

Swedegas Successfully Implements PSI System for Tracking Gas Quality



In the first step, the project team defined a relatively precise model of the transport system. From left to right: Klaus Arnold (PSI), Wilhelm Terlau (PSI) and Emil Nilsson (Swedegas).

The Swedish transmission gas grid operator (TSO) Swedegas monitors fluctuating gas qualities in its network closely with PSIganesi. This will benefit both Swedegas and its gas customers. Firstly, it will enable more accurate billing; secondly, gas consumers can adjust their plants more efficiently to volatile fuel values.

Swedegas was established in 1976 as a subsidiary of Vattenfall with the aim of establishing the supply of natural gas in Sweden. In the 40 years of its existence, the company has developed into an integrated TSO and storage facility operator.

Its headquarters are located in Gothenburg. The 601 kilometre long pipeline network stretches from Dragor in Denmark to Stenungsund in Sweden. In the last few years, Swedegas has delivered on average 1.2 billion Nm³ of natural gas per year to local distribution network operators and industrial end users in Sweden's southwest. Swedegas supplies natural gas to 33 cities and several heating power plants. In addition, it is used in around 37 000 households and partially in the transport sector.

Gas produced in Denmark is fed into the Swedegas transport network in Dragor. Danish North Sea gas is also transported to Germany via a further pipeline connection. Furthermore, Swedegas also owns a gas storage facility with a storage capacity of 105 GWh.

Swedegas will play a leading role in the further development of the Swedish natural gas industry. Plans to build a terminal at Gothenburg's port for landing liquefied natural gas (LNG) are

currently being considered, for example. There are also plans to construct an additional infeed station and a downstream regional gas distribution network in the region of Gävle, north of Stockholm. In addition, large-scale biogas production will also be supported.

Transport network operator and system balance administrator

In 2012, Swedegas was certified as transport network operator for the Swedish gas market in accordance with the Swedish Gas Act and the EU directive. In June 2013, Swedegas also took over the task of system balance administrator (SBA), a role previously fulfilled by Svenska Kraftnät, a Swedish government agency that monitors the Swedish electricity network.

The infrastructure

The Swedegas pipeline system is located on the west coast of Sweden and comprises a total of approx. 601 km high-pressure pipes with 43 measuring and control stations. The network infrastructure in operation is on average 25 years old.

Different gas qualities

The quality of the gas flowing from the Danish North Sea to Sweden was constant for many years. However, as a result of changed gas flows implemented in the autumn of 2010, the imported natural gas has since been a mixture of North Sea gas and gas infeed from Germany. The different compositions have consequences for the Swedish distribution network operators and gas consumers. Furthermore, two large biogas plants (in Trelleborg and Gothenburg) also feed gas into the transport network, again slightly changing the quality of the natural gas.

Swedegas assumes that the quality of the gas supplied via Dragor will vary more in the future than it has done in the past. The reason for this is that natural gas from the North Sea is increasingly blended with high calorific Russian natural gas fed into the Swedish transport system via Germany. It is also to be expected that many more biogas plants will be connected to the Swedish natural gas transport network.

System for tracking gas quality

This increases the need to know the quality of natural gas at every delivery point. To date, the heating value is determined on the basis of the monthly average at the infeed point in Dragor. This method is considered inadequate with regard to both billing and in relation to the efficient control of industrial processes.

The project recommendation was to implement gas quality tracking to calculate the heating values for every exit point in the transport network and to use them for billing purposes. The contract with PSI for the implementation of the gas network simulation *PSIganesi* was signed in June 2015.

With the help of powerful simulation tools that are provided with the software package, Swedegas can now provide industrial customers with accurate quality forecasts. This enables the companies to better plan and adapt their natural gas-based processes. In addition, gas quality tracking provides important information for managing delivery bottlenecks and provides decision making support in emergency situations.

Implementation of tracking for natural gas quality

The project for implementing the PSI software to track the quality of natural gas began in August 2015. In the first step, the partners defined a relatively precise model of the transport system. In the second step, measurement values such as pressure, flow, natural gas composition (using gas chromatography), valve positions, etc., were adopted from the existing SCADA system. An OPC connection was set up between Swedegas and PSI in Essen (Germany) to enable system and model changes implemented by PSI to be tested using process data from the SCADA system installed in the IT environment at Swedegas. This communication tunnel was a great success as it streamlined project work considerably and made progress with the implementation easier.

Successful completion of the project

In June 2015, Swedegas and PSI had agreed on an ambitious timetable that was adhered to thanks to strict project management. A working model of the system was already available in November 2015. The interface to the billing system was subsequently taken into operation and fine-tuning performed on the model. To this end, the gas quality values calculated were compared with the values measured in the gas chromatographs installed in the transfer line.

The project was successfully completed in January 2016. Swedegas plans to use the gas quality tracking system for commercial billing and accounting from October 2016. Thanks to the success of the joint project with PSI, Swedegas will soon be able to reliably provide its customers with gas quality data at every exit point of the transportation network.