

IntelliSub Europe 2013

2-Day Conference: **26th-27th November 2013**
Post-Conference Workshop: **28th November 2013**
Mövenpick Hotel, Frankfurt City, Germany

2nd Annual Next-Generation Smart Substations

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Driving cost-efficiency, standardisation and security into the next phase of smart substation deployment

Hear In-depth Insights on:

- ✓ **Smart Investment** – Identifying priorities for the next stage of investment and implementations to cost-effectively leverage the full potential of smart substations
- ✓ **Cyber and Physical Security** – developing a substation cyber security implementation plan that balances prevention and detection of both cyber and physical security threats
- ✓ **Implementation of IEC 61850** – working towards multi-vendor interoperability through the cost-effective adoption of Edition 2 of IEC 61850 and determining next steps for full standardisation
- ✓ **Grid Communication Advances** – developing a robust and secure communication network strategy and infrastructure to drive the mass deployment of smart substations
- ✓ **Data Management and Analytics** – effectively handling the high volumes of data flow from smart substations to improve grid stability, asset management and network planning
- ✓ **Integration of DER, RES and EVs** – managing the impact of the evolving smart grid and the subsequent unpredictability to maintain power quality and grid stability

Utility Case Studies and Strategic Vision From:

Professor Peter Birkner
Chief Technical Officer
Mainova

Christian Schorn
Director of Technological
Innovation, EnBW

Aurélio Blanquet
Director for Automation
and Telecontrol
EDP Distribuição

Luis Cabezón López
Head of Substation
Engineering Department
Red Eléctrica de España

Joris Jongen
Project Leader – KRIS
Project, Enxsis

Christoph Brunner
President, it4power
& Convenor
IEC TC 57 WG 10

Dr Mihai Paun
Network Development
Advisor, ENTSO-E

Bas Kruimer
Managing Director Europe
Quanta Technology

Bert Heerbaart
Strategic Programme
Manager, Smart Grids and
Cyber Security
Alliander

Dr Ray Zhang
Technical Leader
Protection Control &
Automation
National Grid

Kaspar Kaarlep
Head of Operational
Technology, Elektrilevi

Eva Sundin
Head of Asset
Management
Vattenfall Distribution

Lee Margaret Ayers
Director, Smart Grid &
Knowledge Services
Doble Engineering Company

Bas Mulder
Senior Consultant
DNV KEMA

Dr Gert Rietveld
Senior Scientist, VSL Dutch
Metrology Institute

Thierry Buhagiar
Project Manager Smart
Substation, RTE

Anh Vu
Smart Cities Programme
Manager, ERDF

Heikki Paananen
Manager of Operation
Planning, Elenia Oy

Sam Alexander
Network Generation
Manager, NIE

Bengt Almgren
Head of Regional
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Distribution

Jürgen Resch
Industry Manager Energy
and Infrastructure
COPA-DATA

Ton Jansen
CEO
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Fernando Alvarez
Cyber Security Technical
Product Manager, ABB

Ellen Diskin
Smart Networks - Design
Analysis and Strategic
Policy, ESB Networks

Niklas Sigfridsson
Technical Development
Strategist, Vattenfall
Operations Nordic

Martijn Ronteltap
Alliander Security Manager
Alliander

Stephen Major
SCADA/DMS Advisor
United Energy

Technology Innovations From:

Didier Giarratano
Communication and Cyber
Security Platform Director
Schneider Electric

Frank Fischer
Partner – Security
Accenture

Maciej Goraj
Director, Optical CT &
Digital Measurement
ARTECHE

2nd Annual Event – Expanded Programme for TSOs, DSOs, Engineers and Asset Managers

Benefit from dedicated tracks designed to meet the unique information needs of both TSOs and DSOs on Day One, and Engineers and Asset Managers on Day Two. Choose the sessions specific to your role and environment, and gather the practical learnings to take your smart substation deployments to the next level.

