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EDITORIAL

Dear Readers,

For energy utilities, the current situation could not be more tense. Suppliers are under pressure from geopolitical conflicts, the increasing impact of climate change and the ongoing consequences of the Corona pandemic, as well as rapidly rising prices for gas and electricity.

Moreover, in particular distribution system operators have to master, for example, the implementation of the constantly changing regulatory requirements for Redispatch 2.0. In addition, further expansion of digitalization is needed to speed up the grids and guarantee supply security. On top of this, they need to continue to ensure their economic viability and thus remain competitive.

Within this field of tension, our proven software solutions can support utilities reliably to cope with these difficult tasks. Read in our cover story how, for example, digitalization and integrative data management using artificial intelligence can optimize processes in the low-voltage sector.

And, join us to find out about the latest energy trends and developments and discuss them with us at this year's "EE Info Days" customer conference in the livestream from Aschaffenburg. In addition, in this current issue we inform you about new research projects, awards and events in the fields of electrical energy, gas grids and pipelines, and energy trading.

We hope you enjoy reading this issue.

Yours sincerely,

Wolfgang Fischer
Business Unit Manager
PSI Energie EE

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Low-voltage processes: Optimization through digitalization

Integrative Data Management for the Distribution Grid

Currently, energy supply is in the spotlight and changes as well as effects are reported on a daily basis. At the same time, geopolitical and sociopolitical efforts have an enormous influence threefold, namely, energy policy goals of economic efficiency, environmental compatibility and secure supply. Within the shortest possible time, energy, transport and heat turnarounds are to be implemented, whereby the technical bottlenecks form only the secondary basis for decision-making.

Distribution network operators are currently confronted with requirements that previously took them almost decades to meet. Now, thousands of connection requests, unknown simultaneity factors as well as the introduction of the cascade have to be managed within just a few years. These current and successive challenges can only be solved through massive digitization plus artificial intelligence.

As a result, the entire energy supply with its productively running processes comes into a field of tension. The grids effectiveness and efficiency must be continuously reviewed. This creates an unmanageable overall complexity reflecting countless influencing parameters. Atomistic processes are forthcoming, which take into account the most important interoperabilities as a "workaround". Thus, digitalization emerges as an enabler for algorithms based on Artificial Intelligence and Deep Qualicision for multi-criteria de-

cision analyses. This is the only way to reduce complexity while leveraging synergies.

Strategic and operational network management

The traditional network management of grid operators is reflected in the

departmental structure. Figure 1 outlines the time horizon of measures illustrating that network planning, service and management must act hand in hand.

Network planning in particular takes strategic and operational network management for the future into account. Network service is the link and enables implementation of any planned infrastructure including its management. Only short-term operational planning is coordinated by network management. This interaction is carried out continuously in different time dimensions, so that the retrospective analysis in turn serves as an input signal for the process.
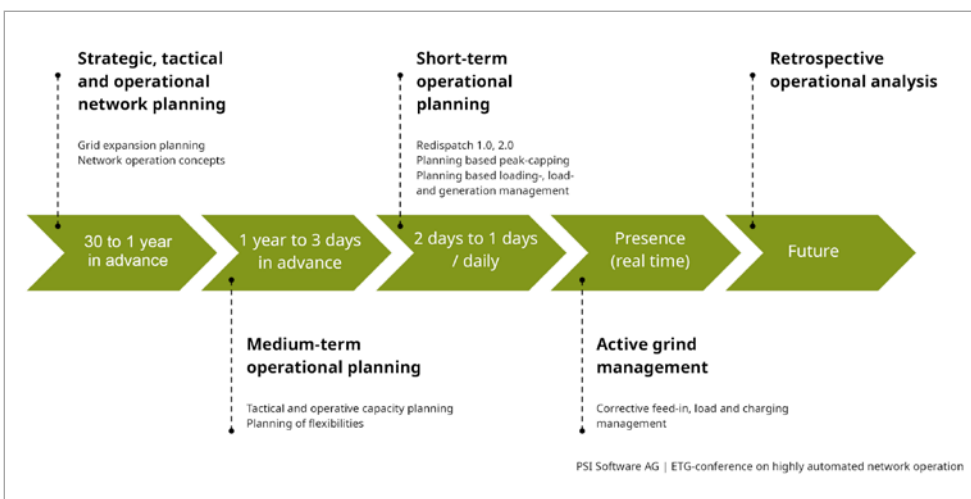

Figure 1: Timing measures show that network planning; network service and network management must act together.

The smartification of low-voltage grid operation

Prior to the smartification process, those long- and medium-term concepts like strategic, tactical and operational network planning or medium-term operational planning are taken into account. This applies to the low-voltage network level. At this point, all trends in terms ofenergy, transport and heat turnaround have an explicit impact on the low-voltage grid level.

Existing infrastructures are facing new types of network use, as network planning has not been able to cope with successive changes and adapt designaccordingly. Due to the lack of process values and flexibility, active operational management has never been possible. Therefore, successive changes, once they have exhausted established low-voltage grid reserves, threaten the security of supply for the grid area in question. Research as well as pilot projects show great potential in active operational management of low-voltage grids. Initial projects already utilized aggregation of low voltage flexibility for medium voltage serving system stability.

Enormous synergy effects for distribution network operators

These projects consider congestion management only segregated, establishing an isolated solution to control network congestion. However, applying interoperable processes and digitalization unfold massive synergy effects for these three core tasks of network operators. Main tasks of network management: network service and network planning, are more and more characterized by a departmental

structure. Nevertheless they can benefit from each other in terms of data and ensure holistic and efficient network operation.

The utilization of these synergy effects depends significantly on consistent digitization and interoperable provision of data. Integrative data management paves the way. With PSIconnect, PSI offers an interoperable, secure, scalable and resilient platform to track and implement the process. This platform can be expanded step by step and thus accompany continuous increases in efficiency. Figure 2 outlines the platform, with protocol adapters enabling migration of data and process values.

System and software architecture as backbone for data migration

Once initial data is available, it can be pre-processed and refined. In addition to data migration, a wide variety of applications can be implemented, such as PSIngo/360 for low-voltage network management. Due to the platform architecture, each application receives all data required,

The selected system and software architecture is capable of dealing with mass data and acts as a perfect backbone for continuous data migration. Holistic interoperability can be ensured by establishing general and specific interfaces.

The platform serves as a development basis for future digital distribution network operation. It comes with various entry points to trigger an efficient, effective and successive digitization process. Considering the focal points of tasks and steps to be processed for distribution network operation, a closed loop is created. To establish holistic processes, each function, department or task can serve as an initiator. Through integrative data management, other functions benefit from existing data or data preparation.

