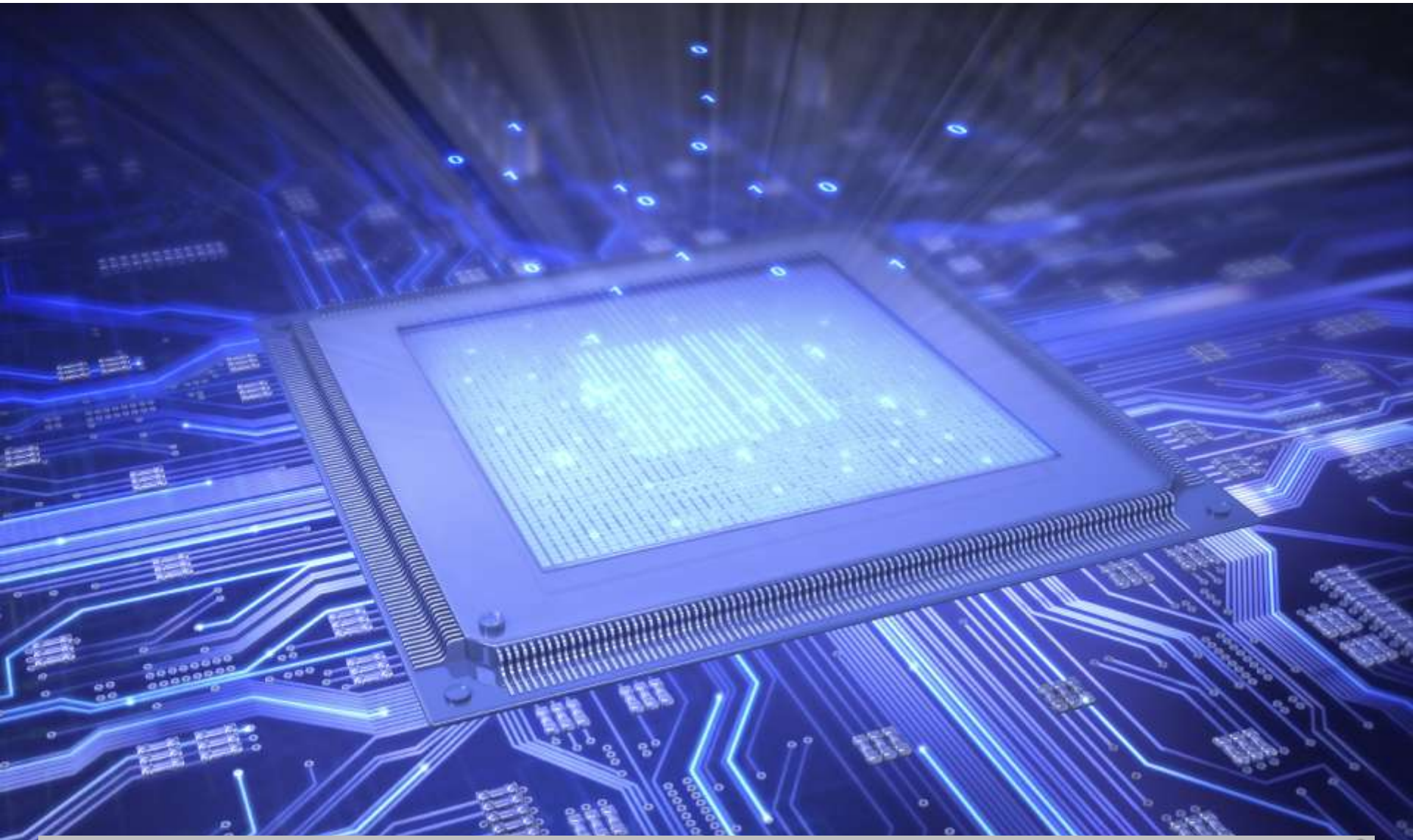
TÜV SÜD as one-stop partner for your business in Smart Grid

CIGRE, Paris 25. – 29.August 2014



Services for Photovoltaics manufacturers

Ensure your product meets international performance and safety requirements

Our testing and certification services for:

- PV Module
- Concentrating PV Module (CPV)
- PV Electrical Components
- PV Materials
- Cells
- Balance Of System (BOS) Components

Other services for PV manufacturers:

- R&D testing: standard or extended environmental tests
- Characterization of secondary reference cells for laboratory use
- Electroluminescence, thermography
- Consultancy on PV laboratory requirements
- PV laboratory qualification for External Testing Programmes with TÜV SÜD