Plus – not to be missed interactive learning opportunity GOOSE Messaging and Sampled Values

Post-conference Workshop, 28th November 2013

Led by **Christoph Brunner**, President, it4power & Convenor, IEC TC 57 WG 10

Understanding and implementing IEC 61850-based communication architectures to optimise the transfer of smart substation information and drive next-generation protection and control

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Conference Day One:

Tuesday 26th November 2013

Morning Plenary Sessions

08:30 Registration and coffee

09:20 Opening address from the Chair

09:30 **Smart Substation Investment: Identifying priorities for the next stage of investment and implementations to cost-effectively leverage the full potential of smart substations**

- Smart investment in the smart grid: Examining progress made and the next steps for translating investment in substation automation technology into cost efficiencies in practice given the economic climate
- Assessing the impact of the evolving smart grid and integration of Renewable Energy Sources (RES), Distributed Energy Resources (DER) and electric vehicles into the grid on future substation architectures and investment requirements
- Navigating regulatory constraints to unleash investment potential and drive the next phase of substation automation
- Standardising the roll-out of smart substations to enable large scale, cost-effective deployment across transmission and distribution networks
- Understanding the implications of new and emerging cyber security threats for next generation substation architectures

Christian Schorn, *Director of Technological Innovation, EnBW*

10:00 **Implementation of IEC 61850: Working towards multi-vendor interoperability through the cost-effective adoption of Edition 2 of IEC 61850 and determining next steps for full standardisation**

- Mapping out the improvements introduced by Edition 2 and identifying the new capabilities and implications for practical implementation
- Identifying where the grey areas remain in the standardisation of the IEC 61850 protocol and how these can be offset in a cost-effective manner to achieve multi-vendor interoperability and independence in device choice
- Understanding the latest developments around IEC 61850 and its implementation for the of DER, wind energy and hydro power plants
- Driving the adoption of GOOSE messaging, sampled values and process bus features to transform testing capabilities and power quality management
- Determining how the standard can be extended beyond the substation to support remote management and end to end communication across the network

Christoph Brunner, *President, it4power & Convenor, IEC TC 57 WG 10*

10:30 **Grid Communication Advances: Developing a robust and secure communication network strategy and infrastructure to drive the mass deployment of smart substations**

- Identifying the critical characteristics of a smart communication network to fully support the functional requirements of smart substations
- Evaluating the suitability of wired and wireless, public and private networks for guaranteeing availability, reliability and security in a cost-effective manner
- Assessing the success of IP/Ethernet migrations to date and how critical teleprotection services are being managed
- Pinpointing evolving security vulnerabilities and solutions for a range of communication media including fibre optics, GPRS, 3G, 4G, ADSL, NMT 450, and satellite
- Understanding how new ICT capabilities are being developed to support dynamic grid protection
- Identifying the key steps and timeline for migrating towards an end to end IP-enabled communications infrastructure

Niklas Sigfridsson, *Technical Development Strategist, Vattenfall Operations Nordic*

11:00 Morning coffee, networking and exhibits

11:30 **Mitigating Cyber Attacks: Developing a substation cyber security implementation plan that balances prevention and detection of both cyber and physical security threats**

- Pinpointing the key security vulnerabilities in evolving smart substations and understanding the implications of emerging trends in cyber attacks
- Revising internal procedures to minimise intended and unintended physical threats to security
- Quantifying the increased risk of cyber attacks with the full deployment of IEDs all networked via the internet
- Examining the latest technological advances to support prevention and detection
- Achieving a balance between robust security and required functionality
- Mobilising utilities on the European level to build a common defence system against the growing risk of cyber and physical security threats
 - Joining forces within the European energy sector to improve the resilience against cyber and physical security threats
 - Establishing a European Energy Information Sharing and Analysis Centre (ISAC)
 - Implementing a common Situation Awareness Network on a European level
 - Developing a united approach to the implementation of a common Information Sharing Platform

Bert Heerbaart, *Strategic Programme Manager, Smart Grids and Cyber Security Alliander*

Martijn Ronteltap, *Alliander Security Manager, Alliander*

12:15 **Security Trends and Innovations Panel Discussion: Examining the latest technological advances to support prevention and detection of security threats for smart substations**

- Identifying where new points of security vulnerability are emerging with evolving technological trends in the substation and communication networks
- Determining the most appropriate technologies to measure and counter-measure cyber and physical security threats in smart substations
- Evaluating solutions designed for use in the protection environment including the wide area protection monitoring and controlling system
- Leveraging the latest advances in communication technology to enhance detectability and mitigate security threats
- Examining technologies designed to assess people and situations and applying these in the substation and control centre to improve physical security

Didier Giarratano, *Communication and Cyber Security Platform Director, Schneider Electric*

Fernando Alvarez, *Chief Cyber Security Technologist, ABB*

Frank Fischer, *Technology Partner for Security, Accenture*

13:45 Lunch, networking and exhibits

Panel Discussion

Track A: TSO

14:45 ENTSO-E Update: Overcoming the challenges of RES integration for the long term development of the electricity transmission infrastructure in Europe

