

2023

ENERGY manager

Newspaper for energy suppliers



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EDITORIAL

Dear Readers,

The stable and reliable integration of renewable energies and the integration of e-mobility into the grid pose major challenges for the current energy supply system. Distribution grids are increasingly being used to absorb and distribute decentralized energy volumes and load flows. The high volatility and the low full load hours of renewable energies require rethinking in the planning and operation of distribution grids. Thus, new approaches are essential.

Distribution grids need to become more observable and controllable—in other words, much smarter. Intelligent distribution grids offer the opportunity to master the challenges of the energy transition and reduce the costs of grid expansion.

This will be the core task of the electricity industry, to take advantage of the challenges and opportunities of digitalization, and to drive forward the transformation into a multimodal system. Finally, on November 27, 2023, the Federal Network Agency defined regulations for the in-



tegration of controllable consumption devices. The law to restart the digitalization of the energy transition and the implementation of Section 14a set the starting point for the required decentralization and comprehensive digitalization of the energy system.

In our cover story, you can read about the potential that intelligent charging and energy management systems for electric bus depots offer for mastering the upcoming

challenges of the energy transition, while further articles provide information on news, research projects and collaborations. For example, on the important topic of “cyber security of critical infrastructures”, as well as events in the fields of electrical energy, gas grids & pipelines, and energy trading.

Yours sincerely,



Martin Stiegler
Managing Director
PSI GridConnect GmbH

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Intelligent charging and energy management systems for electric bus depots

Electrification promotes sustainable mobility

Public and private transport companies are currently undertaking great efforts to make public transport more sustainable and environmentally friendly. This process is also being driven by political requirements, such as the Clean Vehicle Directive within the EU. According to this act, transport companies in EU member states are obliged to meet minimum quotas of “clean vehicles” when tendering for new buses for local public transport, to procure minimum quotas of “clean vehicles”. This is why more and more companies are opting to electrify their bus fleets.

In the process, transport companies are facing challenges, but also a wide range of potentials that will enable future efficient, economical and environmentally friendly mobility in cities and municipalities. The electrification of a transport company’s bus fleet requires not only the procurement and commissioning of electric vehicles, but

also a fundamental adaptation of the infrastructure and processes in the bus depots as well. Efficient and powerful software tools that enable automated and optimal monitoring and control of the relevant processes are available to relieve the burden on management and operating staff as the complexity of day-to-day business increases.

In the course of modernizing a bus fleet, two fundamentally new tasks have to be mastered for a transport company: On the one hand, the monitoring and control of the bus depot’s electric charging infrastructure, taking into account mobility, safety and capacity aspects. On the other hand, the optimization of charging processes to minimize

costs, energy consumption, the load on the public grid infrastructure and the environmental impact.

Automatic recording of all process data with optimization algorithms

The implementation of these tasks requires the collection and processing of a considerable amount of data in real time, as well as a continuous decision-making process that takes into account a large number of optimization criteria with constantly changing influencing factors. Transport companies are already using a charging and energy management system (in German: LEMS) to automate these processes for a very manageable charging infrastructure with just a few charging points.

PSI's software products for the intelligent charging and energy management of electric bus fleets enable the automatic recording and processing of all relevant process data from the charging infrastructure, vehicles and peripheral systems of a bus depot. PSI's proprietary multi-criteria optimization algorithms are used to achieve optimum control of the charging processes within the bus depot. These systems ensure that the depot's mobility targets are met with the best possible utilization of the charging infrastructure, and minimal operating costs, without jeopardizing the safety and stability of the network infrastructure.

Optimization of the entire charging infrastructure

The LEMS takes into account not only the charging infrastructure, but also the entire relevant infrastructure of the depot. In addition to the facilities for generating electrical energy, such as PV sys-

The EU member states must transpose EU Directive 2019/1161 into their respective national laws. The proposed law to implement this directive on the promotion of clean and energy-efficient road vehicles and to amend public procurement regulations (Clean Vehicles Directive) was published in the Federal Law Gazette on June 14, 2021. As a result, binding minimum targets for low-emission and zero-emission passenger cars and light and heavy commercial vehicles, such as buses in public transport, are specified for public procurement contracts.



Source: <https://bmdv.bund.de/SharedDocs/DE/Artikel/G/clean-vehicles-directive.html>

tems and wind turbines, this also includes the infrastructure for generating heat. Furthermore, the cooling of the buildings such as combined heat and power plants, heat pumps, air conditioning systems and the infrastructure for storing electrical energy such as batteries and electrolyzers with hydrogen storage are recorded. Charging and energy management systems thus enable the monitoring and control of all essential resources, consumers and generators for safe and economical charging of the bus fleet under optimal conditions.

Support of the public power grid

In addition to improving the internal processes of the bus depot, the LEMS can also optimize the behavior of the depots in terms of supporting the public power grid. Thus, the depots can behave in a grid-supportive manner on the basis of monetary incentives (preventive) and ad hoc control signals (curative). The available storage capacities and the flexibility to shift energy consumption over time are used to provide system services for the upstream electricity grid (distribution grid).

Depending on the customer's needs, PSI products for charging

and energy management of electric bus fleets offer the right solution and enable automated planning and control of charging processes based on forecasts, real-time data and optimization algorithms.

Primary goals of a LEMS: planning, controlling and monitoring

The primary purpose of a LEMS is to plan, monitor and control the charging processes of an electric bus fleet within a depot in such a way that the following objectives are achieved. This includes ensuring reliable and punctual transportation. With optimal planning and control of the charging processes, sufficient buses with an adequate charge status are available for departure at all times so that the planned routes and travel times can be adhered to in accordance with the depot management system (DMS) specifications. It is also important to comply with all operating limits of the electrical equipment in the depot power grid, such as thermal or voltage-related limits.

Another target is to minimize the peak load at the grid connection point through improved planning and control of charging processes

in order to minimize the maximum power consumption at the depot's grid connection point (NAP) over a billing period.

To achieve these goals, charging processes must be planned in advance and controlled in real time, taking into account the specifications provided by the peripheral systems. Planning is based on data and forecasts provided by the peripheral systems via standardized interfaces. The real-time control of the charging processes is based on the pre-defined planning and takes into account real-time information provided by the peripheral systems as well as the process values of the local electrical and charging infrastructure.

