



TIMS

Technical Infrastructure Management System



TRANSITION
TECHNOLOGIES

gasLUX

gasLUX Framework

GLS Framework & GUI Dashboards Workflows Doc Repo Organizer

Commercial processes [COMS]

SMS Management

GCC Communication

BRS Invoicing

Technical processes [TIMS]

EDS, TAMI, NF, PDMS Information

COS, PSOS, AGFS Simulation

SOE, CEP Optimization

vSMS Management & Optimization

The The gasLUX product family is designed for customers active on gas market as gas storage operators (SSO) and/ or as transmission system operators (TSO). The product family supports transparency, flexibility and availability along all commercial and technical processes with state of the art management, information, simulation and optimization features. Modular and usable gasLUX products cover wide range of areas from marketing, via commercial and technical operations with maintenance, up to invoicing of gas products.

The solutions developed within the gasLUX product family become a firm foundation for further development of IT-systems in the gas sector, such as the Logistics Management System (LMS) for supporting the LNG business. gasLUX products are being developed in accordance with the major Green Deal trends. Flexible architecture of the solutions allows considering ongoing changes, including dynamic implementation of hydrogen-based technologies.

gasLUX main qualities



User-friendly

Modular structure providing flexible configuration. Access for every user to all functionalities via WWW interface. User configurable dashboards for data presentation.



Safe

Safety provided by solid system's architecture and advanced management solutions for users' authorisation.



Auditable

System records all important system's activities and users' actions in one Log.



Scalable

System's architecture allows the extension of system usability range (new users, data input, etc.).



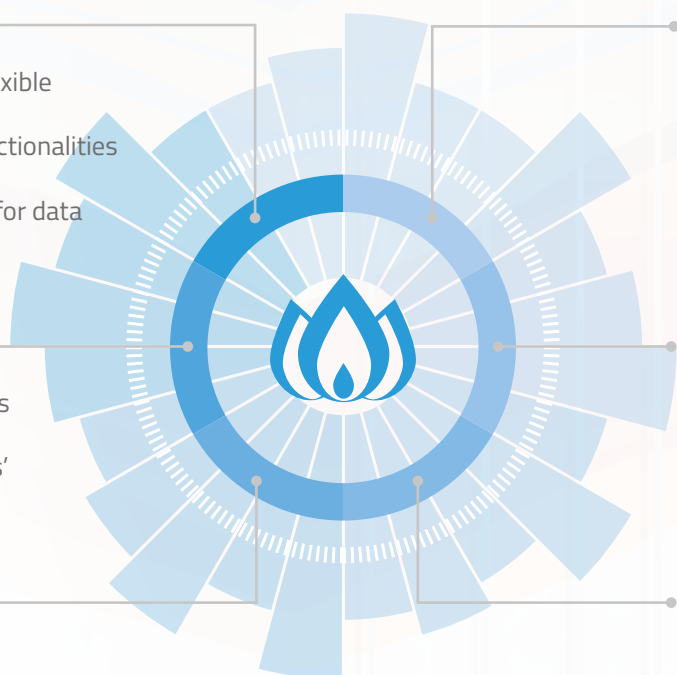
Flexible

Possible implementation of further functional enhancements in case of new requirements.



Always ready to use

Availability and reliability of system results from utilized proven technologies.



gasLUX framework functions



Common and consistent web-based GUI for all gasLUX products

The gasLUX framework provides access to all functional modules within one web-based graphical user interface, accessible from the corporate network.

Coherent user management

The gasLUX framework offers a unified mechanism of authorisation and management of users' access, with possibility to create and manage groups of users.

Dashboards

Special module for visualizing results with fast access for all current and archival data, with visual comparison analyses of key performance indicators (KPIs). Easy individual set up for every user.

Automatic workflows execution

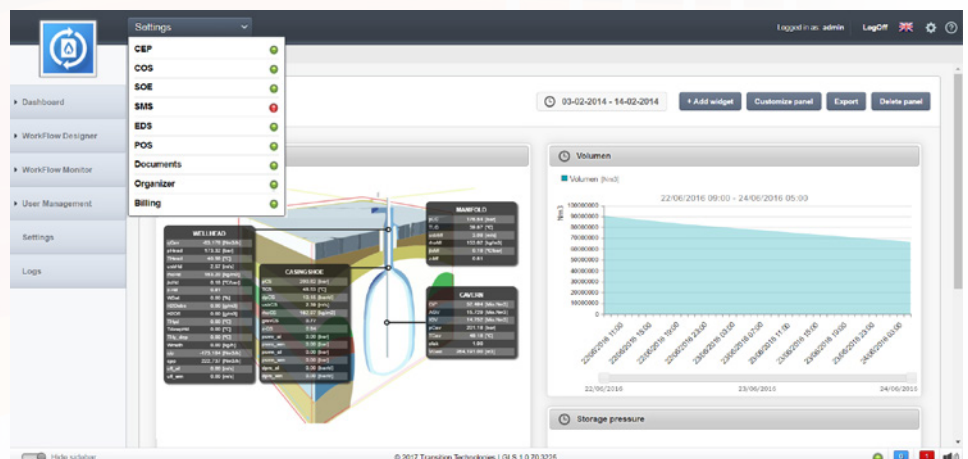
System allows to configure and execute workflows between gasLUX modules automatically, integrating their individual functionalities.

Common documents repository

All important documents related to gas storage management e.g. system reports, contracts data as well as invoices, etc. are stored in a common documents repository accessible via GUI.

Audit logs related to all modules

Fast audit of the operations performed by the system and its users.



gasLUX screenshot

Technical Infrastructure Management System [TIMS]

TIMS is a modular and configurable IT solution, which supports variety of decision-making processes and goals, related to the technical execution of gas nominations. It allows complex, technical management of underground gas storages and transmission networks technical installations.



Information

- Access to current and archive measured process data and KPI's evidence
- Availability and status of each technical installation component
- Maintenance plans including equipment shutdowns
- Reports of performance parameters, indicating quality and efficiency of realized processes
- Simulation results of underground and above ground equipment
- Analyses of gas storage and transmission optimization results
- Current and projected costs associated with execution of incoming nominations

Simulation

- Estimation of future technical capacities to execute nominations
- Calculation of operational costs for each equipment (e.g. compressors)
- Provision of data for decision-making process, related to execution of nominated gas flow
- Technical verification of nominations considering current and predicted technical installation state
- Monitoring of parameters of geological structure