Services for Photovoltaics operators

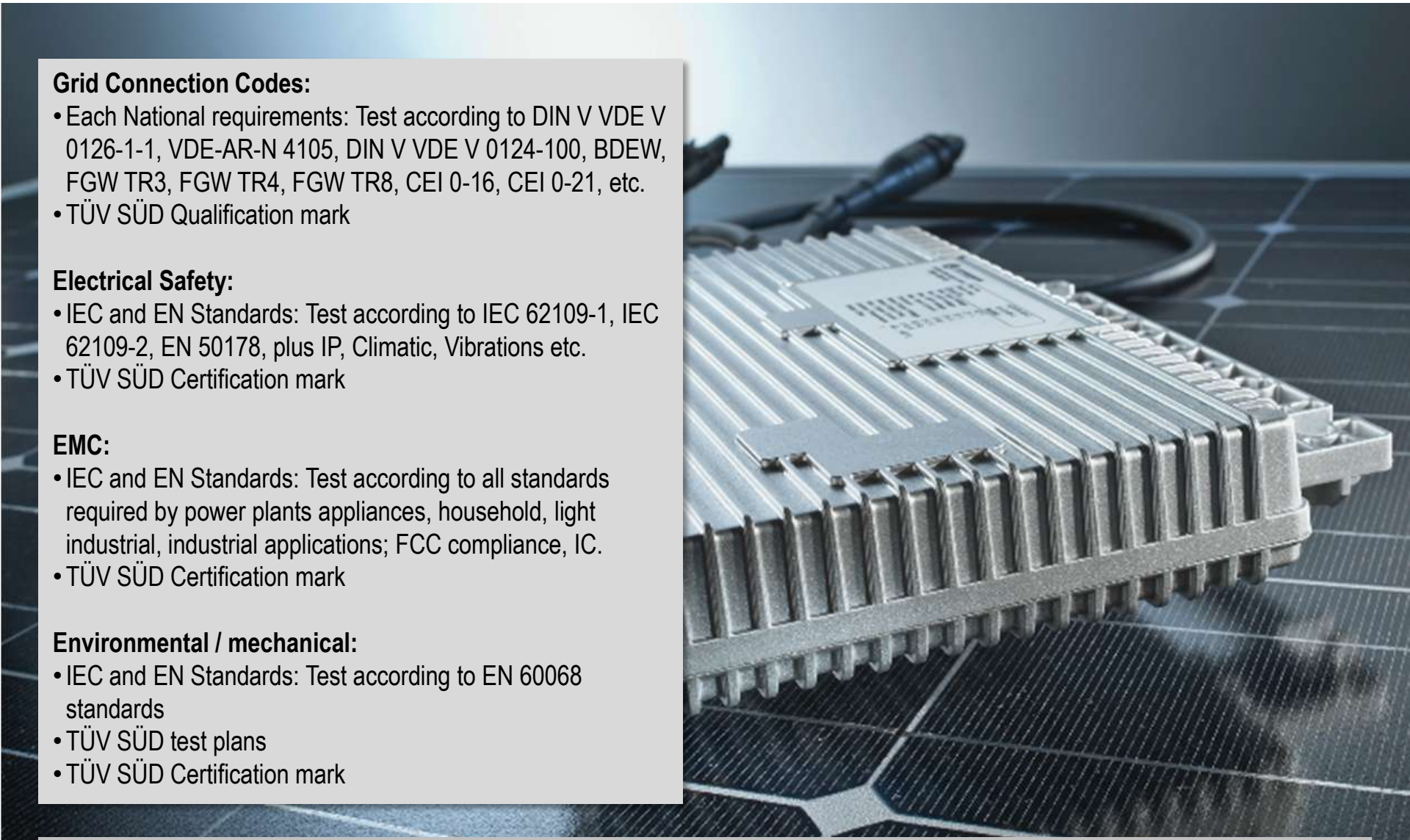
Expertise you can rely on around the globe

Our services for PV Operators (Investors, Importers, Installers):

- Comparative testing & supplier evaluation (customised or off-the-shelf)
- Pre-shipment services (onsite random sampling of goods, loading supervision)
- Testing for design qualification from specific production samples
- PV-specific factory audits
- Standard or extended reliability testing (indoor and outdoor)

Services for Inverter testing

Ensure your inverters meet the highest standards



Grid Connection Codes:

- Each National requirements: Test according to DIN V VDE V 0126-1-1, VDE-AR-N 4105, DIN V VDE V 0124-100, BDEW, FGW TR3, FGW TR4, FGW TR8, CEI 0-16, CEI 0-21, etc.
- TÜV SÜD Qualification mark

Electrical Safety:

- IEC and EN Standards: Test according to IEC 62109-1, IEC 62109-2, EN 50178, plus IP, Climatic, Vibrations etc.
- TÜV SÜD Certification mark

EMC:

- IEC and EN Standards: Test according to all standards required by power plants appliances, household, light industrial, industrial applications; FCC compliance, IC.
- TÜV SÜD Certification mark

Environmental / mechanical:

- IEC and EN Standards: Test according to EN 60068 standards
- TÜV SÜD test plans
- TÜV SÜD Certification mark

Services for Wind Energy

TÜV SÜD Wind Cert Services: More reliability. Long-term profitability.

Type Certification
- Certification and approval of the design
- Product certification and manufacturing inspections
- Type testing

Site Assessment
- Analysis of wind potential – project creation
- Wind measurements – project acquisition
- Wind expert reports – project qualification
- Turbulence and extreme winds – project safety

Wind Farm Certification
- Foundation design evaluation
- Transport control
- Manufacturer control
- Errection Monitoring
- Site assessment – soil conditions
- Due Diligence
- Initial test
- Regular wind farm inspections

Services for Battery testing

Development and validation testing to current and emerging standards

Battery lifecycle testing
- Verify how long a battery lasts and demonstrate the quality of the product to customers

Battery abuse testing
- Simulate extreme environmental conditions and scenarios to test your battery beyond its limits

