Standards for Smart Grids

Smart Grids & Cleanpower Conference
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http://bit.ly/cleanpower

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ETSI Board

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Standards for Smart Grids

- Why do we need Standards?
- Who is driving them?
- What Standards are needed?
- Who is producing them?
- What's the next step?

What is a Smart Grid?

- **EC Smart Grids Task Force**

  Defines a Smart Grid as an electricity network that can intelligently integrate the actions of all users connected to it, including generators, consumers and those that do both in order to efficiently deliver sustainable, economic and secure electricity supplies.

  "A smarter grid makes this transformation possible by bringing the philosophies, concepts and technologies that enabled the Internet to the utility and the electric grid", US Dept. of Energy report on Exploring the imperative of revitalizing America's electric infrastructure

  - ➤ Smart Grids are about power
  - ➤ but also: billing, eCommerce, subscription management, OAM functions, data models, connectivity and routing, access technologies, data storage, virtualization, cyber-security, …

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The Smart Grid ecosystem

Technology providers | **Value chain participants**

Policy and standards

Governmental regulatory bodies | Industry trade groups and NGOs | Standards bodies

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Wide range of communications technologies for the Smart Grid

- Standards and interoperability are key
- "Best-fit" technology may vary as geographies differ

Communications technologies

Powerline carrier (PLC)

Broadband over powerline (BPL)

WiMax (700 MHz)

900 MHz RF mesh

Zigbee

WiFi

2.4 GHz mesh wireless

Digital subscriber line (DSL)

Fiber optics

Example companies that implement it

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Smart Grid Ecosystem

❑ A very complex eco-system
  ➢ Nobody can do it alone -> Coordination and reuse of work are key
❑ Close relationship of Standardization and Regulation

	Standards Bodies	Influential Bodies	Policy & Regulation
Vision & Framework	IEEE P2030, IEC Smart Grid Strategy Group	EC, NIST, EPRI, SG-ETP SEA, INCITS, OpenADR	IERN, ICER US: FERC, EU: ER-GEG / ACER, CEER China: SERC France: CRE UK: OFGEM Etc.
Service plane	ANSI C12, IETF, Zigbee, ETSI IEC 60870, 61868-70, Cenelec	DLMS, OpenADR, OPC-UA,	
Control & connectivity plane	ANSI C12, IETF, Cenelec, IEEE 1686, 1588, IEC 61850, 62351, Zigbee, ETSI (incl. 3GPP)	DLMS	
Energy plane	IEEE PES, 1547, C37, IEC, NERC, Cenelec	DNP, NEMA	

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ICT meets Power: the horizontal view

Service Plane
- ➢ Billing
- ➢ e-Commerce
- ➢ Subscription management and activation
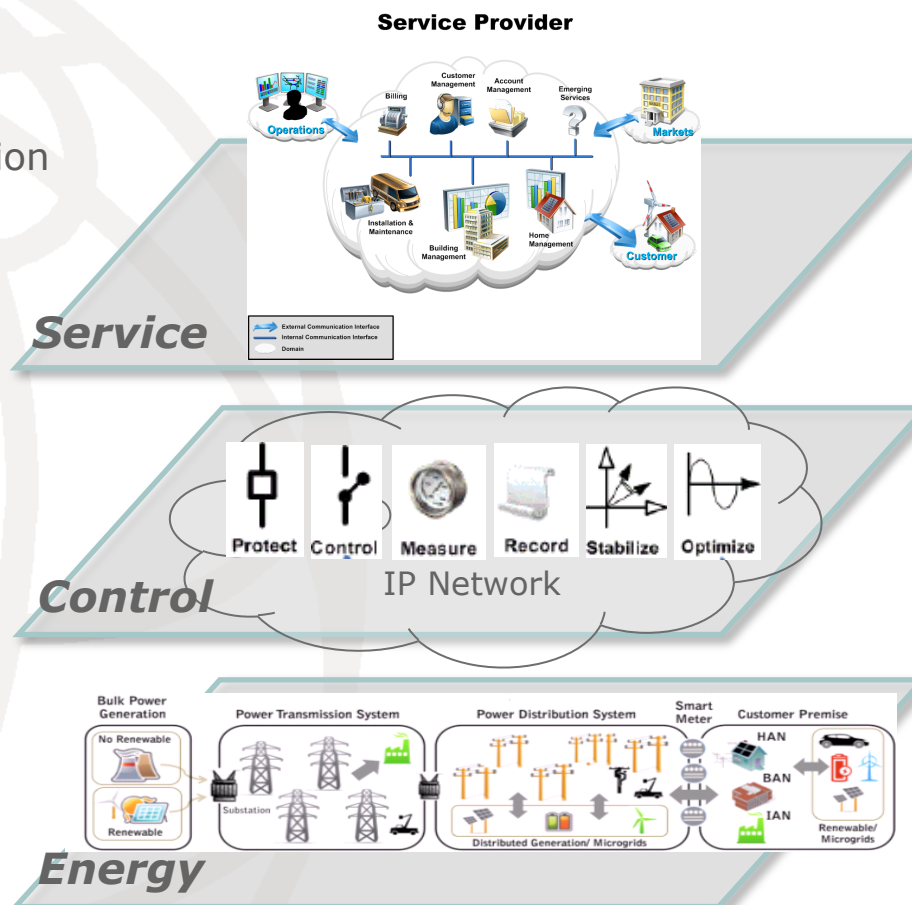- ➢ Business processes