Network service as a possible initiator for digitization

For example one important data supplier is the network service, since measured values from the field are already
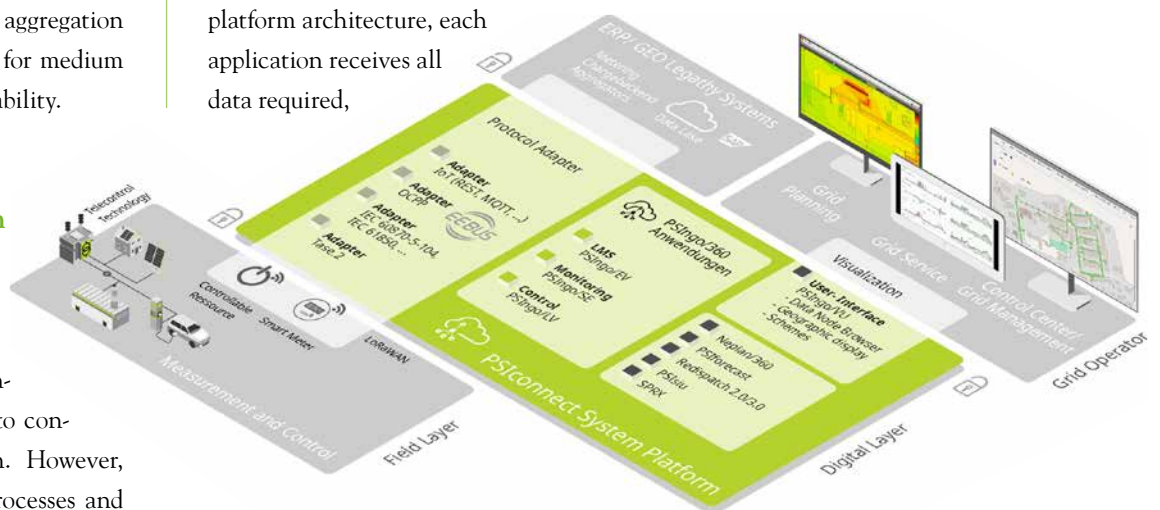

Figure 2: Protocol adapters enable migration of data and process values.

preprocessed in terms of quality and formatting. It also receives output of parallel applications such as PSIcommand and PSIcontrol.

available in various digital tools. These values, if managed in a meaningful way, are cruial for network planning. Once combined, the grid service
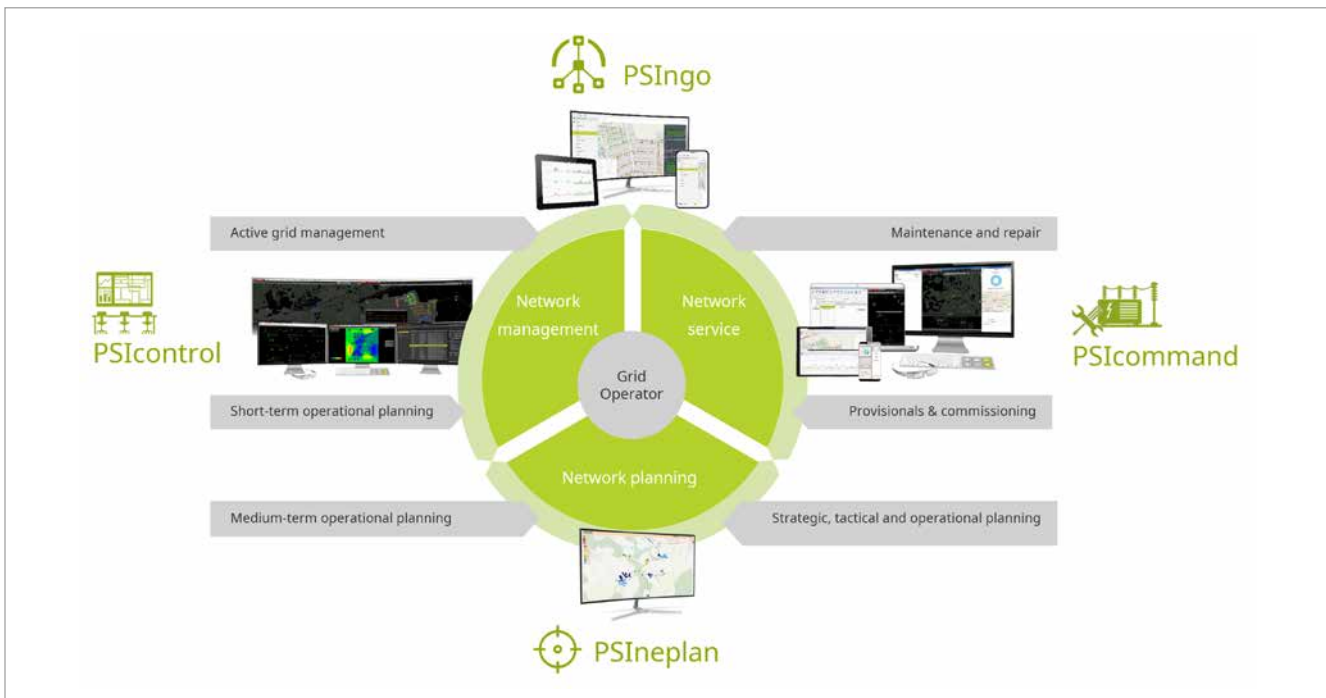
Figure 3: Planning grid expansion, using PSI Software Plattform.

and planning have positive effects on grid management. They provide new flexibility throughout planning processes or install and commission processes. This interoperability is illustrated below using a low-voltage example, but it applies to all processes and thus represents the potential for all voltage levels.

The vast number of connection requests along with successive integration of PV systems, charging columns and heat pumps into the low-voltage grid imposes a considerable burden on grid planning processes and its physical grid infrastructure. Various recommendations for action can be retrieved during network planning based on the PSIneplan software solution. Applying integrative data management to the PSIconnect platform allows network planning processes to be optimized. It is all based on newly gained network transparency. Assuming a heavily utilized low-voltage network with a need for expansion, there are two possible solutions.

1. Conventional network expansion
A concrete expansion variant is transferred from network planning and passed to network service for implementation. Ahead of preparation, organizational and technical processes must be taken into account. These preliminaries can be efficiently supported by step lists and data maintenance processes based on the field force management system PSIcommand. After installation, systems are ready for monitoring and control as soon as the data maintenance processes are available for the PSIngo/360 system. Manual provision is costly and error-prone without standardization and automation. PSI's integrative data management is an efficient solution to this problem, as the process value mapping can be prepared by PSIcommand and transferred to PSIconnect.

During implementation and initial operation of measuring technology, the network service can use existing measurement data from the network

control. Coordination between control centers and field can be simplified or made subsidiary by mobile solutions, e.g. PSIgridmobile.

2. Intelligent network expansion
Intelligent expansion includes several steps. First, a digital twin for network transparency is established to initiate active operation management later on. For this, PSIngo/360 requires static network data plus dynamic process values. As a result, the flexibility can be applied to all bottlenecks, revealed via the active operational management.

Static network data is made available to the data management by network planning. Dynamic factors, like switch positions, are updated by the network service technicians. Newly installed measuring devices can be automatically transferred to the digital twin in priciple. Thus, an optimized implementation of PSIngo/360 minimizes configuration effort. By continuously monitoring the network utilization sit-

uation, new operating states and current switch positions may be provided for future planning scenarios.