Battery performance testing
- Demonstrate the efficiency of batteries

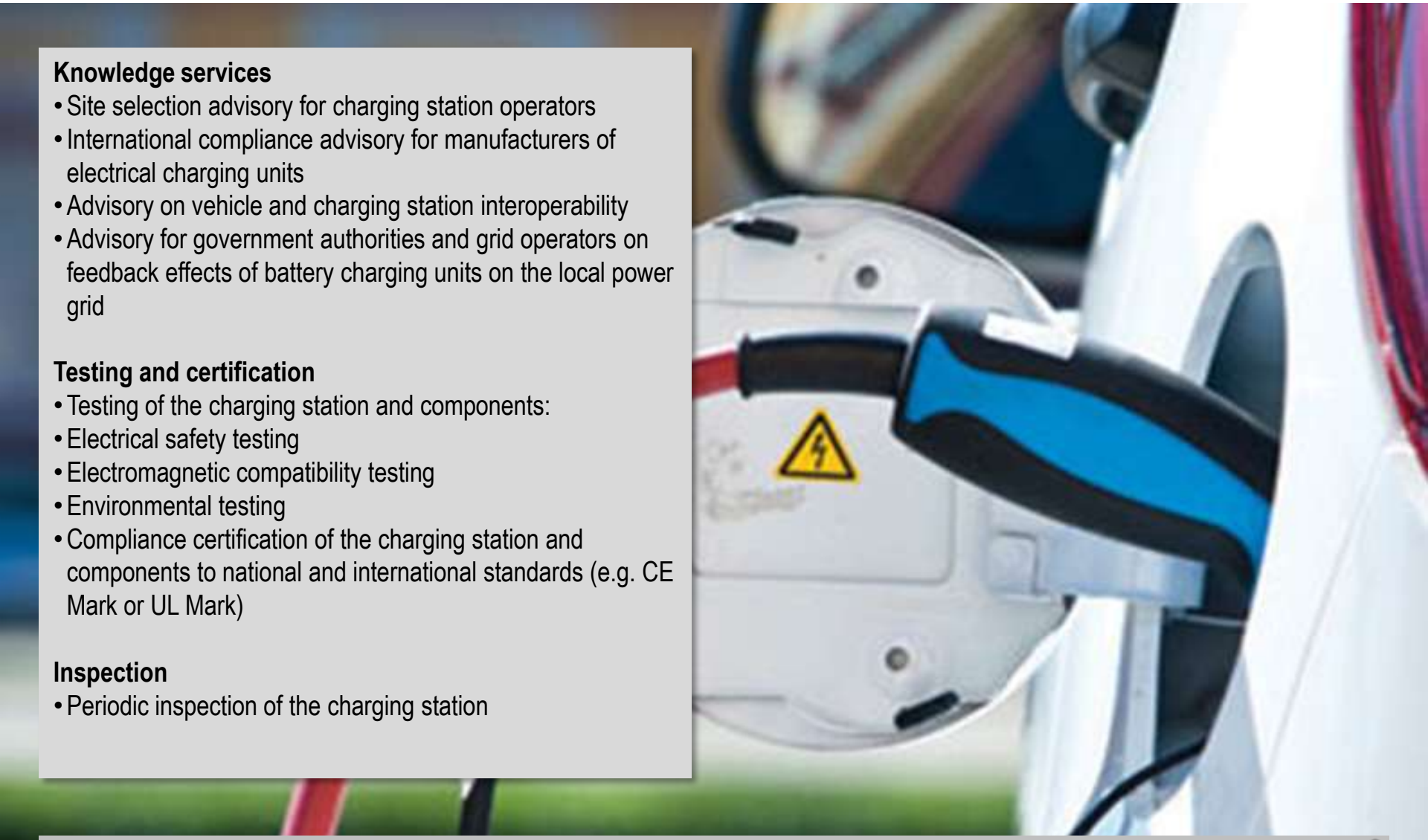
Battery environmental testing/ Battery durability testing
- Demonstrate the quality and reliability of your battery.

Battery transport testing
- Demonstrate the quality and reliability of your battery

Dynamic impact test for electric vehicle batteries
- Develop safer batteries through comprehensive impact tests that model the actual conditions of a crash that may cause major deformation of the battery

Services for e-Mobility Infrastructure

Fuel the growth of tomorrow's mobility



Knowledge services
- Site selection advisory for charging station operators
- International compliance advisory for manufacturers of electrical charging units
- Advisory on vehicle and charging station interoperability
- Advisory for government authorities and grid operators on feedback effects of battery charging units on the local power grid

Testing and certification
- Testing of the charging station and components:
- Electrical safety testing
- Electromagnetic compatibility testing
- Environmental testing
- Compliance certification of the charging station and components to national and international standards (e.g. CE Mark or UL Mark)

Inspection
- Periodic inspection of the charging station

Services for e-Mobility Vehicles

Choose a one-stop partner for e-Mobility vehicle services

eSafety concept
- eSafety concept is the holistic support for fulfillment of safety requirements that takes into account all safety aspects of electrical vehicle development

ISO 26262 Functional safety
- Evaluation of safety concept and requirements as well as of entire safety lifecycle, analyses (e.g. FMEA)
- Analysis techniques (ISO 26262/IEC 61508)

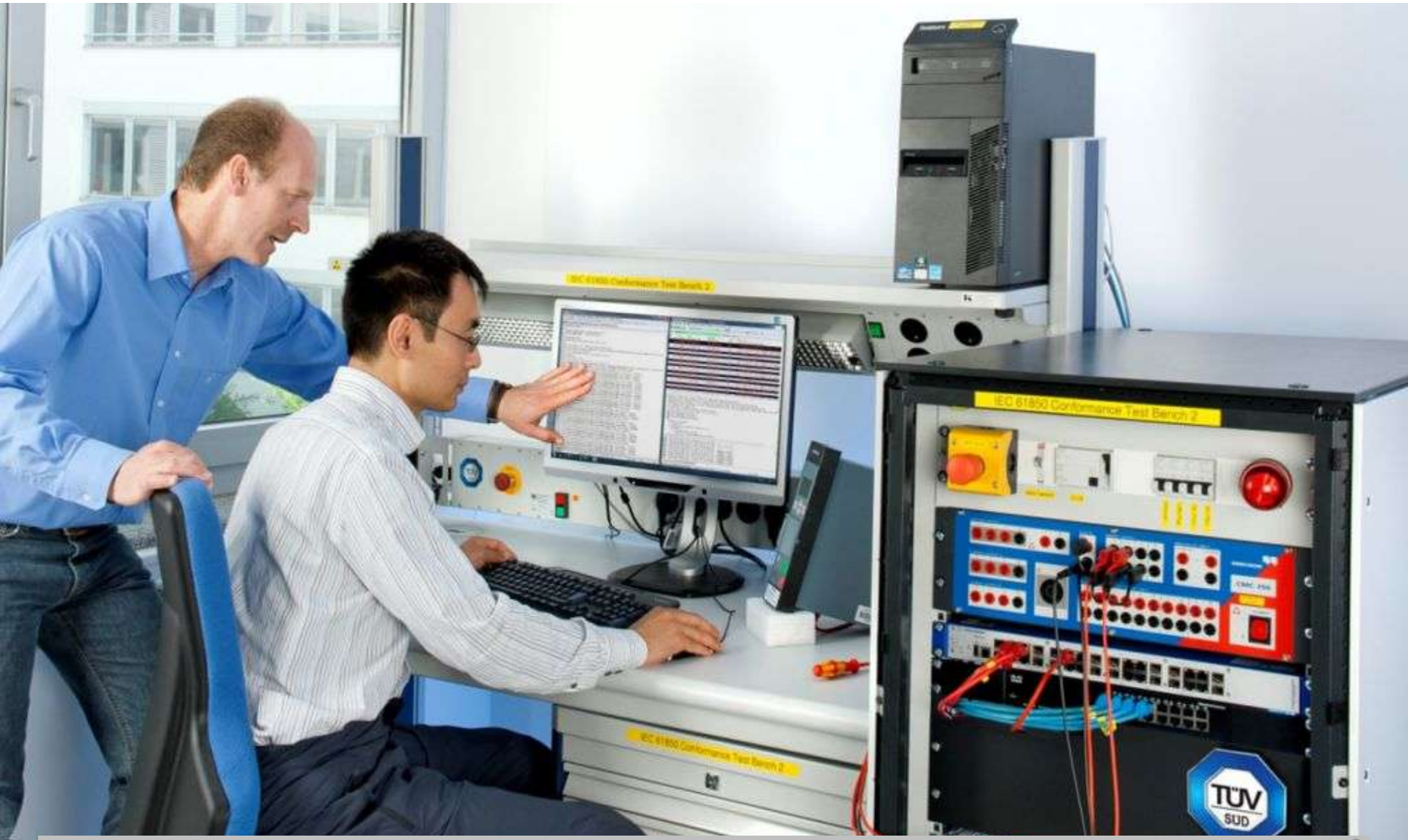
E-Homologation
- Homologation support, management and consulting