Control and Connectivity plane
- ➢ OAM functions
- ➢ Protection and restoration
- ➢ Traffic engineering
- ➢ Connectivity and routing
- ➢ Virtualization
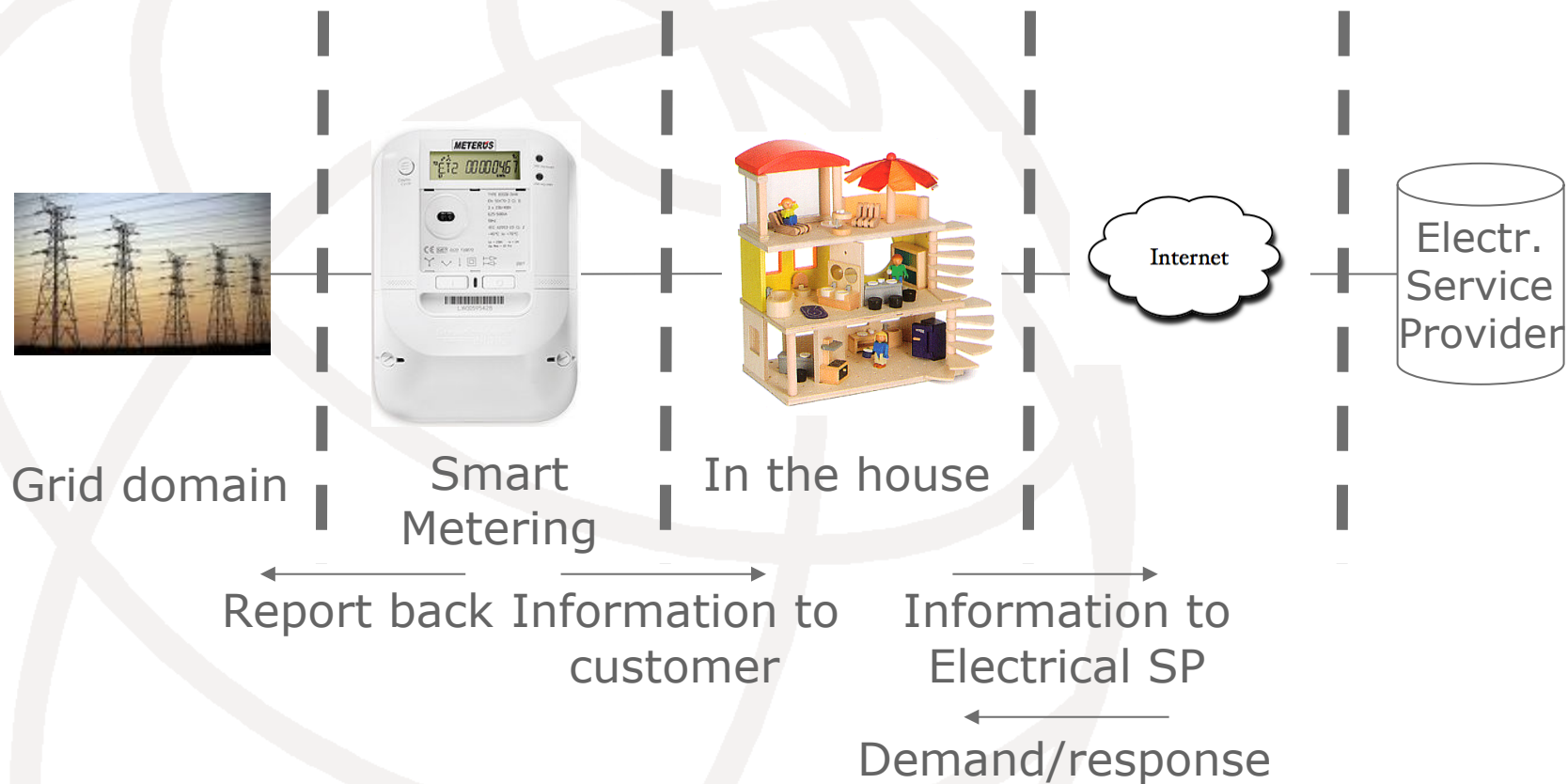- ➢ Access technologies
- ➢ Time synchronization

