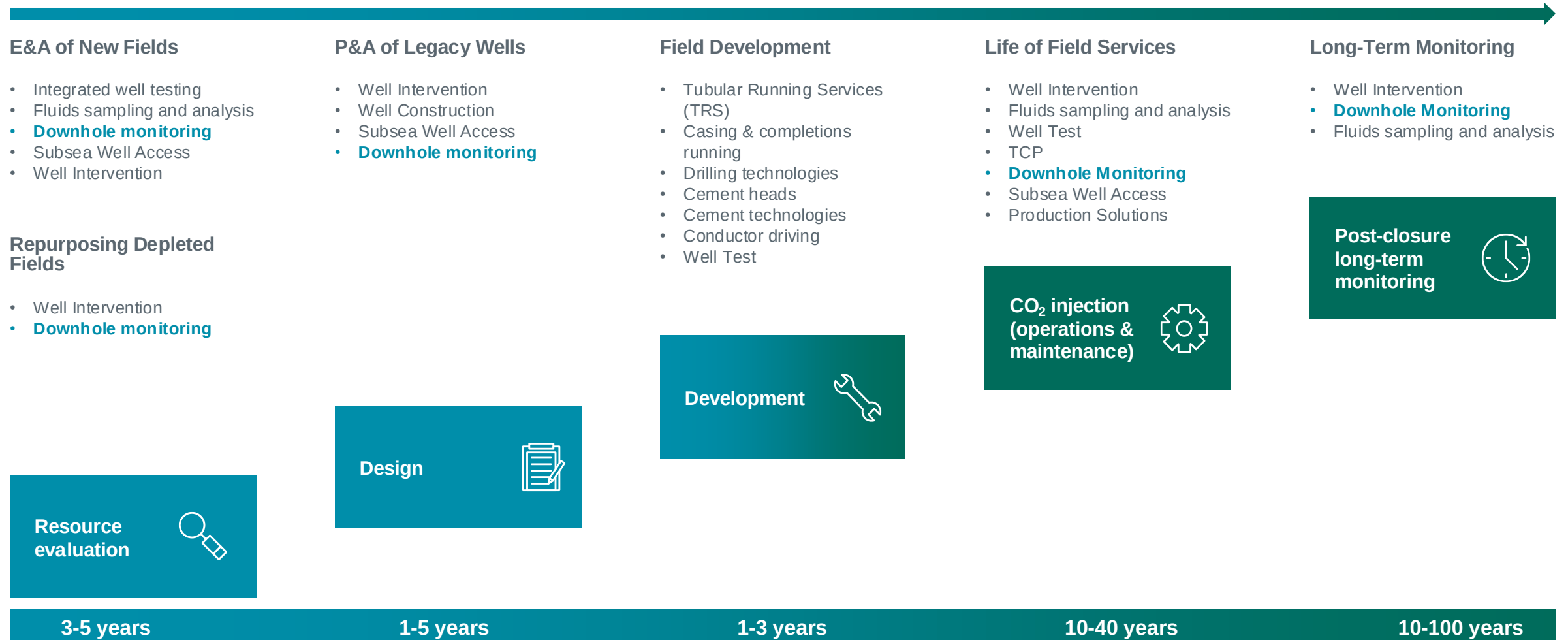
**SUSTAINABLE
ENERGY SOLUTIONS**

Technology Showcase on CCS MMV

North Sea Transition Authority

29th October 2024

CO₂ Storage Well Lifecycle



CaTS™ Wireless Downhole Monitoring

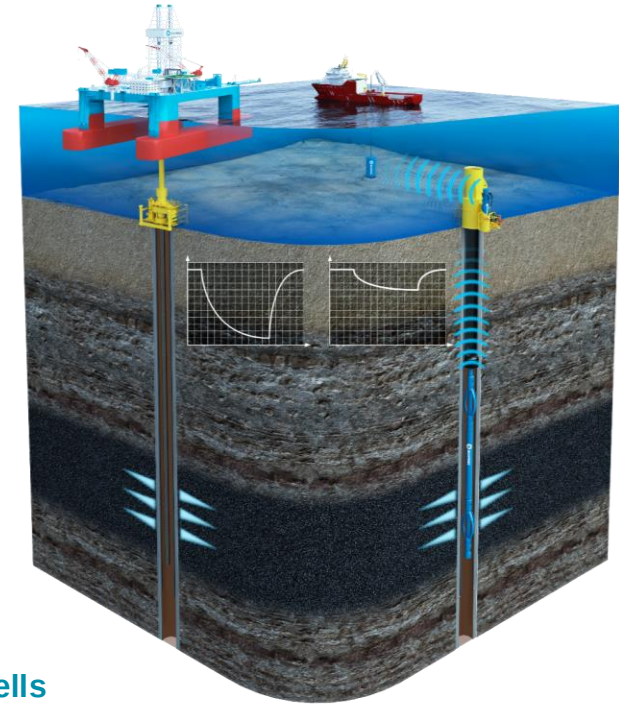
The next generation of downhole surveillance