Training
- Management systems
- Functional safety
- Electrical safety

Benchmarking and performance testing
- The TÜV SÜD e-Car Cycle (TSECC) puts an additional dimension to the conventional evaluation range (different climate conditions)

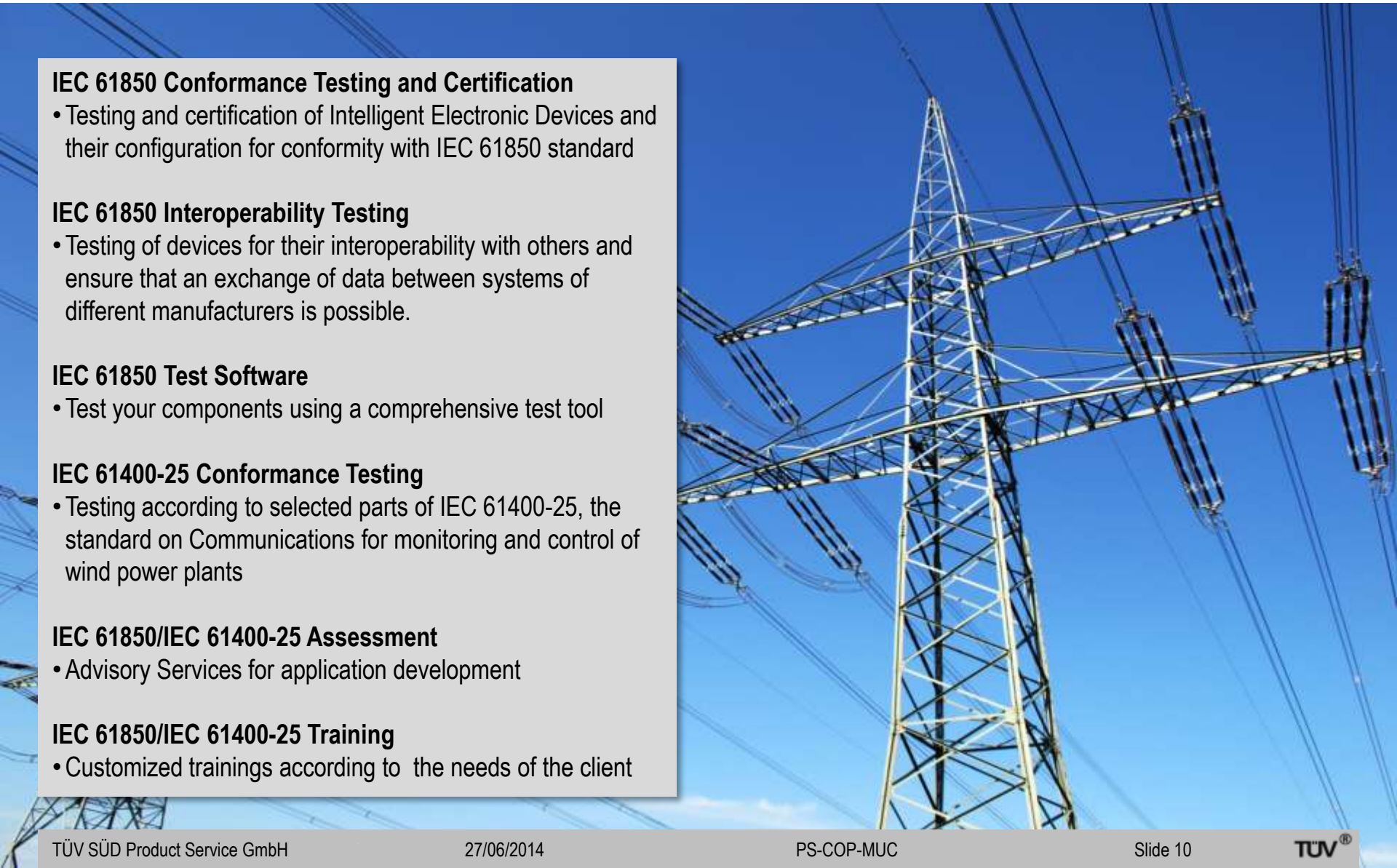
Level A Accreditation by UCAIug Testing Laboratory

TÜV SÜD's unique Smart Grid Test Laboratory & Communication Protocols



Services for Communication Protocols

Make your devices and systems ready to communicate in the Smart Grid



IEC 61850 Conformance Testing and Certification
- Testing and certification of Intelligent Electronic Devices and their configuration for conformity with IEC 61850 standard

IEC 61850 Interoperability Testing
- Testing of devices for their interoperability with others and ensure that an exchange of data between systems of different manufacturers is possible.

