

# ENERGY manager

Newspaper for energy suppliers



Holistic use of the Internet for measuring systems

## IoT and Industry 4.0 for energy suppliers

User report

**Network security management with PSIcontrol**  
Upgrade of the Syna GmbH control system

Product report

**Configuration management with PSIsiu**  
Installation and updating in distributed systems

User report

**Fit for BEATE Gas: Adding to the standard functionality**  
Uniper Energy Storage relies on PSITransstore

## EDITORIAL

Dear readers,

The EE Infodays 2016 focused on the theme “Combine innovation & efficient solutions“. Here at PSI, we rigorously realise this guiding principle. We are all aware of the challenges of the energy transition. With regard to the IT security requirements for operators of critical infrastructure, we have to expect yet more stringent regulations. In order to optimally comply with the recent requirements in terms of already realised processes, the entire PSI group is being ISO 27001 certified. The business unit “Electrical Energy” has already been successfully certified in mid-2016.

All IT security requirements which are relevant for electrical networks have been included in our products. We have implemented new func-



tions and updated already available modules. Several of these functions we already presented to you in the current releases of *PSIcontrol* and *PSIcommand* during the Infodays.

We have also implemented your long-standing request to modify the behaviour and representation of picture variables without reducing the optimum *PSIcontrol* performance. The

network fault analysis and the topology functions have a new look and feel, too. Both the overhead line monitoring and the telecontrol protocol DNP3 are now standard features. *PSIcommand* provides planning board improvements and integration of the Qualicision®-based optimisation. The standardisation of data exchange formats using CIM profiles continues to be the focus in the industry. The articles in this edition provide you with an overview of various functions and current projects.

Yours truly,



Wolfgang Fischer  
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Electrical Energy, PSI AG

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## TITLE STORY

Using the Internet for measuring systems

## IoT and Industry 4.0 for energy suppliers

**F**irst came the printing press, then the steam engine and industrialisation, and just recently the digitalisation and the Internet. These innovations have massively influenced the fabric of humanity. By all indications, yet more technology-driven and radical changes are ahead of us. The present advances in measuring and communication technologies as well as locally autonomous IT have the potential to redefine existing standards.

While the costs for measuring technology and communication are dropping, the transmission capacity continues to increase. The development of ever more powerful batteries and the decreasing power requirements of mobile end devices is turning continuous measuring and monitoring into reality.

The Internet of Things (IoT) is about to revolutionise the knowledge of states of individual things and entire systems.

### Continuous measurements using IoT

Twenty years ago, the mobile phone was still an innovation. But in 2007, the smartphone already combined mobile end devices and the Internet. Wireless networks have become ever more ubiquitous and powerful in ways unimaginable when they were first introduced.

And while the number of users increased, the new features allowed the market to offer new and innovative services.

Directions to the nearest restaurant and parking as well as mobile “last minute” reservations are now available everywhere.

### New applications determine the optimum for each user

Entirely new applications are entering the market today. They are determining the optimum for each user by analysing a multitude of profiles.

The best example is a navigation app which uses speed data of traffic to determine traffic congestions much more precisely and makes the delay times instantly available.

While the primary purpose of individual mobile phones is not the reporting of traffic congestions, the similar movements of a multitude of mobile phones is a perfect example of the IoT.

### Integration of IT between corporations creates new opportunities

In parallel to swarm intelligence, there are also new opportunities for automation between corporations. The automation of transactions between suppliers and end customers as

well as digitally supported B2B services will increase.

The intelligent integration of IT between corporations also creates new production opportunities which results in increased product life cycles. This objective requires that all players have a holistic view of the production and maintenance processes.

### Energy supply in relation to Industry 4.0 and IoT

The maintenance of production assets continues to be a significant cost



factor for all industries. However, the products of the traditional production industry are subject to very fast changes which also requires upgrades to the production equipment. In contrast, the change cycles in energy distribution tend to be much longer. Therefore the operation and maintenance are even more important factors in determining whether the cost

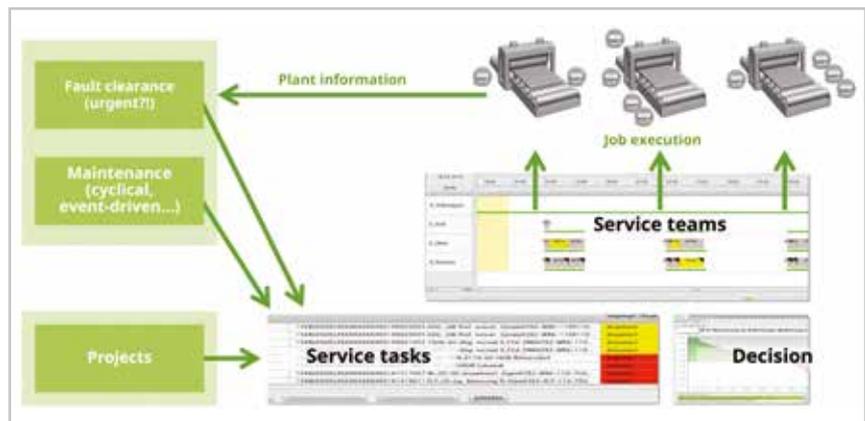
structure of a energy supply company is market-oriented.

### Extended operation of expensive assets reduces costs

In typical energy distribution networks, the typical life cycle of expensive assets such as transformers, switchgear, and overhead power lines is 40 to 50 years. Due to the significant cost of these assets, extending the operational life cycle provides an important lever to reduce cost. Right here Industry 4.0 will provide major benefits.

### Optimised maintenance

Within a very short time, the industry will be able to acquire and transmit wirelessly all measurements which today still require a technician on site. This not only saves the time of the technician to travel to the equipment and to perform the measurements but also provides new tools to assess the state of the equipment. Once a significant base of measured values is available, the precision of forecasts and trend analysis will far exceed today's capabilities.



Optimised maintenance reduces the service teams costs.

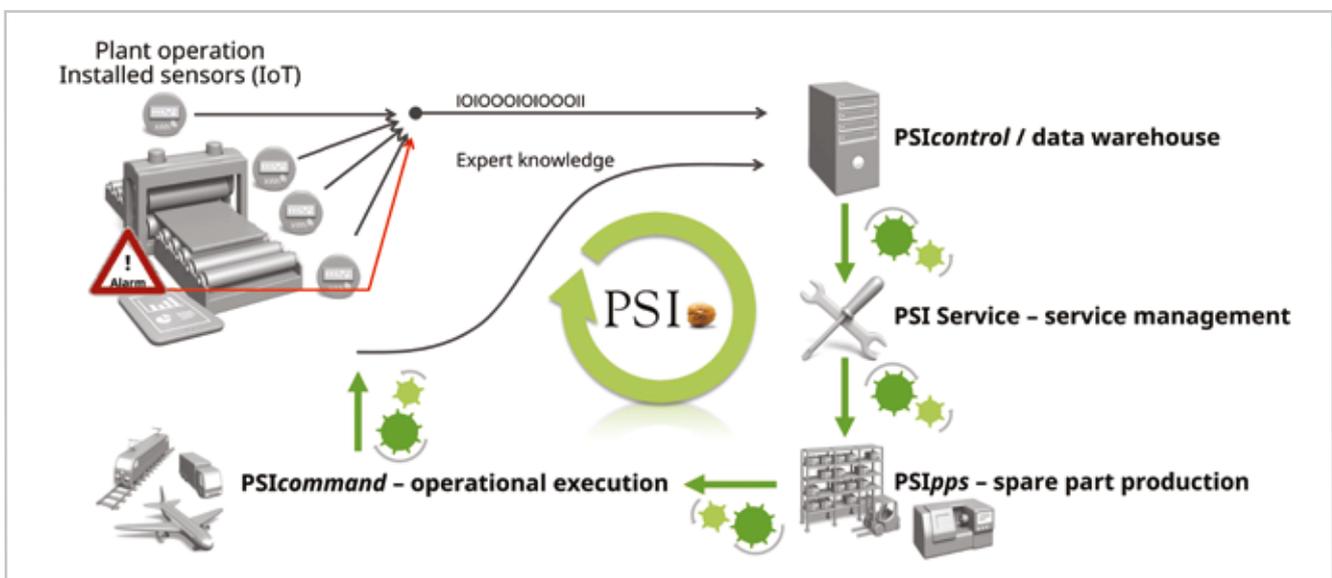
Improved maintenance scheduling and data-driven installation of spare parts in combination with intelligent workforce management systems will significantly reduce the costs for maintenance crews. Linking the ERP systems results in on-time delivery by the supplier as well as timely requests of expert teams of the supplier as needed. This extends the life cycles and thereby reduces capital expenses.