Increased transparency in networks

Critical changes in network requirements are forcing grid operators to impose massive process changes. Planning scenarios and evaluation of grid usage through transparency become extremely important, especially for new, initial planning scenarios. Identifying potentially affected low voltage grids can alternatively be carried out by multi-criteria decision support via Qualicision algorithms. In addition to other network simulation

methods, it provides classification of low-voltage networks and development of rollout strategies for smartification. This can also be optimized with Deep Qualicision based on empirical values, verified and successively implemented by the three departments of network management, planning and service of the distribution network operators. In addition, this process could carry out complete target network planning and use it as a template for upcoming rollouts.

Conclusion

PSI thus offers the entire value chain up to full rollout. In particular, the full rollout can be realized through the se-

lected system and software architecture with scalable performance and licensing models. Marketing via an app store will be pursued successively, so that distribution network operators can act independently after initial projects and transfer of knowledge. In summary PSI platforms stand for efficient network management from initialization to implementation. ◉

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News: Swiss BKW Puts New PSIcontrol 4.9 Network Control System into Operation

Analysis and Elimination of Faults

As part of an extensive upgrade, the Swiss distribution grid operator BKW Power Grid has renewed the network control system PSIcontrol, which has been in use since 2009, and put it into operation on schedule. The future-oriented system, based on the version 4.9, offers innovative functions, such as those in the area of fault analysis.

With the new system, the causes of an interruption can be identified even more quickly and the power supply restored. The redundantly set up system is also suitable as a platform for integrating renewable energies such as photovoltaics or wind into the grid and thus meet the challenges of the energy transition.
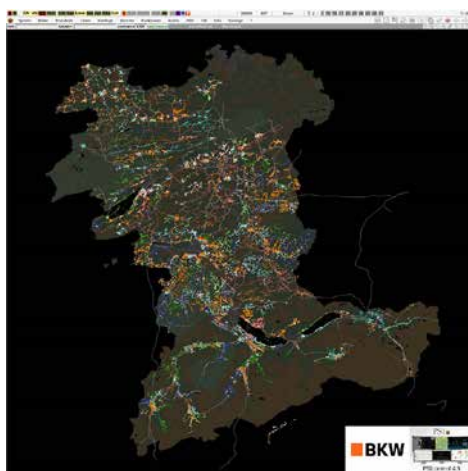
Ensure maintenance: software and hardware renewed

In order to ensure maintenance for the next ten years, BKW has renewed not only the software but also the hardware. The implementation

Geo-referenced network map of the BKW supply area.

was completed within the planned three-year project schedule. This is

the first stage of an extensive renewal at BKW. The implementation of further functional additions is planned for 2023.

Largest supply area in Switzerland

The control center in Mühleberg centrally controls BKW's extensive power grid. At peak times, dispatchers monitor the approximately 22 000 kilometers of lines and the grid installations in the high and medium voltage areas of Switzerland's largest distribution grid, which is monitored and controlled by BKW Power Grid in the cantons of Jura, Bern and Solothurn, on 36 monitors. ◉

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R&D: PSI Participates in the "Redispatch 3.0" Research Project

Flexibility Potentials for Congestion Management

Coordinated by OFFIS e. V., PSI is participating in the research project Redispatch 3.0 with fifteen other partner companies. As part of the 7th Energy Research Program "Innovation for the Energy Transition", the project is funded by the German Federal Ministry for Economic Affairs and Climate Action (FKZ: 03EI4043).

During the three-year research project "Redispatch 3.0—Demonstration Project Redispatch and Marketing of Unused Flexibilities of Micro Plants behind Smart Metering Systems", concepts and methods for the further development of the current Redispatch process will be researched, tested and evaluated under real conditions in two field tests.

Reliable avoiding of bottlenecks at all voltage voltage levels

The research project aims to integrate micro plants and flexible loads of the low and medium voltage level into the congestion management process in order to compensate the decreasing flexibility provided by conventional generators today. This enhancement

of the Redispatch 2.0 process is intended to ensure that in future, despite the planned decommissioning of conventional power plants, bottlenecks can still be reliably avoided and counteracted at all voltage levels.

In this project, PSI is working with the participating partner companies to develop the organizational design of the cascade and is also researching

innovative approaches to meeting the increased requirements regarding the information exchange between transmission system operators (TSOs) and distribution system operators (DSOs). In addition, the Controllable Local System interface of Intelligent Metering Systems (iMSys) is used and evaluated for the integration of prosumers from both low and medium voltage level.

Along with the optimized and automated grid operation in the sense of reactive system management, incentives for system-serving behavior are to be created by facilitating the market participation of decentralized actors.

The developed solution approaches will be tested and validated under real conditions during field tests at EWE Netz GmbH and MVV Netze GmbH. The project duration is from January 1, 2022 to December 31, 2024. ◉

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Supported by:

Federal Ministry
for Economic Affairs
and Climate Action

Redispatch 3.0

**INTRODUCING
AN INDUSTRIAL
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PSI

News: PSI and partners design an interoperable ecosystem via Living Lab Cologne

Mass Business Capable Power Management

PSI subsidiary PSI GridConnect GmbH has conceptualized an end-to-end interoperable ecosystem for the power management of end-customer systems in a partner network. The partners comprise the EEBUS-Initiative e.V., the consulting company BET Büro für Energiewirtschaft und technische Planung GmbH, BTC Business Technology Consulting AG, GWAdriga GmbH & Co. KG, as well as Rheinische NETZGesellschaft mbH (RNG), in whose network area the "Lindgens-Fabrik" real laboratory is located.

For the successful integration of electro mobility as well as the progressive electrification of the heating market, mature and resilient technological solutions involving an intelligent metering system must be usable in "end-to-end" processes.

Basis for system stability and new business models

This leads to new requirements, primarily in small-scale systems located in the low-voltage grid. For example, the subscriber, the network operator, and market-based roles must be enabled to perform fine-grained power management, on the basis of which system stability and new business models can be established in the course of increasing volatility in the energy market.

In this context, power management can also be used via an intelligent metering system to ensure compliance with the physical power limits at the

In order to test the step-less power management in the interaction between PSIngo and the energy management at the grid connection, all major renowned automotive companies arrived.

grid connection. In this ecosystem, from the energy industry to the end device in the customer's system, it is now possible to test the real-life practical use of a wide variety of EEBUS[1]

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[1]*EEBUS is a standard and norms based communication interface that any device and technical platform can freely use, regardless of manufacturer and technology.*

applications and to demonstrate interoperability.

Information exchange on power management with the customer system

All relevant market roles are represented, which can impact relevant customer systems such as charging stations and heating systems. In particular, the parallel flexibility use of grid, sales and manufacturer-specific business models will be tested. Thus, grid operators, sales and other external market participants can exchange information on power management with the customer system, e.g. on the use of time-variable energy prices and grid charges up to participation in flexibility instruments.

The Living Lab (www.livinglab.cologne) offers all market participants to test their systems and products in this context. The starting signal for the live test is on June 20, 2022 in Cologne. All participating partners will be available for further information at the E-world from June 21 to 23, 2022. ◉

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Event: 43rd meeting of the ETG/ITG joint committee "Protection and Automation Technology

Experience Exchange among Experts

At the 43rd meeting of the ETG/ITG Joint Committee "Protection and Automation Technology", on June 20, 2022, the expert members exchanged experiences at the PSI headquarters in Dircksenstraße in Berlin.