Cost minimization through dynamic electricity tariffs

In addition to the primary objectives of a LEMS, modern systems enable further optimization functions. Cost minimization becomes more important when dynamic electricity tariffs are taken into account. Various electricity tariffs can be considered for large consumers such as a bus depot. If the operator opts for a model with dynamic prices, this information can be taken into account in the system in order to minimize energy procurement costs. If a depot operates generators such as photovoltaic systems or combined heat and power plants, these can be included as well.

Extending battery life

Extending the battery life of e-buses is another optimization goal that offers monetary benefits. The service life of the batteries can be extended by charging at a lower charging power and by re-

ducing the target charge level. Conventional lithium-ion batteries used in electric buses exhibit lower ageing effects at low charging currents. If there is sufficient time available for a charging process for operational reasons, e.g. overnight, a low charging capacity is advantageous. Furthermore, if the maximum range is not required according to the route planning, the bus does not have to be charged to 100 percent state of charge.

Architecture and operation of a LEMS for electric depots

The architecture and system landscape of a LEMS for bus depots is shown in Figure 2. It shows the subsystems that must work together to ensure optimal and coordinated planning and control of

Communication connection of the charging stations and the electrical infrastructure

To monitor and control the electrical and charging infrastructure in the depot, the LEMS requires a bidirectional communication connection with the components to be monitored and controlled (chargers, buses, measuring devices, actors). This is usually done via a private TCP/IP network in which an OCPP gateway with VAS (Value Added Service) server functions is integrated. Alternatively, the functionalities of the OCPP gateway can be provided from a cloud in virtualized form.

Communication between the buses, the charging points, the OCPP gateway and the LEMS is based on standardized protocols. The Open

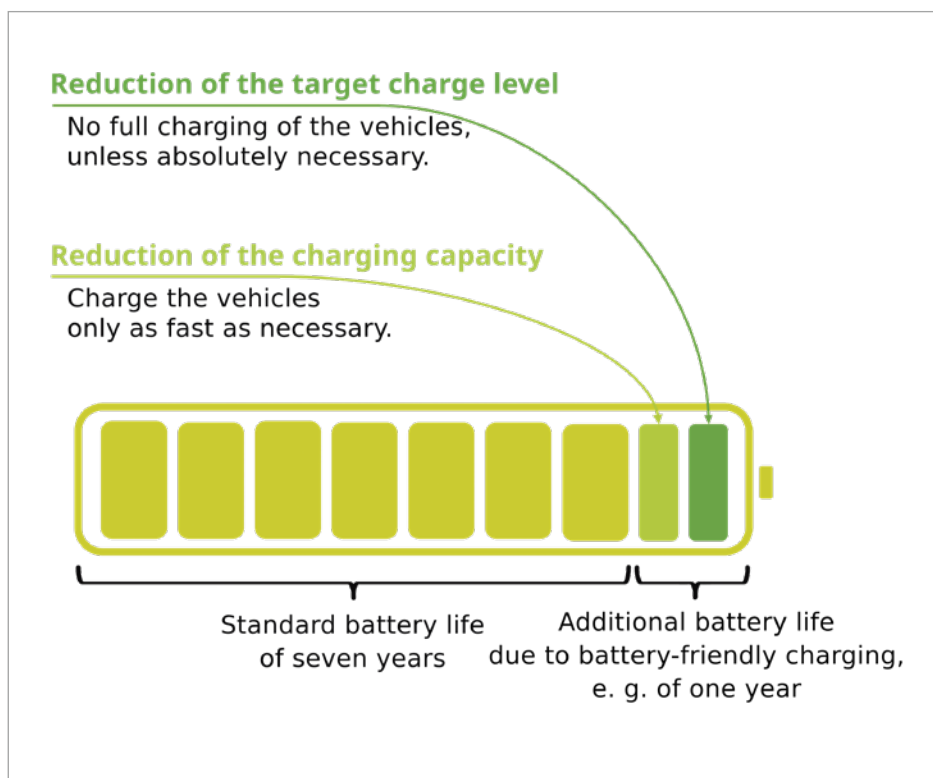


Figure 1: Cost savings through battery-friendly charging.

the charging processes in the bus depot. In addition, the figure shows the most important communication interfaces between the subsystems and the protocols used.

Charge Point Protocol (OCPP) is used to connect the charging points (chargers) to the LEMS. Communication between buses and charging points is implemented on the basis