Optimization

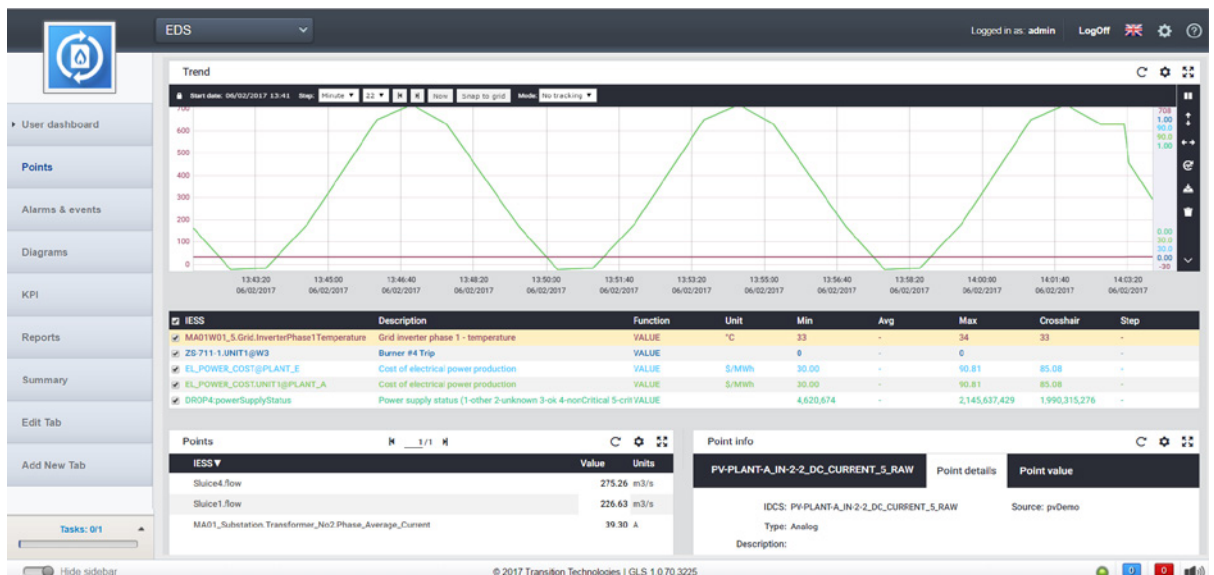
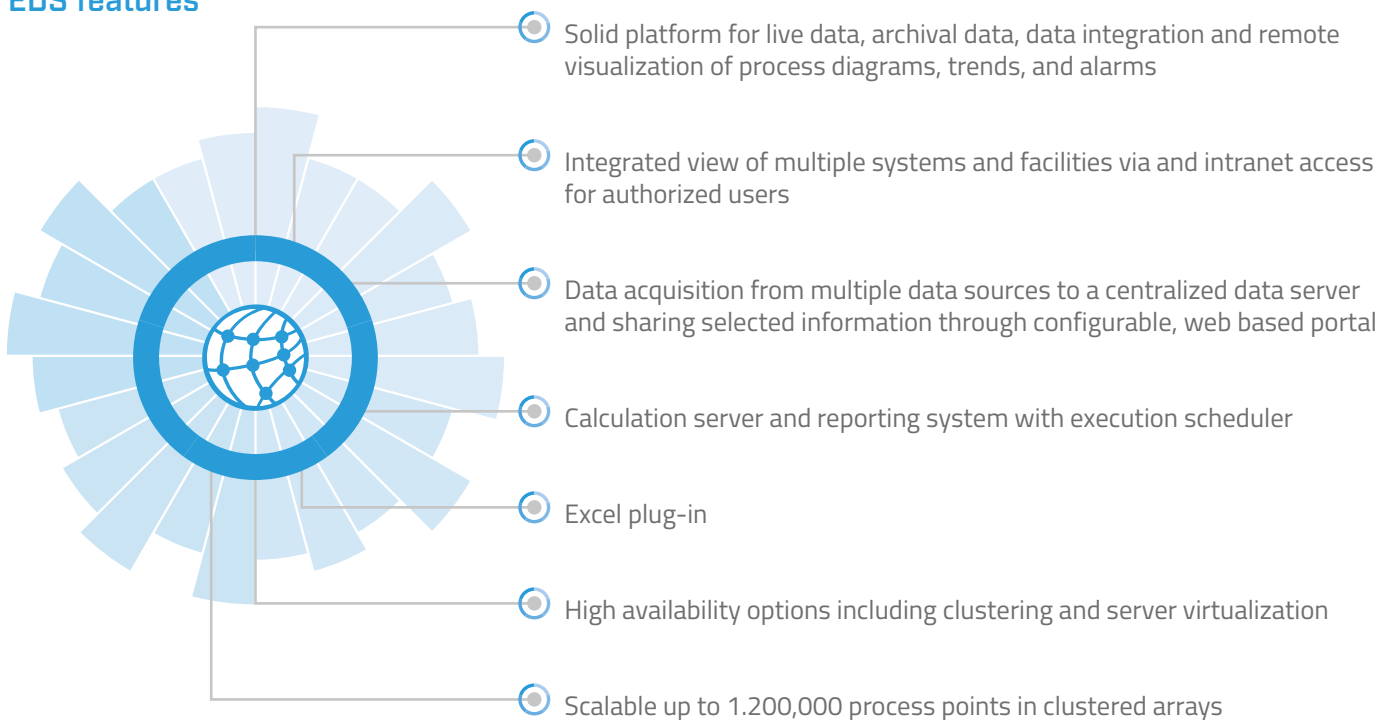
- Ensuring technical feasibility of nominated gas flow profile, considering current state of technical installation
- Minimizing the operational schedule's execution costs through evaluation of the optimal combination of utilized equipment (optimal gas path)
- Preparation of short-term and long-term reports for cost-optimal distribution of nominations to available installation components
- Ensuring safety of operations through consideration of complex technical constrains of the installation

Enterprise Data Server (EDS)

EDS is a comprehensive Information System for collecting, validation, processing and monitoring of data that allows analyses of current and past process information from anywhere within your corporate network. EDS information is gathered from control systems, as well as other technological object data sources into one database and is presented in process diagrams, alarm lists, trends, and reports.

The module provides required, up to date information on technological processes to wider range of users for better monitoring and transparency of operation. EDS is a dynamic product with huge number of references and users. It has been updated and maintained continuously (Software, Hardware, Cybersecurity).

EDS features

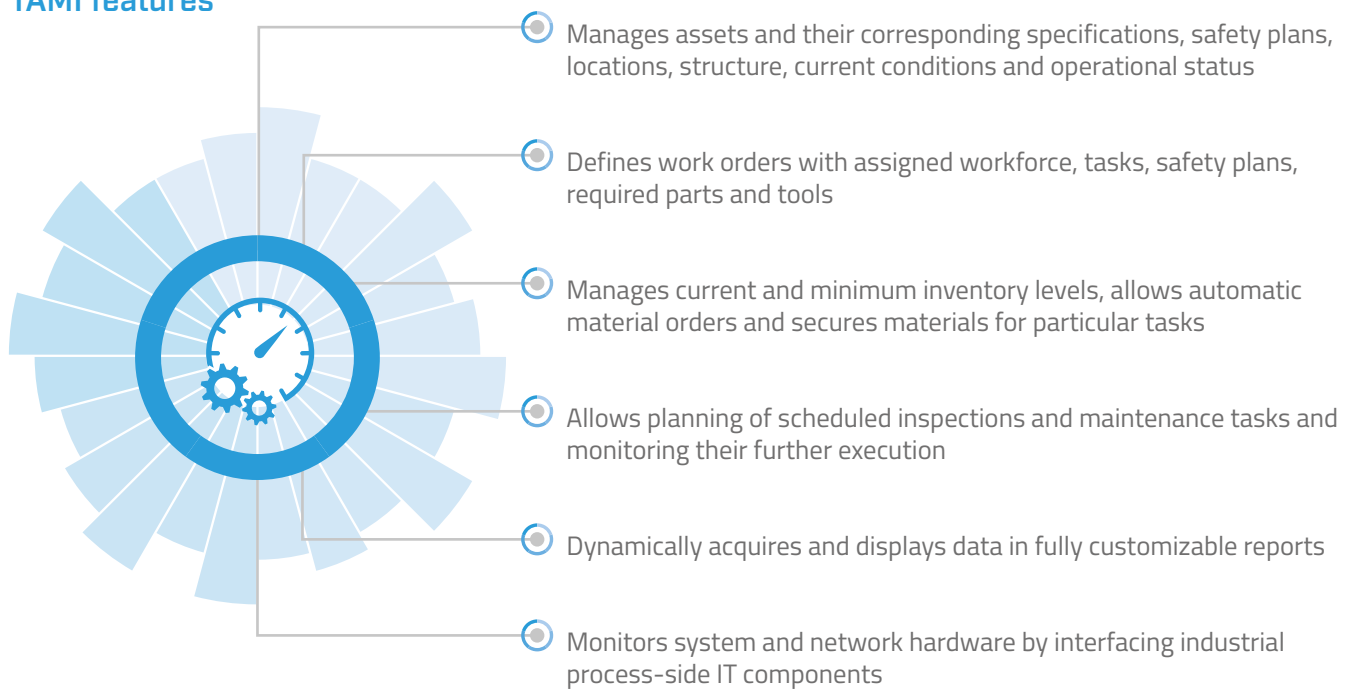


Technical Asset Management & Information (TAMI)

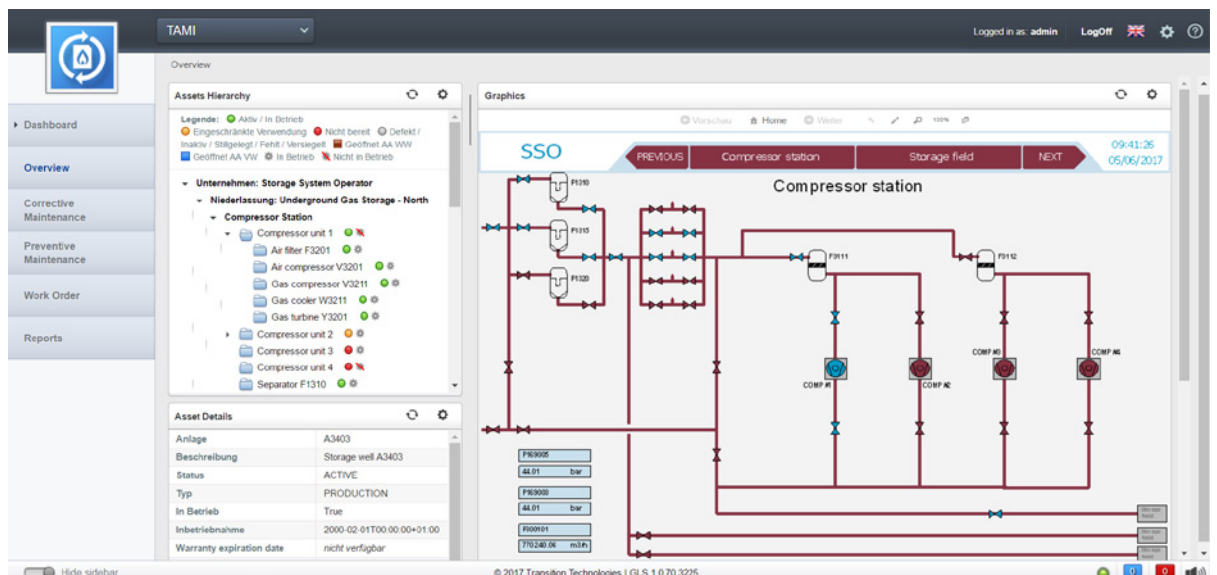
TAMI is a modern, fully featured solution for monitoring and management of technical assets. Its uniqueness consists in utilizing on-line, operational data for the real-time assets monitoring and maintenance workflows automation. TAMI's role is creating a bridge between process data and technical assets. With the integration of user interface into that consistent information environment, there is a common space for all 3

areas. Thanks to full integration with CMMS products, such as IBM Maximo, complete information flow is assured with regard to technical asset management execution. The implementation of TAMI and its modules enables higher Return on Assets (ROA), contributes to increasing the site's productivity and efficiency. Costs of Maintenance, Repairs and Operations can be reduced by 10-25 %.