### Protecting equipment

Reliable measurement data provide not only information about the aging of the equipment. The correlation to the system settings of the surrounding net-

work also provides information about dangerous operational situations. "In situ" measurements can identify and mitigate these situations. This requires correlating the equipment values acquired by IoT with the network situations in the control system.

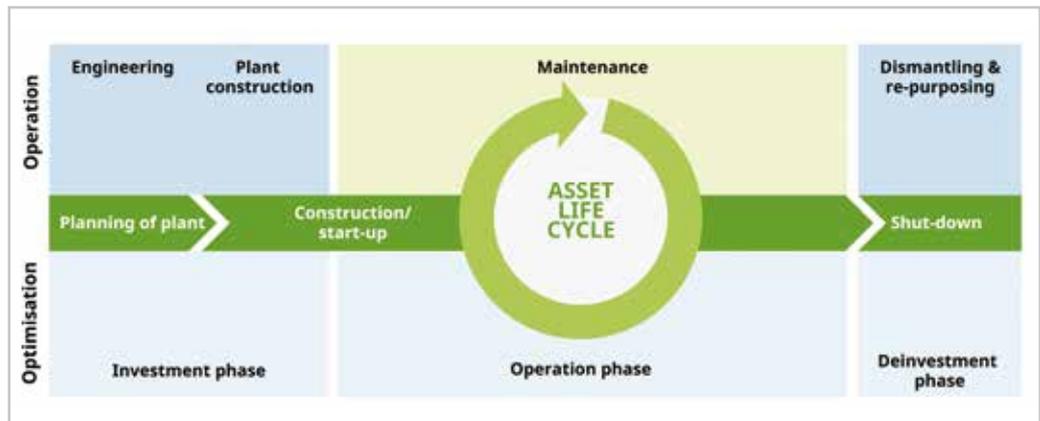
The combination of the global view of the entire network and the knowledge about the equipment pool and its state allows local responses to protect equipment. These responses must be synchronised with the already established network state optimisation. Therefore the simulation algorithms require new variables to include this new information.



Maintenance core processes using the potential of IoT.

### All steps under control

ERP systems in combination with the process control of PSI Automotive & Industry on one hand and the warehouse management and logistics solutions of PSI Logistics on the other hand cover the typical production and distribution processes.



Energy industry customers can use the advantages of Industry 4.0 already today in applications provided by PSI.

### PSI offers a complete system

The PSI business unit Electrical Energy has long-term experience in SCADA, value acquisition, and processing. The acquisition, validation, and initial processing of data as well as advanced processing by various special systems are the main components of control systems. The PSI workforce management system *PSIcommand* provides optimised dispatching of service orders for internal as well as external service teams.

### Qualicision® optimisation core

While making these systems increasingly "intelligent", PSI has accumulated years of experience with the Qualicision® optimisation core of the PSI subsidiary F/L/S Fuzzy Logik Systems. This core is currently used for optimisation in a variety of special applications such as warehousing, bus parking, production plans, and service routes.

### New solutions for the energy supply industry

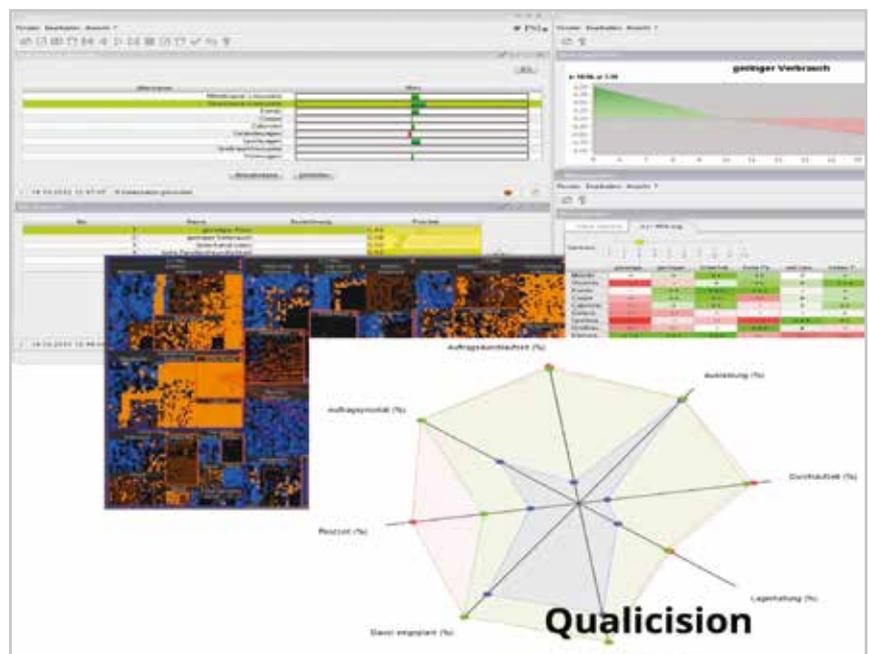
The task at hand is the integration of already existing components and the realisation of an overall system. As the initial step, PSI offers the contents integration between a

PSIcontrol-based SCADA system and the asset services managed by *PSIcommand*. The IoT measurements shared with the SCADA system and the state analysis using these data may result in *PSIcommand* in maintenance interval modifications or repair orders in case of outages. In turn, *PSIcommand* directly integrates any orders into the service teams schedules which can then be processed with the mobile components. The completion of a repair order also results in a new assessment of the equipment state.

### State assessment of equipment

The PSI software Qualicision® provides two benefits. It provides a meaningful state assessment of the equipment based on the dependencies of old and new measured values, the time between the value acquisitions, and the relevance of the measured variables. In addition Qualicision® also provides optimised integration of the new work activities in the overall work schedules of the teams.

This also results in two benefits for the customer: first, reduction of costs by more precise maintenance inter-



State assessment of equipment using Qualicision®.

vals, reduced number of inspections, and more focused inspections due to premature aging. Second, the automatically determined workload including the required materials is directly optimised and assigned to the service teams.

### Integration experience

The close cooperation between our customers and PSI has contributed substantially to the maturity of the PSI software systems. The resulting products provide industry-specific and efficient process management and control. The increasing cost pressure forces the realisation of optimisation strategies in all industries. PSI has incorporated its optimisation expertise in process control systems in respec-

tive industry-specific solutions. This step absolutely requires understanding of the specific context and industry-specific knowledge.

