

A digital twin for gas distribution networks

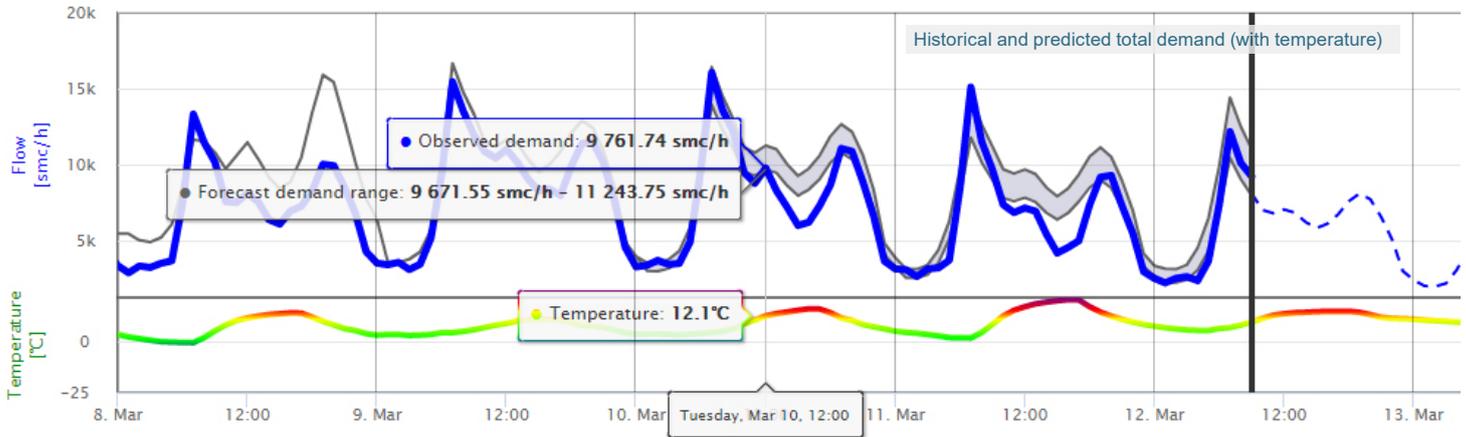
Sim-On Gas

Sim-On Gas is a web platform for the optimal management of gas distribution networks. The application integrates a fluid dynamics simulation engine with datasets arriving from SCADA and smart meters; this creates a digital twin, where the real-time behaviour of the network is replicated in a virtual environment.

This modelling technology gives operators a complete view of their assets' performance by building upon real-time SCADA data to simulate each node, pipe, Meter and Regulation Station (MRS), Distribution Pressure Regulator (DPR) and valve on the system.

In addition to representing the status in real-time (nowcasting), Sim-On Gas allows you to forecast any adverse events by simulating future conditions, both automatically and on-demand. Future maintenance operations can also be included in forecast simulations and their effects tested in advance.

Sim-On Gas has been designed to meet the needs of operational teams; the software is accessible via web browsers from desktops or mobile devices. It is intuitive, user-friendly, and allows control room staff or field operators (even without any previous modelling experience) to manage the system, assessing any possible consequences of ordinary and extraordinary maintenance programmes or unexpected low pressure conditions.



Calculation functions

- > An automatic calculation of the network status is made at regular intervals, starting from the flow rate and pressure values measured at the remote control gauges, from which the current total demand of the system and the MRSs and DPRs settings are derived.
- > Total demand forecast is calculated at hourly intervals, for 48/72/96 hours ahead, based on a combination of the temperature forecast and the past flow trend measured at MRSs.
- > Test simulations can be performed enabling users to modify some network conditions:
 - opening or closing of valves
 - pipeline flow interruptions
 - creating bypasses
 - inserting mobile gas cylinder trucks
 - changing calibration settings for MRSs and DPRs.
- > It is possible to connect the hourly consumption data of large remote-managed users to the simulation system in order to accurately represent the consumption of the most demanding users.
- > The Sim-On Gas simulator imports offline calibrated models developed previously for planning purposes and connects them to data coming from SCADA systems.
- > Sim-On Gas can be set to send alert emails triggered when anomalies are detected or expected in the network or when insufficient pressures are forecast in any part of the system.

Applications

- > The main objective of Sim-On Gas is to support gas distribution network managers and operators. Its added value lies in the integration into a single georeferenced and easy-to-access platform that automatically combines all your SCADA and smart metering data with hydrodynamic modelling.
- > Managers always have access to an up-to-date baseline of simulation modelling results that enables them to check, in real-time, the status of their distribution system.
- > Reports can be extracted for the DPRs and MRSs, e.g. you may accurately reconstruct the flow rate (derived values, obtained from the simulation) which passed through each device during the entire annual management cycle.

- > The modelling team will, in turn, benefit from the Sim-On Gas system, by continuously monitoring the actual reliability and calibration level of the background model loaded into the system.

Interface

- > Sim-On Gas is installed on company servers and end-users enter the system through a web browser interface. This eliminates the need to install and update the software on every computer used by your staff to access the system.
- > Sim-On Gas is designed to be deployed quickly, allowing you to benefit from the application almost from day one.