- Outlining the ENTSO-E 10/20/40 year views, ENTSO-E Work Programme 2013, and Network Codes to understand the implications for transmission networks and smart substations
- Examining the Ten Years Network Development Plan (TYNDP) and the role that transmission substations will play in managing the growth in RES
- Understanding the guidelines for New Infrastructure Priorities Regulation and the implications for smart substation investment and deployment
- Determining how the Electricity Highways – e-Highway 2050 Project will impact the architecture and implementation of the European transmission system and meet future European energy needs

Dr Mihai Paun, Network Development Advisor, ENTSO-E

15:15 Smarter Transmission Substations: Implementing cutting-edge technologies to optimise the capabilities of transmission substations and meet the new demands of the evolving smart grid

- Identifying opportunities for increasing the intelligence of transmission substations to achieve higher levels of functionality
- Managing the impact on transmission substations of the rapidly increasing integration of DER and RES into the grid – understanding how the market of services can be leveraged to minimise volatility and ensure grid stability
- Collating real time transmission system load ability information for technical real time data exchange in the substation between TSO and DSO to support DSO remote management and the integration of DER
- Determining the technologies and applications that will deliver the greatest return on your smarter transmission substation investment
- Effectively integrating smart components and technologies into substations for maximum grid stability and performance

Thierry Buhagiar, Project Manager Smart Substation, RTE

15:45 Afternoon tea, networking and exhibits

16:15 Future HV Grid Monitoring and Control: Introducing Wide Area Measurement Systems (WAMS) and other advanced monitoring technologies and techniques to improve power quality and asset management

- Examining the functionalities of WAMS and related technologies and how they are developing and impacting the future of grid control
- Determining the optimal installation of these technologies in transmission substations to ensure each function capitalises on the full capabilities
- Leveraging WAMS to allow synchronised real time measurement of multiple remote points on the grid
- Optimising transmission capacity through the use of phasor measurements
- Ensuring that data collection from synchrophasor devices is carried out in a consistent way
- Moving towards the integration of all intelligent functions into a single measurement and control system to avoid the complexities of mixing equipment and ensuring consistency in data collection

Dr Ray Zhang, Technical Leader, Protection, Control & Automation, National Grid

16:45 Capitalising on the Process Bus: Applying lessons learned in the early implementation of the process bus to drive cost efficiency in the next phase of smart substation deployment

- Quantifying the benefits of process bus implementation in terms of more cost efficiency, safety and ease of maintenance
- Effectively managing the transition from copper cables to optical fibres and developing a maintenance scheme to manage the new ways of working
- Managing the impact of automation technology developments on future maintenance requirements in initial process bus planning
- Leveraging enhanced testing capabilities to facilitate smarter protection functionality
- Overcoming the lack of interoperability of solutions and the need for improvements in time synchronisation with sensor detection
- Examining the benefits of the combined installation of process bus, GOOSE messaging and sensors at the primary substation level

Luis Cabezón López, Head of Substation Engineering Department, Red Eléctrica de España

Track B: DSO

14:45 The Smart City DSO: Investing in advanced smart substation functionalities to adapt the network to the new DSO environment and ensure high levels of power quality and reliability in high demand locations

- Determining the new demands on the DSO and how the smart city can control and monitor voltage at a local level
- Establishing how city substations need to be configured and adapted to meet current and future requirements around high demand, reliability and safety
- Examining how new features of IEC 61850 including GOOSE messaging for protection and process bus can be used to improve power quality in cities
- Effectively capturing and sharing relevant data with TSOs in the required time period to facilitate the balancing of the system
- Identifying the optimal communication infrastructure and adapting engineering procedures to support remote maintenance and self-monitoring
- Understanding how energy storage technology is being developed for cost effective implementation to support reactive power control and power quality improvement
- Examining the developments in automation technology required to enable future consumer load management

Anh Vu, Smart Cities Programme Manager, ERDF

15:15 Integrating DER, RES and EVs: Building in the smart substation capability to support the cost effective integration and management of new energy sources while managing the volatility in distributed energy production and the unpredictability of consumers

- Identifying cost effective and highly functional techniques for connecting and integrating rapidly rising volumes of DER, RES and EVs into the smart substation and grid
- Examining appropriate methods to carry out the effective protection and control of this distributed generation
- Simplifying the automation of data identification and recovery to ensure rapid assessment of behaviour, load and capacity and maintain grid stability
- Optimising the process of real time data collection and management to enable the efficient analysis of load flow and rapid response to voltage fluctuations
- Evaluating different methods for the effective management of bi-directional power flow to avoid outages including variable MEC and protection coordination