TAMI features



TAMI
screenshot



The screenshot displays the TAMI software interface. On the left is a navigation sidebar with options like Dashboard, Overview, Corrective Maintenance, Preventive Maintenance, Work Order, and Reports. The main area is split into two panels:

- Assets Hierarchy:** Shows a tree structure for 'Unternehmen: Storage System Operator' and 'Niederlassung: Underground Gas Storage - North'. It lists various assets like 'Compressor unit 1', 'Air filter F3201', 'Air compressor V3201', 'Gas compressor V3211', 'Gas cooler W3211', 'Gas turbine Y3201', 'Compressor unit 2', 'Compressor unit 3', 'Compressor unit 4', and 'Separator F1310'. Each asset has a status indicator (green, yellow, or red).
- Asset Details:** Provides information for asset 'A3403', including description 'Storage well A3403', status 'ACTIVE', type 'PRODUCTION', and in-service date '2000-02-01T00:00+01:00'.
- Graphics:** Displays a process flow diagram for a 'Compressor station'. It shows various components like 'F1310', 'F1311', 'F1312', 'COMP M', 'COMP E', 'COMP S', and 'COMP N' connected by pipes and valves. A legend at the bottom identifies symbols for pressure (P), alarm (AL), and motor (M).

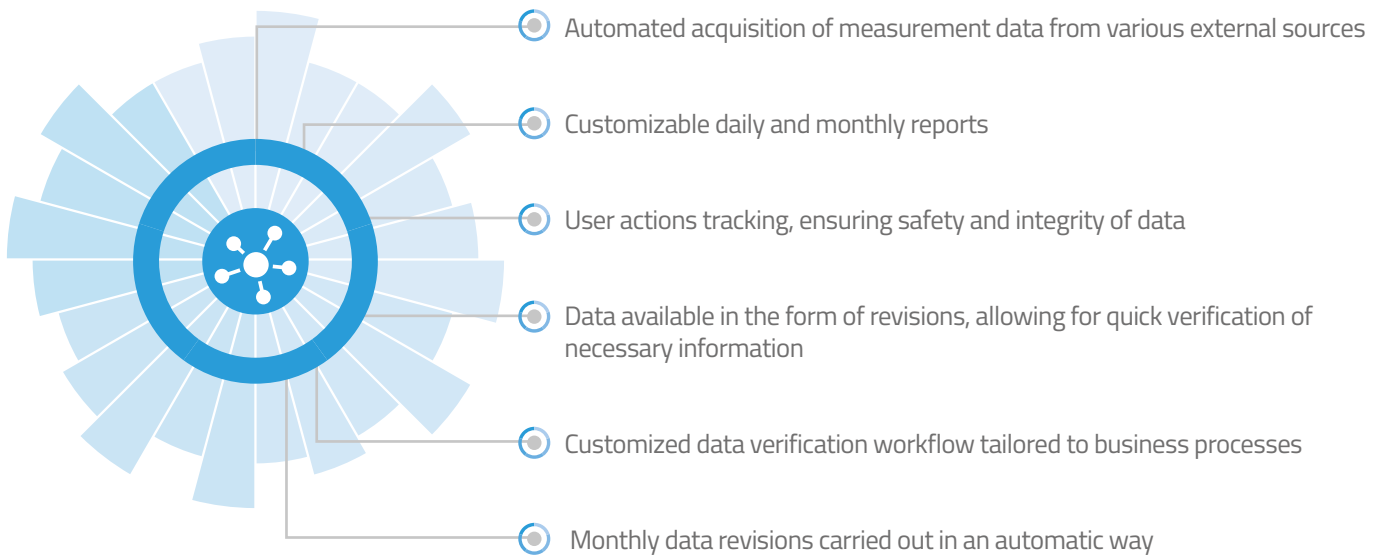
The interface includes a top navigation bar with 'SSO' and 'Compressor station' tabs, and a bottom status bar with '© 2017 Transition Technologies | GLS 1.0.70.3225'.

Process Data Management System [PDMS]

The main task of PDMS module is to acquire processing data from an automation system and to support a controlled process of proportional distribution of gas between devices of the technical installation. In case of any interruptions or measuring point failures, the module supports manual data corrections. Safety of the data is relevant, therefore any change of data is registered in the module in a form of data revisions, ensuring data continuity and history of both

raw and corrected data. PDMS provides convenient and easy to edit daily and monthly reports, gathering the most important information facilitates everyday work. The module functionalities also allow it to be used in other industries. Additionally, PDMS can be used as a data collecting and verification tool before sending data to other systems, where data correctness is crucial.

PDMS features



The screenshot displays the PDMS web interface. At the top, there's a navigation bar with the PDMS logo, a dropdown menu, and user information (Logged in as: admin, LogOff, and a settings icon). Below this is a sidebar with navigation options: User dashboard, General daily data, Well daily data, Monthly data, and Status & reports (which is currently selected).

The main content area is divided into two sections: 'Daily report' and 'Monthly report'. Each section has a date selector, a status dropdown (set to 'Approved'), and several action buttons (Import new data, Start allocation, Preliminary report, Final daily/monthly report, Export daily/monthly data). Below these are tables of report modifications.

Modification Date	Username	Gas Day	Action Type	Status	Comment
08/01/2020 14:45:51	admin	19/12/2019	Status changed from verified to approved	Success	
20/12/2019 12:22:39	admin	19/12/2019	Status changed from provisional to verified	Success	
20/12/2019 12:22:34	admin	19/12/2019	Daily report allocation	Success	
20/12/2019 09:19:01	admin	19/12/2019	Session created	Success	

Modification Date	Username	Gas Day	Action Type	Status	Comment
08/01/2020 14:45:51	admin	12/2019	Status changed from verified to approved	Success	
08/01/2020 13:22:46	admin	12/2019	Monthly report correction	Success	
08/01/2020 13:17:37	admin	12/2019	Status changed from provisional to verified	Success	
02/12/2019 08:15:37	admin	12/2019	Session created	Success	

At the bottom of the interface, there's a 'Tasks: 0/0' indicator, a 'Hide sidebar' button, and a footer with copyright information (© 2020 Transition Technologies | GLS 3.2.0.1) and system icons.

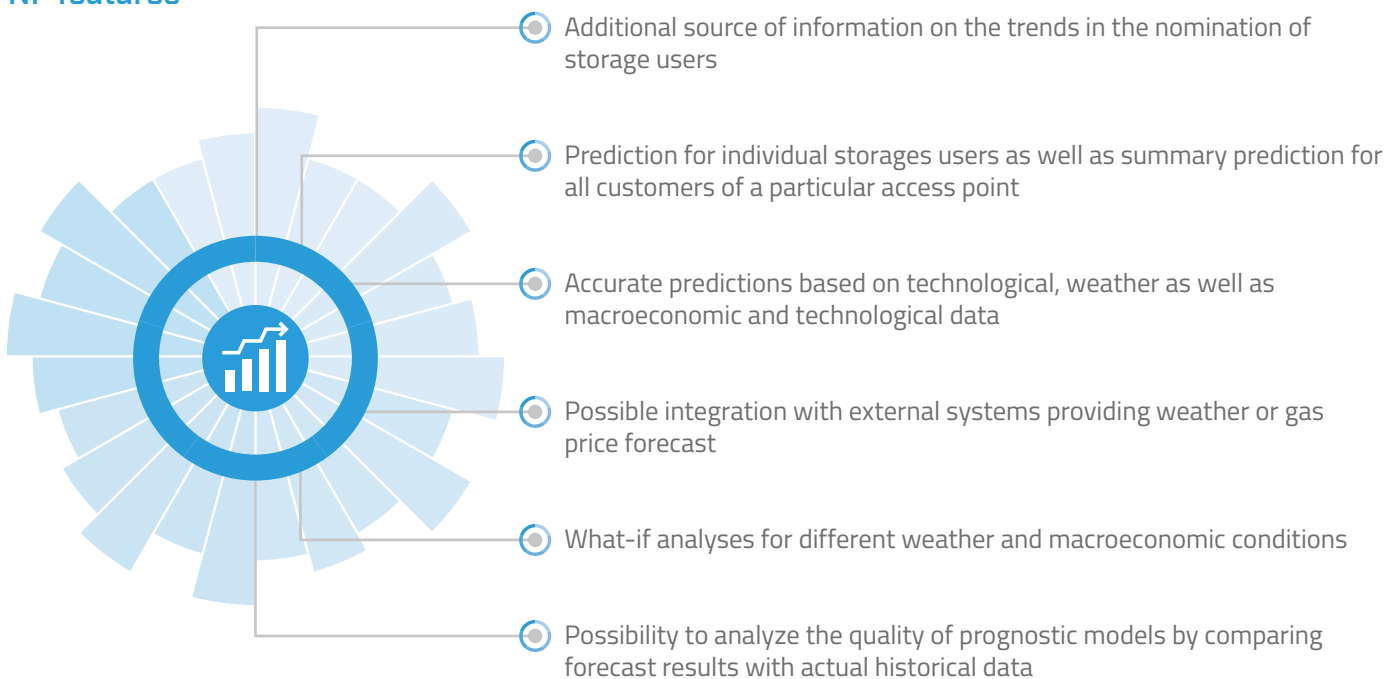
PDMS screenshot

Nomination Forecast [NF]