IEC 61850 Test Software
- Test your components using a comprehensive test tool

IEC 61400-25 Conformance Testing
- Testing according to selected parts of IEC 61400-25, the standard on Communications for monitoring and control of wind power plants

IEC 61850/IEC 61400-25 Assessment
- Advisory Services for application development

IEC 61850/IEC 61400-25 Training
- Customized trainings according to the needs of the client

Services for Smart Grid Architectures and Integration

Smart Grid: Power from an array of intelligently linked sources

Updating a Traditional Grid to Smart Grid
- Assessment of existing devices and systems for IEC 61850 compatibility
- Development of an overall concept

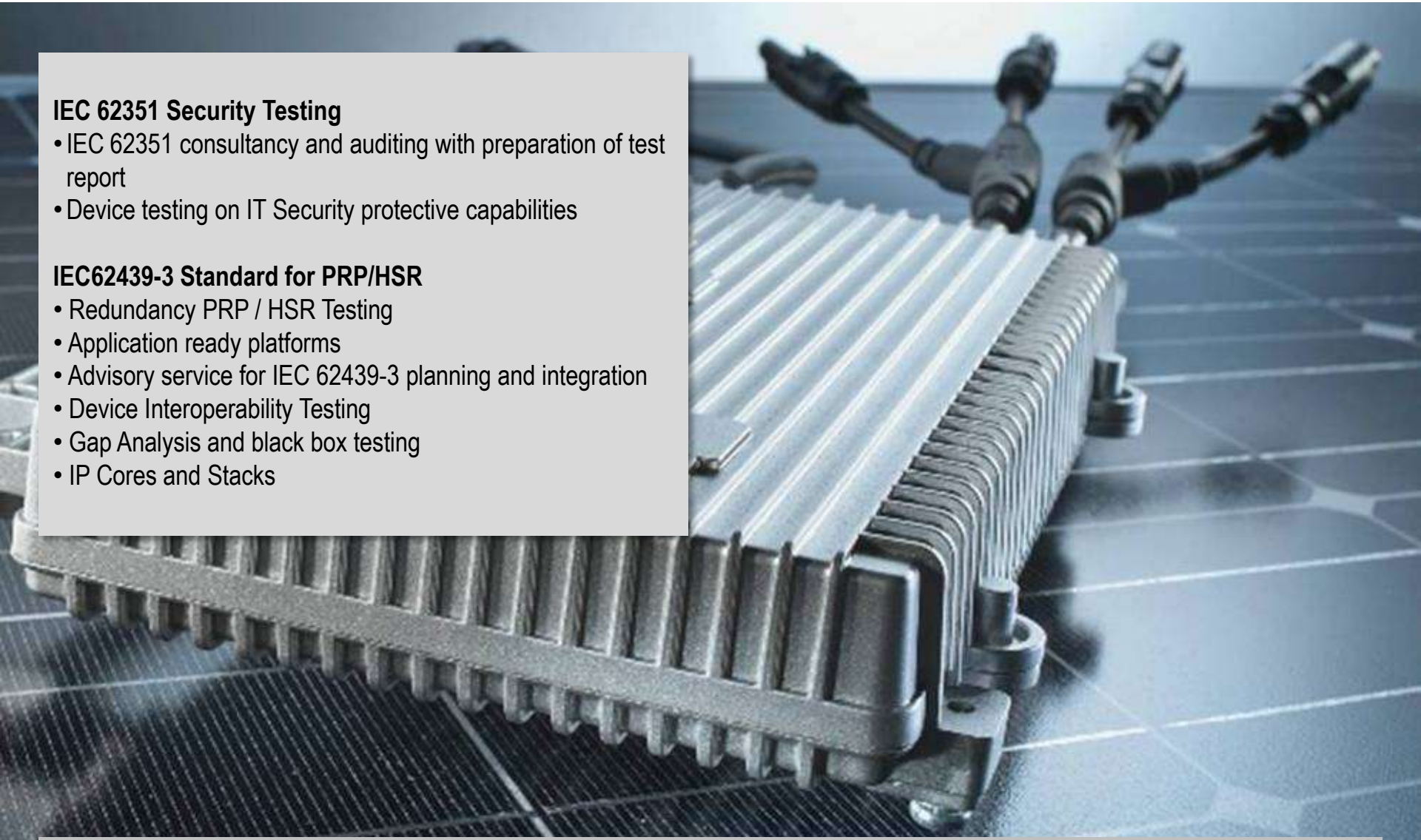
IEC 61850/IEC 61400-25 profiling for Utilities
- Component analysis to guarantee the interoperability of all systems involved

Type Testing VDE-AR-N 4105, CEI 0-16, CEI 0-21
- Testing of acceptable grid impact
- Testing of circuit breakers (grid protection device)

IEC 61850-3 Testing
- Electromagnetic Compatibility (EMC), shock and vibration testing

Services for Smart Grid High Availability Network

Smart Grid: PRP and HSR Testing & IT Security Testing



IEC 62351 Security Testing
- IEC 62351 consultancy and auditing with preparation of test report
- Device testing on IT Security protective capabilities

IEC62439-3 Standard for PRP/HSR
- Redundancy PRP / HSR Testing
- Application ready platforms
- Advisory service for IEC 62439-3 planning and integration
- Device Interoperability Testing
- Gap Analysis and black box testing
- IP Cores and Stacks

Services for Industrial IT Security

Industrial automation and control systems: Networked open systems save time and money

Consulting Industrial IT Security
- Review of the design and configuration of systems

ICS Security Handbook
- IT Security Handbook based on the defense-in-depth strategy for the operators and integrators of facilities

Risk Analysis Industrial IT Security
- Examination of industry-specific vulnerabilities, threat scenarios and consequences in various areas including networks, control systems etc.