The Energy Technology Society (Energietechnische Gesellschaft—ETG) and Information Technology Society (Informationstechnische Gesellschaft—ITG) belong to the VDE (Verband der Elektrotechnik Elektronik Informationstechnik e. V.). The societies connect experts through a cross-company and cross-sector exchange of experience as well as cross-sector support of standardization activities and exchange of experience on practical implementations. The exchange takes place every six months in technical committee meetings with impulse lectures by experts.

The ETG/ITG expert committee includes 25 personal members from utilities, industry, universities and (engineering) services.

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The participants in Berlin: PSI was represented by Dr. Guido Remmers (center). Also present was the former long-time PSI employee Gerd Buchweitz (2nd from left).

Event: AI and cloud-based Software for energy Supplier at the CIGRÉ 2022 in Paris

Intelligent Applications for Stable Power Grids

PSI Software AG presented current software products and developments as well as AI and cloud-based applications from the areas of network control and intelligent technology for smart grids as well as network planning and optimization at the international high-voltage conference CIGRÉ in Paris (Palais des Congrès, Hall 2, Stand S240) from 29 August to 2 September 2022.

A special focus was the network control system PSIcontrol 4.9 with the latest functions for high-performance network operation of all network levels. Furthermore, visitors could learn about the unique autopilot PSIsaso for network control.

Transient stability investigation of the energy networks

The module Security Assessment and System Optimization (SASO) with its integrated functionality Dynamic Security Assessment offers a transient stability analysis of the power networks after sudden voltage and current changes in the power supply network. Furthermore, the system solution for

the operation of an ENTSO-E wide platform for the joint call of secondary services is presented. The project was successfully implemented by PSI under the name PICASSO.

Moreover, the cloud-capable network planning software PSIneplan will be presented, which is successfully used for planning, analysis, simulation, technical and economic optimization of energy network expansion for electricity networks, but also in the cross-connected areas of gas, water and district heating.

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News: Energy suppliers rely on PSI solutions for Redispatch 2.0

Reliable and Simplified Network State Analysis

For many distribution system operators, the implementation of the extended requirements for the redispatch process due to the Network Expansion Acceleration Act is still in the foreground. For this, PSI offers, in addition to its many years of expertise, the modular software solution PSIsaso/DSO, which is independent of the control system and ensures a reliable implementation. Numerous energy suppliers are already relying on this solution.

With the software solution PSIsaso/DSO, which is permanently adapted and expandable to the changing requirements and specifications of the BDEW, distribution system operators can participate in the planning and forecasting processes of the new redispatch regime and design the effects in their own power grids transparently and efficiently through a proven network state forecast with an optimal selection of measures. In addition to the "Extended" version, PSI also offers a "Basic" variant especially for system operators with a simple network structure and no congestions in their own network.

system effort required for a full implementation.

In addition to maintenance and the necessary hardware, the scope of de-

functions, such as network state forecasting or the optimal selection and dimensioning of measures, can be activated and the procedures parameterized according to the roles to be assumed by the municipal utility in the BDEW process.

The regional energy service provider Stadtwerke Homburg GmbH also benefits from the very lean and cost-effective Basic variant. Here, the module is coupled with the existing PSI control
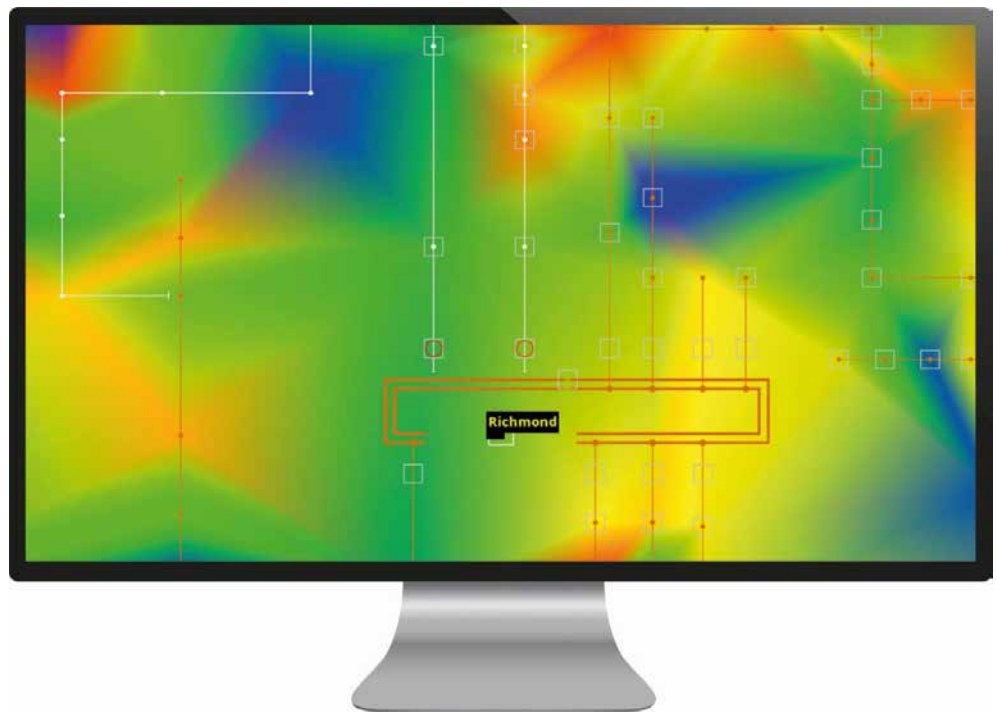
Visualization of a "heat map" in the PSIsaso module of the PSI network control system.

Benefiting even if less affected

Stadtnetze Münster GmbH, for example, has ordered the implementation of the Redispatch 2.0 Basic variant of the software solution. This enables the utility to create a simplified network state analysis, implement the requirements of the upstream network operator and participate in the regulatory redispatch regime without having to operate the

livery includes, among other things, the powerful communication module PCOM+ and the forecasting solution PSIforecast for the creation of spatial and temporal high-resolution and precise power forecasts.

Due to the fact that they are less affected, Stadtnetze Münster benefits from the lean and cost-effective Basic variant. If required, extended

system in order to exchange both master and dynamic data.

Extended variant: Reliable recording of forecasts and planning data

In contrast, MVV Netze GmbH, the network company of the Mannheim-based energy company MVV, relies on the Redispatch 2.0 Extended

variant. This allows it to combine its extensive forecasts and planning data, forecast network states, and automatically determine measures to reliably implement the extended requirements for the redispatch process.

In addition to maintenance and the necessary hardware, the scope of delivery also includes,the modules network state forecast with the corresponding visualization tools and redispatch in the network control system for demands in tolerance case and extended reporting. The forecasting solution PSIforecast is also used here for the creation of spatially and temporally high-resolution and precise power forecasts. Furthermore, TEN Thüringer Energienetze GmbH & Co. KG and Netzdienste Rhein-Main (NRM) GmbH also use the modular and control system-independent software solution.