Ellen Diskin, Smart Networks - Design, Analysis and Strategic Policy, ESB Networks

15:45 Afternoon tea, networking and exhibits

16:15 Future HV/MV Grid Monitoring and Control: Building intelligent networks capable of sophisticated monitoring and control to support DG integration and grid stability

- Understanding the impact on the infrastructure of DER and EVs simultaneously going online, and the critical role of monitoring to manage this
- Determining the kind of monitoring required in secondary substations and evaluating which measurement devices support this
- Examining the latest developments in WAMS and PMUs, and their capabilities and applicability to the DSOs
- Leveraging monitoring technologies to effectively manage increased load and the unpredictability of consumers through the switching of the network
- Carrying out effective monitoring of voltage profiles to enable accuracy in prediction of distributed energy production and ensure quality of service
- Implementing nodal control to manage reactive flows from the TSO/DSO interface to the customer and facilitate DG integration

Sam Alexander, Network Generation Manager, NIE

16:45 MV/LV Component Development: Influencing the development of MV/LV smart substation components to support the mass roll-out of cost effective off the shelf solutions fit for DSO purpose

- Highlighting the unique characteristics of MV/LV substation components and identifying how these can be incorporated into product development
- Developing highly functional low cost components that will deliver:
 - Flexibility for future requirements
 - Resilience for commercial application
 - Supplier independence for interchangeability
 - Scalability for mass roll-out
- Creating a specification document that leverages both parties' expertise and key requirements to ensure an effective and efficient commissioning process
- Establishing a thorough testing procedure of new MV/LV components to ensure their suitability for large scale deployment
- Ensuring the commercial viability of new components in the wider DSO market

Joris Jonen, Project Leader – KRIS Project, Enxiss

17:15 Champagne Roundtable Discussions

During this session the group will break into several smaller working groups, each focused on one of the most critical themes emerging from the day's discussions. This highly interactive session will enable you to bring your real-life challenges to the table, hear multiple perspectives and gather practical solutions to drive forward your next-generation smart substation deployments. And all with a relaxing glass of champagne in hand!



20:00 Networking Dinner

Take the opportunity to continue your conversations from the day with your fellow delegates, expert speakers and solution providers, and make new contacts over dinner and drinks. Attend this exclusive evening reception to round-off your day of learning in a relaxed and informal environment. See the booking form overleaf for details of how to reserve your place.



18:45 End of conference day one

Conference Day Two:

Wednesday 27th November 2013

Morning Plenary Sessions

08:30 Registration and coffee

09:20 Opening address from the Chair

09:10 **The German Energiewende: Opportunities and risks of a municipal energy supplier**

- Understanding the physics behind the German Energiewende
- Examining the practicalities of keeping the balance of power
- Determining effective methods for managing high volatility in the grid
- Establishing further developments of urban systems
- Identifying conclusions for policy makers and energy companies

Professor Peter Birkner, *Chief Technical Officer, Mainova*

09:40 **Data Management and Analytics: Effectively handling the high volumes of data flow from smart substations to improve grid stability, planning and development**

- Identifying the most critical data to extract for advanced system planning and grid operations
- Establishing how to streamline and automate the extraction of data from legacy equipment not originally designed for data recovery
- Managing the interconnection of various data sources from smart substations to ensure that the relevant information is received by all parties
- Evaluating automation approaches to maximise data quality and minimise manual intervention
- Adapting data management and engineering procedures to achieve system harmonisation and overcome interoperability issues between systems and tools
- Leveraging advanced analytics techniques tailored to utility networks to translate data into valuable grid management and planning information

10:10 **Future Proofing SCADA Infrastructure: Developing a flexible and secure SCADA architecture that fully supports current and future requirements and maximises return on investment**

- Prioritising the key SCADA functionalities for investment
- Pinpointing emerging security vulnerabilities in the SCADA system and determining effective methods for safeguarding this central nervous system
- Striking the balance between providing adequate access levels with ensuring high levels of security as the SCADA system integrates across the organisation
- Identifying the critical factors to consider in developing a vendor-independent SCADA system with remote management capabilities
- Implementing measures to effectively access and interconnect SCADA with other data sources to derive valuable information for grid planning and operations

