IEC-IEEE Smart Energy Standardization Coordination Workshop

Presentation on “European/Global Standards“

Mr. Dinesh Chand Sharma

Director – Standards & Public Policy (SESEI)

Outline

- Introduction
- Policy Initiatives
- Standardization
- Conclusion

Introduction

- EU framework and targets on climate and energy for 2030 are to reduce greenhouse gas emissions by 40% and increase the use of renewables to at least 27% by 2030
  - Smart grids and smart meters enable better management of energy networks and more efficient consumption.
- A study from December 2019 on deployment of smart meters in EU found out that:
  - nearly 225 million smart meters for electricity and 51 million for gas will be rolled out by 2024.
  - Which also means that by 2024, almost 77% of European consumers will have a smart meter for electricity and about 44% will have one for gas.
  - the cost of installing a smart meter in the EU is on an average between €180 and €200
  - on average, smart meters provide savings of €230 for gas and €270 for electricity per metering point (distributed amongst consumers, suppliers, distribution system operators, etc.) as well as an average energy saving of at least 2% and as high as 10% based on data coming from the pilot projects.
- EU Directives concerning common rules for the internal market for electricity and gas (**2009/72/EC** and **2009/73/EC**) and EU Directive on energy efficiency (**2012/27/EU**) requires Member States to ensure the implementation of 'intelligent metering systems' that shall assist the active participation of consumers in the energy market.

EU: Key Policy initiatives

- **EU strategy on energy system integration**
  - As part of the European Green Deal, and to encourage energy sector integration, the European Commission presented its EU strategy for energy system integration on 8th July 2020.
  - The strategy involves various existing and emerging technologies, processes and business models, such as ICT and digitalization, smart grids and meters.

- **Digitalising the energy system - EU action plan**
  - To further promote the digitalisation of the energy sector, European Commission will formally re-establish the existing Smart Grids Task Force (SGTF) and the group will be renamed as 'Smart Energy Expert Group' and it will have a greater responsibilities while involving all Member States and additional relevant stakeholders.
  - The Commission will also promote international cooperation, through joint research and innovation activities supported under Horizon Europe and build on existing experiences, such as the EU-India High-Level Platform on Smart Grids.

Standardization work

Smart Metering

- **Standardization Mandate: M/441, March 2009** on the development of open communication architecture for utility meters involving communication protocols enabling interoperability (smart metering).

- **Smart Meter Co-ordination Group (SMCG):** CEN, CENELEC, ETSI and European stakeholder representatives including consumers
  - M/441- 1st phase: CEN-CENELEC-ETSI TR 50572: 2011 'Functional reference architecture for communications in smart metering systems' published in December 2011
  - M/441- 2nd phase: European Standards containing harmonized solutions for additional meter functionalities within an interoperable framework finalised in December 2012 (Click here)
- SM-CG has released four reports from 2013 to 2016:
  - SM-CG - Privacy and Security approach – part I
  - SM-CG - Privacy and Security approach – part II
  - SM-CG - Privacy and Security approach – part III
  - SM-CG - Privacy and Security approach – part IV
  - SM-CG – Minimum Security Requirements for smart metering

- For more details, please click here:
  - https://www.etsi.org/technologies/internet-of-things/smart-metering
  - https://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/smart-grids-and-meters/smart-meters/