Meeting the requirements for curative measures

The extended Redispatch 2.0 modules PSIsaso/DSO, which have already been delivered to the energy group E.ON SE in 2020, fulfill the requirements for curative measures. Moreover, in addition to coordinating the new planning process, they also provide high-quality network model forecasts in the control system environment and control system-related solutions.

The regional distribution system operator ENERVIE Vernetzt GmbH from South Westphalia can now also use the software to combine extensive forecasts and planning data and reliably forecast future network states. ◉

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News: EWE NETZ and wesernetz Bremen migrate to control system PSIcontrol 4.9

Greater Flexibility across All Sectors

The network operating companies of EWE AG, EWE NETZ GmbH and wesernetz Bremen GmbH, have commissioned PSI Software AG with the migration to the multi-utility control system PSIcontrol Version 4.9. The migration will take place as part of a joint overarching project.

The multi-network technology in PSIcontrol gives network operators even greater flexibility. The control system regulates the gas, water, electricity and district heating utilities and works with data models that are, for example, separated by supply sectors. This allows the free choice between a multi-utility mode of operation or the separate management of the networks.

Dispatchers are supported for assessing the network state

PSIcontrol supports the dispatchers with a variety of advanced functions for assessing the network state. This
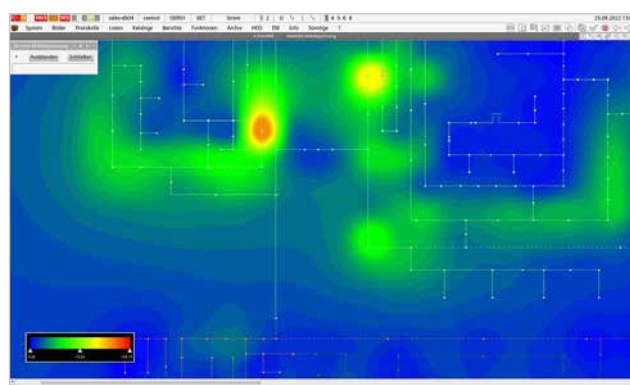
View of the medium voltage network diagram in PSIcontrol.

offers a high level of innovation security in the future.

Both network operatorsare previously using the PSIprins control system. The migration will take place to the current PSIcontrol version 4.9. The project duration is planned until 2024.

Overview of the network operating companies
EWE NETZ GmbH, headquartered in Oldenburg, is a company of the EWE Group. EWE NETZ is indirectly a subsidiary of EWE AG. In addition, 123 cities and municipalities from the Ems-Weser-Elbe region have a 4.1 percent stake.

wesernetz Bremen GmbH operates all or parts of the local supply networks for electricity, natural gas, drinking water and district heating in Bremen, Bremerhaven, Geestland, Stuhr, Samtgemeinde Thedinghausen and Weyhe. ◉

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News: More sustainability in production processes through intelligent software

Optimal Control of Energy Networks in Industry

More than ever, modern manufacturing companies, especially in the automotive, chemical, steel and aluminum industries, are faced with the challenge of reconciling their high energy requirements with economical production and the lowest possible environmental impact. In addition to electrical energy, other forms of energy used in production processes also play an essential role in the operation of energy networks in industrial environments.

PSI's software products, which have been used in the energy industry for decades, provide support in optimizing the energy requirements of industrial customers. The network control system PSIcontrol controls the energy networks on all

ployees. A high level of supply security minimizes downtimes and failures of industrial plants while optimizing economic efficiency. The field force management system PSIcommand also increases reliability in the industrial environment through intelligent

Minimizing industrial asset failures

By combining various AI methods in proven PSI software solutions, industrial companies can save resources and costs, automate and optimize processes, achieve productivity and efficiency increases, improve sustainability and make qualified decisions in real time.

Today, numerous industrial customers are already using PSI software to manage their energy networks in a resource-conserving, sustainable and at the same time economical manner.

Digitalized and automated production processes stabilize energy networks and relieve employees.

voltage levels of electrical energy as well as the pipe networks for heating, cooling, process energy, air ventilation, gas and water. The intelligent software also enables a rapid response to power fluctuations in the energy networks. Complete digitalization and a high degree of automation make it possible to actively stabilize the networks and significantly reduce the workload of em-

maintenance and servicing strategies. With the AI-based multi-criteria decision support and optimization software PSIqualicision, sustainability metrics can be added as optimization targets on an equal footing with profitability metrics, directly linked and integrated into companies' holistic strategies, for example in predictive asset management.

Regardless of whether it is a single plant, a network of several companies in an industrial park or the central control of several plants at geographically distributed locations.

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News: Swedish transmission system operator Svenska kraftnät relies on PSIcontrol

Load Frequency Controller for Four Bidding Zones

The Swedish transmission grid operator Svenska kraftnät has awarded PSI Software AG with the delivery of the control system PSIcontrol 4.9. In addition to the load frequency controller (LFC), the delivery includes an optional control module for high-voltage direct current (HVDC) transmission. This will be used to introduce an aFRR market in Sweden in the coming years in accordance with the European Electricity Balancing Guideline (EB-GL).

Due to the introduction of an aFRR market (secondary control reserve), Svenska kraftnät requires a load frequency controller to ensure system balancing for each of Svenska krafnät's total of four bidding zones. A real-time interface will be established between the LFC and ENTSO-E with PICASSO (Platform for the International Co-ordination of Automated Frequency Restoration and Stable System Operation), also implemented by PSI, to activate control power from a Europe-wide common merit order list.

HVDC systems are essential for reliable power transmission over long distances

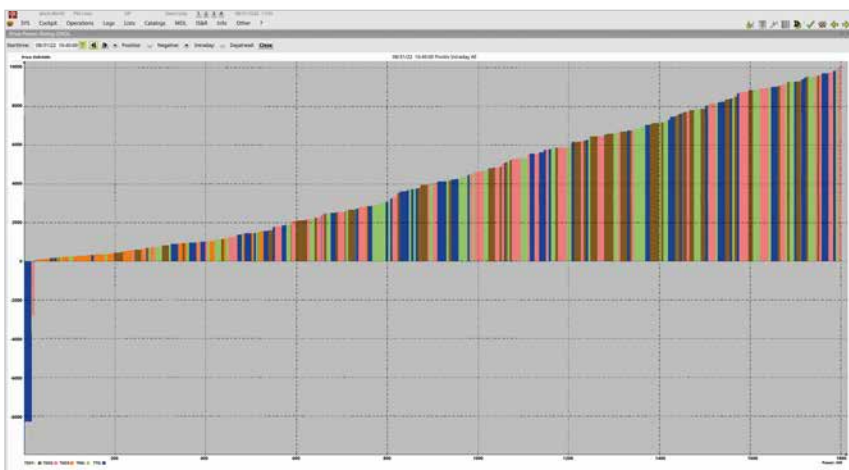In addition, an HVDC control module will be implemented as an option

High voltage power line in Sweden.

in order to flexibly use HVDC connections in the future, especially for system services. This is particularly essential considering that HVDC systems play a central role in reliable power transmission over long distances from the point of generation to the consumer.