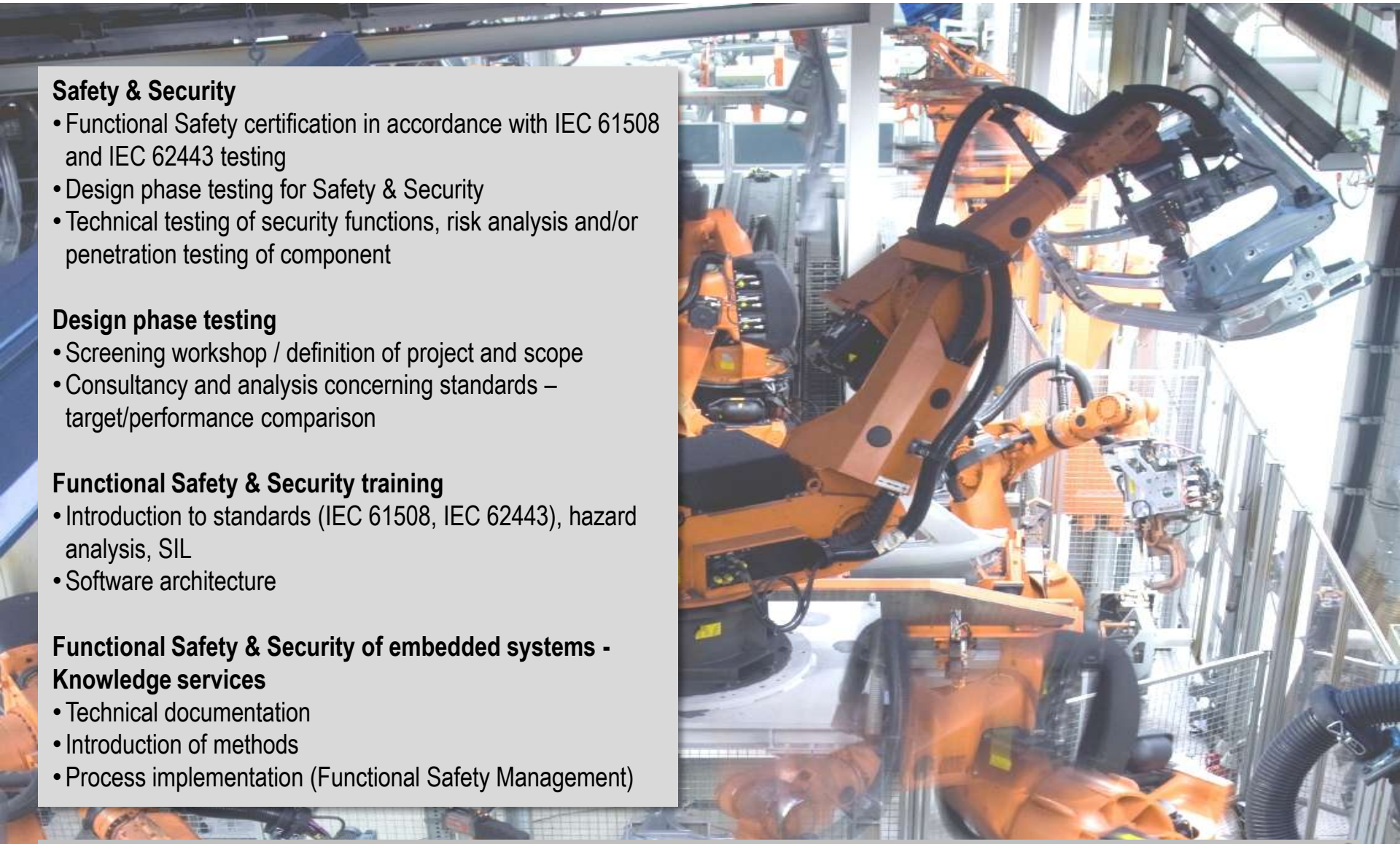
Basic-Check for Industrial IT Security
- Development of a checklist based on ISO 27001, IEC 62443 and/or the IT baseline protection standard

Advanced Assessment of the Industrial IT Security
- Comprehensive action plan plus prioritized measures to ensure the protection and security of your systems

Penetration Test
- Penetration tests of IEDs to identify vulnerabilities

Services for Functional Safety

Functional Safety Management for Smart Grids



Safety & Security
- Functional Safety certification in accordance with IEC 61508 and IEC 62443 testing
- Design phase testing for Safety & Security
- Technical testing of security functions, risk analysis and/or penetration testing of component

Design phase testing
- Screening workshop / definition of project and scope
- Consultancy and analysis concerning standards – target/performance comparison

Functional Safety & Security training
- Introduction to standards (IEC 61508, IEC 62443), hazard analysis, SIL
- Software architecture

Functional Safety & Security of embedded systems - Knowledge services
- Technical documentation
- Introduction of methods
- Process implementation (Functional Safety Management)

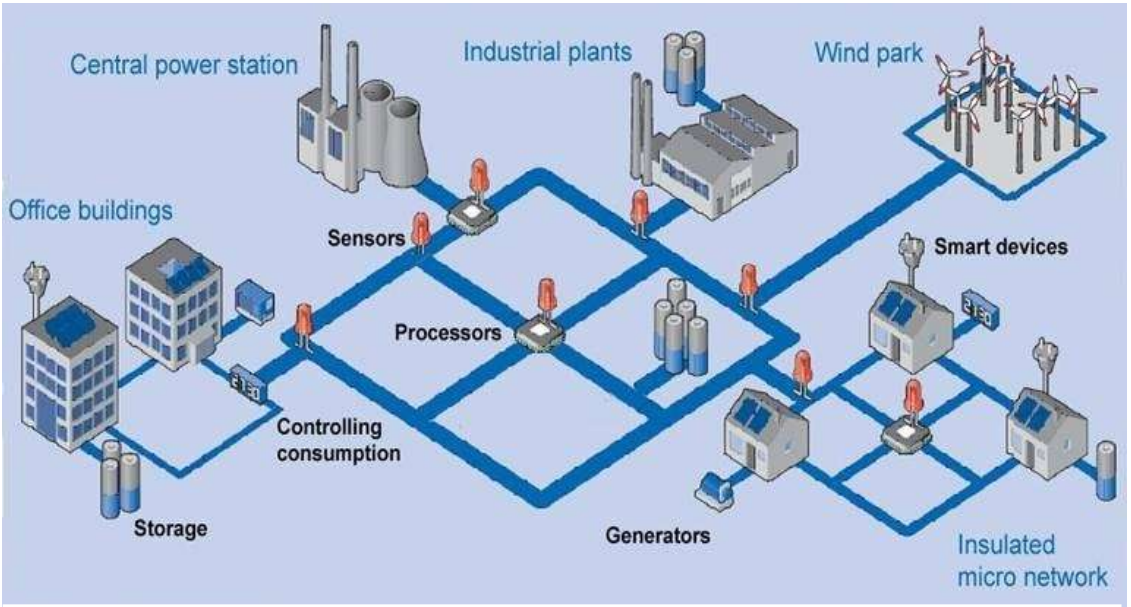
Reference project: German Smart Grid Roadmap

Running out of time: 10 more years to completion

German Parliament, Germany

Project description

- Developing a Smart Grid Road Map for Germany.
- Focus lies on the integration of Energie Providers and Consumers in the Smart Grid and possible energy storage solutions



Situation

- Liberalized energy market
- Termination of nuclear power
- Expansion of volatile renewables
- Transition to future smart grids
- Cyber Security