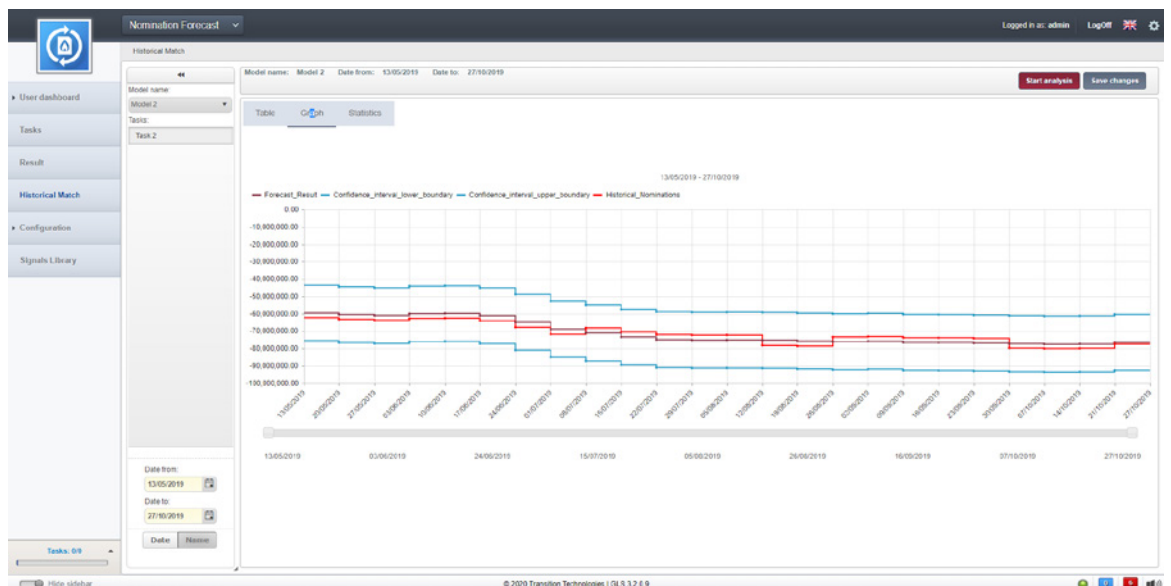
The Nomination Forecast is used to forecast the nominations of underground gas storage facilities or gas transmission networks users, based on the advanced forecasting models (linear or neural networks). The created models allow estimating the value of the nominations over a long time horizon (maximum 1 year), which can be used for long-term planning of installation

operations. The results represent the forecasted nominations in the weekly aggregation presented together with the confidence interval of the model. User has the possibility to compare forecast results with real data and analyze them based on a number of statistical data provided by the system.

NF features



NF
screenshot

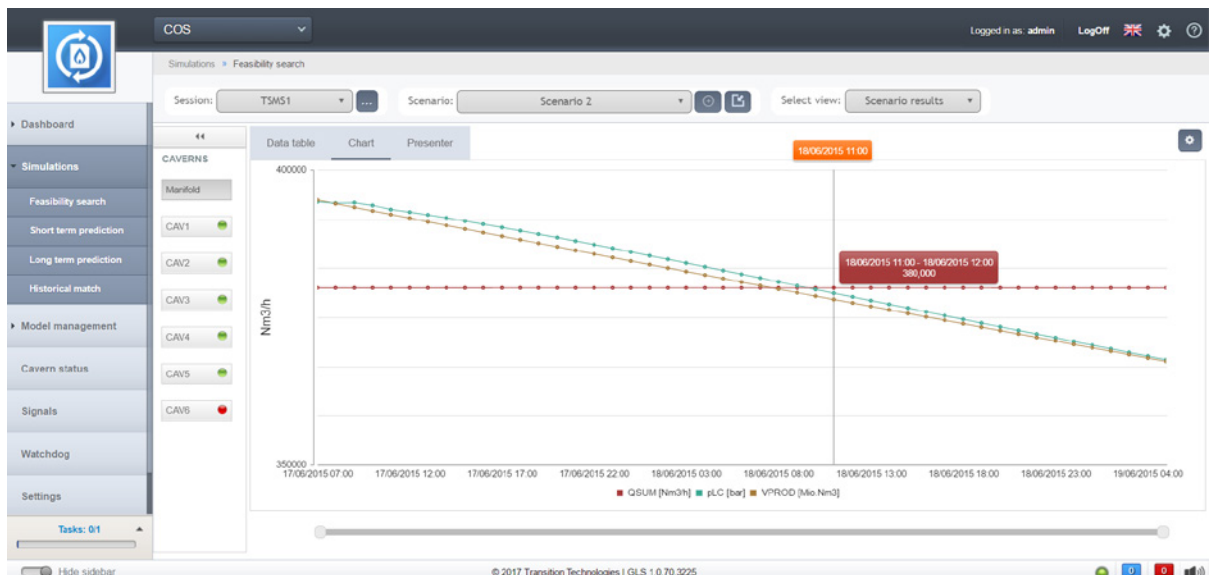
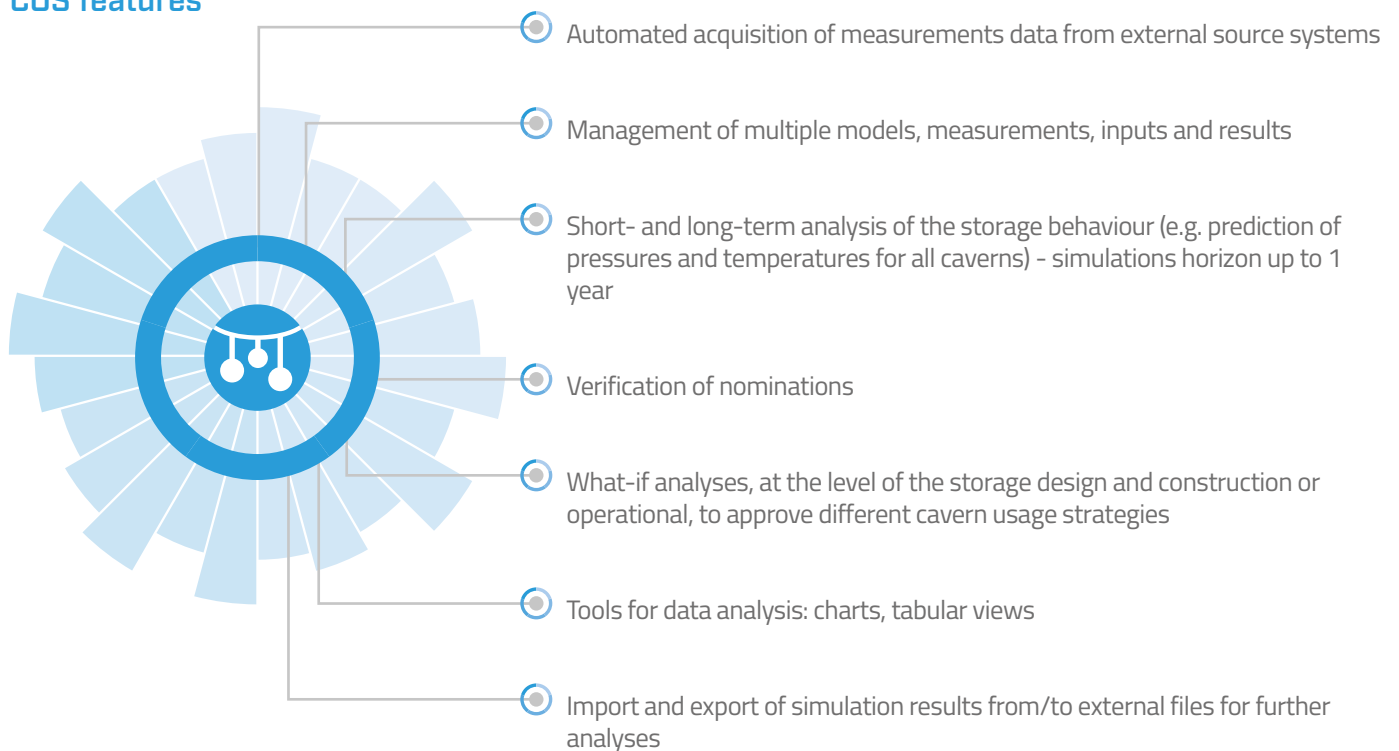


Cavern Operation Simulator (COS)

Cavern Operation Simulator supports processes, related to gas caverns availability forecasting. The main goal and advantage of COS is to enable users' execution of multiple, operational simulations daily. They can be performed with known nomination scenarios or for approval of caverns volume and flow capacity in case of new requests for gas products. COS fully integrates the underground storage

facility model with live measurements, acquired in most cases from the automation system. COS provides the gas storage operator with accurate and practical information regarding the actual availability, state and simulated behaviour of gas caverns. COS supports technical processes but also provides the information suited to help commercial business processes.