The project will be managed in close cooperation with the Swedish sub-sidiary PSI Scandinavia in Karlstad. The overall project, including implementation and activation in Sweden, is scheduled for 12 months.

Svenska kraftnät operates the Swedish high-voltage transmission grid for electricity. With this order PSI wins an important new customer in Scandinavia in the area of transmission grid. ◉

Price-Power-dialogue in PSIcontrol 4.9.

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Event: PSI Scandinavia at the energy trade fair "Di Framtidens Elmarknad 2022" in Stockholm

Future Challenges for the Energy Markets

The Grand Hotel in Stockholm was the focus for one of the largest energy trade fairs in Scandinavia on May 5, 2022. At the "Di Framtidens Elmarknad 2022" more than 250 participants informed themselves about the latest innovations and trends in the energy sector. PSI Scandinavia was there as an exhibitor.

With the theme "Future Electricity Market", the Swedish CEOs of Ellevio, Svenska Kraftnät and Vattenfall, among others, spoke about the energy markets of the future and the current challenges for the industry.

> *As exhibitors, the event offered us great opportunities for discussions with interested trade visitors, including the newly appointed Minister for Digitalization and Energy, Khashayar Farmanbar.*
>
> **Azra Dajic**
> Manager Marketing and Sales
> PSIAG Scandinavia

Sanna Eriksson (left), Azra Dajic (right) (both PSI Scandinavia), Khashayar Farmanbar, Minister of Digitalization and Energy Sweden (center) in the foyer of the Grand Hotel.

Investments in the expansion of power grids

Sweden is not the only country where the last harsh winter led to record high electricity prices. In order for utilities like Ellevio to be able to cope with increasing demand and future electrification, major investments in power grids are required above all, as Ellevio's CEO Johan Lindehag also confirmed in his presentation.

High demands for the new global energy economy

The event showed that the successful implementation of the energy transition—which is of key importance, not only in Scandinavia—places high demands on intelligent and secure solutions. These include new climate-friendly as well as renewable, and decentrally generated energies as well as storage solutions and grid systems. PSI's control systems are already making an important contribution to this. ◉

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PSI will be presenting intelligent software solutions for the energy industry at the E-world 2023.

E-world
energy & water

23.–25.5.2023
ESSEN/GERMANY
www.e-world-essen.com

News: New AI-based software product PSIdetect

Anomaly Detection in the Grid

At this year's "PSI EE Info Days," PSI's business unit Electrical Energy presented new software products and features for network control technology, network planning, and field force management. The conference took place on November 16 and 17, 2022. It focused on load and charging management, Redispatch 2.0, service monitoring, and detecting anomalies. For this, the new software product PSIdetect, which is based on PSI's own Qualicision AI technology, has been shown for the first time.

PSIdetect was developed jointly with E.ON and PSI. It systematically monitors the grid using Qualicision-based artificial

Earliest possible protective intervention

Training PSIdetect requires historical and synthetically generated data,

allows protective intervention at the earliest possible stage. In addition, detected faults improve the control system's secure operation.

Specific interface provides relevant information for the evaluation of anomalies

Through an entirely Java-based PSI platform-specific user interface, administrators in the back office, service staff as well as system administrators receive their corresponding informa-
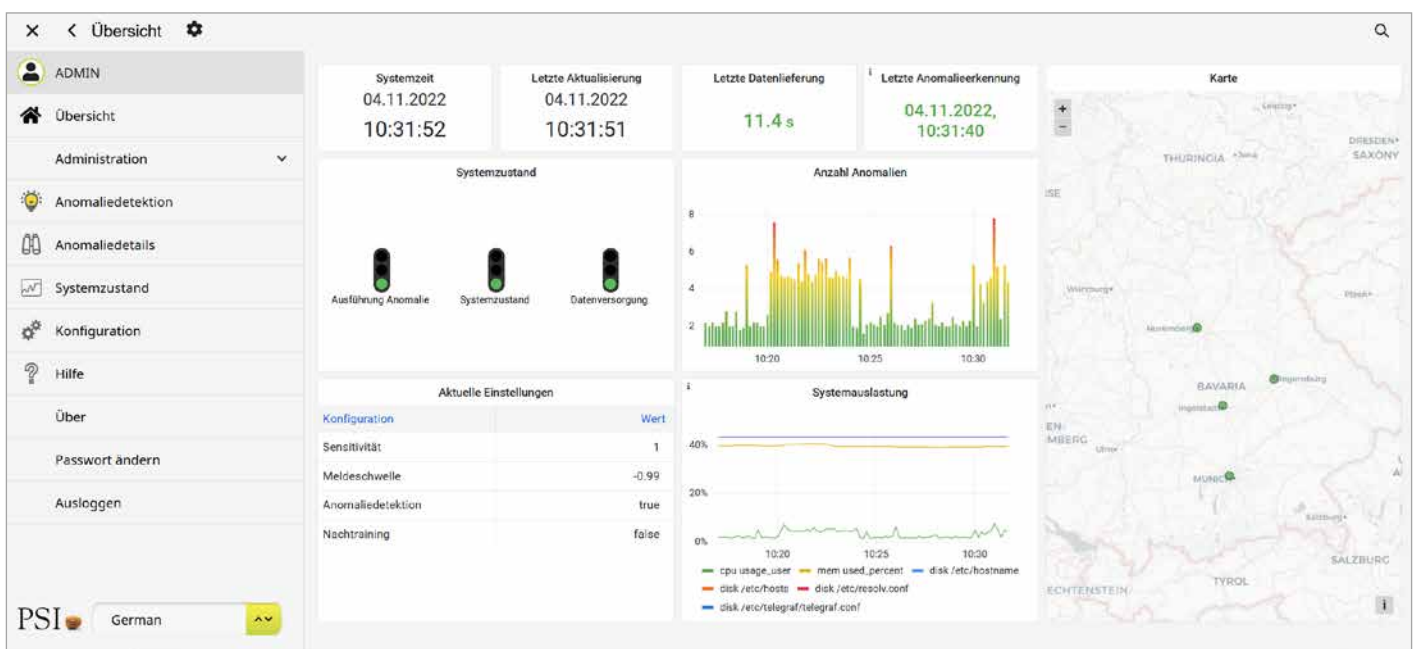
Signal light visualization of the different system status.

intelligence specially designed for security applications. It currently detects anomalies at power feeders and transformers, individually and in a system context.

current processes, and weather data during operation. The trained system PSIdetect permanently determines and compares a target state with the actual condition. Relevant deviations are detected, meaning anomalies that can result from a possible attack. It

tion for the evaluation of anomalies. Thus, they are able to carry out parameterizations. ◉

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News: PSImarket supports energy trading as cloud-based Software-as-a-Service

ETRM System for Energie AG Oberösterreich

PSI Energy Markets GmbH has been commissioned by the utility company Energie AG Oberösterreich with the delivery of the energy trading system PSImarket. As a cloud-based Software-as-a-Service (SaaS), the solution will support operational trading activities, portfolio management as well as analysis and risk management.

