New ETSI-CEN-CENELEC approach for rapid SG deployments
Policy Drivers

**Sustainability: 20-20-20 targets**

- Reduction of CO$_2$ emissions
- Increased generation based on renewable sources and
- Need to increase grid and consumption efficiency - decrease losses

**Security of supply**

- Increase grid robustness and resilience
- Integration of different generators (centralised and distributed)

**Competitiveness and Internal Market development**

- Better management of supply and demand
- New market opportunities and increased efficiency of the market
- Empowerment of consumers

All these challenges call for the restructuring of the grids, e.g. the structure of generation, market and the use of electricity
Legal Framework

**Energy Efficiency Directive** (2006/32/EC, Annex3) has identified smart meters as one of the main measures, contributing to the overall energy efficiency improvement.

**Renewables Directive** (2009/28/EC, Art16) views Smart Grids as an enabler for integration of increasing renewable energy into the grid and obliges the Member States to develop transmission and grid infrastructure towards this aim.

**3rd Package for the internal energy market** (Directives 2009/72/EC+ 2009/73/EC), among others:

- defines tasks and provisions for the organisation of the electricity and gas sectors relevant for the implementation of Smart Grids
- encourages decentralised generation and energy efficiency
- imposes an obligation of roll-out of smart metering by 2020
European Standards Organizations

European Committee for Standardization
31 Members (NSB/NC of 27 EU Members + 3 EFTA countries + 1 EU applicant)
http://www.cen.eu

European Committee for Electrotechnical Standardization
31 Members (NSB/NC of 27 EU Members +3 EFTA countries + 1 EU applicant)
http://www.cenelec.eu

European Telecommunications Standards Institute
700 ETSI member organizations from 60 countries worldwide
http://www.etsi.org

“Recognized” by the European Union under Directive 1025/2012
Mandate M490

Description of mandated work

• **Technical Reference Architecture**
  A technical reference architecture, which will represent the functional information data flows between the main domains and integrate many systems and subsystems architectures.

• **Set of Consistent Standards**
  A set of consistent standards, which will support the information exchange (communication protocols and data models) and the integration of all users into the electric system operation.

• **Sustainable standardization processes**
  Sustainable standardization processes and collaborative tools to enable stakeholder interactions, to improve the two above and adapt them to new requirements based on gap analysis, while ensuring the fit to high level system constraints such as interoperability, security, and privacy, etc.
Current Setup of standardization

EU Mandate on Smart Grid Standardization

Issues

EU Commission

Legislation

Smart Grid Reference Group

EC Steering Group for Mandate Execution
(consists of EC representatives and experts)

Smart Grid Co-ordination Group

Coordination of ESOs work
(consists of ESO representatives and associations)

Accept and work on

Consult

Standardization
SG-CG – Who are we?

SMART GRID Coordination Group
(established June 2011)
International Activities

- SG-CG Smart Grid
- European Technology platform
  FutuRed – Spanish Electrical Grid Platform;
  Smart Grids-Roadmap Austria; Electricity
  Networks Strategy Group (UK) etc.
- Smart Metering EU-Mandate M/441
- Electrical vehicle Mandate – M/461
- DKE, VDE „German
  standardization roadmap E-
  Energy“
  BMWI Uslar et al „Investigation of
  standardization for BMWi-project E-Energy“
- BDI „Internet of Energy“

- METI, JISC
  Roadmap to
  international
  standardization Smart Grid
- SGCC
  The State Grid
  Corporation of China –
  Smart Grid Framework
- IEEE
  IEEE SCC21 Standards
  Coordinating Committee on Fuel
  Cells, Photovoltaics, Dispersed
  Generation, and Energy Storage
- IEEE P2030 Standard
  Interoperability Smart Grid
  Concepts
- NIST Framework and Roadmap for
  Smart Grid Interoperability
  Standards
- SGIP
- Intelligrid
- Gridwise Alliance

- IEC/SMB Strategy Group 3 (SG3)
  „Smart Grid“ - Roadmap
- UCAiug - Open Smart Grid
  Subkomitee
- ITU Smart Grid
- CIGRE D2.24
Structure of SG-CG

Mandate Scope

EC Level

SG-CG Level

TC Level

Smart Grid Coordination Group (former JWG)

EC Reference Group

Steering Committee

Further Tasks

• Report 2.0
• Liaisons
• Promotion

M/441
M/468

Consistent Set of Standards

New Appl. and Methodology

Inter-operability

Information Security

New joint WGs
Existing WGs

New joint WGs
Existing WGs

New joint WGs
Existing WGs

New joint WGs
Existing WGs

• NIST
• JISC
• China
• Etc.

coordination
Process including testing

1. Step
Identification of Generic Use Cases

2. Step
Map GUCs to SGAM
Security and privacy evaluation

3. Step
Locate requirements for standards

4. Step
Identify existing standards and new gaps

5. Step
Definition of standardization projects

6. Step
Work on standards

7. Step
Profiles

8. Step
Test on functions and interoperability

Use Cases Sources

source: SG-CG
Smart Grid Architecture Model SGAM

Business Layer
- Represents business models and regulatory requirements

Service/Function Layer
- Represents logical functions or applications independent from physical implementations

Information Layer (OSI 6-7)
- Represents information objects or data models required to fulfill functions and to be exchanged by communication

Communication Layer (OSI 1 – 5)
- Represents protocols and mechanisms for the exchange of information between components

Component Layer
- Represents physical devices which host functions, information and communication means
Use Cases as base for evaluation