COS features

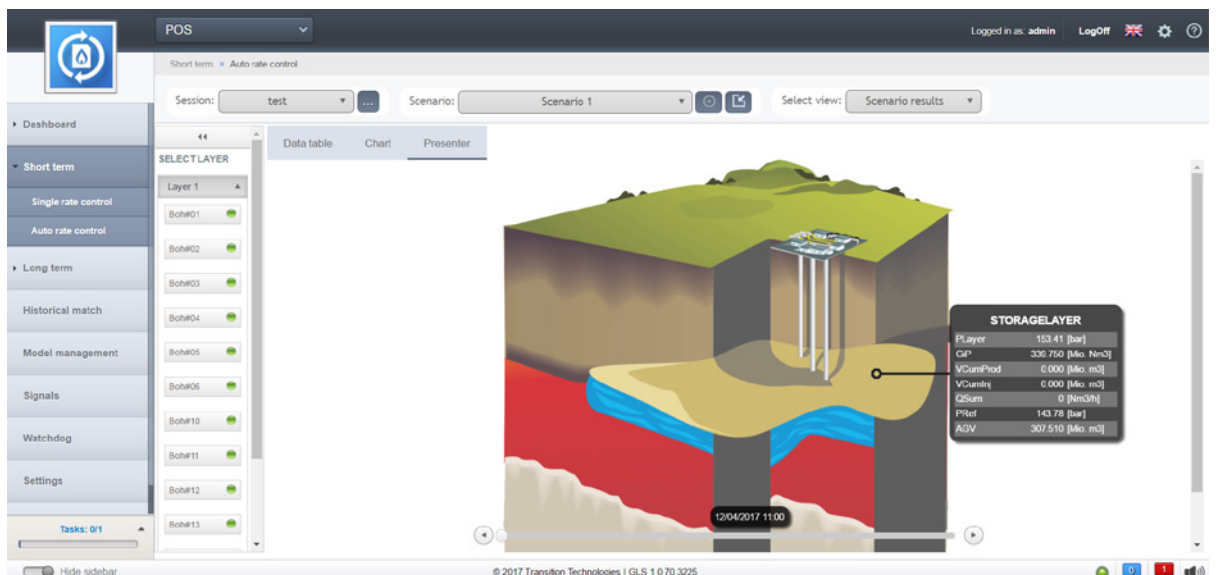
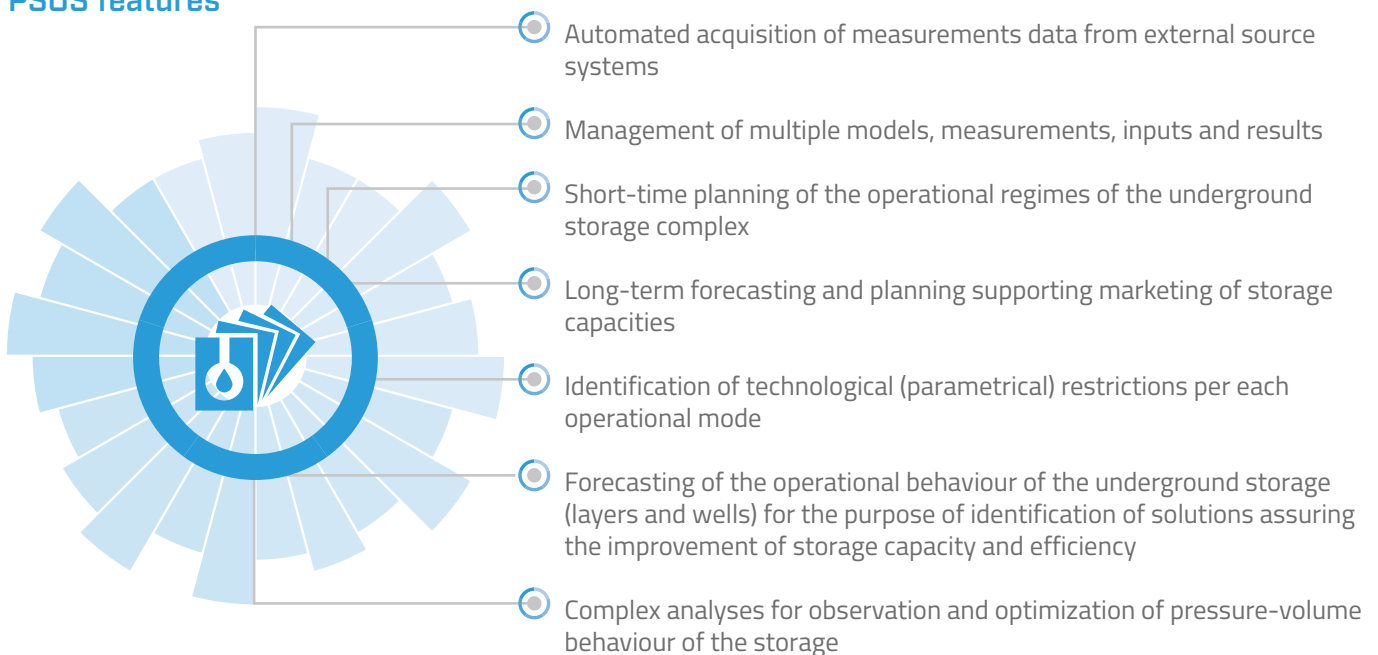


Porous Storage Operation Simulator (PSOS)

PSOS supports processes related to availability forecasting of gas storages, constructed on porous geological formations (depleted gas or oil fields, aquifers). The main goal and advantage of PSOS is to enable users' execution of multiple, operational simulations daily. They can be performed with known nomination scenarios or for approval of volume and flow capacity for wells and layers in case of new requests for gas products. PSOS fully integrates the underground storage

facility model with live measurements, mainly acquired from the automation system. PSOS can be used as a fast working simulator to obtain results about the predicted behaviour of the underground storage itself, as well as in connection with other gasLUX software tools. PSOS may be implemented for each porous gas storage as a component of a complex technical storage management system.

PSOS features

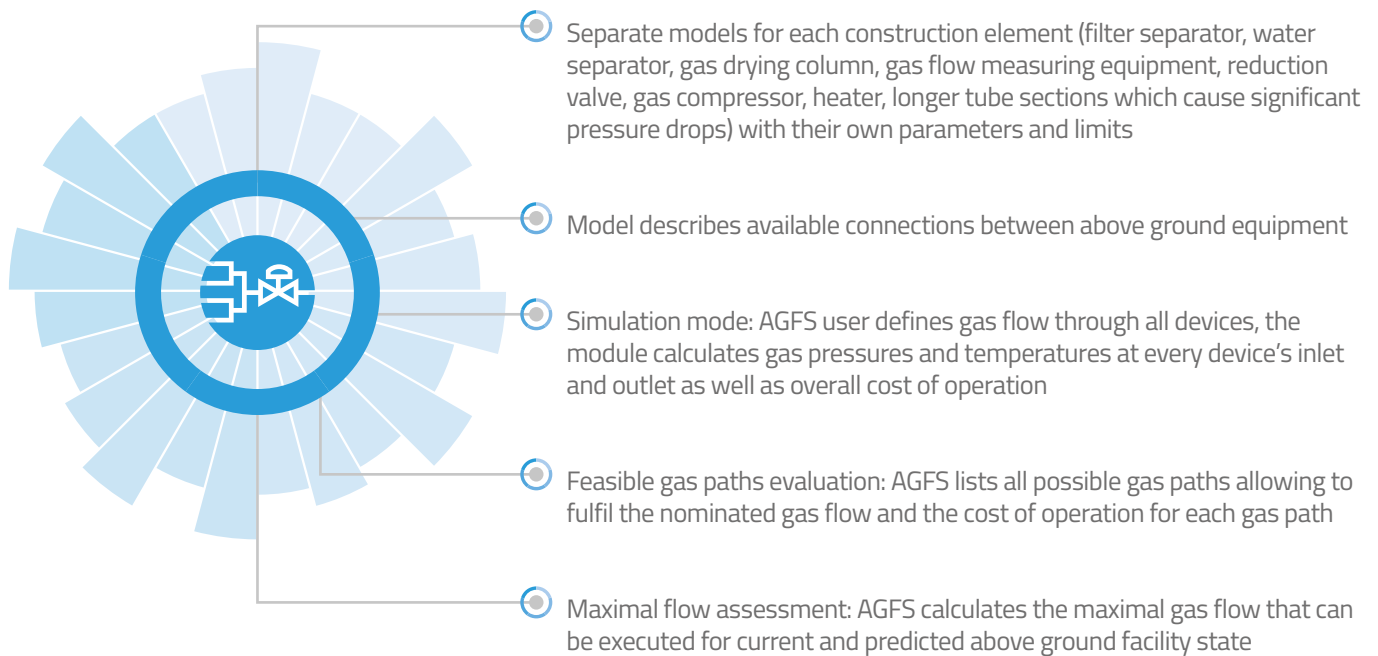


Above Ground Facility Simulator (AGFS)