As an integrated standard platform, PSImarket offers all necessary functionalities for end-to-end support for the entire energy trading and procurement processes. These include contract, portfolio and risk management as well as planning and optimization.

Set up as an agile project, functionalities for analysis and risk management in particular should be usable, in addition to the reduction of manual activities for trade entry and portfolio management.

Thanks to a modern Java-based web GUI with PSI Click-Design, graphical user interfaces can be quickly and easily adapted to individual customer needs and designed to be clear and easy to use.

Secure data exchange through full encryption

As a cloud-based SaaS solution, PSImarket enables full encryption. This significantly increases secure data exchange, transparency and also control. Hosting is carried out via a cloud service.

Energie AG Oberösterreich is the modern and efficient provider of electricity, gas, heat, water as well as waste disposal and information and communication technology services. The Group stands for the highest quality and reliability of products, processes and services. In order to implement the sustainability goals, part of the electricity is generated in own power plants according to the highest ecological standards. ◉

The Energie AG Power Tower in Linz in Austria.

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News: Energiedienst Holding AG optimizes with PSImarket

Value Chain from Power Plant to Trading

Energiedienst Holding AG has awarded the contract for the implementation of the new energy trading system PSImarket to PSI Energy Markets GmbH. PSI prevailed in a Europe-wide tender.

Energiedienst will implement the modular and flexible standard software system PSImarket in connection with PSI's optimization software TS-Energy. This is intended to optimize the entire value chain from the power plant, through trading, to sales with all involved interface fields, in order to meet the most important needs of the market.

Hydropower plant in Rheinfelden.

Automates trading activities

The system further provides decision support for marketing on different markets and also automates trading activities via the new Algo Trader module "Smart Day Trader" for both the German and the Swiss part of the company. The contract was awarded in November 2021.

Energiedienst Holding AG, headquartered in Laufenburg, Switzerland, is a German-Swiss energy supply company offering electric power and energy-related services in southern Baden and Switzerland. ◉

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News: Stadtwerke Leipzig successfully implements optimization software from PSI

Transformation Supports Decarbonization Strategy

Stadtwerke Leipzig GmbH has comprehensively implemented PSI's TS-Energy Version 8.3 software suite for the optimization of the district heating system in the city of Leipzig in the short-term and long-term.

The focus of the optimization software, which has already been in use since 2021, is on automated plant marketing and control in the short-term area. TS-Energy forms the basis for calculating the deployment planning of all assets such as the complex gas CHP plants, district heating network, heat storage and supply contracts. The flexibility of the PSI software makes it possible to react to spontaneous changes and requirements in a reasonable time.

In the long term, TS-Energy is used for the transformation of the district heating network. The optimization calculations form the foundation for profitability calculations and ultimately investment decisions for new assets to realize the decarbonization strategy in Leipzig. The agility allows a large number of calculations to be performed automatically in order to be able to achieve robust results.

Thanks to a very customer-oriented and cooperative partnership between the Stadtwerke Leipzig GmbH and PSI, the project was implemented comprehensively and quickly. ◉

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Event: Annual meeting of the PSIcontrol User Group (PAG) in review

Product Developments for Gas Grids and Pipelines

As the 5th web session, the Annual Meeting of the PSIcontrol User Group (PAG) took place on June 9, 2022. With presentations on the latest developments and cloud-based applications from PSI's Gas Grids and Pipelines business unit, customers were also able to obtain comprehensive information online.

After the welcome by the business unit manager Dr. Simone Bauer and the CEO Dr. Harald Schrimpf, news from the business unit Gas Grids and Pipelines was reported. These included further developments of the 2022 releases of PSIcontrol version 8.0, which is based on the PSI platform, as well as the the roadmap. In addition, the work results from the user groups were reported.

The participants followed the web session live in Berlin or online.

In numerous live demonstrations, new functions were presented for PSIganesi and for Commercial Dispatching with PSItransport and PSIcomcentre, among others. In addition, the research projects "Industrial Artificial Intelligence for Safety in Gas Grids (IKIGas)" and "Beautiful—Load Optimized Work Design" were presented. Already on the previous day, the opportunity was offered to attend live presentations in Berlin and to obtain information in personal discussions. ◉

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R&D: Research project "Industrial Artificial Intelligence in Gas Grids" (IKIGas)

Exploring Self-Learning Tools

PSI Software AG and its partners have been awarded the grant for the project "Industrial Artificial Intelligence for Security in Gas Grids" (IKIGas). The grant is part of the research call "Civil Security—Artificial Intelligence in Civil Security Research II" by the German Federal Ministry of Education and Research.

The goal of the IKIGas research project is to explore innovative and powerful self-learning tools for the analysis, prediction and decision support on the state of gas grids.

The focus is to fully exploit the potential of the gas infrastructure for the secure supply of raw materials and energy and to protect it from threats. With the help of Industrial Artificial Intelligence, anomalies that are triggered by natural disasters, geopolitical tensions, terrorism, organized crime and large-scale emergencies can be detected more quickly and can swiftly identify appropriate measures more efficiently.

The goal is to strengthen the performance and resilience of the gas grids and to significantly improve the security of supply for industry and citizens as well as to ensure a reliable and uninterrupted supply of energy, heat and raw materials.

A holistic research approach is being set up with the interdisciplinary involvement of science, industry and users as well as practical testing. PSI's Gas Grids and Pipelines business unit is leading the consortium and will be responsible for the "Intelligent Control Systems" sub-project. ◉

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News: PSI receives the innovation Aaward of the German gas industry 2022 for PSIcontrol/Greengas

Conversion of Gas Networks for Renewable Gases

PSI Software AG received the Innovation Award of the German Gas Industry 2022 in the category "Intelligent Infrastructure" in Berlin on 12 October. The business unit Gas Grids and Pipelines had applied for the award with the software product PSIcontrol/Greengas. This supports network operators in converting their gas networks for the transport of renewable gases.

Association for the Economical and Environmentally Friendly Use of Energy (ASUE). The company Wintershall Dea supports the award as a partner. ◉

With PSIcontrol/Greengas, control specifications for energy-equivalent gas deliveries can be calculated in the required gas quality. Hydrogen hubs, biomethane and LNG deliveries can thus be integrated into the energy system by gas network operators via the well-developed gas network. For the grid infrastructure, hydrogen compatibility requirements as well as its compatibility states are visualized. Feed-ins of hydrogen, biomethane or LNG can be simulated. This year's Innovation Award of the German gas industry focused on Re:Inventing Energy. The jury of the 22nd Innovation Award of the German Gas Industry nominated 12 projects from 52 applications in the four categories "Application-oriented Research", "Efficient Application Technology", "Intelligent Infrastructure" and "Sustainable Generation" for the Innovation Award.

The nominated projects were presented in digital events from September 14 to October 5. The Innovation Award ceremony took place on October 12, 2022 in Berlin. The sponsors of this year's award are the industry associations „Bundesverband der Energie- und Wasserwirtschaft (BDEW), Deutscher Verein des Gas- und Wasserfaches (DVGW) and Zukunft Gas". The Innovation Award's competence partner is the

Representatives from PSI at the award ceremony on October 12, 2022 in Berlin.