Level of ABSTRACTION

Low

Primary use case scenario
Primary use case scenario
Primary use case scenario

Primary use case scenario
Primary use case scenario
Primary use case scenario

High

Conceptual Description

Business Cases

High Level Use Case

Primary Use case A

Primary Use case B

Level of GRANULARITY

Low

can be linked to architecture and systems

High

source: SG-CG
First set of standards - report

Mapping of Systems on SGAM

<table>
<thead>
<tr>
<th>Layer</th>
<th>Standard</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>EN 61970-1</td>
<td>Energy management system Application Program Interface</td>
</tr>
<tr>
<td>Communication</td>
<td>IEC/TR 62235</td>
<td>Framework market communication</td>
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<tr>
<td>Communication</td>
<td>EN 60870-5-101</td>
<td>Telecontrol protocols</td>
</tr>
<tr>
<td>Information</td>
<td>IEC 61850 (all parts)</td>
<td>See substation automation system in 8.3.1</td>
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<tr>
<td>Information</td>
<td>IEC 62331</td>
<td>Security - all parts</td>
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<tr>
<td>Information (guidelines)</td>
<td>IEC 62357</td>
<td>Reference architecture power system information exchange</td>
</tr>
<tr>
<td>Information</td>
<td>IEC 62361</td>
<td>Harmonization of quality codes</td>
</tr>
</tbody>
</table>

Reference Architecture of each system

source: SG-CG
Core Standards

**Architecture**
- IEC 62357: Seamless Integration Reference Architecture

**Communication**
- IEC 60870: Transport protocols
e.g. EN 60870-5-104:2001-05
- IEC 61970/61968: Common Information Model CIM
e.g. EN 61970-405:2007-09, EN 61968-3:2004-06

**Data Models**
- IEC 62325: Market Communications using CIM

**Market**
- IEC 62325: Market Communications using CIM

**DER**
- IEC 61850, 61850-7-4XX: SAS, Communications, DER
  EN 61850-7-420:2009-06

**RES**
- IEC 61400: Communications for monitoring and control of wind power plants
  EN 61400-1:2004-02

**Security**
- IEC 62351: Security for Smart Grid

**Metering**
- IEC 61334: DLMS
- IEC 62056: COSEM
e.g. EN 62056-53:2002-06

**Home&Building**
- EN 50090 (KNX)
  (ISO/IEC JTC1 SC25 -ISO/IEC 14543-3, CEN/TC 247 (BACS/HLK) -EN 13321 -1 und -2)
SG-CG/SGIS WP1: Smart Grid Set of Security Standards

Selected Standards Coverage, SGAM Mapping and Detailed Analysis are Presented in This Section
### SG-CG/SGIS WP2: Cyber Security

<table>
<thead>
<tr>
<th>European Set of Recommendations Domains</th>
<th>SGIS Security Levels</th>
<th>Domains</th>
<th>SGAM</th>
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<tr>
<td></td>
<td>1  2  3  4  5</td>
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<td></td>
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<tr>
<td>Security governance &amp; risk management</td>
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<td>All</td>
<td>Business, Function</td>
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<tr>
<td>Third parties management</td>
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<tr>
<td>Secure lifecycle process for smart grid components and operating procedures</td>
<td>++ ++ +++ +++ +++</td>
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<td>Personnel security, awareness and training</td>
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<td>Incident response &amp; information knowledge sharing</td>
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<td>All</td>
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<tr>
<td>Audit and accountability capability</td>
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<td>All</td>
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<tr>
<td>Continuity of operations capability</td>
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<tr>
<td>Physical security</td>
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<td>Process, Field, Station, Operation</td>
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<td>Network security</td>
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<tr>
<td>Situational Awareness</td>
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<td>All</td>
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<tr>
<td>Liability</td>
<td>++ ++ ++ +++ +++</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

**European Set of Recommendations Dashboard**

**European Set of Recommendations and Applied Information now in place**
Interoperability

Deliverable: according to details given in the letter to commission

Methodology for interoperability

• A system interoperability testing method including conformance testing, "profiles" and "test use cases", should be provided by the end of 2013

Survey on existing

• A conformance testing map should be provided by the end of 2013

Recommendations for deployment

• An assessment of needed profiles (limiting implementation options given by the standards to improve interoperability), should be provided by the end of 2014
Interoperability - terminology

- **Irrelevant**
  The implementation has no features in common with the specification. (so the question of conformance does not arise).

- **Consistent**
  The implementation has some features in common with the specification, and those features are implemented in accordance with the specification. However, some features in the specification are not implemented, and the implementation has other features that are not covered by the specification.

- **Compliant**
  Some features in the specification are not implemented, but all features implemented are covered by the specification, and are in accordance with it.

- **Conformant**
  All the features in the specification are implemented in accordance with the specifications, but some more features are implemented that are not in accordance with it.

- **Fully Conformant**
  There is full correspondence between specification and implementation. All specified features are implemented in accordance with the specification and there are no features implemented that are not covered by the specification.

- **Non-Conformant**
  Any of the above in which some features in the specification are implemented not in accordance with the specification.
Summary

Achievements

- Consensus
- On time
- International acknowledgement

Standardization is ready

- Systematic process in place
- Current industry applications are supported by standards
- Selection guide available - easy entry for all stakeholders
- Overview on available and coming standards
- Work programme describes time table for new standards
- Future requirements can be easily included in systematic framework
Thank you for your attention

Contact:
Laurent SCHMITT
Chairman for SG-CG Dissemination Working Group
Email : laurent.schmitt@alstom.com