Aurélio Blanquet, *Director for Automation and Telecontrol, EDP Distribuição*

10:40 **Real-time Substation Automation: Implementing IEC 61850-based load shedding on platforms to cost-efficiently improve system reliability, safety, and remote diagnostic capabilities**

- Examining how a SCADA system based on IEC 61131 logic programming and IEC 61850 communication can support the integration of real-time automation functions into Microsoft Windows PC platforms
- Comparing distributed RAS (Remedial Action Scheme) and centralised RAS to determine if the performance, security and cost justify the complexity of an integrated system
- Evaluating COTS SCADA software to assess its capability for running a time-critical CRAS application

- Leveraging the system to reduce engineering costs and provide a unified engineering environment that allows simple and seamless configuration based on open standards
- Determining the best relation between data objects and GOOSE messages
- Concluding the benefits of PC-based load shedding including remote access and diagnostics, significant cost savings and improved personal safety

Jürgen Resch, *Industry Manager Energy and Infrastructure, COPA-DATA*

11:10 Morning coffee, networking and exhibits

11:40 **Operational Workforce Transformation: Redefining new organisational structures, embedding new skill sets and identifying new hiring strategies to drive the benefits and efficiencies of smart substations**

- Identifying trends in smart substation technological developments to determine how the workforce must evolve to keep pace with future requirements
- Adapting roles and responsibilities to meet the new requirements around combined ICT, telecoms and electro-technical knowledge necessary to specify, manage and maintain a digital substation
- Optimising the integration of IT and OT and laying the foundations for effective knowledge sharing to facilitate the end to end management of smart substations
- Establishing a remote operational management model that maintains high levels of control and visibility of smart substations
- Defining an outsourcing strategy that maximises service quality while protecting internal skill development and longer term vendor-independence
- Developing a programme to attract and retain highly skilled recruits to future proof smart substations

Kaspar Kaarlep, *Head of Operational Technology, Elektrilevi*

12:10 **Components Technology Innovation Panel Discussion: Examining the latest technological advances that meet cost, flexibility, stability, and reliability requirements of smart substations**

- Panel Discussion
- Translating the pressures presented by the smart grid, DER, and electric vehicles into new transmission systems and components to meet the needs of the smarter TSO
 - Specifying the key characteristics of cost-effective off the shelf components designed for the distribution smart substation
 - Examining the viability of practical solutions for building truly vendor-independent smart substations
 - Assessing the latest advances in smart components:
 - Sensors
 - Digital relays
 - Transformers
 - Controllers
 - Breakers
 - Transducers
 - Understanding the benefits and optimal application of current and voltage Non-Conventional Instrument Transformers (NCIT) in smart substations
 - Evaluating the latest measurement and monitoring devices for advanced smart substation management
 - Identifying the level of support required from vendors to drive forward the cost-effective adoption of smart components

Ton Jansen, *CEO, Locamation*

Maciej Goraj, *Director, Optical CT & Digital Measurement ARTECHE*

13:40 Lunch, networking and exhibits

Track A: Asset Management

14:40 Upgrading Legacy Substations: Standardising replacement and refurbishment processes to optimise the rate of system improvement while minimising cost and service disruption

- Building upgradability and flexibility into plans to facilitate ease of future replacement and refurbishment
- Effectively utilising the specification document to ensure the necessary understanding and knowledge to support replacement and refurbishment projects
- Evaluating the key considerations when upgrading substations while in service and effectively managing the process of continual hardware and software upgrades
- Ensuring backward compatibility of new technologies when replacing old equipment with modern solutions in a legacy infrastructure
- Implementing process changes to facilitate IEC 61850-based protection and control concepts for primary substations

Eva Sundin, *Head of Asset Management*, **Vattenfall Distribution**

15:10 Flexible Smart Platforms and the Asset Lifecycle: Building a flexible platform to enable new substation functionality and effectively manage the asset lifecycle evolution

- Determining the practicalities of building an open platform fit to form the basis of future smart grid development
- Examining how the platform can meet the requirements for continual hardware and software upgrades and the demands of variable lifecycles in smart substations
- Capitalising on the flexibility and standardised applications to enable increased substation functionality including enhanced protection, surveillance and communication
- Understanding how the system flexibility can be used to facilitate multi-vendor device interoperability
- Leveraging the open platform to enable continuous development of new functions in the smart substation and optimise asset lifecycle management

