



Ensuring the integrity of REN's gas pipeline

CGI helps Portugal's gas transport operator to advance their digital transformation to enable a safe, secure and sustainable future.



REN (Redes Energéticas Nacionais) seeks to be one of Europe's most efficient energy transmission system operators (TSOs) while creating shareholder value within a framework of sustainable development. REN operates two major business areas:

- The transmission in very high-voltage electricity and overall technical management of the National Electricity System.
- The transport of high-pressure natural gas and overall technical management of the National Natural Gas System, guaranteeing the reception, storage and regasification of liquid natural gas (LNG) and underground storage of natural gas.

REN Gasodutos operates the National Natural Gas Transport Network (RNTGN), which receives the natural gas at the Spanish border, as it leaves storage facilities (REN Armazenagem) or at the regasification terminal (REN Atlântico) and delivers it to distributors or high-pressure end users. REN Gasodutos holds the concession for the high-pressure transport of natural gas, which includes overall technical management of the National Natural Gas System, through which it coordinates the operation of natural gas distribution and transport infrastructures, which guarantee the continuity and security of supply.

Gas pipelines are integral to Europe's energy transport infrastructure and increasingly strategic. Efforts are underway to expand Europe's capacity to receive LNG from the U.S. and elsewhere, and there is a growing desire for pipelines to transport hydrogen throughout Europe.

REN's gas pipeline is a critical infrastructure in Portugal, and pipeline integrity is key to meeting energy demand in a safe, secure and sustainable manner. Failures can cause serious harm to the environment, societies and economies.

CGI has been a trusted partner to REN Gasodutos since 2015, working in strategic areas such as pipeline integrity management, including software, systems and data integration, and aerial inspection services along the right-of-way to detect potential methane leaks or third-party interferences. Our track record of delivery and continuous innovation has earned us a reputation for managing complex challenges well and adding value at every step.

Advancing REN's digital transformation journey

REN's 1,400-kilometer gas pipeline network was built in the late 1990s and early 2000s. Regulatory compliance requirements and potential risk issues awareness lead to effective plans for managing and mitigating such risks. This required digitizing REN's asset inventory data (e.g., pipeline materials, diameters, locations, etc.) as well as situational data about potential interferences near the pipeline (e.g., construction, buildings, trees, stream crossings, etc.). REN also needed to factor in the population data and wind information required for proper risk models, and have the ability to integrate this information with other systems.

Pipeline integrity management

CGI implemented and has maintained REN's Pipeline Integrity Management System (PIMS) since 2016. PIMS supports REN's very complex, strategic business objective to monitor pipeline conditions and to maintain pipeline safety for methane and in the near future also for hydrogen transport. Key business needs, goals and functions supported by CGI, include:

- To optimize and efficiently manage infrastructure security, in compliance with national regulation and line with best practice.
- To manage pipeline risk and ensure safe operations with as little environment impact as possible.
- To restrict third-party interference on the right of way.
- To keep a proper risk model up to date, supported by effective data collection from periodic observation and analysis of leak detection and demographic evolution.
- To operate the PIMS to support the risk model.
- To operate an integrated information systems architecture, supporting asset management.

Risk modeling

REN uses two risk models (quantitative and qualitative) and runs the data in PIMS to recalculate these risk models. The advanced PIMS software allows categorizing risk by pipeline segments, each with an assigned risk weight.

GIS application management

CGI manages the ESRI ArcGIS location intelligence software as the base for storing this information. We also developed the mobile GIS application, including both geographic and schematic (process flow diagram) modes.

Data management and integration

We created a digital repository of REN's asset inventory, built the data model and prepared the data. We now provide inspection and data management services on top of this platform in addition to integration services. As the developer of PIMS, we provide a unique capability to integrate the systems and data with other systems, such as the IBM Maximo enterprise asset management system.

“REN relies on CGI as a trusted provider of our critical pipeline integrity services, including state of the art aerial inspections. Their operational excellence and ongoing innovation help us fulfill our strategic objectives of digital transformation and realizing an integrated platform to automate processes as much as possible.”

Carlos Pires de Sousa

Asset Integrity Management (REN)

Aerial inspections

Since 2018, CGI has provided REN with aerial inspection services via helicopter to detect gas leaks and third-party interferences and to inspect points of periodic observation.

Any natural or man-made interference can cause potential issues along the pipeline right-of-way (e.g., root growth from large trees, fires, erosion, traffic, earthworks, etc.) Our services provide critical information that allows REN to implement risk mitigation actions in their infrastructure.

The aerial service uses advanced laser methane absorption sensor technology from our partner Pergam-Italy. It detects leaks by emitting a laser at a particular wavelength and analyzing the light reflection to determine how much was absorbed by the methane leak plume.

This methodology is used by REN to reduce methane emissions in alignment with the OGMP 2.0 (Oil & Gas Methane Partnership), that REN is a member of, thus contributing to the sustainability objectives of the RE Group.

REN also conducts inspections by foot or vehicle to detect critical situations; however, aerial inspections offer several advantages, including:

- Works where land inspection is impossible
- Is faster than ground inspection (the entire network can be done in just 4 days)
- Is lower cost than ground inspections
- Provides regularly spaced high-resolution videos to identify anomalies

The video recordings enable analysis of notable points, including those not visible or difficult to access. All situations requiring eventual field intervention are recorded. Following a flight campaign, CGI updates the status of notable points, integrates the data into the PIMS and GIS and updates the risk model.

Operational excellence and ongoing innovation

Setting up a program like this takes superior planning, organization and expertise to deliver consistent outcomes. Fundamental to our partnership with REN is our continuous commitment to add value by proposing innovative and world-class solutions. It is one reason REN chose us to support their mission to guarantee the safety of gas pipelines, at a national level.

For example, we are proposing a full-range of complementary inspection approaches, including the use of drones and satellite data. Satellite data with intelligent analytics for change detection and features identification, as well as for specialized methane leaks detection, will enable more frequent monitoring and analysis to detect issues faster and at lower cost.

For human intervention, technology is advancing as well. When REN sends teams out for field inspection, findings from remote sensing inspections can be sent through the mobile platform for field verification.



About CGI

Insights you can act on

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world.

We are insights-driven and outcomes-based to help accelerate returns on your investments. Across hundreds of locations worldwide, we provide comprehensive, scalable and sustainable IT and business consulting services that are informed globally and delivered locally.

[cgi.com](https://www.cgi.com)