Energy Plane
- ➢ Sensors
- ➢ Electric storage and interconnection
- ➢ Transmission and Distribution Power Systems, etc.

… with some vertical enablers
- ➢ Privacy
- ➢ Security
- ➢ Data models

Service

Control

Energy

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Split of domains to identify key interfaces

Grid domain   Smart Metering   In the house

← Report back   Information to customer →

Information to Electrical SP →

← Demand/response

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EU Perspective

❑ Smart Grids Directive 2009/72/EC of 13 July 2009

  ➢ "Member States should encourage the modernisation of distribution networks, such as through the introduction of smart grids, which should be built in a way that encourages decentralised generation and energy efficiency."

Task Force for Smart Grids

❑ EU Smart Grids Task Force
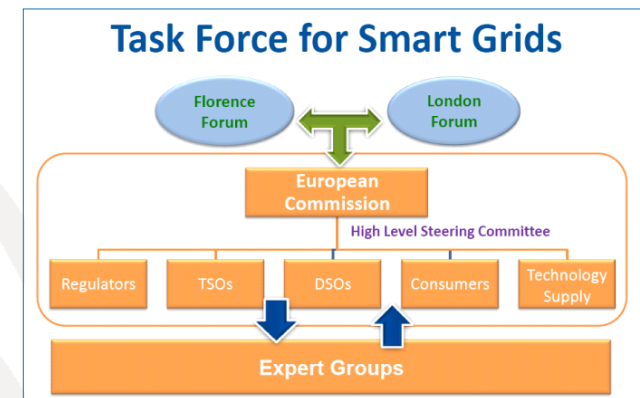 Steering Committee and 3 Expert Groups

  EG 1: Functionalities of Smart Grids and Smart Meters.

  EG 2: Regulatory recommendations for data safety, data handling & data protection.

  EG 3: Roles and responsibilities of actors involved in the deployment of Smart Grids.
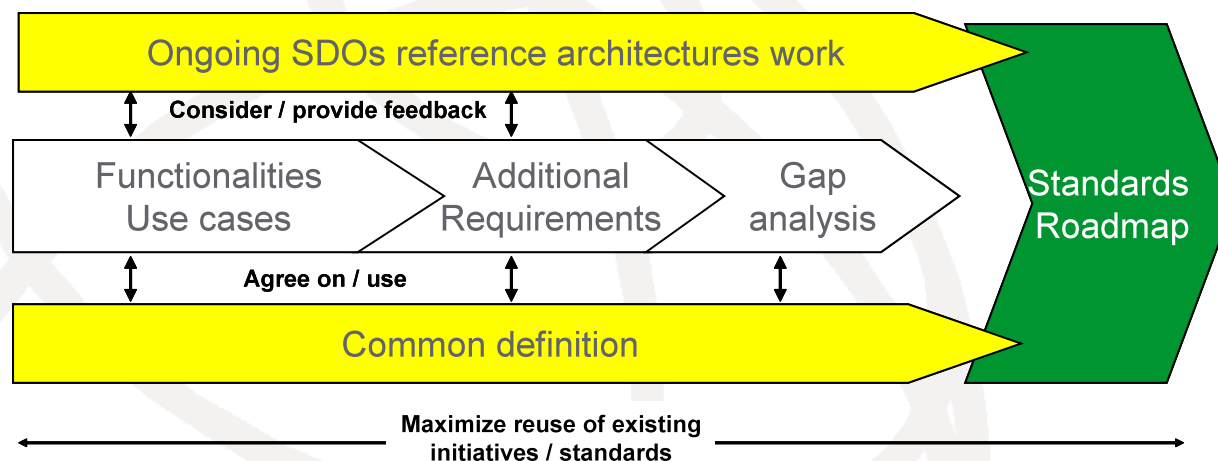
  Recommendations due Mid-2010