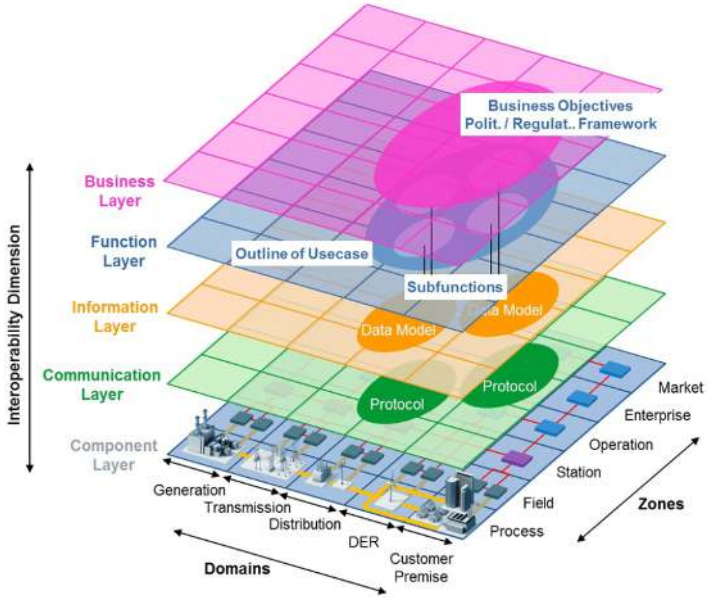
Smart Grids

- **Standardization Mandate: M/490, March 2011**
  - Develop a framework Reference architecture, Sustainable processes covering efficiency, interoperability, security, data protection and privacy, Set of consistent standards and work in Synch with Mandates M/441 (Smart Meter),M/468 (Charging of Electrical Vehicles) and other energy directives

- **CEN-CENELEC-ETSI Smart Grid Co-ordination Group (SG-CG) established in 2011**
  - In 2012, SG-CG produced the following reports: **Sustainable Processes**, **First Set of Consistent Standards**, **Reference Architecture**, **Information security and data privacy** and the Framework Document
  - In 2014 SG-CG produced the following reports and successfully completed the requirements of M/490: Extended Set of Standards support Smart Grids deployment ; Overview Methodology , General Market Model Development, Smart Grid Architecture Model User Manual and Flexibility Management ; Smart Grid Interoperability and its tool; Smart Grid Information Security.
  - SG-CG released following two reports to maintain transverse consistency and promote continuous innovation in the field of Smart Grids:
    - Smart Grid Set of Standards report 1
    - Smart Grid Set of Standards report 2

- In 2021, Smart Meters Coordination Group (SM-CG) and Smart Energy Grid Coordination Group (CG-SEG) were merged to the Coordination Group on Smart Grids (CG-SG)
- More info is available on below links:
  - https://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/smart-grids-and-meters/smart-grids/

Smart Grid Reference Architecture



Smart grid architecture model (SGAM) with interoperability layers.

The motivation for the creation and utilization of reference architectures can be to have a blueprint for the development of future systems and components, providing the possibility to identify gaps in a product portfolio. It can also be used to structure a certain Smart Grid domain and provide a foundation for communication about it to other domains which need to interoperate. Furthermore, it can be used to document decisions which have been taken during the development process of an infrastructure.

It must support the work of Smart Grids standardization over a long period of time:

- Be able to represent the current situation (principles of already realized tasks and reference architectures)
- Be able to map future concepts (migration and gap analysis)
- Address a common understanding of stakeholders
- Fulfill the demand for systematic coordination of Smart Grid standardization from an architectural perspective
- Provide a top-level perspective encompassing entire smart grid including endangerments to stability
- Be able to be represented using established and state-of-the-art System Engineering technology and methodologies (e.g. Usecase model, architecture elements and methods)
- Take into account standardization entities (regional, Europe, international)
- Be able to reflect European R&D and research projects (national, Europe, international)

Set of standards

Set of standards = Smart Grid users a selection guide which, depending on the targeted system and the targeted layer (component, communication or information layers) will set out the most appropriate standards to consider

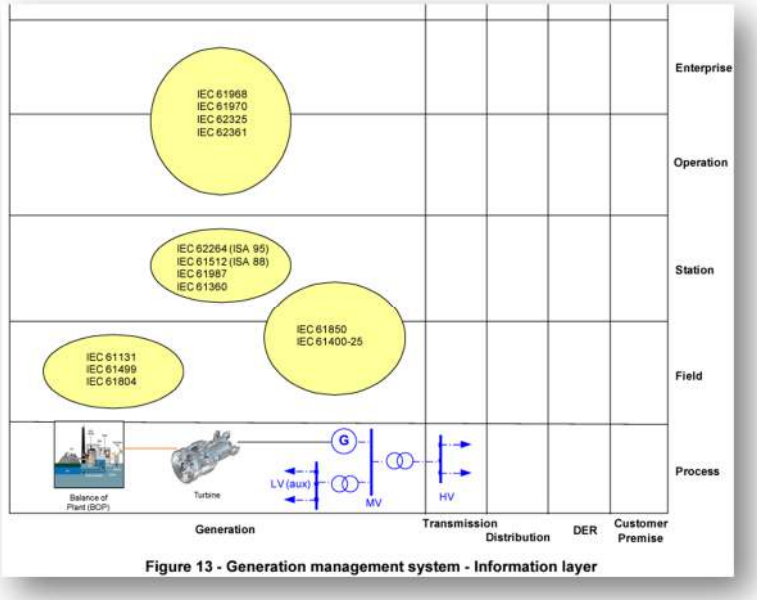


Figure 13 - Generation management system - Information layer

Table 14 - Generation management system - Available standards

Layer	Standard	Comments
Information	EN 61131	Programmable controllers
Information	EN 61499	Function Blocks
Information	IEC 61804	Function Blocks for process control
Information	IEC 62264	Enterprise-control system integration (ISA 95)
Information	IEC 61512	ISA 88
Information	IEC 61987	Industrial-process measurement and control - Data structures