For the entire chain of the upcoming Industry 4.0, PSI offers systems and references which provide a flexible and adaptable optimisation tool based on Qualicision®. In addition to the industry knowledge, the expertise with the optimisation of all steps can also be integrated in the Industry 4.0 solutions.

### Outlook

The advances in local, mobile, and cost-effective measurement equipment will also affect the networks and network management in other areas of the energy industry. Tech-

nologies for measuring and controlling low voltage networks and automatic determination of topology of to date unknown network islands as well as services for controlling intelligent secondary substations (iSS) are already feasible today. Increasing maintenance efficiency by integration of various systems for ordering, production, shipping, and installation of spare parts is realistic in the immediate future. With its variety of products, PSI is therefore optimally prepared for Industry 4.0. ☺

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**Product report: Basis version offers flexible applications and lower costs**

## PSIcontrol—Becoming a standard system

**In its early years, the PSIcontrol systems were characterised by customer-specific designs. However, the PSIcontrol systems have now evolved into a powerful and flexible standard system. This step provides advantages for both our customers and PSI.**

Until about 10 years ago, the control systems were realised based on existing components and significant customer-specific adaptations. PSI supported the philosophy of exactly meeting individual customer requests which certainly had often been one of the reasons for awarding projects to PSI. Until then, relatively high prices for meeting complex technical and operational requirements were common.

### Network control systems progress over time

The deregulation of the energy industry changed the operational frame-

work for energy suppliers. The cost pressure has significantly increased since then so that purchasing decisions are now increasingly determined by purchase price and operating costs.

### IT security requirement facilitate standardisation

In addition, the IT security requirements for energy supply automation systems as documented in the BDEW whitepaper have indirectly facilitated more standardisation. These specifically include requirements for simple and fast system up-

date processes in addition to the required technical features (secure information transmission, access control, etc.).

### PSIcontrol responds to these changes

For more than six years, PSI has made substantial investments in the development of PSIcontrol as a standard system. At the same time, the very flexible design of the application functions has been maintained.

The system core has been defined as basis system with structured and ongoing development of application and system functionality. Now there is a new release available every year. The current release version is 4.4, and version 4.5 is scheduled for release by the end of 2016.



PSIcontrol implementation at Westnetz GmbH.

### Many customer requirements are already fulfilled in the basis system

Today's basis system already fulfils many customer requirements including security features. There are also optional basis functions for applications which are not requested by all customers. The decision about integration in the basis system is largely based on customer requests as well as input from the user group. Many functions which have first been implemented and tested in operations for specific projects have later been included in the system core along with other general technical developments by PSI.

### Significant benefits

This results in significant benefits for our customers. The basis version already includes numerous functions and comprehensive design possibili-

ties so that custom developments can be reduced to a minimum. Our customers benefit by substantial cost savings. System updates by a standardised update/upgrade process as part of our maintenance offering ensures that the system is always up to date. These updates/upgrades are faster and minimise errors due to the new system design and the resulting simple patch processes.

PSI also benefits from the standardisation: with new development processes, planned product design, and defined processes according to security guidelines, systems can be delivered and updated faster. In the end, this contributes significantly to economic efficiency and customer satisfaction.

### On the right path

The introduction of these processes was admittedly not always smooth. Especially during the transition period

of a couple of years, there were coordination issues which resulted in installation delays and errors.

We are certain that any remaining inconsistencies can be resolved in the near future. We feel obligated to continue on this path since almost all of our customers have already switched to the basis version of PSIcontrol with the corresponding update/upgrade contracts. Other customers with legacy contracts are also planning to switch.

In the future, we will rigorously follow this control system product strategy for a secure and comprehensive basis product with significant built-in design flexibility. ☉

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Product report: From an individual system to an updatable/upgradeable system

## Innovations in PSIcontrol 4.5

With the network control system **PSIcontrol 4.x**, the PSI AG is evolving from individual systems to an updatable and upgradeable product. Now control system customers can benefit from enhancements to the **PSIcontrol** product on an ongoing basis. The new release will be released at the end of 2016 which includes many new developments and enhancements.

In the previous versions, any picture variable adaptations had to be performed by a PSI developer. In the new version, customers can directly adapt any standard picture variables as needed. New library functions will be available for analysis of process states and for display of graphic elements which can be included in the picture variable.

### Easier detection of network correlations

The topological colouring is an important tool for easier detection of network correlations. In particular, network states such as “Deenergised” or “Earthed” are represented by specific colours. These were predefined in the basis and could be modified only on a project-specific basis if needed. Starting in

**PSIcontrol 4.5**, the user can adapt the topological colours of the network via



Dialog for setting the topology colours in the new **PSIcontrol 4.5**.

a parameterisation dialog based on the requirements of the network operator. This is available not only for colour sources such as transformers or in-feeds but also for various supply states and tag states of the network.

### Context-sensitive online help

For more convenient access to the **PSIcontrol** user manuals, context-sensitive online help is now integrated in the new release.

### Multi-network fault analysis

The network fault analysis has been completely redesigned and is available for multiple networks in **PSIcontrol 4.5**. Now multiple electricity networks can be man-

aged by one control system. A dialog provides an overview of all present faults to the user.

### Better utilisation of transmission capacities

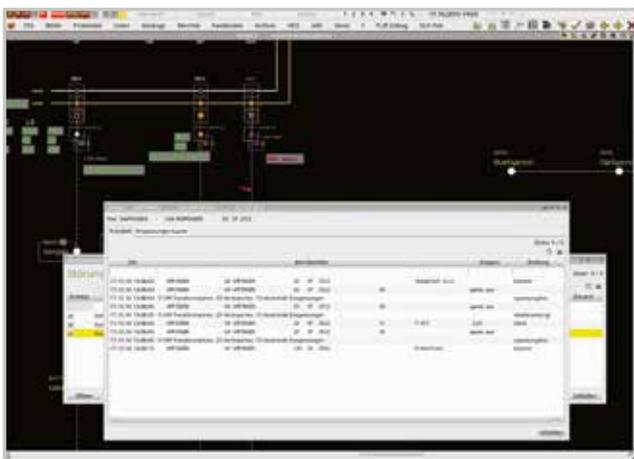
The current limit values of powerlines and transformers are dynamically calculated by the overhead line monitor-

ing. The objective of the function is the optimal utilisation of the equipment depending on the weather conditions.

This function has been proven in several customer-specific implementations and has now been included as a standard function in **PSIcontrol 4.5**

### Distributed Network Protocol

The Distributed Network Protocol **DNP3** for data transmission between the control system and **RTUs** is an international communications standard. It transmits telegrams serially or via the Internet protocol **TCP/IP** and has also been included as standard in the new release. 



Dialog for fault analysis.