Bengt Almgren, *Head of Regional Networks*, **Fortum Distribution**

15:40 Afternoon tea, networking and exhibits

16:10 Asset Analytics and Data Quality: Validating data and developing reliable indicators of asset health to minimise the impact of data errors on asset analytics, and optimise smart substation operations and maintenance investment

- Examining how the determination of asset health using analytics that combine and analyse all available data sources can be automated
- Understanding how the degradation and unreliability of sensors and online monitors can redirect O&M decisions away from assets that need attention and how asset analytics will help with this issue
- Establishing a robust validation process to evaluate data errors introduced through intermediate delivery systems including gateways, relays, IEDs, applications and databases
- Identifying the key steps for effectively isolating, eliminating or managing data errors when automating asset analytics to enable the accurate assessment of asset health, criticality and risks
- Reviewing how IEC 61850 and the CIM (IEC 61970 and IEC 61968) can be leveraged to automate asset analytics and the validation process

Lee Margaret Ayers, *Director, Smart Grid & Knowledge Services*, **Doble Engineering Company**

16:40 Creating Value from Utility Data: Leveraging intelligence in the smart substation for effective data gathering and condition monitoring to optimise asset maintenance and future system development planning

- Examining the data sources and technology available to gather substation equipment condition and maintenance status data
- Establishing the optimal substation communication architecture and using IEC 61850 to support asset management data collation
- Adopting a uniform system approach to direct all the required information to the relevant stakeholders
- Implementing effective applications to translate data into beneficial information for asset management, condition-based maintenance and asset lifetime extension
- Identifying the optimal methods for protection data asset management to derive the most value for protection engineers

Bas Kruimer, *Managing Director Europe*, **Quanta Technology**

17:10 Closing remarks from the Chair and end of conference

Track B: Engineering

14:40 Advanced Substation Safety and Maintenance: Implementing an intelligent substation monitoring system to enhance visibility and achieve more cost-efficient and improved control, safety and maintenance

- Establishing the key vulnerabilities and requirements in terms of gate and door access control, switching and material safety, human safety and maintenance
- Evaluating the automation technologies available to meet these requirements and improve visibility including the installation of motion sensors, cameras and voice sensors to the substation area
- Examining how the ICT system can be developed to support improved substation monitoring and ensure ease of system operation and fault identification
- Understanding how the installed functionalities may require adaptation to meet the cost efficiency needs of rural area substations
- Applying lessons from the comprehensive pilot project and carrying out continuous development of the system interface to minimise irrelevant monitoring components and ensure long term cost efficiency and functionality

Heikki Paananen, *Manager of Operation Planning*, **Elenia Oy**

15:10 Securing Smart Substations: Maximising network visibility to enable real-time situational awareness and optimised substation security

- Examining emerging cyber threats and vulnerabilities in the smart substation architecture to identify security requirements and the challenges of critical infrastructure protection
- Evaluating protection and detection methods and how a SIEM tool can be leveraged to provide proactive monitoring in real-time for substations and the SCADA network
- Developing and implementing a secure device configuration management tool to ensure the integrity and security of substation equipment configurations
- Generating advanced analytics through security information and event management to increase situational awareness and improve substation security

Stephen Major, *SCADA/DMS Advisor*, **United Energy**

15:40 Afternoon tea, networking and exhibits

16:10 Robust Conformance and Interoperability Testing: Evolving testing procedures both in the field and virtually to better meet smart substation interoperability, security and quality assurance requirements

- Examining the importance of conformance testing, how techniques are evolving and the role of UCA and IEC
- Determining the optimal methods for conformance testing on different protocols including CS104 and IEC 61850
- Adapting conformance testing techniques to perform effective cyber security testing and mitigate potential security threats
- Identifying the key criteria to test within Ethernet-based substations – physical layout, installation of wiring and environmental considerations
- Adopting new procedures to support centralised top-down engineering and robust conformance testing with a single tool allowing virtual testing
- Comparing conformance and interoperability testing to determine the most effective methods for testing the interoperability of substation automation systems

Bas Mulder, *Senior Consultant*, **DNV KEMA**

16:40 Smart Measurement and Calibration: Capitalising on the intelligence in smart substations to effectively calibrate measurement instrumentation for enhanced monitoring and control of the grid

- Establishing the importance of reliable measurements in smart grids, and the current regulations and practices to determine requirements for the smart substation
- Understanding trends in measurement science and their practical implementation to overcome measurement challenges in smart grid monitoring and control
- Developing robust processes to effectively assess the accuracy of voltage and current transformers
- Evaluating new intelligent solutions to enable live calibration in a substation without taking it out of operation
- Examining how calibration of the entire smart grid chain can be achieved – calibrating from first measurement, through to communication and data concentration, and finally to measurement use in applications and the outputs derived