Outcome

- Assessment of needs for technological and regulatory improvements
- Identification of mid-term options
- Roadmap for transformation and operation to future Smart Grids
- Steering of funding

Reference project: Smart Grid Test Tool

Funding for Smart Grid test tools development at TÜV SÜD

Ministery of Economy of the Free State of Bavaria, Germany

Project scope

- Development of communication test tools for a reliable and sustainable smart grid
- Ongoing project until 2015

Project tasks

- Testtools for IEC 61850 - interoperability testing
- Automation of conformity tests according to VDE-AR-N 4105
- Test tools for Smart Metering / Home Automation
- Penetration test tools for IT-Security in the electricity grid

Partners

- Software Factory
- Beckhoff Automation GmbH
- Maschinenfabrik Reinhausen GmH
- Fraunhofer AISEC

Reference project: Secure communication in Smart Grids

Smart Grids interoperability and secure communication

Smart Grid Device Manufacturer

Project Description

- IEC 61850 Conformance Test and Certification of a IEC61850 Station Controller produced by a Utility Manufacture

Situation and Challenges

- Testing and certification services according to IEC 61850, the new global standard for power utility communication in the Smart Grid.

Benefits

- Secure Communication with Smart Grid devices therefore benefit for devices which are fit for integration into the Smart Grid, the future power distribution for generators and consumers
- IEC 61850 conformity and interoperability

Reference project: Conformance test according to IEC 61400-25

Wind Energy is the power of tomorrow, built today

Wind Turbines Assembler / Builder

Project Description

- The IEC 61400-25 standard is a basis for simplifying the roles that the wind turbine and SCADA systems have to play, This addresses the issue of proprietary communication systems utilizing a wide variety of protocols, labels, semantics, etc.

Situation and Challenges

- Testing according to selected parts of IEC 61400-25, the standard on Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring

Benefits

- Exchange of information with different wind power plants independently of a vendor
- Users, manufacturers, service providers, and system integrators with interest in the specific issues on interoperatibility

We are accredited to certificate your products

IEC 61850 Conformance Testing and Certification

IEC 61850 Certificate
Level A[1]

No. «CertificateNumber»

Issued to:
«CustomerName»
«CustomerAdrsStreet»
«CustomerAdrsZIPcity»

For the product:
«ProductName»
«ProductType»
«ProductVersion»

Issued by:
TÜV SÜD
Embedded Systems
Barthstrasse 16
D-80339 Munich
Germany

Certification Mark:

The product has not shown to be non-conforming to:

IEC 61850-6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems in substations.

1 Basic Exchange («CB1»/24)	9a GOOSE Publish («CB9a»/13)
2 Data Sets («CB2»/8)	9b GOOSE Subscribe («CB9b»/11)
2+ Data Set Definition («CB2p»/23)	12a Direct Control («CB12a»/12)
3 Substitution («CB3»/4)	12b SBO Control («CB12b»/14)
4 Setting Group Selection («CB4a»/3)	12c Enhanced Direct Control («CB12c»/13)
4+ Setting Group Definition («CB4p»/7)	12d Enhanced SBO Control («CB12d»/19)
5 Unbuffered Reporting («CB5»/19)	13 Time Synchronization («CB13»/6)
6 Buffered Reporting («CB6»/21)	14 File Transfer («CB14»/7)

Munich, «CertificateDate»

«TechCertifier»
Technical Certifier

«TestEngineer»
Test Engineer

TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstraße 65 · 80339 München · Germany

TÜV SÜD is a Level A Independent Testing Lab:

- On August 24th 2012, TÜV SÜD has been accredited by UCAIug as Level A Independent Test Lab.
- TÜV SÜD is hereafter authorized to issue IEC 61850 Conformance Certificates

Committee work for standard development

Standardization Committees / Research Cluster & Projects		
DKE 931.1	Security in industrial automation	DKE
DKE 952	Power systems management and associated information exchange	DKE
IECEE	Member of respective working groups ▪ Sub WG 2A „Smart Grid“ ▪ Sub-WG2B “Industrial automation”	IEC IECEE
IEEE	Power and energy society	IEEE
IEC TC 57	Power systems	IEC
UCA	Integration and Interoperability of utility systems	UCA
USE61400-25	Wind Energy Communication	USE61400-25
ISA 99	Industrial automation security	ISA
ISA Secure	Industrial automation	ISASecure
KITS	DIN IT Security coordination site	K·ITS
Artemis	Embedded Systems for critical application	ARTEMIS
ITEA2	Design tools for safe and secure ES	ITEA 2
DAkkS	Accreditation body	DAkkS

Reference project: Secure communication in Smart Grids

EMC, Environmental and Mechanical Testing according to IEC 61850-3 and IEEE 1613

Telecommunication Company

Project Description

- Test According with IEEE 1613 2009 Electromagnetic Compatibility
- Test According with IEC 61850-3 Electromagnetic Compatibility
- Test According with IEC 61850-3 Climatic/Mechanical Compatibility

Situation and Challenges

- IEC 61850-3 and IEEE 1613 deal with guidelines for environmental conditions and auxiliary services, with recommendations on the relevance of specific requirements from other standards and specifications.

Benefits

- Reputation in the market
- Staff experience
- Technical expertise
- Test lab capabilities

Reference project: Compliance testing on VDE AR-N-4105

Green Energy needs the right „Input“

DC-AC Converter Manufacturer

Project Description

- Basic requirements for a so-called "symmetrical three-phase current infeed" from generators, in particular from inverter-based generators, also addressing frequency-dependent active power control, in order to guarantee system stability in the event of overfrequency (50.2 Hz problem)

Situation and Challenges

- Testing and certification services according to VDE AR-N-4105 , the German standard for DC-AC power conversion in the Smart Grid environment, extending the Italian standard is CEI 0-21