Function

- System records **pressure** and **temperature** and **transmits the readings wirelessly to surface**
- Uses **metallic structure** of the well (casing or tubing) as a conduit to transmit **electromagnetic (EM) signals** to surface

Technology

- **Long EM transmission distances** from downhole gauges at depths - Record distance > 12,500ft in single-hop
- EM signal is not impacted by mechanical barriers or cement plugs, so is **perfectly suited to abandoned and suspended wells**
- Uses industry leading Quartz crystal transducer **for high accuracy, good resolution and importantly low drift** over time
- **Addressable** enabling multiple gauge installations in a well
- **Duplex functionality** to optimise system performance and deliver critical data at the right time



CaTS™ Wireless Downhole Monitoring

Enabling long-term wireless surveillance of isolated and abandoned zones for CO₂ storage projects

Challenge: How to collect P&T data from abandoned and suspended wells/zones?

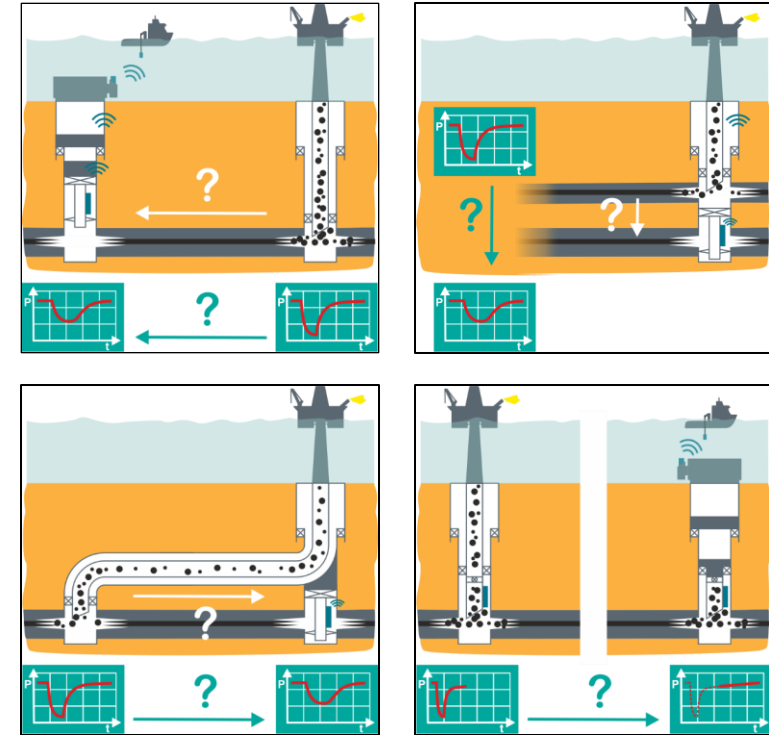
- **Solution:** CaTS P&T system installed in abandoned zone to detect changes in conditions and validate subsurface models.
 1. Long term pressure build-up or injection/fall-off test after appraisal test to “look deeper” into the reservoir
 2. Interference testing from well testing during appraisal or injection to **reduce uncertainties** in reservoir
 3. **Pressure front and plume tracking** in reservoir as a result of CO₂ injection

Challenge: How to monitor for leaks in and around the well bore?

- **Solution:** CaTS gauges installed within injection zone or above the confining layer for **long-term well integrity** surveillance
 1. Installed within well bore in new well – run as part of completion
 2. Retrofit into existing well bore (keeper or future abandonment)

Challenge: How to monitor behind casing?

- **Solution:** Install CaTS gauges behind casings with externally mounted perforating systems, to allow direct formation **sensing from isolated and cemented intervals**
 1. Timer activated guns / with interlocks
 2. Wirelessly activated guns (new product development)



“By the application of CaTS technology, well testing no longer has to end at well suspension / abandonment. CaTS allows the acquisition of qualitative reservoir data from suspended and abandoned wells to make informed decisions to optimise developments, save cost and reduce risk.”

Distributed Fibre Optic Sensing (DFOS) Intervention

From deployment to evaluation to remediation, Distributed Fibre Optic Sensing Intervention gives you enhanced insight into your well

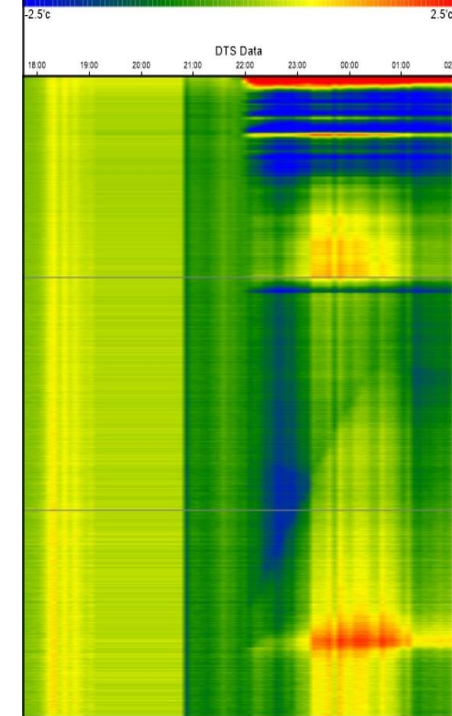
Distributed Fibre Optic Sensing (DFOS) Slickline allows well performance to be assessed over its entire length during a Slickline intervention.