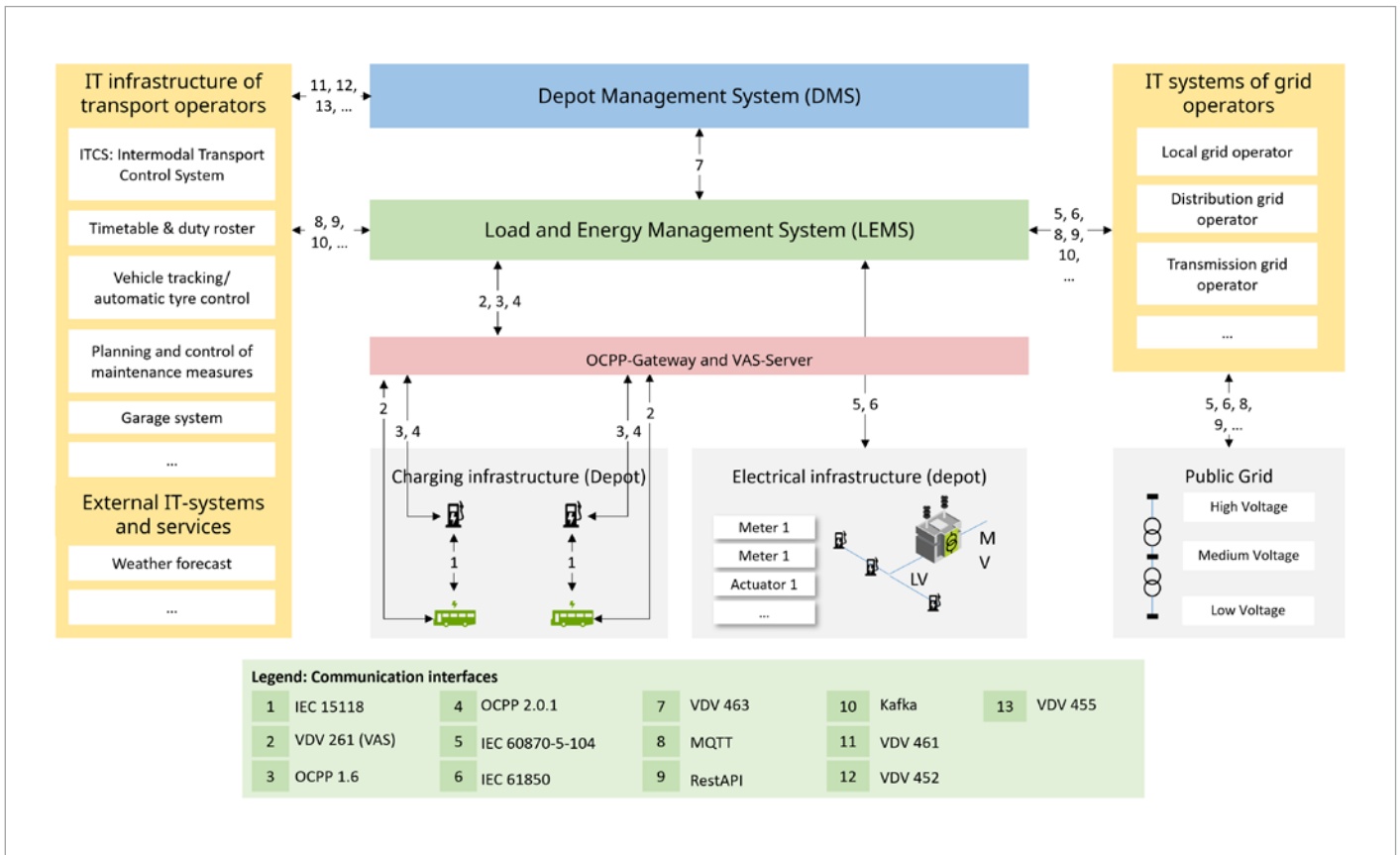


Figure 2: System overview and peripheral systems of a charging and energy management system for electric bus depots.

of the ISO 15118 series of standards, which regulates bidirectional communication between electric vehicles and charging stations.

Communication between the LEMS and the measuring devices as well as the actuators of the electrical infrastructure is implemented on the basis of the IEC 60870-5-104 and IEC 61850 protocols. Alternatively, individual measuring devices or actuators can be connected to the LEMS based on IoT protocols such as MQTT and RestAPI.

Interface between LEMS and IT systems of a depot operator

Data exchange between LEMS, DMS and ITCS is based on VDV Guideline 463 of the Association of German Transport Companies, which specifies the data format and transport protocol for communication between these systems. Commu-

nication between the DMS and the relevant IT systems of the transport company is implemented on the basis of VDV publications VDV 461, VDV 452 and VDV 455, among others. A direct communication link between the LEMS and the transport company's IT systems and external services is also possible. For example, data transfer of weather data and weather forecasts can be realized via MQTT, Rest-API or Kafka.

Interface to relevant IT systems of the power supply

In order for the behavior of a depot to be used to provide system services for the upstream distribution grid, interfaces are required to enable data exchange between the LEMS and the IT systems of the power supply. Integration can take place via conventional protocols (IEC 60870-5-104) or more modern ones (IEC 61850). On this basis, data can be exchanged to coordi-

nate the grid-friendly use of flexibility for load shifting.

Another alternative is to connect the LEMS to the IT systems of the energy supply via a mass data-capable streaming platform, which enables the connection of different data sources and the exchange of data between different applications. PSI relies on a high-performance Kafka-based architecture with the PSIconnect software. Direct communication between LEMS and the streaming platform can be established via Kafka interfaces. Communication with other systems, such as a control system, is also possible via this interface.

Aspects of IT security

The IT Security Act 2.0 (Zweites Gesetz zur Erhöhung der Sicherheit informationstechnischer Systeme or IT-SiG 2.0, in force since May 28, 2021) obliges operators of crit-