❑ Second document expected Jan. 2011; towards an EC Mandate

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EG1 view on Standards Roadmap

- Process for developing a standards roadmap

- Guiding principles
  - ➢ Reuse existing standards and learn from existing initiatives
  - ➢ Adhere and seek the development of international standards
  - ➢ Ensure and maximize collaboration and coordination among the different stakeholder organisations
  - ➢ Streamline and speed-up the development of European requirements for Smart Grids
  - ➢ Standardise applications enablers, but not applications

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EU M/411 Smart Metering Mandate

- **European Commission Mandate**
  - Issued in March 2009 by DG TREN
  - Sent to the 3 ESO's : CEN, CENELEC and ETSI

- **Main objective**
  - To build standards for European smart meters, allowing interoperability and Consumer actual consumption awareness

- **Time schedule :**
  - March 2009 + 9 months
    - state of the art of existing standards, gap analysis, and first Work Program
  - March 2009 + 30 months
    - Develop new smart metering standards

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M2M Application #1 Smart Metering

Wind Turbine

Solar Panel

Light

Appliances

Temperature

Breaker

Valves

Smart Water

Smart Gas

Smart Elec.

Home displays TV, Computer

In-Home Energy Display

Meters Coms

Wan Communication

Data Center

Gateway

•Consumption info
•Fault details
•Threshold management

•Remote Meter reading
•Consumption management
•Pricing info

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NIST and Smart Grids

- NIST (National Institute of Standards and Technology)
  - ➢ Provides the Coordination of Interoperability Standards in the USA
  - ➢ Adopted a three phase plan for Smart Grid Interoperability
  - ➢ Published NIST Framework and Roadmap, Release 1.0
- NIST has created a Smart Grid and Interoperability Panel (SGIP)
  - ➢ Not a Standards Developing Organization
  - ➢ Project Management of the production of the appropriate standards
  - ➢ 1600 Individual Members, 600 Organizations
  - ➢ Public Plenary Meetings
    - http://www.nist.gov/smartgrid/ and http://collaborate.nist.gov/twiki-sggrid

ITU Focus Group on Smart Grid

- CTO Group and Global Standards Collaboration (GSC) highlighted Smart Grid as priority area

- FG on Smart Grid will
  - Identify impacts on standards development
  - Investigate ITU-T study items
  - Familiarize ITU-T with emerging attributes of smart grid
  - Encourage collaboration between ITU-T membership and utilities/Smart Grid community

ITU FG Smart Grid Leadership

- Chairman
  - Les Brown (Lantiq, Germany)
- Vice Chairmen
  - Hyoungsoo Kim (Korea Telecom, Korea)
  - Haihua Li (MIIT, China)
  - Yoshito Sakurai (Hitachi, Japan)
  - David Su (NIST, USA)

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ITU FG Smart Grid Collaboration

- Focus on ITU-T strengths: ICT standardization

- Avoid duplication of effort

- ITU-T management in talks with NIST, IEEE, IEC...

- More than 25 related organizations invited to the first meeting

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ITU FG Smart Grid
First meeting

- Date: 14 – 16 June 2010
- Place: ITU, Geneva, Switzerland
- Further information:
  - www.itu.int/ITU-T/focusgroups/smart/
- Contact:
  - tsbfgsmart@itu.int

ITU FG Smart Grid
First meeting

- 48 people participated
- 27 input documents
- Participation from IEC, NIST/SGIP, IEEE-SA, ETSI and ZigBee Alliance with inputs
- Initial study issues list was created
- Will progress collaboration with relevant organizations including utility providers

Next meeting

- Date: 2 – 5 August 2010
- Place: ITU, Geneva, Switzerland
- Further information:
  - www.itu.int/ITU-T/focusgroups/smart/
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  - tsbfgsmart@itu.int

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