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User report: Network reliability management with PSIconrol

## Upgrade of the Syna GmbH control system

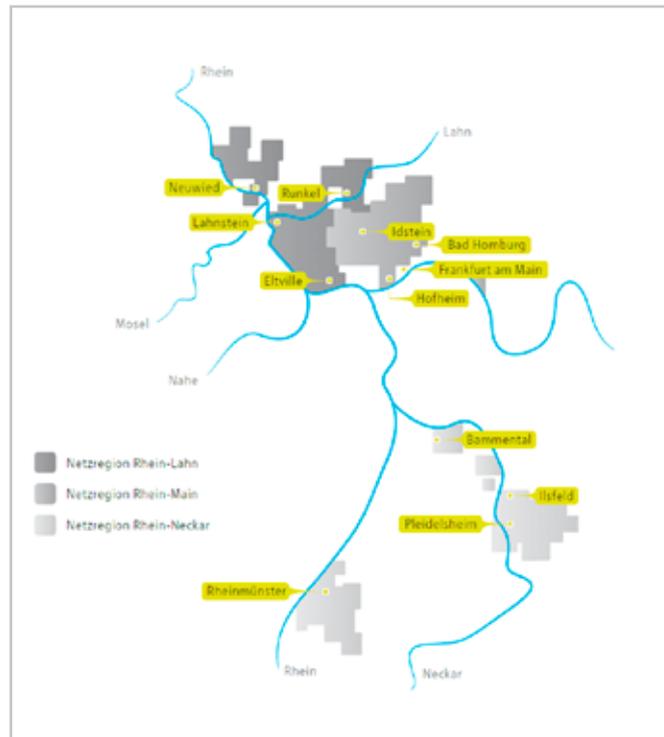
Syna GmbH as a network affiliate of Süwag is a distribution network operator located in Frankfurt/Main and manages 343 electricity networks covering high voltage to low voltage as well as 99 gas networks in the southwest of Germany. The electricity network includes about 150 primary substations and 11,000 secondary substations. Presently approximately 31,000 renewable energy generators are feeding into the Syna network.

For controlling and monitoring the electricity and gas networks, Syna operates two network control centres with the PSIconrol network control system at locations in Frankfurt/Main and Pleidelsheim. In April 2015 the control system upgrade project was awarded to PSI. The new control system is based on a virtual system platform, and its multiple interfaces fulfil the IT security requirements stipulated by the BSI guidelines.

### Network reliability management requirements

The new control system realises the Syna requirements for network reliability management which ensures reliable and secure network operations while the number of decentral infeed plants is continuously increasing. The network reliability management includes processes for realisation of network-related and market-related measures such as load shedding and infeed regulation management. These processes are supported by proven tools in

PSIconrol such as the tool for managing decentral infeeds (DCI tool) and the infeed management controller.



For controlling and monitoring the electricity and gas networks, Syna operates two network control centres based on PSIconrol at locations in Frankfurt/Main and Pleidelsheim.

### Expanded network calculation functions

The inclusion of the medium voltage networks in the network reliability management is an innovation in PSIconrol. Unlike in high voltage where the overloading of equipment is usually the limiting tech-

nical constraint, the violation of the permitted voltage band is the main constraint in medium voltage. Therefore the network calculation functions have been expanded and now include the calculation of voltage sensitivities. In case of voltage band violations, now the most effective infeed plants for resolving the congestion can be selected by both manual control with the DCI tool and automatic control with the infeed management controller.

### Look ahead network calculation

In order to anticipate potential congestions ahead of time instead of responding after their occurrence, the look ahead network calculation already proven in high voltage has been expanded to medium voltage. It performs simulation calculations and checks for limit violations for the next 72 hours based on infeed and load forecasts and the expected switching state.

The start-up of the new control system is scheduled for the end of 2017. This project continues the long-term and successful relationship between Syna and PSI. ☺

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Product report: Workforce management system with comprehensive functions

## New developments in PSIcommand 3.5

The new version of *PSIcommand 3.5* of this year continues the system redesign from the 3-layer architecture of the workforce management system to the PSI standard with the Java-based framework (PJF) 2.13. Thus *PSIcommand* benefits from the joint and continued development of PJF in the PSI group.

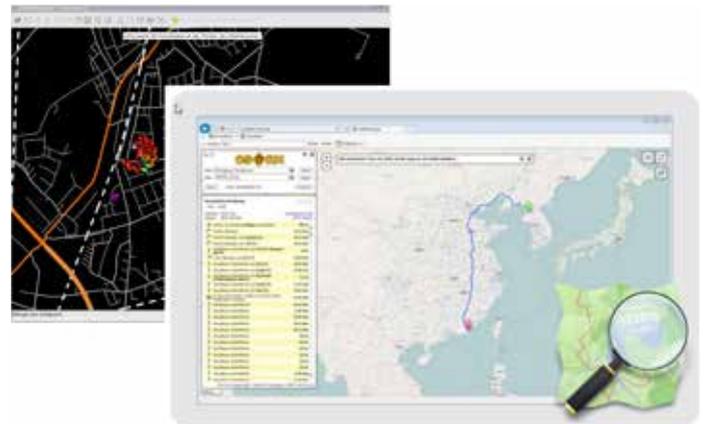
support for the switching operation and the transfer of the responsibility on the mobile components. The support can be configured so comprehensively that the entire switching oper-

The new PJF version 2.13 includes comprehensive functions for lists. Dynamic colouring conditions and display options which are available in this version increase the usefulness for the project specification. On one hand, the now available support of modelling technologies is the main technological bridge for the transition from Swing to JavaFX. On the other hand, the functions of the “PSI click design” can already be used during the project specification in order to adapt the user interfaces of pure PJF dialogues to customer requirements.

### Security and central application components

Using *PSIcommand* in proximity of control centres with direct links to

*PSIcontrol* requires high security standards. In *PSIcommand 3.5*, the database has been updated to Oracle 12 and all internal communication paths including to mobile components have been encrypted. This also provides the option to encrypt the communication to third-party systems via web service interfaces.



The geographic component of the *PSIcontrol* systems is used in the OSM component.

### Mobile component

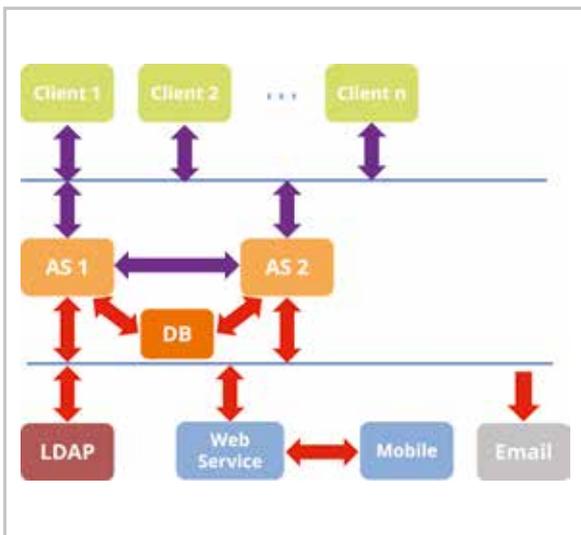
Starting in *PSIcommand 3.5*, reports can be created directly on the mobile component. A QR code scanner supports the expansion of the planned outage request management.

ation can be performed autonomously on site without affecting the information security of the control centre.

### OpenStreetMap (OSM) component

The PSI geography component OSM which is independent of *PSIcontrol* has been integrated in *PSIcommand 3.5*. Now *PSIcommand* has an effective tool for geographic representation and routing.

With the expanded use of the OSM component and expanded asset management in *PSIcommand 3.6*, PSI is taking an important step towards global operations management. 🌀



IT security is realised on all communication links.

### Planned outage request management module

The support for the planned outage request management including the actual switching operation has been expanded in the new version. The combination of the *PSIcontrol 4.5* and *PSIcommand 3.5* systems provides electronic

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Product report: Supporting the PSIcontrol system by mobile components

## Planned outage function with PSIconmand 3.5

In order to reduce the control centre load during peak times for planned outages, PSI has developed the passive switching component which ensures both full information access and secure switching operations. The objective is support for secure execution of planned switching operations by the control system without blocking workplaces in the control centre for activities like manual updates.

When a step list matching a planned outage request is sent to a mo-

available without phone calls to the control centre and the control centre staff.