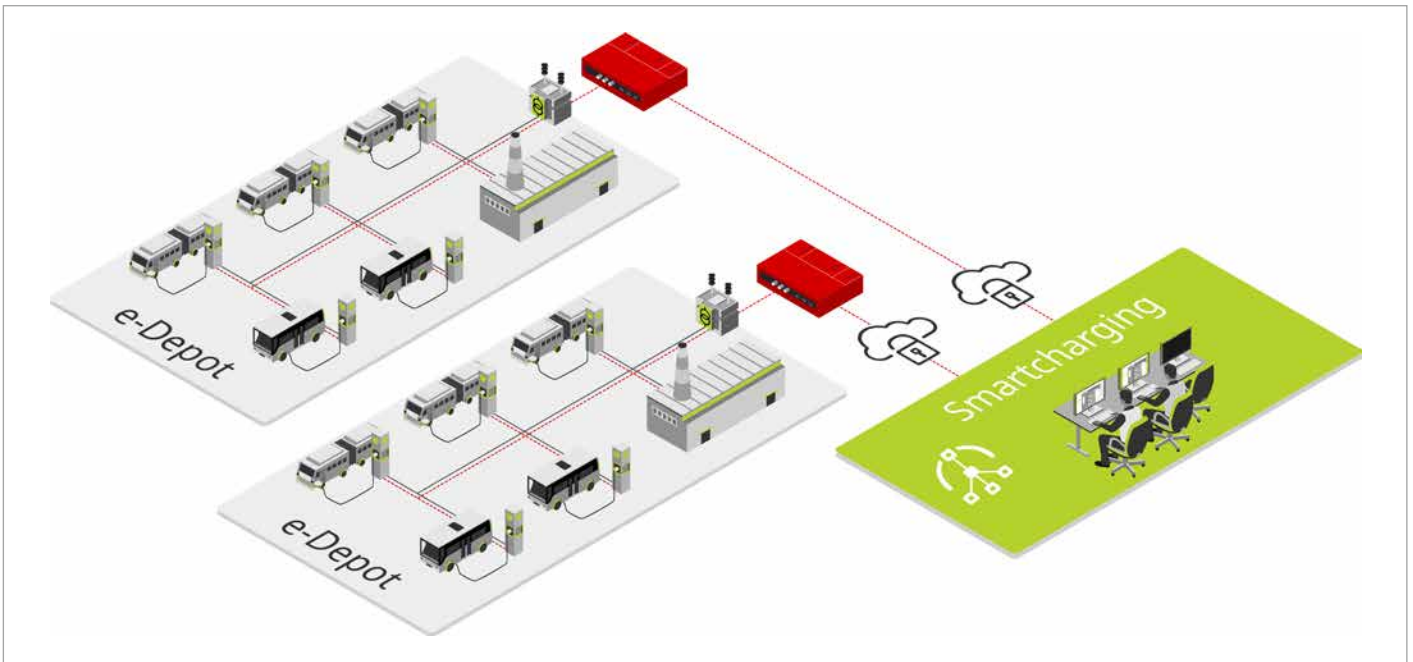


Figure 3: Smartcharging—intelligent charging management system for electric bus depots.

ical infrastructures (KRITIS) to secure their IT in accordance with the “state of the art”. Ten sectors, including the energy sector and the transport and traffic sector, currently belong to the critical infrastructure. For transportation companies threshold values for annual passenger numbers and the size of the region covered were defined, at which point corresponding requirements are to be implemented.

PSI offers solutions that achieve high security standards through network segmentation. Data traffic between the individual subsystems is restricted to the bare minimum by network routes. Individual network segments form a “demilitarized zone” (DMZ) and separate the core system from the potentially less secure depot IT networks and the customer’s office networks.

LEMS subsystems are operated in these DMZ network segments, which take over the communication tasks to charging stations, vehicles and the customer’s office networks. They also protect the core LEMS systems,

which run in a separate network segment, from unauthorized access. Communication with vehicles, charging infrastructure and office systems is encrypted. PSI solutions also have an integrated and isolated user role as well as rights management. Security-relevant events are logged and integrated system monitoring warns users in the event of critical infrastructure events.

Outlook

The number of electrified and digitalized bus fleets of transport companies will increase significantly. Future-proof and high-performance LEMS with network-supporting optimization functions will play a central role in the system landscape of transport operators.

When selecting a LEMS, it is crucial to use and support manufacturer-independent and standardized communication interfaces in order to ensure investment security and freedom of choice with regard to the charging infrastructure, vehicles and third-party systems to be integrated. For public transport operators, the

changeover will help to improve the efficiency, sustainability and cost-effectiveness of bus depots. This is because they will not only lead to the realization of efficient, economical and environmentally friendly mobility in cities and municipalities, but will also make a decisive contribution to the safe and stable operation of public power grids. 🌱

For further information, please scan the QR code.



Load and charge point management for depots



ETG-Paper

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R&D: PSI and partners conduct research in the DISEGO—Distributed and Secure Grid Operation project

Development of an Innovative eIoT Platform

Together with two distribution system operators and four universities, PSI GridConnect and PSI FLS Fuzzy Logik & Neuro Systeme are collaborating in the practical DISEGO research project. The aim is to develop an innovative eIoT (Energy Internet of Things) platform that enables secure, traceable and automated control of distribution grids based on smart meter data.

With the energy transition and the associated smart meter rollout in Germany, the DISEGO project consortium has set itself an ambitious mission: to develop an

own measurements at transformer stations and cable distribution cabinets. This data is merged in the PSI GridConnect systems to estimate the grid status and control

Economic Affairs and Climate Action (German BMWK) is to ensure a climate-friendly, reliable and affordable energy supply.

An important component of this is the development of a distributed and IT-secure grid monitoring and control system that can be implemented in energy industry practice.



The energy sector needs smart, creative minds and, in particular, software solutions that can support us on the path to the energy transition. With the DISEGO project, these ideas are becoming reality. This is how we can meet the upcoming challenges posed by Section 14 EnWG.

Thorsten Meyer, Innovation and Product Management, Stadtwerke Norderstedt

Comprehensible AI-based decision support

In future, the eIoT platform will provide system managers in the grid control room with comprehensible AI-based decision support. Based on qualitatively labeled network data, the Qualicision AI software from PSI FLS prioritizes the control recommendations in the event of critical network conditions, among other things, and learns from the network operation modes that have been imple-

eIoT platform that makes distribution grids more efficient and reliable and creates “real” interoperability in the energy system.

Based on the combination of smart meter measurement data from grid customers and the grid operator’s

actuators in the grid, as well as for the use of various other microservices. Despite, or perhaps because of, the distributed cloud-based architecture, the application is capable of handling mass data. A fundamental goal of all research projects funded by the Federal Ministry for



The project members at the kick-off meeting in November 2022.

mented. As a result, equipment overloads and voltage band violations can be minimized in a targeted manner and counteracted with traceable measures.

From testing in the laboratory to use by grid customers the DISEGO research project runs through successive stages of testing: simulative and practical laboratory tests at Hamburg University of Technology and two field tests on the Stromnetz Hamburg GmbH innovation campus and in the supply area of Stadtwerke Norderstedt with real grid customers.

Further partners in the project are the University of Duisburg-Essen



DISEGO is funded by the Federal Ministry for Economic Affairs and Climate Action as part of the 7th Energy Research Program "Innovations for the Energy Transition". (FKZ: 03EI6078A).

Supported by:



Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

and the Hamburg University of Applied Sciences. The results of the project, led by the Helmut Schmidt University of Hamburg, will subsequently be prepared for incorporation into regulation and standardization as well as enable the DISEGO platform to be used by distribution system operators for automated control of the distribution grid. 🌱

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News: Stadtwerke München rely on PSImarket

Automated Billing at Charging Stations

Stadtwerke München (SWM) have awarded PSI Energy Markets GmbH with the implementation of the flexible software solution PSImarket. Based on this solution, the billing processes at the charging stations as well as all aspects of electro mobility will be automated in the future.