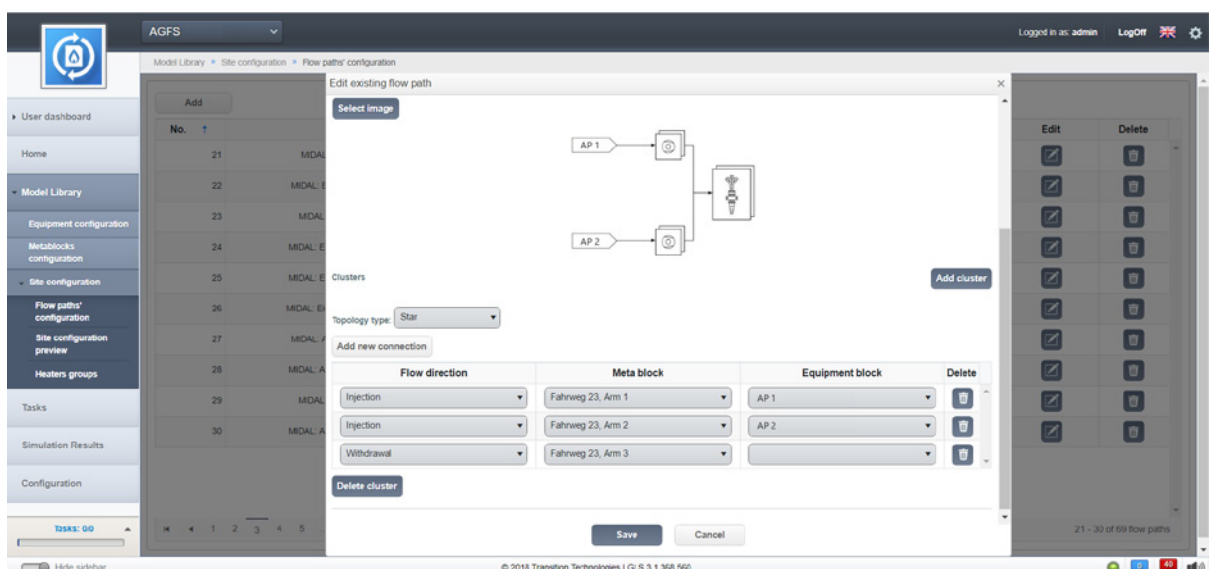
Main task of AGFS module is simulation of above ground installation of gas storage facility. The module supports the process dispatcher with forecasting the future state of above ground equipment depending on his decisions.

Main benefits of AGFS relate to quick evaluation of possible configuration of aboveground equipment assuring possibility of nominated gas flow execution. This, combined with the estimated cost of operation provides important support of dispatching process.

AGFS features



AGFS
screenshot

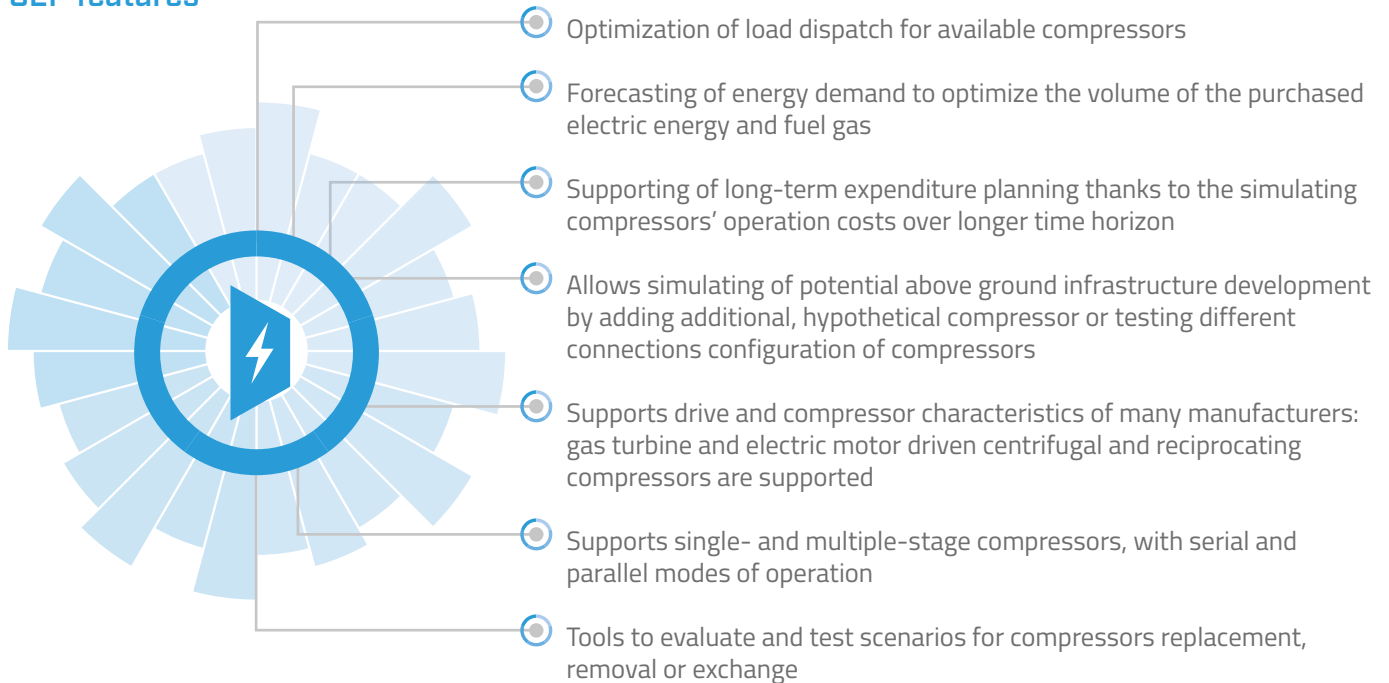


Compressor Energy Prognosis (CEP)

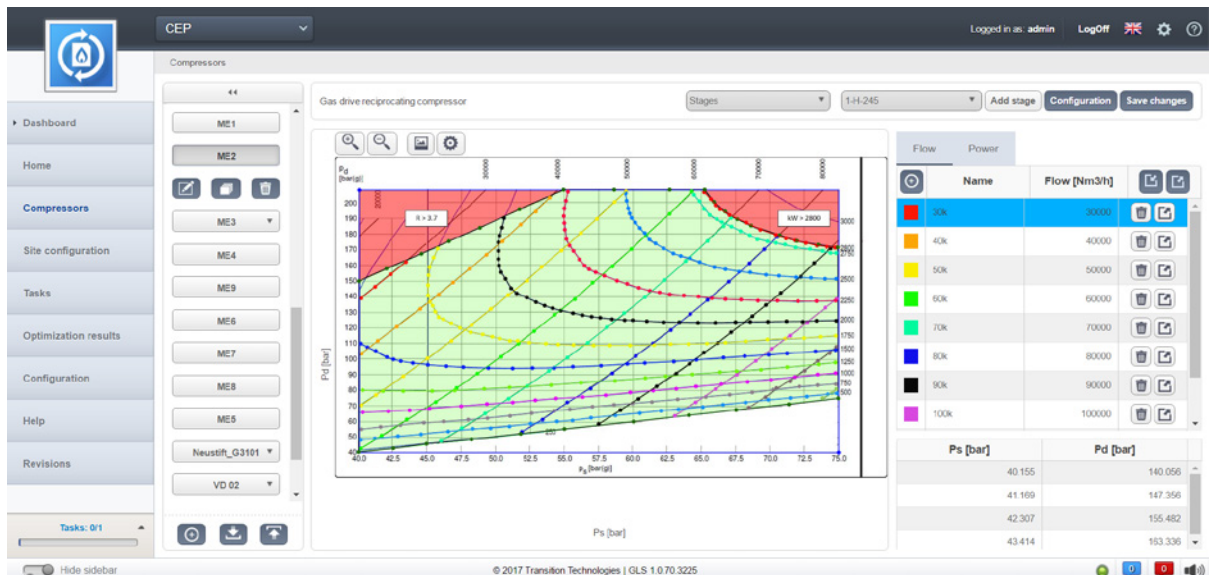
CEP is a software tool for calculation and optimization of compressor electricity and/or fuel gas demand. Based on gas nominations for each pipeline, the tool proposes compressors' configurations and flows for any type of compressors within a compressor station and calculates an electricity and fuel gas demand schedule for the entire time horizon defined by the user. Users from energy procurement

receive precise electricity and fuel gas demands forecasts. CEP allows to minimize costs of operation of the entire site through optimal load dispatch for each compressor unit, minimizing consumption of fuel gas or electric energy. Moreover utilization of CEP may lead to extension of compressors MTBF (mean time between failures) by avoiding operation on critical conditions.