### Maintenance without any loss of security

The combination of the planned outage management in PSIcontrol and the features of the workforce management system PSIconmand results in synergies which integrate the scheduled maintenance work with the sensitive activities for secure network management without any reduction of security. When

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QR code scans support synchronisation of the correct equipment and teams at different locations.

mobile component, the person responsible for the switching operations has full access to the required information. After synchronisation with the control centre, the responsible person can now perform each switching step including safety verification by the control system. Now the switching information including timestamp and authentication is

### Teams at different locations can synchronise switching operations

The correct equipment can be verified by scanning the QR codes for each switching operation. This technology allows synchronisation of the switching operations of multiple teams at different locations without involving the control centre.

both work areas are integrated in a single application, then optimisation algorithms can further minimise the maintenance work. ☺

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News: Kazakhstan distribution network operator awards first energy project to PSI

## MREC purchases PSIcontrol

The Kazakh distribution network operator JSC “Mangistau electricity distribution network company” (“MREC”) has awarded the implementation of the network control system PSIcontrol as the basis for the regional dispatching centre in Aktau in the west of Kazakhstan.

**F**or this project, PSI has supplied comprehensive SCADA/DMS systems for managing the electricity distribution in Mangistau, the leading oil and gas region in Kazakhstan. The project has been successfully completed in the third quarter of 2016.

### Optimised operation of the electricity network

JSC “MREC” operates 57 substations, 220 kV, 110 kV, 35/6-10 kV and low voltage networks, and more than 5,000 km overhead lines with a transmission capacity of about

2,000 MW. JSC “MREC” distributes more than 2,500 GWh annually and supplies electrical energy to about 20,000 customers, of which 80 % are oil and gas producers. JSC “MREC” is using this project to improve the operation of the electricity network in order to support the development and the realisation of smart grid solutions.

### Development of modern network management

This first comprehensive SCADA/DMS system in Kazakhstan created new interest of energy suppliers in Kazakhstan and the neighbouring countries in Central Asia in modern trends in network control systems. 



The regional dispatching centre in Aktau in the west of Kazakhstan is based on PSIcontrol.

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Product report: CIM profiles in PSI applications

## Data exchange by defined profiles

The Common Information Model (CIM) is specified in the IEC standards 61970 and 61968 and has been available for 20 years. It provides data descriptions for a variety of objects in the energy supply industry, in particular for the data exchange between network control systems and other IT infrastructure systems.

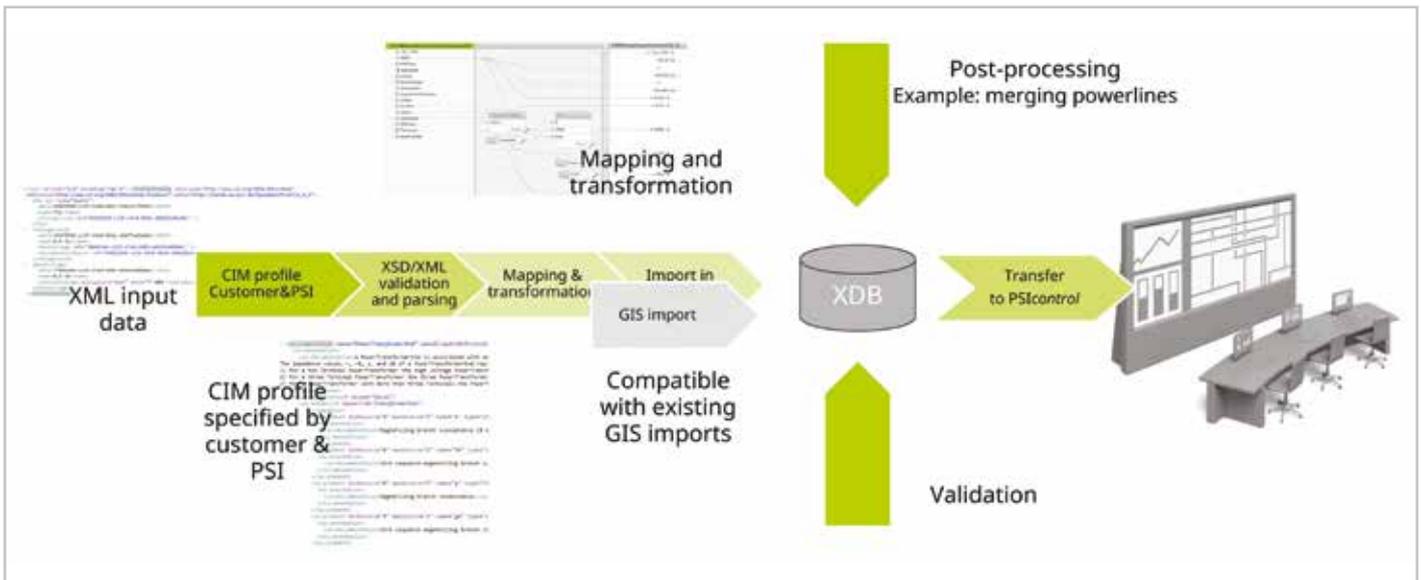
**H**owever, CIM has found little use to date in Europe and especially in Germany. Instead, proprietary in-

terfaces are often used for data exchange. This results in substantial costs for the implementation and maintenance of such interfaces.

In contrast, data exchange based on defined profiles is more efficient economically but requires an initial investment and establishment of the appropriate know-how by the manufacturers and users.

### Big data in the future

Today and in the future, the energy transition causes a significant increase



Import workflow.

of the amount of data generated by the process. All such data must be defined and managed. The required data exchanges across systems and across all process levels render individual solutions too expensive and impractical. Standardisation based on the two standards mentioned above provides

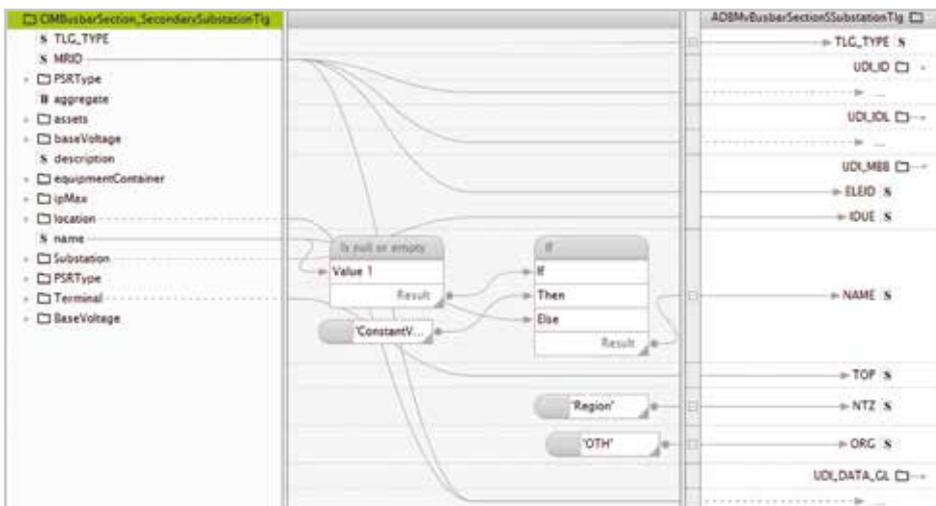
### CIM in practice

PSI has developed a CIM profile based on IEC 61970 version 16 for the import of medium voltage data and low voltage data.

This profile includes both the currently used “GIS data electricity network import” of PSIcontrol 4.4 and the

### Definition of transformation and assignment rules

As part of the ongoing development of the CIM profile and as an efficient customer-specific enhancement, a configuration tool for the definition of transformation and assignment rules such as transformation of coordinates has been developed. This supports potential adaptations of the import into the customer installation without any code changes and the related release process. In addition, the import process including receiving, processing, logging and documentation of the data is specified and transparently integrated in the existing import interfaces in PSIcontrol. This flexible approach is designed to realise any modifications efficiently and to develop and map new or adapted profiles for future exchange of master data, for example for gas networks. ☺



Mapping dialog.

the required solution.