SWM were faced with the challenge of offering their customers monthly kilowatt-hour billing for all charging processes, whereby the number of charging processes varies greatly. By using PSImarket, the billing processes for the transactions recorded in the system can be carried out efficiently. During the charging process, data such as charging duration and energy quantity are recorded and transmitted to the system. Based on this data and the predefined tariffs, the amount will be calculated and the invoice generated.



Charging stations of SWM.

ing on the success of the regional energy, heating and transport transition. Their mobility subsidiary Münchner Verkehrsgesellschaft (MVG) ensures sustainable mobility in the city with its subway, bus, and streetcar and MVG bike services. SWM also build and operate e-charging stations to ensure the necessary infrastructure for electro mobility. In the spirit of the traffic turnaround, they are thus creating the basis for climate-friendly individual transportation in addition to local public transport. 🌱

Stadtwerke München are one of the largest municipal supply and service companies in Germany. They supply

Munich and the region with energy, drinking water, local transport and telecommunications and are work-

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Artificial Intelligence in Energy Trading

The dynamic and competitive electricity market requires efficient and intelligent technologies to meet the increasingly complex challenges of energy trading. This is where AI-powered algorithms come in.

With their ability to efficiently analyze large amounts of data, react to market conditions in real time, and make complex decisions for optimal trades, process automation using AI algorithms is becoming increasingly important.

Artificial Intelligence meets energy trading

The use of AI technology in the energy sector offers numerous advantages and plays a crucial role in the transition to a renewable energy system. The main benefits lie in the planning of distribution network infrastructures, the optimization of power plants and generation facilities, including renewable energy, the support and optimization of trading decisions, and the control of smart grids.

Due to the increasing share of volatile power generation from wind and solar, algo trading is more im-

portant than ever, especially in short-term power trading. Traders would find it extremely challenging to manage all activities without the use of advanced algorithms that can monitor and analyze trading activities themselves.

Value proposition for energy traders

Automated processes through AI enable efficient and accurate management of energy flows, adapting

trading algorithms, energy traders can be relieved of the burden of daily trading decisions, increase their competitiveness, and thrive in a dynamic market environment.

AI-based trading support for the intraday market

The new algorithm-based module Qualicision Smart Day Trader for trading on the intraday market has been developed as a supplement to the integrated trading and sales

Algorithmic trading offers many benefits to traders:

- Increased efficiency through price-optimized trading decisions
- Save time by allowing intuitive parameterization of the trading strategy
- Automation of trading activities
- Optimizing trading decisions by analyzing market conditions
- Risk management through clearly defined decision guidelines

to volatile energy production and balancing consumption and generation in minutes. With intelligent

system PSImarket. It complements the existing workflow in short-term trading by offering the increas-



Algorithms improve the trading process.



Algorithmic trading in energy trading.

ingly important option of balancing open positions via the market until shortly before the start of delivery, thus saving both expensive balancing energy costs and marketing generation capacities completely and profitably.

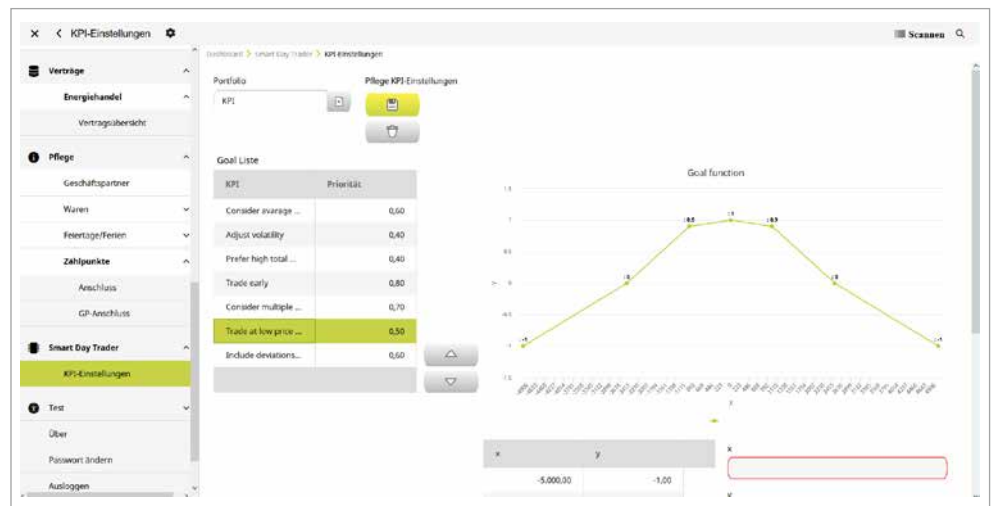
residual positions and the flexible contract management for modeling are also included.

The main functionalities of the module include setting the trading strat-

trading. The use of AI-based algorithms plays an important role in this transition due to their speed and efficiency. Because decisions are made automatically and without human intervention, trades can be executed in fractions of a second, creating potential profit opportunities that would be difficult or impossible for human traders to capture. Therefore, only energy traders who use AI-powered algorithms in their trading activities will always be one step ahead.

Overall, algo-trading has the potential to make the trading process more efficient and profitable.

Trading activities are prepared, calculated and executed with integrated KPI-driven multi-criteria optimization. This proven PSI system stands for qualified decision support in the optimization of business processes. Conflicting trading objectives are evaluated, balanced and resolved in real time based on easy-to-understand Key Performance Indicators (KPIs).



KPIs are set via an intuitive user interface using scroll bars.

Traders can combine and prioritize these KPIs according to their market assessments via an optimized parameterization interface. This provides the trader with an extremely powerful and innovative intraday market management solution that requires no programming knowledge.

egy via an intuitive interface with KPI scroll bars, visualization of fundamentals and trading decisions, real-time display of trading results, on-demand visualization of historical trading sessions to evaluate KPI settings, as well as visualization of current market prices and statistical results.

It provides access to fast trading opportunities while eliminating human error. 🟢

The complete integration of the module into the existing module landscape of PSImarket as well as the use of the proven functionalities for the determination of structured

More efficient and profitable algo trading

We are already seeing a transition from manual to fully automated

Scan the QR code and read the article in our blog (only in German).



