Leak Detection & TPI for a 72 km CO_2 Injection Pipeline

United Arab Emirates

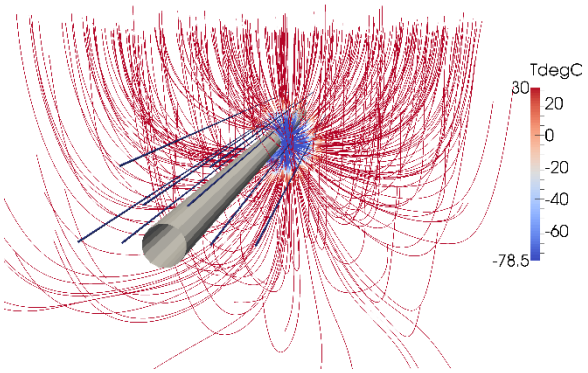
The operators of a 72 km CO_2 pipeline wanted a fast and accurate system for leakage detection and Third Party Interference (TPI) monitoring. AP Sensing's solution uses Distributed Temperature Sensing (DTS) for pipeline leakage detection and Distributed Vibration Sensing (DVS) for TPI, ensuring maximum protection of this valuable infrastructure.

The pipeline transports CO_2, pressurized at roughly **278 bar**, which travels through the eight-inch pipeline with a flow rate of **16 MMSCFD** (one million standard cubic feet per day).

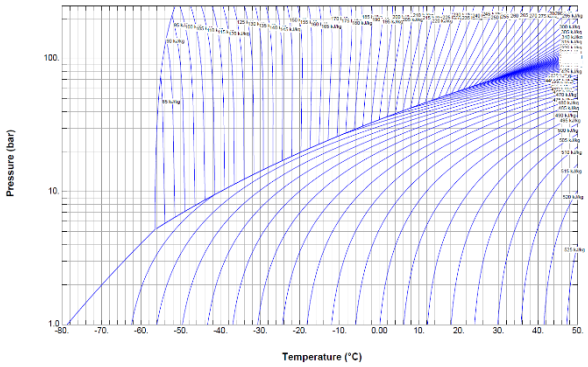
CO_2 pipeline exits the receiving station and proceeds 2 m underground

The installation uses a singlemode fiber optic cable, double-sheathed and steal armored. The cable is then employed for leakage detection, the TPI system, and Ethernet and Synchronous Digital Hierarchy (SDH) connections.

The leakage detection system is based on three 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 achieves the ambient pressure, the rapid decrease in temperature is detected by the DTS system, and the system triggers an alarm. The DTS (thermal) based leak detection method is particularly known for its outstanding Probability of Detection (POD) and low Nuisance Alarm Rate (NAR).



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



P/T graph for CO_2: Determining the physical state of transported materials

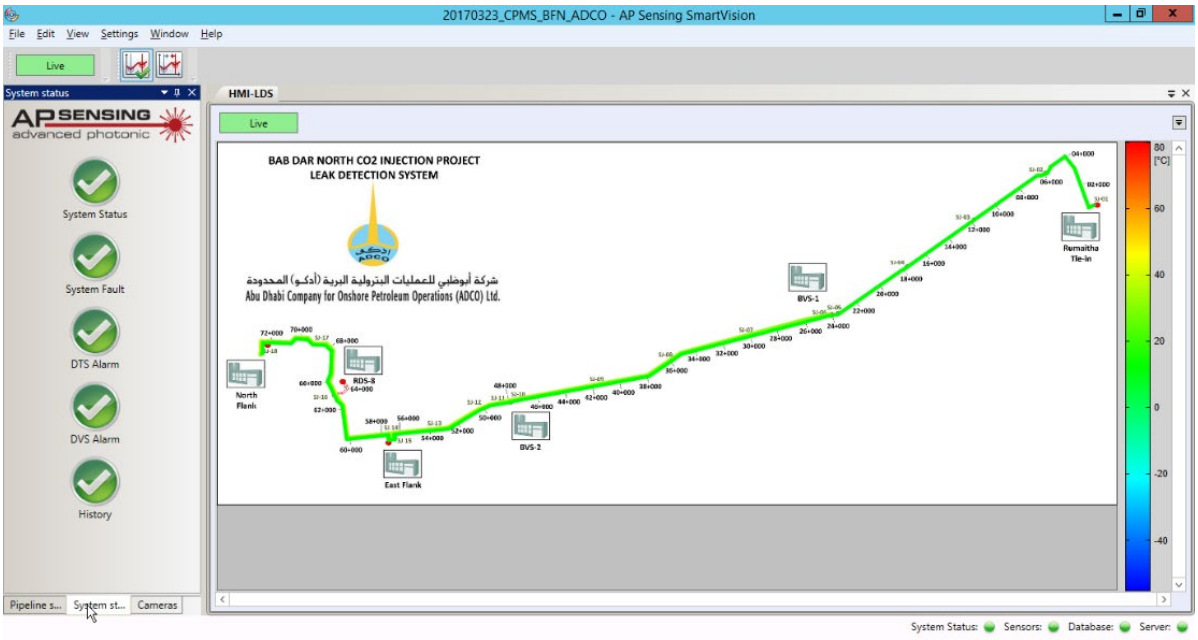
The two DVS units recognize pre-defined acoustic and ultrasonic patterns. The DVS system detects and issues alarms when acoustic patterns indicate **TPI events such as manual or machine digging**. When PIG maintenance occurs, the DVS tracks its progress through the pipeline.

System installation and configuration

AP Sensing SmartVision in the remote control room

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 various locations**. Operators are kept informed of all alarm conditions with a clear and intuitive graphical user interface (GUI).



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 CO_2 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.