PSI has already realised CIM interfaces for several customers. In particular, the CGMES-based profiles developed by ENTSO-E must be mentioned here.

import of the new version 4.5. In addition to the import of technical data, the profile generates geographic network diagrams. It is also used for validation of XML-based data and their import into data engineering.

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News: Network operators award new orders to PSI

## New systems and comprehensive upgrades

The PSI business unit Electrical Energy has been awarded various interesting orders for new systems and comprehensive upgrades by several network operators. This continues the excellent order intake of the first quarter which included the large upgrades for the Netze BW systems and Trafikverket (Swedish railroad) as well as the TIWAG order in early 2016.

hancements, fast system modernisation, and error minimisation.

These orders solidify the PSI order intake in distribution networks in Germany as well as expand the international order awards. This success

In October, EP HZHB in Mostar, Bosnia-Herzegovina awarded PSI with the implementation of a PSIcontrol system for managing the distribution network of the southern part of the country. This is a new customer, and the order will be fulfilled in cooperation with the Croatian partner company KONČAR.



Contract signing with the project managers in Mostar.

### System expansions and maintenance

Orders for system expansions and maintenance are a significant part of the order intake, and the majority of our customers call on us for these services. This is also required for compliance with the current security guidelines (BDEW). Furthermore, the update/upgrade process which has now been established is an efficient and cost-effective approach to

keeping the system up to date. This is an important system capability in a time of fast changing tasks and requirements.

One of the enabling factors is the rigorously implemented update and patch capability of PSIcontrol which benefits all contract parties. In particular, this capability provides the current security level, continuous en-

confirms the substantial investments in the PSI product strategy for network control systems in the last few years. ☉

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7. - 9.2.2017  
ESSEN, GERMANY  
[www.e-world-essen.com](http://www.e-world-essen.com)

PSI presents its comprehensive portfolio of solutions for the energy supply industry during February 7-9, 2017 on the E-world in Essen, Germany.

**We are looking forward to your visit at our booth 326 in hall 3.**

Product report: Configuration management with PSIsiu

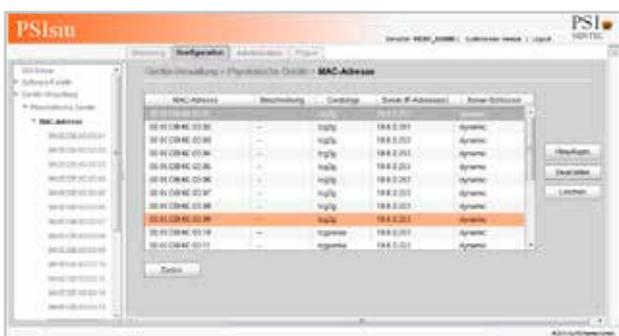
## Installation and updating in distributed systems

Network control systems usually require operation of numerous devices. This requires a long-term plan to keep all devices up to date. The installation of security patches must be performed contemporaneously and logged.

PSIsiu allows customers to automate these processes and provides an overview of all devices of the product families Telecontrol Gateway and Smart Telecontrol Unit. PSIsiu consists of a central PSIsiu server and PSIsiu agents on the devices. All system components are stored on the PSIsiu server. Target states are defined for all devices which the PSIsiu agents achieve autonomously. The connection between the PSIsiu server and the PSIsiu agents is encrypted and requires authentication. This represents another independent communication path in addition to the encrypted links to the process interface.

### Automatic installation of devices

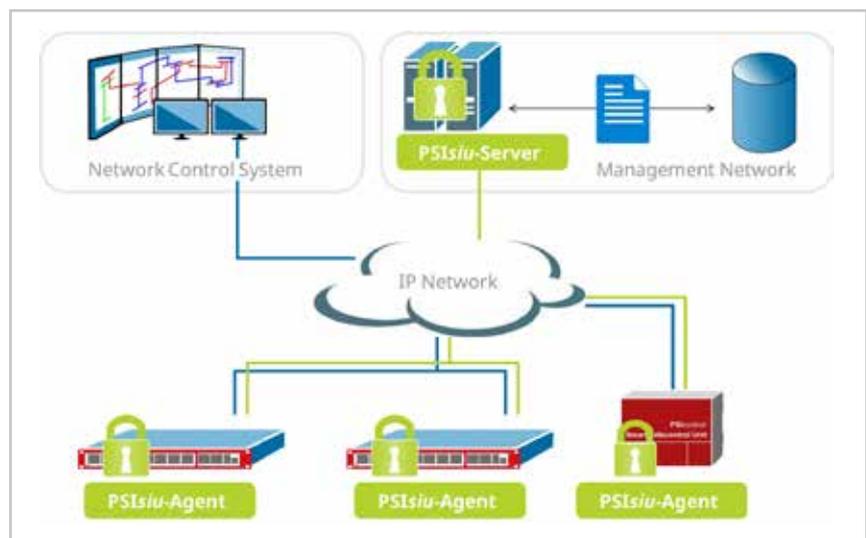
All system components are stored on redundant PSIsiu servers. This includes software versions and software modules as well as configuration files, security certificates, and data models. The PSIsiu agent on each device cyclically updates its policies and the device based on the server policies.



PSIsiu web user interface.

### Monitoring devices

Each device is monitored and the current device state is displayed at the user interface of the PSIsiu server.



PSIsiu installation.

### Exchanging devices

Exchanging a device with PSIsiu is rather simple. In the server, the parameters of the defective device are assigned to the replacement device. When the replacement device connects to the PSIsiu server, the correct software and configuration are automatically loaded to the device.

### Testing software

It is possible to store several versions of a system component. A system component is enabled only if it is included in the target state of a device. This process allows step by step testing and roll-out of the software.

When devices are modified, then PSIsiu automatically backs up the previous state. This backup can be restored to the device at any time.

### Logging of security-relevant actions

Security patches are installed like any other system components. All actions are stored by the PSIsiu agent in reports. The PSIsiu server retrieves these reports and stores them long term. In addition, critical device data can be monitored in order to detect error situations immediately. ☉

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Event: “Combine innovation & efficient solutions”—Review of the Infodays 2016

## Changes in the energy industry

The PSI-EE Infodays with the theme “Combine Innovation & Efficient Solutions” were held for the third time in the Aschaffenburg city hall on November 16-17, 2016. The event provided customers and interested visitors with an overview of new developments and the broad spectrum of services by the PSI group. It included exciting presentations and workshops as well as a partner presentation of all PSI business units.

A comprehensive mix of technical presentations by our customers, PSI experts, and external presenters as well as workshops and panel discussions covered a variety of energy supply topics. In his opening speech, Wolfgang Fischer, managing director of the business unit Electrical Energy, reported the positive developments and new projects of the business unit over the past years. Dr. Harald Schrimpf, CEO of PSI AG, addressed the diverse challenges posed by the energy transition and its implications for the network management in his welcome speech.

### New developments and product highlights

The focus of the business unit Electrical Energy was the presentation of the highlights of the network control system *PSIcontrol 4.5* and the outlook on planned developments. The presentation of the workforce management system included the innovations in the releases 3.3 through 3.5, the development strategies for *PSIcommand*, and the ongoing

developments for switching operation support for *PSIcontrol* by a mobile component. Furthermore, the topic “CIM & CGMES—Common Information Model” was covered by presenting the practice of data exchange between different systems in energy suppliers.



Live presentation in a workshop.