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New Roadmap for PSIprins

In 2019, the PSIcontrol system portfolio has been supplemented by the software product PSIprins, which is currently in active use in more than one hundred installations in Europe. By now, the range of households reliably supplied with energy by the control system varies from network operators with 10000 to 1.5 million households. Numerous industrial customers also rely on PSIprins.

The proven PSIcontrol and PSIprins control systems differ both in their business models and in their technical basis from each other and address different markets and existing customers. Through standardized interfaces of the PSI Energy Data Platform to other PSI products, both control systems will offer even greater added value in the future. Thus, the customer requirements that go beyond the core tasks of a network control system can be optimally served.



Typical setup of a PSIprins 8 operator station.

Transmission and distribution system operators as well as large municipal utilities and industrial customers, but also large rail power grids benefit from PSIcontrol

PSIcontrol is the leading innovative control system for transmission and distribution system operators, large municipal utilities and industrial customers as well as large traction power grids. It offers outstanding performance, innovative functions and customer-specific adaptability.

PSIprins for municipal utilities and operators of industrial networks and infrastructures

On the other hand, PSIprins is ideally suited as a pragmatic control

system for municipal utilities and operators of industrial networks and infrastructures. It is optimized for operation under Microsoft Windows and allows customers to achieve cost-optimized operation thanks to a high degree of standardization. In order to meet future requirements even better, the roadmap for the upcoming product release 9 is currently being developed together with the PSIprins customer advisory board.

Swiss network operator EW Wald AG relies on PSIprins

In line with this, the Swiss network operator EW Wald AG will replace its existing control system with PSIprins. The multi-divisional software product will take over the management, monitoring and control of the power grid. This will

As a regional energy service provider, EW Wald AG, based in Wald, supplies customers in the municipal capital and the areas of Laupen, Riet, Töbeli- Dürnten, Oberholz and Diemberg. EW Wald also provides comprehensive services in the areas of electrical installations, home automation, comprehensive energy consulting and the construction of photovoltaic and heat pump systems.

modernize the existing service portfolio and increase security of supply. ☺

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News: PSI awarded contract for new network calculation system of Swissgrid

More Security in the Transmission Grid

PSI Software SE has been awarded the contract for the implementation of a new network calculation system (EMS Core) based on PSIcontrol 4.10 by the Swiss transmission system operator Swissgrid AG.

With the help of the “EMS Core System”, complex network calculations, including dynamic stability calculations, can be carried out in the future in the transmission grid of the whole of Switzerland in order to evaluate and, if necessary, optimize grid security.

In addition, the system calculates grid situations that can be defined as possible variants up to 72 hours into the future. If a critical grid situation is identified, corrective measures are developed and proposed to the operating staff. This enables Swissgrid to avoid possible critical grid situations in advance.

Swissgrid decided in favor of PSI's proven software solutions, among other things, due to the extensive



Swissgrid's headquarters in Aarau.

updateable and upgradeable functions and the existing references with leading transmission system operators (TSO).

With the current order from Swissgrid, PSI wins another important European transmission system op-

erator and thus consolidates its leading position in the DACH region. The project duration is expected to be 27 months. 🌱

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20.-22.2.2024
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www.e-world-essen.com

At E-world 2024, PSI will be presenting intelligent software solutions for the energy industry.

We are looking forward to your visit.

New Developments for Gas Grids and Pipelines

The annual meeting of the PSIcontrol User Group (PAG) took place on June 6 and 7, 2023 in Berlin. The latest developments in software products solutions from the Gas Grids and Pipelines business unit were presented in live presentations and lectures. In addition, the current research projects “IKIGas” and “Beautiful”, as well as the “Innovation Award of the German Gas Industry 2022”, were highlighted.

On the first day, the conference took place at the PSI headquarters in Berlin Mitte. The participants had the opportunity to learn more about the software for gas grids and pipelines in live presentations. Afterwards, there was a guided tour of the EUREF campus in Berlin Schöneberg, followed by a joint dinner. EUREF is short for the “European Energy Forum” and promotes the idea of a model district for the climate-neutral, resource-conserving and intelligent city of tomorrow.

On the second day—in the nearby Alexander Plaza Hotel—following a welcome address by CFO Gunnar

of the GP suite. The changes to the business unit’s organization were also reported on.

New functions and enhancements

The subsequent presentations provided information about the GP Suite 2023 and the rollout of release 2023/01. Extensive new features and enhancements in PSIcontrol 8.1 were also presented. These include, for example, workstation configurations with default and curve process displays, adjustments in the password change dialog or axes in ad hoc curves. A list editing functionality for TASE.2 client and server variables is also now available as standard. New convenient filters for a reliable search enable filtering by all columns in the TASE.2 dialog references.

Support for certificate management

The PSI Site Manager has also been extensively expanded. This includes a coloring option by location as well as the convenient visualization of RPM and MSI third-party software packages installed on the respective computers. Support for certificate management has also been added.

This was followed by the presentation of the PSIcontrol/Greengas software solution, for which PSI was awarded the Innovation Prize of the

German Gas Industry 2022 in the “Intelligent Infrastructure” category. PSIcontrol/Greengas can be used to calculate control specifications for energy-equivalent gas deliveries in the required gas quality and thus support network operators in converting their gas networks for the transportation of renewable gases. The presentations on new developments in the areas of gas grids and pipelines were held in parallel in thematic blocks.

Focus on gas grids

In the gas block, particular attention was paid to the presentation of the GP Suite roadmap for the upcoming years based on the Live Cycle Support Matrix. Other presentations on gas simulation and gas quality reconstruction as well as commercial dispatching also highlighted the further developments in these specialty areas.

Moreover, the pipelines block focused on hydraulic simulation for pipeline operators and the PSICarlos software for operational planning of TAL’s oil pipelines and tank farms.

Important research projects in partner network

Finally, the current status of the “IKIGas” and “Beautiful” research projects, in which PSI is significantly involved in the partner network, was presented to all participants. In the project “Industrial Artificial



Participants at a live presentation.

