

Leak Detection & TPI for a 72km CO₂ Injection Pipeline United Arab Emirates

The pipeline operators of a 72 km CO₂ pipeline wanted a fast and accurate leakage detection system and TPI (Third Party Interference) monitoring. AP Sensing's solution uses Distributed Temperature Sensing (DTS) for Pipeline Leak Detection and Distributed Vibration Sensing (DVS) for TPI ensuring maximum protection of this valuable infrastructure.

The pipeline transports CO₂, pressurized at roughly **278 bar**, which travels through the 8-inch pipeline with a flow rate of **16 MMSCFD** (one million standard cubic feet per day).



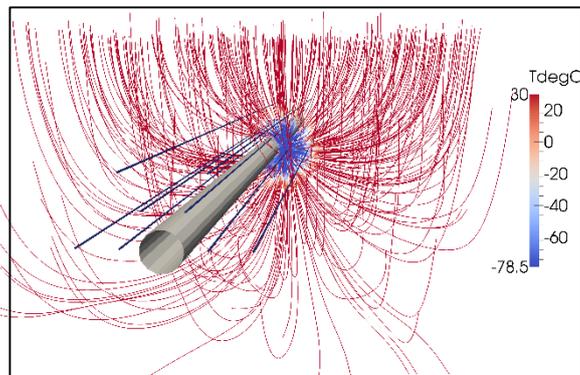
CO₂ pipeline exits the receiving station and proceeds 2 m underground

A **double-sheathed steel tape armored fiber optic sensor cable** using single mode fibers is utilized. The cable is then employed for the leakage detections, TPI system, and **Ethernet** and **SDH** (Synchronous Digital Hierarchy) connections.

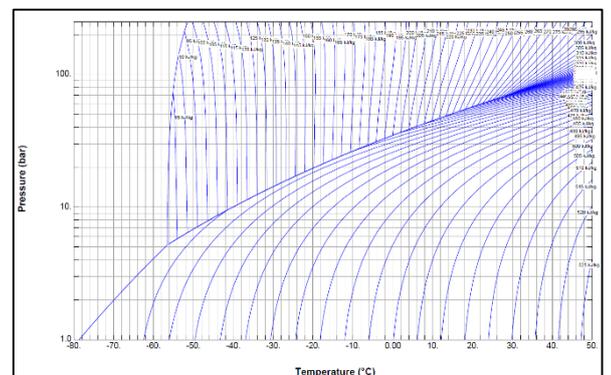


The AP Sensing Linear Pro DTS Distributed Temperature Sensing interrogator

The leakage detection system is based on the 3 AP Sensing DTS interrogators. Should a leak occur, a cold spot forms quickly along the pipeline, due to the **Joule-Thomson effect**. The pressurized gas meets the ambient pressure, the rapid decrease in temperature is detected by the DTS system, and an alarm is issued. The DTS (thermal) based leak detection method is particularly known for its outstanding POD (probability of detection) and low NAR (nuisance alarm rate).



AP Sensing's finite element modeling tool for leak-detection simulation



P/T graph for CO₂: Determining the physical state of transported materials

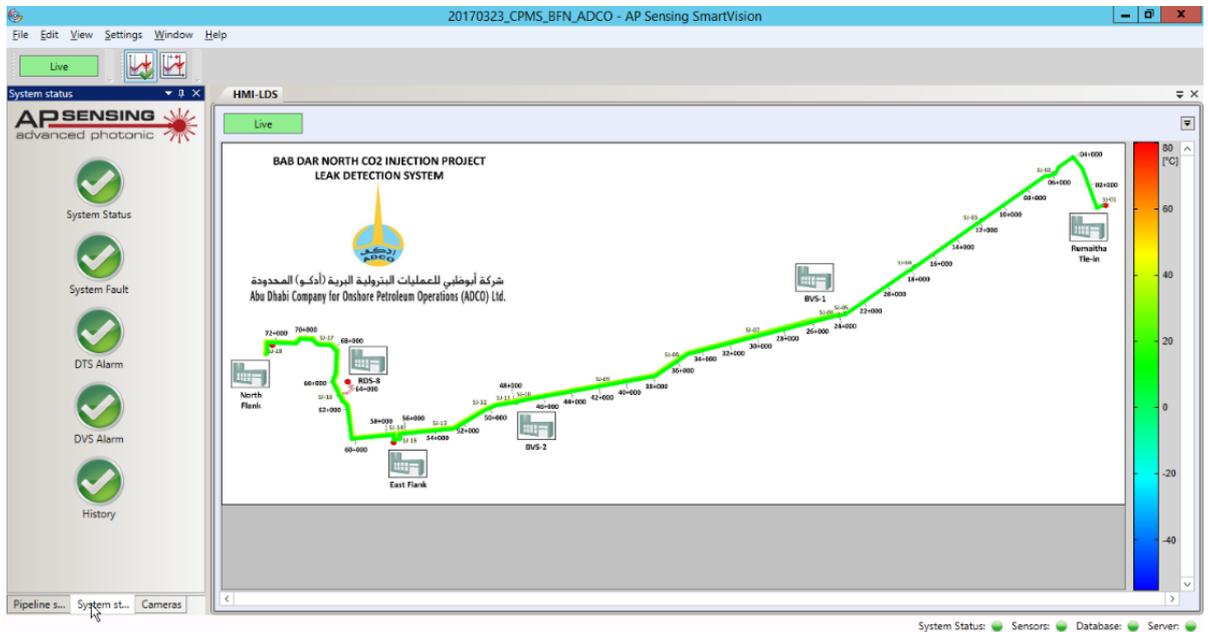
The DVS recognizes pre-defined acoustic and ultrasonic patterns. The DVS detects and issues alarms when acoustic patterns indicate **TPI events such as manual or machine digging**. When PIG maintenance occurs, the DVS tracks its progress through the pipeline.



System installation and configuration

The SmartVision™ database and asset visualization platform

SmartVision™ integrates monitoring data from all devices in real time, stores it and makes it available to multiple users at multiple locations. Operators are kept informed of all alarm conditions with a clear and intuitive graphical interface.



SmartVision: Graphical overview of the pipeline route

The main server for the leak detection system is located at the remote de-gassing station. SmartVision™ manages all of the temperature and vibration alarms.

Using its TCP/IP-based client architecture, SmartVision™ enables the SCADA/DCS platform to access the system and alarm status information.

With the AP Sensing solution – both DTS and DVS independent technologies are integrated into one screen ensuring that the CO₂ is reliably transported to the BAB Far North Flanks.

AP Sensing's experienced Project Management and Project Engineering team played a key role in managing the installation, commissioning and sensor cable splicing activities onsite.

The installation has been operating with no issues since it was installed, and plans are in place for future projects.

*AP Sensing SmartVision
in the remote control room*