The presentation “SASO (Security Assessment and System Optimisation)—The Innovation Platform” presented the latest developments for advanced network state analysis and decision support in the SASO platform which has already been introduced in 2014. The emphases included the integration of voltage/reactive power management and special task-oriented visualisation functions.

The new features of the hierarchical network management with central and decentral components for distributed applications in the intelligent network were also presented. Enhancing the system concept and the system components for distributed infeed management, the *PSI*siu-



Wolfgang Fischer welcomes the attendees.

based configuration management for secure installation and updates in decentral systems was introduced.

### Current research projects

The PSI group is involved in numerous advanced research and development projects. Their strategies and the current projects were also presented at the conference. The following projects shall be mentioned

- BERCOM  
Blueprint for pan-European resilient critical infrastructure based on LTE communication
- SENCOM  
System security for integration of information and communication technologies for energy supply networks
- LINDA  
Network restoration with renewable energies
- NETZKRAFT  
Network restoration considering future power plant structures
- MathEnergy  
Mathematic key techniques for changing energy networks
- IDEAL  
Impedance controller and decentral congestion management for autonomous power flow coordination
- NetzDatenStrom  
Standard-compliant integration of open source big data solutions into existing network control systems.

### Reports by customers and experts

In his presentation about "Management of the Russian distribution network" with *PSIcontrol*, Georgii Ostantin, director of electrical network management for NizhNovEnerg in

Russia, reported about the experiences using *PSIcontrol* for network operations of the largest Russian distribution network operator.

Jürgen Schunk, manager of asset service of Stromnetz Berlin GmbH, explained the objectives of the project APEKS (task-optimised staff and field crew management) in his presentation "Asset service at Stromnetz Berlin / Stromnetz Hamburg with *PSIcommand*". The presentation also covered the realisation and start-up at two locations as well as the possible optimisation achievements when using *PSIcommand*.

Abdullah Jabir, Senior General Manager Projects & Engineering Business Unit Utilities Automation for the Malaysian PSI Incontrol Sdn Bhd., reported about the customised fault management system and current process issues of TNB Distribution, Malaysia.

### Dynamic stability assessment and network security

Prof. Dr.-Ing. habil. István Erlich (Director of the Institute for Electrical Energy Systems at the University Duisburg-Essen) lectured about "Dynamic stability assessment" and the effects of the energy transition on the dynamic stability as well as the requirements and solution approaches. The assessment of the dynamic network security as part of network management will be the subject of a joint research project by the University Duisburg-Essen and PSI.

Finally, Philip Westbroek, DSO Security Officer at the distribution network company Enexis B.V. in the Netherlands, spoke about "Changes in the energy distribution and their effects on our work".

Network security management in the control system with look ahead network security calculation (high and medium voltage) was also presented based on the example of the Syna project (for details please see the article on page 9).



Discussion in the foyer.

### Conclusions

About 200 high-profile attendees showed again very positive interest. The conference was rounded off by a trip on an original steam engine train from Aschaffenburg to the historic farm Hofgut von Hünersdorff in Würth/Main.

The next PSI-EE Infodays will be held in the autumn of 2018. ☺

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Event: Netz.Werk.Technik—The conference for network control, station, and protection technology

## PSI presented network control system solutions

On November 29-30, 2016 the conference Netz.Werk.Technik about the current framework and constraints for network management was held for the first time in Mainz, Germany. The PSI business unit Electrical Energy presented the network control system *PSIcontrol* and the workforce management system *PSIcommand*.

**N**etz.Werk.Technik is initiated by the technical committee Grid Control Systems of the ZVEI division Power Engineering and organised by the ZVEI Academy. For this conference, ZVEI

followed the proven concept of the Metering Days. About ten companies for network control systems, station control systems, telecontrol systems, and protection systems were represented in the technical committee.

The PSI presentation at the conference emphasised the applications *PSIcontrol* and *PSIcommand*. In the category con-



trol systems, PSI also presented on the topic “Integration of technical systems into the control system”. ☉

Event: PSI presents new solutions at Cigré and European Utility Week

## Smart systems support the energy transition

The PSI business unit Electrical Energy presented at Cigré in Paris on August 22–26, 2016. This is the leading conference in the world for energy suppliers, current high-end software solutions for network control systems, workforce management, network utilisation management, and smart technology for smart grids.

**T**he newest product releases of the control system *PSIcontrol*, the workforce management system *PSIcommand*, and the network utilisation management system *PSIpassage* as well as examples from current transmission and distribution network projects were on display. The new system component “Security Assessment and System Optimisation” (SASO) was also presented which provides sophisticated network state analysis to the network operator.

The Smart Telecontrol Unit (STU), an intelligent process



The PSI booth and visitors at Cigré.

interface unit with all control functions required for smart grid applications, was shown as well. Scheduled presentations about the featured topics were held every morning and afternoon at the PSI booth.

### Security requirements for network management

The European Utility Week was held in Barcelona on November 15-17, 2016. PSI presented current network control system solutions and new product releases. The featured topic was network management security requirements within the context of the successful realisation of the energy transition. ☉

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User report: Fit for BEATE Gas: Enhancing standard functionality for optimal customisation

## Uniper Energy Storage relies on PSITransstore

The Uniper Energy Storage GmbH in Essen, Germany, provides natural gas storage access and storage services across Europe. The company portfolio includes 12 underground storage locations in Germany as well as storage locations in Austria and Great Britain. This provides storage customers with 9 billion m<sup>3</sup> storage capacity which can be reached by all major natural gas pipelines.

The dispatching tasks of Uniper Energy Storage include technical monitoring and controlling as well as contract management. This encompasses sales support for long term and short term capacities, the verification and confirmation of nominations, setup of

Gas, PSIcomcentre, and PSITransstore were installed in dispatching. This investment helped support the positioning of the company as an independent storage operator. Since then, enhancement and updates have been installed on a frequent basis. For example, PSIarchive was introduced in

the customers' requirements for managing the technical and geological conditions in combination with the contractual constraints. For example, it supports increasingly flexible contracts, capacity management, nomination management, inventory management, and billing preparation.

### New challenges for the software

As an international and national storage provider, Uniper Energy Storage is subject to the requirements of the German and European author-

ities. This results in continuously updated requirements for the software of the storage management system.

Currently the necessary additions due to the requirements of the Bundesnetzagentur (Federal Network Agency) for BEATE Gas are realised as enhancements of the PSITransstore standard functionality. In dealing with the new regulations, PSI benefits from the long term practical experience at Uniper Energy Storage.

At the end of 2016, Uniper Energy Storage will be able to use the integrated PSI enhancements for dispatching. 



Uniper staff in Etzel 2 natural gas storage unit.

storage schedules, coordination with neighbouring network operators, and calculation of the actual usages for commercial billing for the contracts. For its demanding core processes, Uniper Energy Storage has been using PSI software for years. In 2012, the standard components PSIcontrol/

2015 as a portal solution for access and analysis of time-based measurements and contract data from dispatching.

### Managing technical and geological conditions

PSITransstore is a specialised storage management application that fulfils

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Event: IT solutions for controlling and monitoring gas networks and pipelines

## 21<sup>st</sup> PSIcontrol user group meeting and celebration of 20<sup>th</sup> anniversary

The 21<sup>st</sup> meeting of the PSIcontrol user group was held June 7–8, 2016 in Berlin and included the celebration of its 20<sup>th</sup> anniversary. In addition to the featured technical presentations about IT solutions for gas networks and oil pipelines, PSI demonstrated its software for technical and commercial controlling and monitoring of gas networks as well as gas and oil pipelines.