Glöckner, the head of the Gas Grids and Pipelines business unit, Dr. Simone Bauer, reported on the latest news from her division. In addition to the strategic goals and requirements for modern, integrated and powerful software products, this also included the future direction

Intelligence for Safety in Gas Networks" (IKIGas), PSI is the consortium leader and is responsible for the sub-project "Intelligent Control Systems".


As part of the research project "Beautiful—load-optimized work design for network control centers of critical infrastructure", PSI is developing a new interactive design

for control centers of critical infrastructures.

In addition, the challenges of information security were discussed and the PSI App Store was presented.

Conclusion

The annual meeting was characterized by an extensive exchange of information. Further work will now

take place in the user groups of the GP Upgrade Service. The results of the working groups will be presented at the next PAG 2024, which will take place at Gasunie Deutschland. 

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R&D: "Beautiful"—Load-optimized work design for network control centers of critical infrastructure

Modern Interactive Concepts for Control Systems

PSI Software SE is developing, together with an interdisciplinary consortium, a new interactive design for critical infrastructure control centers in the research project "Beautiful – Belastungsoptimierte Arbeitsgestaltung für Netzleitstellen kritischer Infrastruktur (Load-optimized work design for network control centers of critical infrastructure)".

Control center personnel are responsible for the safe and reliable operation of gas and electrical grids. The integration of renewable energy sources into the energy system requires the development of new control mechanisms. This leads to a significant increase in the relevant process information that must be considered for safe grid management. The goal is to optimize the energy mix while ensuring security of supply at all times.

PSI is providing a research control room where operating situations, including fault and attack scenarios, can be realistically mapped in a university environment and innovative operating concepts and assistance systems can be scientifically evaluated. The network operator will receive a training system that allows the control center personnel to simulate complex monitoring and control tasks in the gas and electric-




Researchers from the "Beautiful" project at the Kick-off meeting in Aachen.

ity grid under real conditions. The project partners can evaluate the benefits of improved operating concepts and new assistance systems from an ergonomic perspective. PSI will use the physio-psychological insights to develop modern interactive concepts for control systems of critical infrastructures.

The "Beautiful" project is funded by the German Federal Ministry of Education and Research. It is led by Fraunhofer FIT and implemented by an interdisciplinary consortium. In addition to PSI Software SE, the proj-

ect partners are Avacon Netz GmbH, the Federal Institute for Occupational Safety and Health, Ergoneers GmbH, the Fraunhofer Institute for Applied Information Technology FIT, the Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE, Humatecs GmbH, IAEW of RWTH Aachen University,

Interactive Wear AG and Visseiro GmbH. Associated partners are Schleswig-Holstein Netz AG and E.ON SE. The Kick-off took place on February 23 and 24, 2023 in Aachen. 

Link to the press release of the FIT.



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Upgrade Capability and Modern Functions

PSI has been awarded by Mainzer Netze GmbH with the implementation of the network control system PSIconrol 4.8. With comprehensive functions, the new system replaces the previous one. A successful factory acceptance test already took place at the end of April.

The delivery includes, along with other important functions, extensive network calculations as well as water management. In addition, the redundant and patch-capable system offers a high level of fail-safety. Using the job technology function, process sequences are now automated and scheduled executions can be planned. In addition, PSIconrol newly offers users the option of logging in at any workstation and performing data processing.

With the implementation of the integrated PSIconrol, future re-

quirements for a control system are fulfilled. Significant factors include IT security in accordance with BDEW and the establishment of an information security management system. The update- and upgrade-capable system also offers Mainzer Netze the opportunity to always remain at the cutting edge of technology. As a result, integration and upgrade costs can also be minimized in the future, if only a few project-specific functionalities are ordered.

As a network operator, Mainzer Netze GmbH is responsible for

the utility networks for electricity, natural gas and drinking water in Mainz and its region. In addition to planning, the range of tasks includes the construction, operation and maintenance of all supply lines and facilities. In addition, a wide range of other services is provided, such as street lighting, communications technology and innovative solutions in the field of electro mobility. 🌱

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All Requirements Fulfilled in the Standard

PSI Software AG has been awarded by Netz Leipzig GmbH with the implementation of the network control system PSIconrol 4.6. The updateable and upgradeable multi-utility system for electricity, gas and district heating fulfills all requirements with extensive standard functionalities and replaces the previous system.

Netz Leipzig decided in favor of PSIconrol as it provides the necessary functionalities in a standard version for all the requirements set in advance. This was possible due to the high flexibility of the software and the data modeling. Moreover, connections to an external Redispatch 2.0 system via a data interface as well as to the GIS system were important.

PSIconrol is hosted off-site in the customer's data center and is con-

“ We definitely requested a stable standard system in order to obtain upgrades easier in the future. Already in the tendering phase, we were able to cover almost all of our requirements with the PSIconrol standard.


Michael Müller, Head of the Network Management Department and authorized signatory at Netz Leipzig GmbH

nected to the workstations in the control room via a provided WAN infrastructure. The resulting high demands on reliability of the com-

munication and redundancy of the provided transmission paths were successfully achieved in intensive cooperation between all participants.

Michael Müller, Head of the Network Management Department and authorized signatory at Netz Leipzig GmbH adds: "After the operational start-up, the successful cooperation with PSI will continue."

Lately, the first extensive supplement was ordered for a TASE.2 coupling with the option of remote control." The Telecontrol Application Service Element 2 (TASE.2) protocol is used to couple different

network control stations with each other." 

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Partner: PSI and Rhebo cooperate on Cybersecurity of critical infrastructures

Operational Technology Monitoring

PSI Software SE and Rhebo GmbH, a German provider of industrial cyber security, have signed a cooperation agreement to increase the cyber security of critical infrastructures. The background to the cooperation is the IT Security Act 2.0, which comes into force on 1 May 2023. As a Trusted IDS Partner, Rhebo will exclusively secure PSI control systems in the core zone via Operational Technology (OT) Monitoring with anomaly detection.

Customers of PSI in the areas of industry and critical infrastructures, in particular energy supply, have the option of using the Rhebo Industrial Protector to secure the core zone within the PSI control system. The OT monitoring solution also monitors the entire communication. Deviations from expected patterns are detected and reported in real time. This allows cyber incidents that indicate compromise or misconduct to be detected early and shut down immediately.