Applications:

- Integrity assessment for length of well:
 - Leak detection
 - Behind casing crossflows
 - Overburden survey
- Production and injection profiling
- Pre-abandonment surveys

Features and Benefits:

- Easy to deploy
- Enables distributed temperature and acoustic sensing
- Monitors dynamic behaviour
- Fast processing of data on-site enables remediation to take place during the same rig up or intervention campaign
- Other logging tools can be deployed on the bottom of the DFOS Slickline to maximise the intervention opportunity



Deployment



Insight

Using thru-tubing fibre optic deployment to enable operators optimise their well stock in real time

Distributed Fibre Optic Sensing (DFOS) Intervention

Monitoring applications



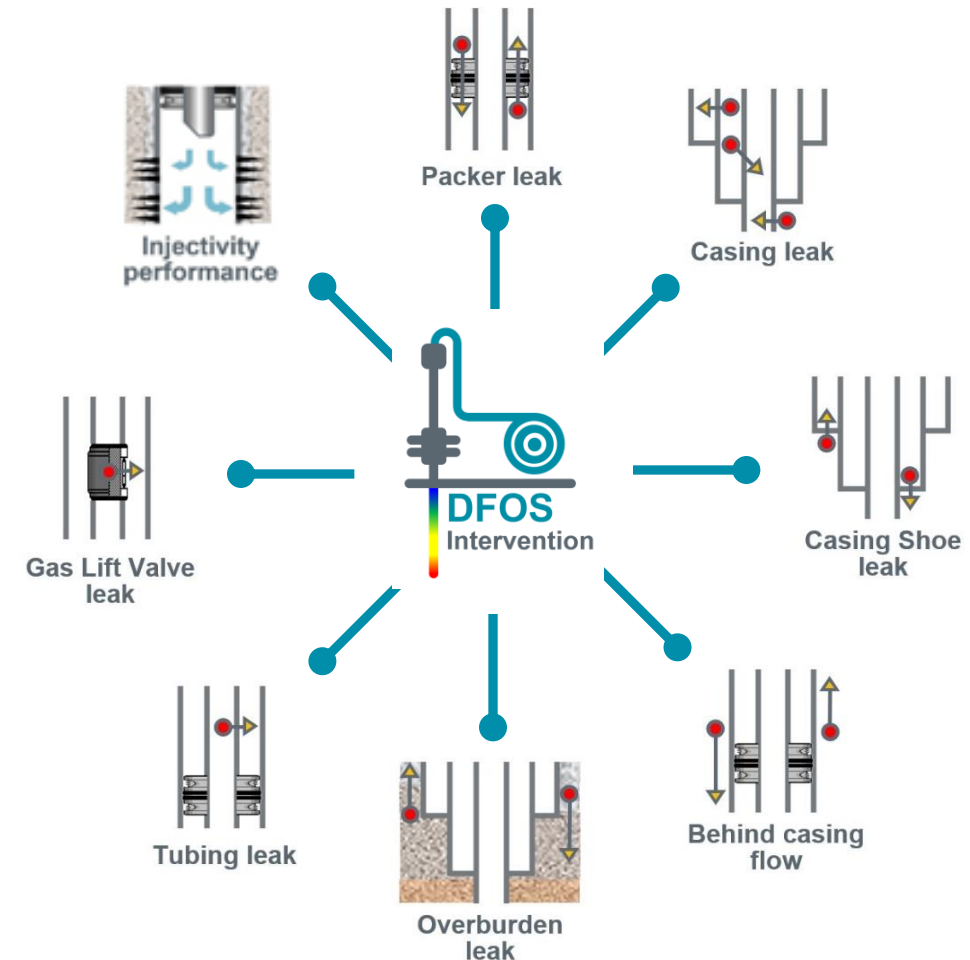
Multiple well integrity scenarios can be evaluated using distributed fibre optic sensing technology. Distributed fiber optic sensing technology has, however, predominantly been in the domain of permanent systems installed as part of the completion.



Well surveillance using thru-tubing deployed DFOS enables the identification and diagnosis of well integrity and flow assurance issues in wells where there is no permanent FO system installed or it is no longer in operation.



A typical in-well survey using DFOS takes less than 12 hours, with rapid turn around of the data at the well site enabling remediation activities to be executed during the same intervention campaign.



Summary

- Wireless gauge data enables monitoring of reservoirs and wells that was **previously impossible**.
- Technology advances delivers **more data and longer system life**, enabling greater risk reduction and further insight for future decision making.
- DFOS intervention enables **real-time DAS/DTS** across the entire length of the well (including reservoir)
- Advance data processing allows operational parameters to be changed immediately to improve well performance.
- Both systems enhance **reservoir characterization, well integrity assurance** and **performance optimization**.
- These technologies have **applications across the well lifecycle**, from E&A, development, operations and long-term post-abandonment monitoring and can support the wider MMV strategy.
- Both systems are fully commercialized and have extensive track record in oil and gas.

Insight



New technology



Thank You Questions?