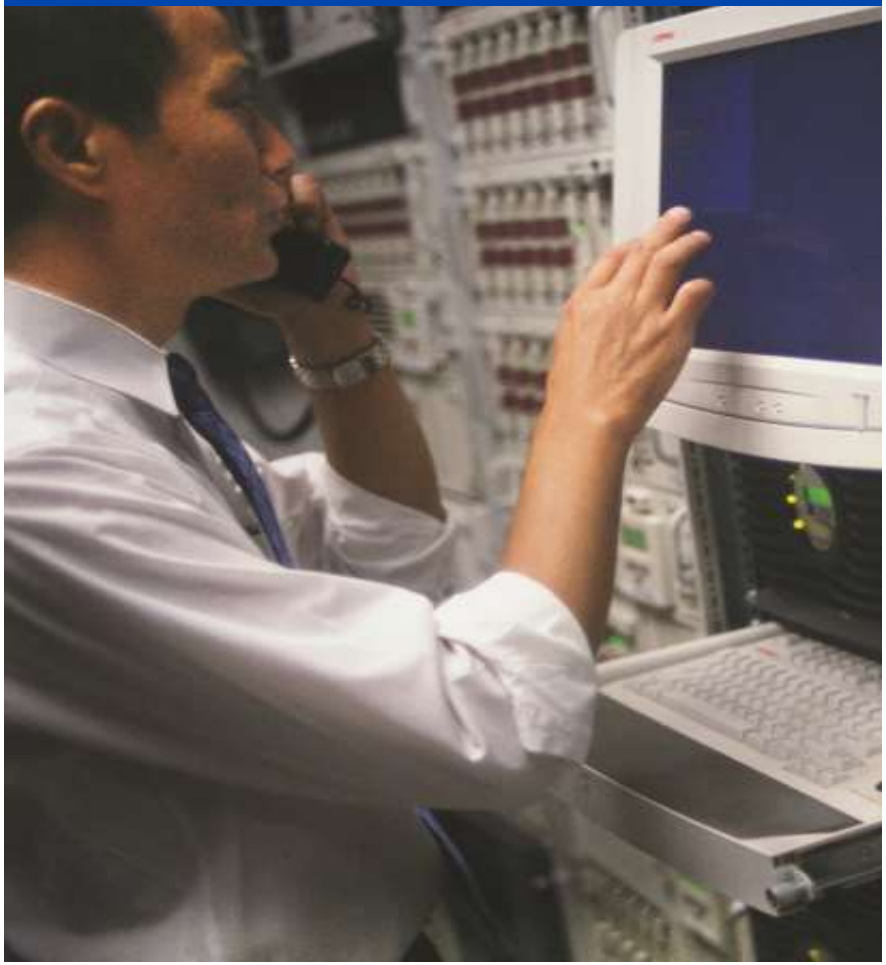
Benefits

- The core of VDE-AR-N 4105 is network-supporting functionality to guarantee safe and reliable network operation for maximum integration of generating capacity in the low voltage distribution network

Reference project: Security for a device

Security handbook for the operator

Communications Device Manufacturer



Project Description

- A security handbook was developed for a device for the industrial IT infrastructure together with the customer. The security handbook described how the device can be installed, configured and operated in a secure manner.

Situation and Challenges

- Relevant security parameters must be identified
- The description must be understandable and not to complex
- The document must be maintainable

Benefits

- Security as a unique selling point
- Clear overview about the security features of the device
- A comprehensive security handbook

Reference project:Industrial IT Security Concept

It is essential to guarantee a secure data transmission

Federal German Water Supplier, Germany

Project Description

- The customer wanted to get an overview about critical vulnerabilities. Important was a holistic approach which addresses people, processes and technique.

Situation and Challenges

- Main parts of IT infrastructure was built up by a third party
- Security requirements which have to fulfilled by third parties were not clearly defined.
- The implemented security level of the IT infrastructure has to be identified.

Benefits

- Review of network and system security
- Improvements of supporting processes
- Definition of next steps for the implementation of security measures

Reference project: Security Roadmap

Security analysis: gaps according to IEC 62443 standard

Production Tobacco Industry

Project Description

- The project includes a gap analysis against IEC 62443 standard, an assessment of the risk analysis methodology, a review of the security documentation and the network architecture.

Situation and Challenges

- Customer wants to improve security in general
- IT security guidelines of the Office IT cannot be implemented easily
- Transition to a more secure network architecture

Benefits

- Assessment of risk analysis methodology and results
- Identified necessary security measures
- Road map for next steps
- Restructuring of the security documentation

Reference project: Security check on IACS

IACS Security

Control System Manufacturer

Project Description

- The manufacturer offers an IACS (Industrial Automation and Control System) to control gas turbines. The project includes a gap analysis against IEC 62443 standard.
- The security requirements and measures have been aligned with the IEC 62443 standard.

Situation and Challenges

- Customer wants to get an independent audit regarding security
- The overall security architecture has to be reviewed and improved
- Transition to a more secure network architecture

Benefits

- Improvement of network architecture and security
- Introduction of zones with secure communication channels
- Realization of defense-in-depth strategy

Reference project: Smart Metering Consulting

Energy Customers want Smart Meters to keep their Privacy

Stadtwerke München, Germany

Project Description

- Implementation of a new control system
- IT-Security Know How
- Energy suppliers collect all customer usage data and can potentially generate user profiles

Situation and Challenges

- "In Smart Metering we take privacy very seriously. Thus, TÜV-SÜD helps us to develop and launch a comprehensive data security concept. That way, we can guarantee secure and reliable data transmission of the consumer profiles of our customers."
  Stadtwerke München – Bernd Hoffmeister

Benefits

- Design and launch of a concept regarding privacy, transmission reliability, and data security for smart metering

Reference project: Building Automation

Secure smart home system

Smart Home Device Integrator

Project Description

- The manufacturer offers a secure smart home system, including sensors, actors and central control unit based on an ARM System, securely connected to a cloud back-end via Internet, Remote control through Mobile App.

Situation and Challenges

- Challenges are to secure all levels of interaction between the integrated components
- Testing of central control unit on physical intrusion protection

Benefits

- The customer gets a report listing vulnerabilities,
- Risk assessment and recomendations to mitigate the impact of the existing vulnerabilities
- Generate strong marktposition with “harden” system

You need more information? Please contact us:

TÜV SÜD Product Service GmbH
PS-COP-MUC
Smart Grid Services
Barthstr. 16
80339 Munich
Germany

smartgrid@tuev-sued.de

Phone: **+49 89 5008 4747**
Fax: +49 89 5155-2444

www.tuev-sued.com/smartgrid