More information is available in the gas.info press release.

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R&D: PSI is consortium leader in the joint research project PROGRESS

Testing of Curative Relief Measures

As consortium leader in the joint research project PROGRESS, PSI Software AG is testing curative measures for decongestion in extra-high and high-voltage networks together with six other joint partners. The project is funded under 03EI4046A as part of the 7th Energy Research Program in the area of "Electricity Networks" of the German Federal Ministry of Economics and Climate Protection (BMWK).

The project objective is the practical testing of curative grid management in extra-high and high-voltage grids. In this context, curative measures correspond to a reactive adjustment of actuators in the network for the targeted influencing of voltages and currents after the actual occurrence of a fault. The existing network can thus be utilized to a higher and more efficient extent and the share of preventive measures in congestion management can be reduced.

The goal of PSI is the development of prototypical applications for curative grid operation management and their field testing in the grid areas of TenneT TSO GmbH, Transnet BW GmbH and Schleswig-Holstein Netz AG. In field test I (transmission system operator/transmission system operator), the focus of PSI is on the prototypical testing of a module for the online determination of limit values and their cross-network operator coordination. Furthermore, the further determination of curative measures and their validation by dynamic network analyses is considered in the project.

In field test II (transmission system operators/distribution system operators), PSI will test individual functional prototypes on the TSO side, which will pilot the data exchange between the network operators and the activation of curative measures. In addition to PSI Software AG, the six joint partners include TenneT TSO GmbH, Transnet BW GmbH, Schleswig-Holstein Netz AG, RWTH Aachen University (Institute for Electrical Systems and Networks, Digitalization and Energy Economics), Otto von Guericke University Magdeburg (Institute for Electrical Energy Systems) and Netze BW GmbH as an associated partner.

The project started on May 1, 2022 and runs until October 31, 2025. ◉

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Kick-off Meeting in Dortmund.

News: PSI receives major order from Belgian transport operator De Lijn

Depot and Charging Management for E-Buses

The Belgian public transport operator De Lijn has commissioned the PSI Group with the delivery of the depot and charging management system PSIebus. The system will dispatch, supply and control more than 2000 buses at over 50 depots throughout Flanders. De Lijn is pushing ahead with the electrification of its buses and their depots, and will convert its entire diesel fleet to zero-emission drives by 2035.

PSIebus will coordinate and dispatch the vehicles and ensure that all buses are reliably ready to start their trips. All depot processes, from parking, supply and workshop, driver registration and vehicle allocation can be mapped in a digital system. The system also incorporates aspects such as the remaining range, the charging status and the required charging time into the charging planning.

The dispatching of the vehicles takes place within a few seconds and is based on PSI's own optimization software Qualicision, which determines the best possible solution in real time based on the operational constraints.

De Lijn is driving forward the electrification of its buses and depots.

The integrated PSI charging management system controls the entire energy demand of a depot and monitors and controls the individual charging devices. In doing so, expensive peak loads are avoided and specifications of the network operator are taken into account.

The new system enables De Lijn to make optimal use of its vehicles and charging infrastructure and ensures the best possible vehicle availability. In addition, PSIebus can be operated on the IT side in accordance with the rules for the protection of critical infrastructure.

De Lijn operates an extensive scheduled bus and tram network and several fleet cars in the Flemish provinces in Belgium. The network comprises about 1000 lines, and the vehicle fleet includes 2250 buses and 400 fleet cars. Around 3.5 million people use public transport in the Flanders region every year.

PSI's depot and charging management system controls the E-buses at De Lijn.

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Event: PSI presented intelligent software products at the E-world 2022

Cloud-Based Applications for the Energy Industry

Currently, supply security and the energy turnaround are the central topics in the energy industry—and thus also at E-world energy & water 2022, which took place in Essen from June 21 to 23. Around 730 exhibitors from 24 countries were represented. PSI was one of them and presented software solutions and cloud-based applications for the energy industry at its booth 314 in hall 3.

Based on the PSI platform, new and expanded functions for energy trading and sales, risk management and optimization, optimized gas transport and storage, intelligent network management, load and charge management and field force management have been demonstrated.

PSI demonstrated energy software products live at the E-World.

New functions for energy trading

As an integrated standard platform, PSImarket offers all the necessary functionalities for end-to-end support of the entire processes of energy trading and procurement. These include contract, portfolio, risk management as well as planning and optimization.

For energy traders, numerous functional enhancements were shown in PSImarket Release 4.4. The focus is on improvements and enhancements in energy data and contract management as well as the new display and calculation functions.

Moreover graphically-based improvements realized by the modern Java-based web GUI have been presented. Here, PSI Click-Design allows graphical user interfaces to be quickly and easily adapted to individual customer requirements and to be de-

signed in a clear and easy-to-use manner. Additionally, the system can be fully operated in the cloud.

For the optimization and risk assessment of contracts, power plants and complex energy portfolios, the integrated platform TS-Energy was one focus, which is already successfully in use at various energy suppliers in Switzerland and Germany.

Software products optimizes gas transport and storage

In the current version of PSIgassuite, new and expanded functions for transport dispatching, regional distributors and storage operators were shown. These include the consideration of green gases and hydrogen in gas transport, the new module Master Data Management based on the

group-wide PSI platform and support for the Postgresql database.

The new solution PSIgasguide supports dispatching in determining and optimizing current and future network operating modes and uses the multi-criteria, AI-based PSI optimization software PSIqualicision. It can be used integrated or standalone. New complex functions and enhancements will be presented for online simulation, gas composition reconstruction, compressor optimization and schedule management.

In addition, the solution for commercial dispatching of a gas shipper with all functions from capacity marketing, nomination, matching and balancing to settlement preparation was demonstrated. This will be complemented by services such as application software upgrade service and hosting in the cloud.

Intelligent network management

Additional important exhibition focal points include advanced software solutions for intelligent grid management as well as cloud-based applications for the integration of electro mobility via smart grid apps and load management for the charging infrastructure.

In this context, the digital twin of the distribution network is presented as the essential component for the data-driven network operator. On the basis of the PSIngo platform, the core processes from the connection request to the operation to the control of the end customer system in the low volt-

age are thus presented. For the first time, the curative network interventions (stepless power management) of the customer plant via controllable local system interface for transport companies had been shown.

Furthermore, the load and charge management PSIsmartcharging for depot operators to support grid-serving operation and the latest version of the network control system PSIcontrol was presented.

In addition, the field force management system PSIcommand which forms the basis for optimized and AI-supported capacity planning as well as for maintenance and fault management in the energy supply has been shown. ◉

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Event: PSI EE Info Days 2022 in Aschaffenburg

Energy Trends and Developments

This year's PSI EE Info Days took place again online from the PSI studio in Aschaffenburg on 16 and 17 November 2022.

As usual, customers and interested parties could find out about the latest trends and requirements for energy suppliers, and in particular about the developments in PSI products. In addition, a smart event software offered the opportunity to exchange information with participants during the two days "almost" like at face-to-face events. ◉

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