CEP features



CEP
screenshot

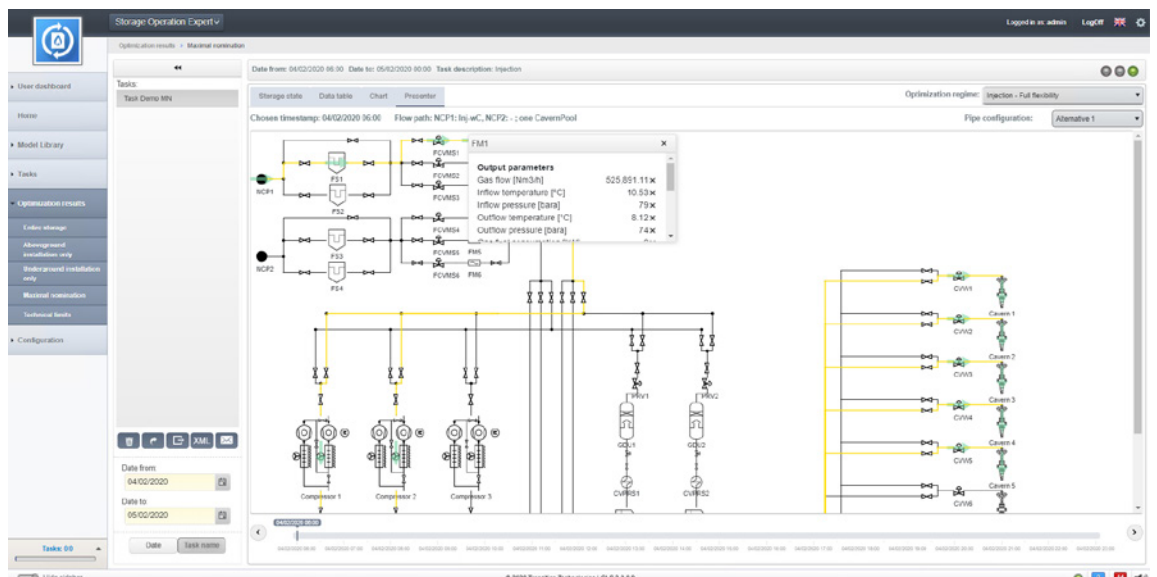
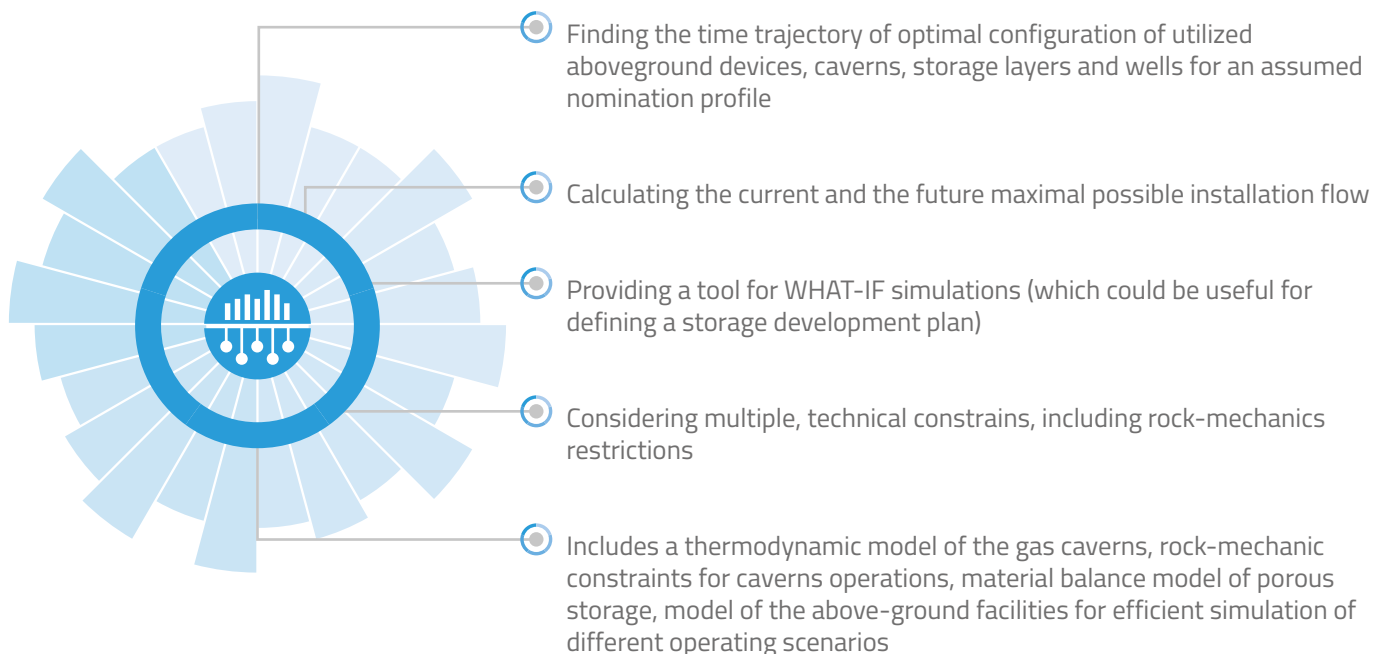


Storage Operation Expert (SOE)

SOE is a software solution for optimizing the operation of entire underground gas storage facilities or to operate the storage according to selected strategy. The main goals of the software are to maximize the technological object capabilities and/or to minimize energy usage, while ensuring compliance with operational safety barriers. Obtaining such a compromise requires taking into account several complex factors. Without an

accurate model of the withdrawal and injection flow execution possibilities, the overall technical installation capabilities might be artificially underutilized. SOE is dedicated for Storage System Operators. Its users easier and faster evaluate the optimal and best strategical way of operation for each type of gas storages with dedicated above ground facility.

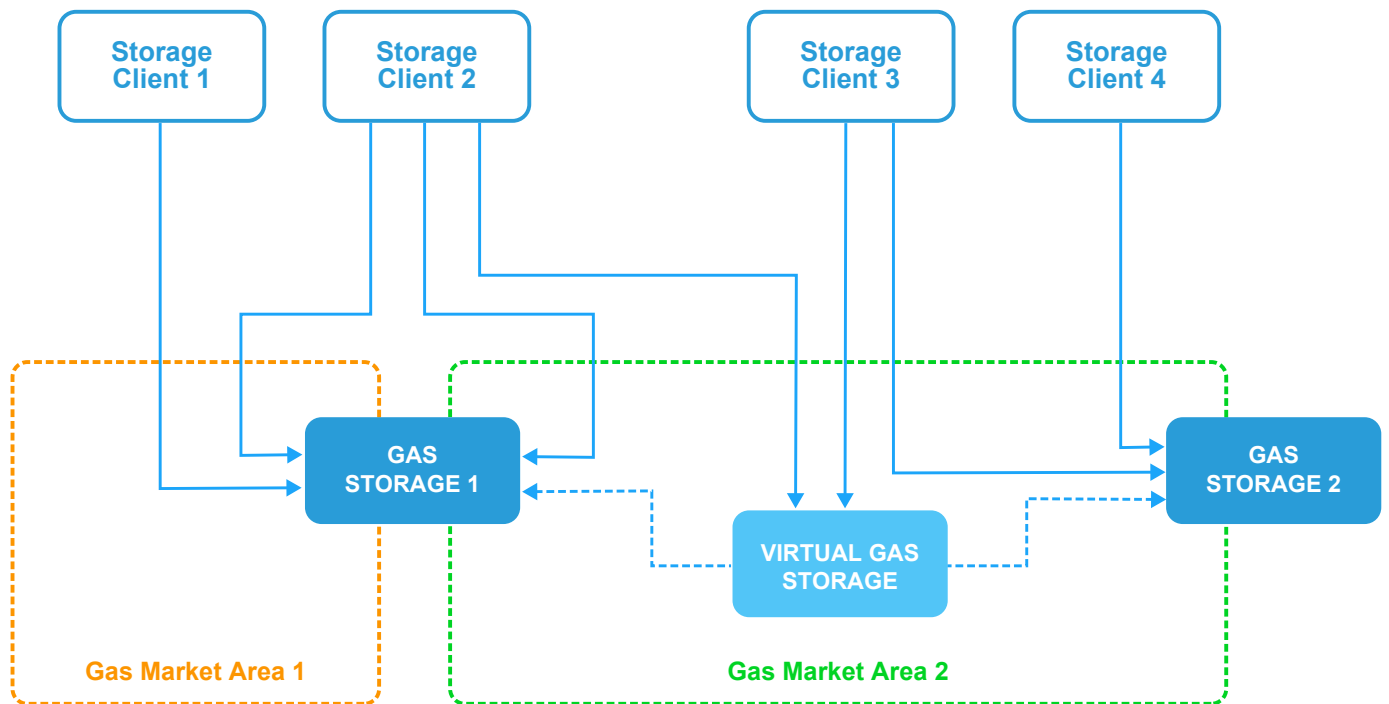
SOE features



Virtual Storage Management System (vSMS)

Several gas storages can be grouped in single virtual gas storage to optimize gas storage operations within a Gas Market Area. From the perspective of gas market participants such approach allows for sending nominations for one, virtual storage instead of multiple storage facilities.