Dr Gert Rietveld, *Senior Scientist*, **VSL Dutch Metrology Institute**

Understanding and implementing IEC 61850-based communication architectures to optimise the transfer of smart substation information and drive next-generation protection and control

Gain a comprehensive overview of the principles and practicalities of GOOSE messaging and Sampled Values (SVs) in this practical, hands-on learning environment. Hear the latest developments in these communication architectures in the context of Edition 2 of IEC 61850 and recent interoperability tests. Learn how engineering procedures need to be adapted, and traffic segmented and controlled to ensure their effective integration into the communication network. Our expert session leaders will tackle the complexities of GOOSE subscription and configuration, and provide you with real-life examples of GOOSE and SVs implementation. Benefit further from taking part in a practical simulation exercise demonstrating how to effectively transfer information between IEDs in practice.

- 1. Introduction and Applications: Examining the IEC 61850 standard to understand the role and capabilities of GOOSE Messaging and Sampled Values (SVs) in smart substations**
 - Deep diving into the IEC 61850 standard and its implementation, and defining GOOSE messaging and SVs
 - Understanding the latest developments in GOOSE messaging and SVs in the context of IEC 61850 Edition 2 and the implications for future smart substation architecture
 - Examining lessons learned from the IEC 61850 interoperability tests and the implications for engineering tools and GOOSE configuration
 - Determining how engineering procedures need to be adapted to manage the migration from copper wires to Ethernet-based communication and the associated legacy issues
 - Assessing effective methods for leveraging the functionalities of GOOSE and SVs for the improvement of protection and control and beyond
- 2. IEC 61850 Communications and Architectures: Understanding GOOSE messaging and SVs to ensure their effective integration into the communication network for optimised traffic and improved network performance**
 - Identifying the specific parts of the IEC 61850 standard relevant to communications
 - Understanding high level communications architectures defined by IEC 61850
 - Examining IEC 61850 communications and where the different protocols and parts of the standard are applied
 - Outlining the different communications protocols including GOOSE, SV and MMS to understand the evolution from pure Ethernet to Ethernet and IP
 - Examining the communications architecture focus inside the substation (part 90-4)
 - Understanding the evolving communications architectures outside the substation (parts 90-1, 90-2, and the developing 90-12)
 - Assessing the different techniques for traffic segmentation and control to free-up bandwidth for other functionalities and improve protection, including:
 - QoS
 - VLAN
 - Multicast management
 - Performance monitoring
 - Identifying the potential cyber security threats to be considered and effective elements to introduce into the communication architecture to mitigate these
 - Leveraging time synchronisation methods to manage timing, latency and jitter requirements from SNTP to IEEE 1588

Workshop Leaders:

Christoph Brunner, *President, it4power & Convenor, IEC TC 57 WG 10*

Rik Irons-Mclean, *Global Solutions Architect, Connected Energy Networks, Cisco Systems*

Andreas Procopiou, *Systems Architecture and Upstream Marketing Manager – Substation Automation Solutions, Alstom Grid*

Enrique Isla-Garcia, *Application Engineer, Alstom Grid*

Jörg Reuter, *CEO, HELINKS*

3. Practical Simulation Exercise: Effectively transferring information between IEDs in practice

Delegates will receive a live demonstration of a scheme involving a full protection and control loop – merging unit, process bus protection, and tripping via GOOSE to switchgear control units. A walk-through of the configuration to achieve this full scheme, the components, and the device interactions will be carried out. The flow of messaging, reports, time synchronisation and other key concerns will be elaborated. Specific focus will be placed upon:

- Digital control of circuit breakers via fast GOOSE messaging
- Distribution of precision time synchronisation in digital substations
- Practical engineering recommendations for protection relays and bay control in digital substations
- Network simulation results and configuration of Ethernet switches in practical applications

4. SVs and NCTIs: Leveraging SVs to enable the application of new sensors including non-conventional instrument transformers (NCTIs) and optimise the use of conventional instrument transformers