A number of new developments and enhancements for the gas management suite were shown: Simplified delivery and implementation processes for PSIcontrol/Gas the PSIGanesi solution for gas network simulation, and the PSIREKO solution for gas composition tracking for billing purposes. Additional reports covered new developments, improved usability for commercial dis-

patching, and report management with comfortable and flexible user interface features. Finally, the PSI IT security service offerings in the PSI application software environment were explained.

### New requirements for oil pipeline operators

As part of the new requirements for oil pipeline operators, pressure loss monitoring as well as organisation

and execution of regulatory acceptances on the basis of a coordinated test procedure were discussed.

### Intensive discussions in small groups

Small groups allowed for intensive discussion of the requirements and solution approaches of different customers. The user group meeting was rounded off in style with a bridge tour of the Berlin waterways. ☺

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Technical presentations covered the PSI software solutions for gas networks and oil pipelines.

Event: Review of Neftegaz 2016 in Moscow

## Software solutions for the Russian oil and gas industry

The Russian PSI subsidiary OOO "PSI" exhibited at Neftegaz from April 18–21, 2016 with emphasis on solutions for simulation of gas and oil pipelines. PSI has been exhibiting at Neftegaz since 2003, which is considered to be the most important event of the Russian oil and gas industry.

installation of automation systems, with whom PSI AG and OOO "PSI" have successfully cooperated since 2009. The software which shall be developed jointly is designed to meet

Numerous visitors reviewed the PSI solutions based on data models which had been specifically set up for the exhibition. The presentations emphasised functional online and offline systems for simulation of gas networks with PSI*ganesi* as well as PSI*pipelines* for the modelling of pipelines including leak detection. Recently the leak detection system based on PSI*pipelines* has been certified for operation by Transneft, the largest pipeline operator in the world for crude oil and crude oil products with a total length of over 100,000 km.

### OOO "PSI" und PAO "Gazprom avtomatizatsiya" start joint company

Moving software development and technical support for the Russian system solutions to Russia has been another emphasis. This is due to the demand of the Russian government for an "import replacement" for technological products which is presently realised by large state-owned companies including "Gazprom".



After signing the partnership contract: (from left) general manager of OOO "PSI" Dr. B. Böhme, general manager of PAO "Gazprom avtomatizatsiya" D.A. Zhuravlev.

At the exhibition, a memorandum of understanding between OOO "PSI" and PAO "Gazprom avtomatizatsiya" was signed to start a joint company for developing new software solutions for the natural gas industry of the Russian Federation. PAO "Gazprom avtomatizatsiya" is a market leader for the development and

the Russian guidelines for replacing imports and to be used broadly by PAO "Gazprom".

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R & D: FLAixEnergy—PSI bundles competencies

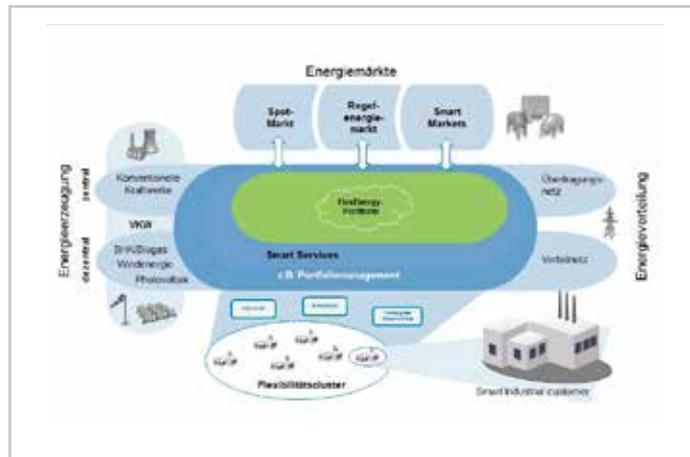
## Analysis and assessment of industrial flexibility

Since August 1, 2015 PSI Energy Markets has expanded its product portfolio for balancing, marketing, and optimisation of the flexibility of industrial consumers. In 2016, the research project FLAix-Energy identified the core innovation and designed the reference architecture.

The research project FLAixEnergy bundles the expertise of PSI Metals in the areas consumption forecast, planning, and scheduling in the metals industry, the process knowledge of PSI Automotive & Industry in the production industry, and the PSI Energy Markets competencies in trading, optimisation, and marketing. This results in a unique competency cluster for developing new processes and services.

### Assessment of the flexibility

The core innovations include the methods for determining the flexibility potential. It is important to rec-



The energy information platform as basis for the digitalisation of the energy market.

ognise the potential of an industrial process. As part of this, determining the value of the flexibility of the industrial consumption by a simple and robust procedure is helpful. The economic assessment is an important basis for capturing the flexibility potential and for the required assessment of the economic efficiency of the market integration of the consumption flexibility.

### Market players benefit from optimised short-term trading

In the research project FLAix-Energy, PSI Energy Markets is developing an approach to determine and to assess the flexibility potential of industrial consumers and to mar-

ket it by converting the marketable flexibility into sellable products on a platform.

A standardised process enables industrial corporations to become market players via the platform and to benefit from optimised short term trading. The focus is on the availability of capacity for energy-intensive industries and optimisation in terms of flexibility and efficiency as a contribution to the energy transition.

### Market potential by energy flexibility contracting

However, industrial consumers are not, or only to

a limited degree, prepared to enter the energy market. On one hand, there is no awareness of the potential of making energy consumption flexible. On the other hand, there are no simple and standardised marketing opportunities. Using the appropriate tools and the process described above, energy suppliers can develop a new market for energy flexibility contracts.

PSI will present PSI FLAixEnergy and the developed concepts and processes at the “new energy world 2017” exhibition in Leipzig, Germany. ☺

5.-6. April 2017  
**new energy world**

**Presentation**  
**“Smart services—selling industrial flexibility”**  
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[www.newenergyworld.de](http://www.newenergyworld.de)

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News: PSI Group awarded ISO 27001 certification for information security

## Implementation of high security standards

The PSI Group has been certified according to DIN ISO/IEC 27001 for information security management system requirements. Achieving the standard certifies that the Group's central infrastructure has implemented high security standards that also meet the requirements of critical infrastructure operators—an important customer group for PSI.

As part of the 2015 transition to group certification, PSI AG and in particular several business units in the field of critical infrastructures were certified. The scope of certification includes the development and marketing of control systems and software solutions for suppliers, industry, and infrastructure operators as well as the performance of ancillary services. Plans to expand to further business units are set for 2017.



The group certification is based on the certification first achieved by PSI subsidiary PSI Logistics GmbH

in 2013, which was simultaneously renewed.

### Privacy, integrity, and availability

Amongst others, the information security management system tested ensures PSI system and data privacy, integrity and availability. The successful audit was carried out by TÜV SÜD Management Service GmbH. The PSI Group has also been certified according to the quality standard ISO 9001 since 1994. 

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## EVENTS

[www.psi.de/en/events](http://www.psi.de/en/events)



06.–09.12.2016	Expoelectroseti 2016	Moscow, Russia
07.–09.02.2017	E-world energy & water	Essen, Germany
17.–20.04.2017	Neftegaz 2017	Moscow, Russia
24.–28.04.2017	Hanover Trade Fair	Hanover, Germany
02.–04.05.2017	12 <sup>th</sup> Pipeline Technology Conference	Berlin, Germany
12.–15.06.2017	CIRED	Glasgow, Scotland
27.–30.06.2017	MIOGE 2017 Oil & Gas Exhibition	Moscow, Russia
09.–13.07.2017	World Petroleum Congress 2017	Istanbul, Turkey

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