The aim of the Storage System Operator is to distribute nominations between physical gas storages, taking into account costs of operation as well as technical limitations of gas flow rates for each storage facility.



-  Storage Client nominations
-  Nomination distribution

Due to differences in gas storages equipment, storage type and current filling level, cost of injecting or withdrawing gas may vary significantly between physical gas storages. With so many factors to consider finding the best nomination distribution is a difficult task.

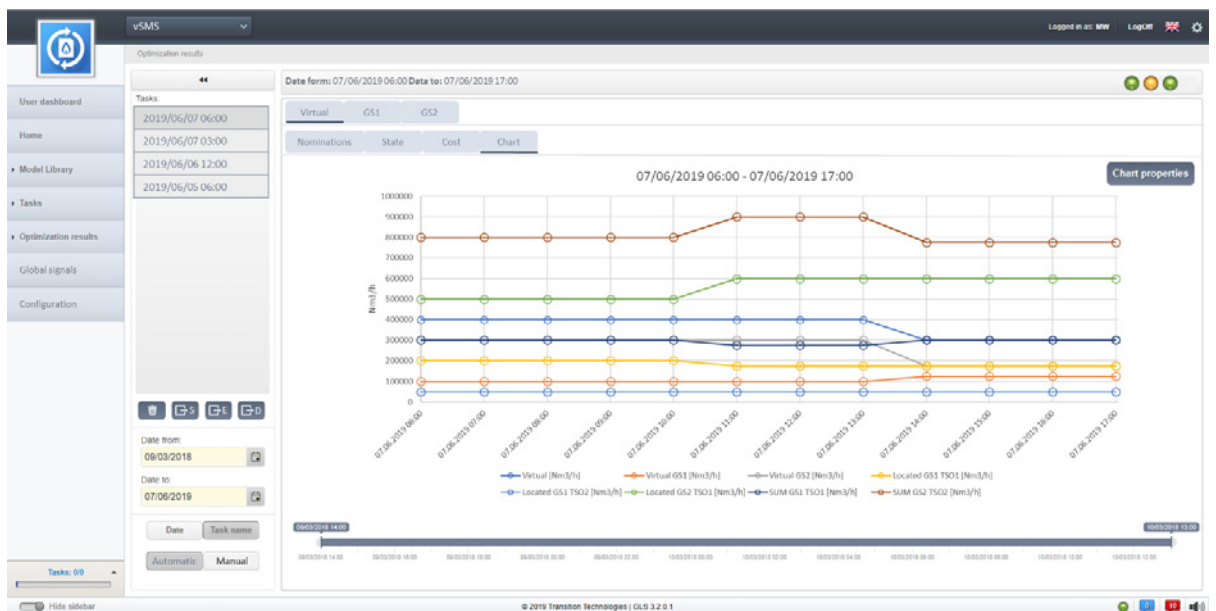
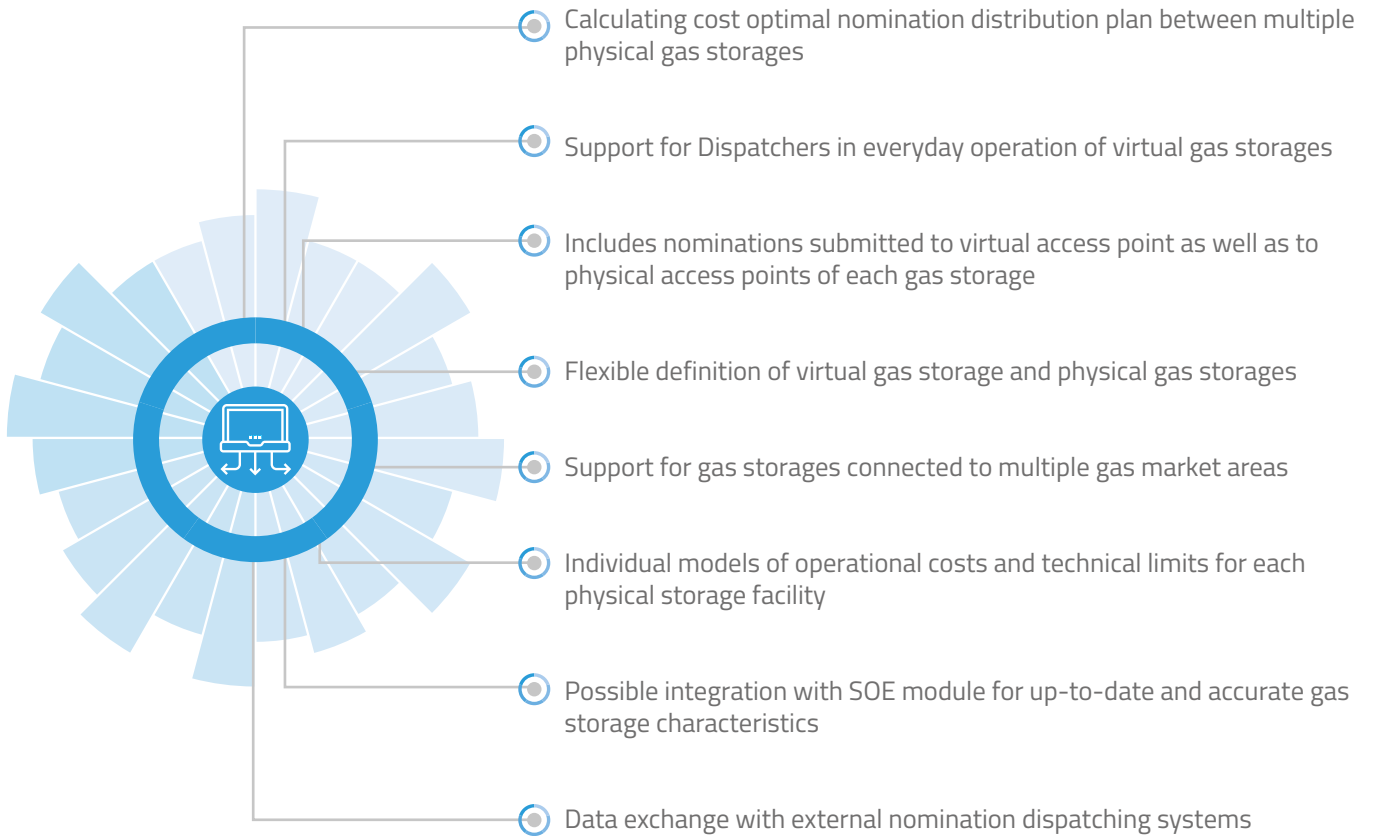
vSMS takes into account all abovementioned factors to calculate cost optimal nomination distribution plan, using models of operational costs and technical limits characteristics of all physical gas storages.

Combining vSMS with Storage Operation Expert (SOE) allows for accurate and up-to-date characteristics to be used in vSMS optimization. SOE calculates maximal gas flow rates

and operational cost values for variety of gas storage states and gas flow rates achievable during vSMS optimization horizon. In case of gas storage connected to multiple gas market areas, nominations submitted on coupling point not included in a virtual storage are considered as constraints and influence calculation of technical limits and cost values.

vSMS optimization and SOE characteristic calculation are designed to fully utilize scalability and hardware concurrency of modern servers. This is crucial in order to meet short time response on client nominations while performing state of art and resource intensive calculations.

vSMS features



Since over 25 years we have been providing our customers with the highest world's level IT solutions based on the latest technologies.

Our services and products cover the following fields:

- Development and distribution of software for utility sectors
- Optimization of technological processes
- Electrical energy and gas trading
- Risk management
- Programming
- Engineering services
- Solutions to mobile technologies
- Research and development projects
- Software service outsourcing
- Software consulting

Our established technological leadership is an outcome of a long-term experience in advanced projects implementation and application of the most innovative solutions, which together have resulted in a number of competitive realizations adjusted to the customers' needs.

We believe that our employees are the key to our success. Our team consists of exceptionally educated young people – graduates of major Polish technical universities. Their knowledge and professional consultancy in application of delivered solutions determine the quality and innovation of our products. With offices located in ten Polish cities, in Germany and in United States our company maintains rapid and dynamic growth.

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