The graphic is a promotional poster for a webinar. At the top, it says 'WEBINAR' in red. Below that, the title 'Detecting attacks on control centers and grid management systems in times of hybrid warfare' is written in a large, bold, brown font. The date and time 'September 19th, 2023 11:00 a.m. - 12:00 p.m.' are centered below the title. On the right side, there is a yellow starburst containing the text 'View recording (in German only)'. Below the title, there are two circular portraits of men. The man on the left is Frank Stummer, Business Development Manager at Rhebo. The man on the right is Dr. Michael Wolf, Director Marketing & Sales at PSI Software SE. A QR code is positioned between the two portraits. At the bottom, the logos for Rhebo (a Landis+Gyr company) and PSI are displayed.

"The core zone is the heart of any PSI control system. It is managed as a high-security zone within the Operational Technology of industrial companies, to which only PSI personnel have access," explains Wolfgang Fischer, PSI Business Unit Manager Electrical Energy. He adds: "With Rhebo, we are bringing an experienced partner on board

who, with OT Security Made in Germany, meets our high standards of trustworthiness and quality. Of course, we accompany our customers during implementation and ensure individual and documented adjustments in PSIconrol."

In addition, with PSIdetect, PSI offers a software product that de-

fects abnormal behavior in the equipment properties and analyzes measured values and data from the core zone of the control system. 

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News: Route network of Schweizerische Südostbahn AG will be controlled by PSIcontrol in the future

Central System for Catenary and Rail Infrastructure

PSI Software SE has been awarded by the Schweizerische Südostbahn AG (SOB) to deliver the control system PSIcontrol 4.9. This will monitor and control all systems in the areas of catenary and rail infrastructure in one central system in the future.

SOB operates power and switching stations on its route network from Romanshorn on Lake Constance to Arth-Goldau in Central Switzerland to ensure the traction power supply. In addition, it runs technical systems for monitoring the various railroad subsystems at the stations.

In the future, PSIcontrol will map, control and monitor the operation and maintenance of the track network for the areas of alarming, catenary and infrastructure in a central system. This will provide the management of the traction service with an overall view for instance of messages or alarms, in

order to initiate suitable measures if necessary.

The integrated module for monitoring also provides an overview of the connected infrastructure systems in order to avoid interventions caused, for example, by sudden changes in the technical systems and to plan maintenance work. The project is scheduled to go into operational service in September 2024.

The 111 kilometer long rail network of the SOB is characterized by numerous engineering structures; 19 tunnels with a total length of 7 km as well as 192 bridges, viaducts and underpasses and overpasses—in-



The SOB rail network.

cluding the 99 meter high Sitter viaduct, the highest railroad bridge in Switzerland. 📍

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SOB train passes over the Weissenbach viaduct in eastern Switzerland.

ETRM Optimizes Processes

PSI Energy Markets has successfully put the energy trading and risk management system (ETRM) PSImarket into production at Thyssenkrupp Steel Europe AG. The new system will optimize trading and risk management processes and provide traders with dynamic real-time analytics for smarter, faster and more proactive decision-making.

As part of its 20-30 strategy and an increased focus on portfolio management and governance

Thyssenkrupp Steel Europe AG is a leading producer of quality flat steel with around 27 000 employees. The



Headquarters of ThyssenKrupp Electric Steel Europe AG.

tasks, Thyssenkrupp Steel Europe chose PSImarket due to its technically convincing functionalities. The ETRM system supports the setup of automated and thus economical and resource-saving processes and replaces the previous system from IRM.

company supplies numerous sectors with quality products, e.g. automotive, packaging steel, and houseware. 🌱

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The PSI blog features more interesting and in-depth articles on production, logistics, AI, energy and mobility.



IMPRINT

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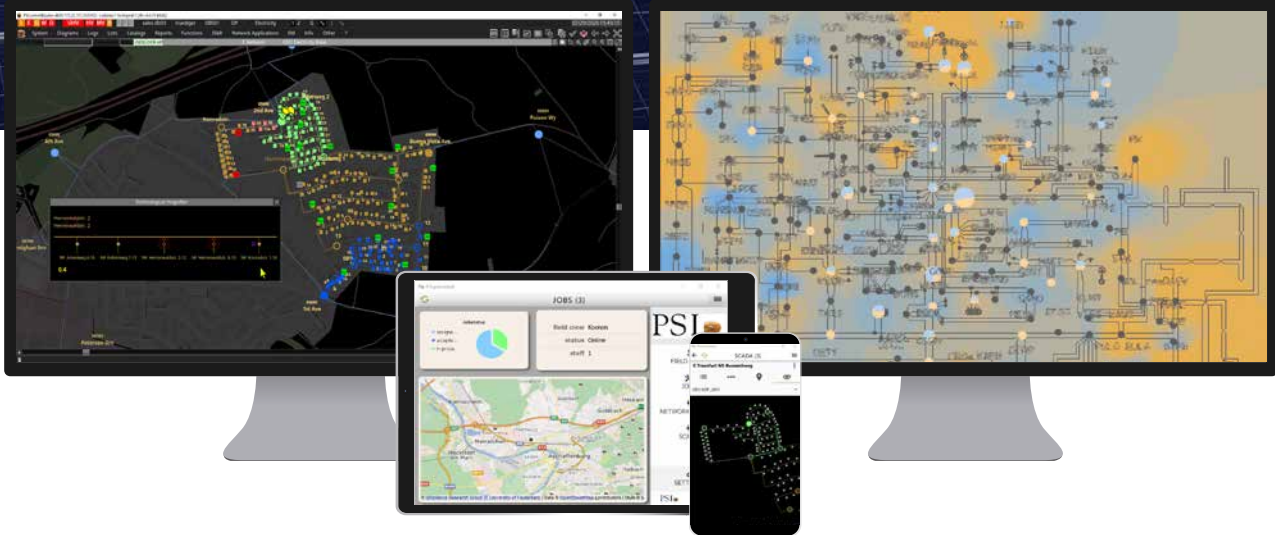
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