- Examining how the move from copper wiring and use of SVs can expand transformer functionality
- Identifying the most effective way to mix voltage and current and the optimal place for the conversion when using NCTIs for current
- Effectively handling the synchronisation of current and voltage values
- Ensuring intelligent construction of voltage measurements in the absence of busbar-connected reference NCTIs
- Achieving high availability protection and control architectures for fast, deterministic main protection applications
- Process bus merging unit communication via IEC 61850-9-2 in transmission substations
- Real substation installation feedback for SV process bus applications in Denmark and Russia, one with full NCTI technology, one with digitising of conventional CT outputs

5. Practical Presentation and Demonstration: GOOSE Message Configuration – Publishing and Subscription

The session leader will explain the configuration aspects of GOOSE messaging and will illuminate the SCL data model elements which describe the GOOSE configuration. Based on this, the engineering process steps to create a valid GOOSE configuration will be discussed. IEC 61850 defines different kinds of tools which have different roles and responsibilities and the impact of these responsibilities on GOOSE message configuration will be demonstrated. Tools often hide the complexity of GOOSE configuration, and at times this is required, but can lead to assumptions and default settings which can cause tool incompatibilities. Understanding these issues is the first step to successfully performing multi-vendor projects. To address this, a vision of device-independent engineering where a smart engineering tool creates proper GOOSE configurations based on an application driven communication specification will be presented. This in-depth presentation will be supported by practical hands-on examples.

Gold Sponsor



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COPA-DATA is the technological leader for ergonomic and highly-dynamic process solutions. The company, founded in 1987, develops the software zenon for HMI/SCADA, dynamic production reporting and integrated PLC systems at its headquarters in Austria. zenon is sold through its own offices in Europe, North America and Asia, as well as partners and distributors throughout the world. Customers benefit from local contact persons and local support thanks to a decentralized corporate structure. As an independent company, COPA-DATA can act quickly and flexibly, continues to set new standards in functionality and ease of use and leads the market trends. Over 80,000 installed systems in more than 50 countries provide companies in the Food & Beverage, Energy & Infrastructure, Automotive and Pharmaceutical sectors with new scope for efficient automation.

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Locamation offers a complete substation automation solution for HV, MV and LV market. Its product range is based on open platform architecture to protect, monitor and control your substation whilst staying affordable, reliable and sustainable. Unique to SASensor is the separation between data acquisition and functionality. Hardware is solely used for data acquisition, and is therefore kept simple and robust. All functionality is based on our SASensor software platform. This architectural model enables easy remote upgrading to meet future market demands and governmental requirements with minimum investments. SASensor ensures flexibility in smart grid functionalities for the Energy Transition in Europe.

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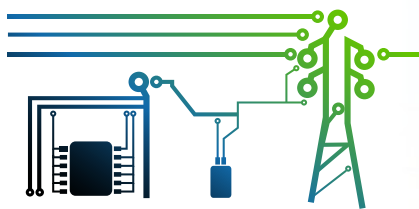
"IntelliSub Europe is a major event for those who want to know what is happening in smart substations. It focuses on practical examples and provides an overview of the current status of implementation of many real projects, which makes it a great place to network and benchmark our approach with other DSOs and TSOs. We got very good direction on future trends and new projects."

Carlos Peças Lopes
*Head of Substation Automation
EDP Distribuição*

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<input type="checkbox"/> Delegate 3-Day Package - Conference & Workshop	€1,895 + VAT @ 19% = €2,255.05	€2,095 + VAT @ 19% = €2,493.05	€2,295 + VAT @ 19% = €2,731.05
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Substitute Delegates: If you are unable to attend you may nominate, in writing, another delegate to take your place at any time prior to the start of the conference. Two or more delegates may not 'share' a place at the conference. Please make separate bookings for each delegate.

Cancellations: Regrettably cancellations cannot be facilitated but transfer to a future conference is permissible. We will provide the conference documentation to any delegate who has paid but is unable to attend for any reason. If we have to cancel an event for any reason, we will make a full refund immediately, but disclaim any further liability.

Exhibitors: The exhibition is located in the networking and catering area alongside the conference room to ensure maximum footfall and visibility for all participants. Each exhibitor will be allocated a 3m x 2m space with table, 2 chairs, power sockets and Internet access. The exact location of each exhibitor will be determined 4 weeks prior to the conference in consultation. Exhibitor set-up commences at 7am on the first day of the main conference, and break-down takes place after 4pm on the last day of the main conference. Depending on Exhibitor package selected, either 1 or 2 conference passes are included. Additional passes may be purchased at the published rates.

Alterations: It may be necessary for us to make alterations to the content, speakers, timing, venue or date of the event compared with the original programme.

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