Table 15 - Generation management system - Coming standards

Layer	Standard	Comments
Information	*EN 61968-1* *EN 61968-3* *EN 61968-11*	Application integration at electric utilities - System interfaces for distribution management
Information	*EN 61970-301* *EN 61970-302* *EN 61970-452* *EN 61970-453* *EN 61970-458* *EN 61970-502-8* *EN 61970-552*	Energy management system Application Program Interface for 61970
Information	*EN 62325-301* *EN 62325-451-1* *EN 62325-451-6*	CIM information model (Market profiles) – Refer to 8.7 for more details

SGAM was the base of other works: IEC, Industry 4.0 (RAMI)

Status

•Recent new structure of the CEN-CENELEC ETSI Smart Grid Coordination Group (SG-CG)

- Last plenary meeting: 2022-11-25

- Working Group: Clean Energy Package
  - Task: to ensure that the SG-CG supports the implementation of the European Commission proposals for new rules for consumer-centred clean energy transition → i.e. the Clean Energy for All Europeans package

- Working Group: Set of standards
  - Task: to update the list of Smart Grids standards gaps and rank these gaps based on stakeholders' priorities + to update the 'Set of standards' based on new inputs

- Working Group Smart Metering
  - Task: to provide a focal point for smart metering standardization in respect to the field of measuring instruments and for the development of an open architecture and advanced multi-utility metering infrastructure involving communication protocols enabling interoperability

- Working Group Privacy & Security
  - Task: monitor the work of European Commission group on Security & Privacy + check whether security and privacy matters are covered by standards + liaise with CEN-CENELEC JTC13 'Cybersecurity and Data Protection'

ETSI Technical Committees

- **ETSI TC for Access, Terminals, Transmission and Multiplexing (ATTM)**
  - Main ETSI entry point of ETSI participation in CEN/CENELEC/ETSI Smart Grids Coordination Group (CG-SG) with other ETSI TBs that indicated their interest to take part in CG-SG (TC SmartM2M, ISG OEU, TC EE, TC CYBER, ISG CIM, TC ERM, TC SET, TC MSG (3GPP).
- TC SET (Secure Element Technologies) core platform specification defining the interface between a UICC (universal integrated circuit card) and a terminal (TS 102 221) is also one of the mandated specifications for the smart meter work item of EC and EFTA (M/441).

- **ETSI TC SmartM2M**
  - focus on an application-independent 'horizontal' service platform with architecture capable of supporting a very wide range of services including Smart Metering, Smart Grids, eHealth, Smart Cities, consumer applications, car automation, Smart Applications (SAREF).
  - ETSI TS 103 410-1 V1.1.2 (2020-05): SmartM2M; Extension to SAREF; Part 1: Energy Domain
  - ETSI TS 103 410-1 V1.1.1 (2017-01): SmartM2M; Smart Appliances Extension to SAREF; Part 1: Energy Domain

Sustainability at ETSI - TC EE (Environmental Engineering)

TECHNICAL COMMITTEE (TC) ENVIRONMENTAL ENGINEERING (EE) Chair: Beniamino Gorini, Nokia

*Responsible for defining equipment engineering, bonding and grounding, power supply interface and **environmental aspects for telecommunication infrastructures and equipment**.*

TC EE develops standards for reducing the eco-environmental impact of ICT equipment. This includes:

- Life Cycle Assessment (LCA) of ICT goods, networks and services
- Methods to assess the energy efficiency of wireless access networks and equipment, core networks and wireline access equipment including Efficiency metrics/KPI definition for equipment and network
  - ES 203 199 “Life Cycle Assessment of ICT equipment, ICT network and service: General definition and common requirement”
  - Series of standards on “Infrastructure equipment control and monitoring system interface” (ES 202 336-x series of 12 parts)
  - ES 203 237 on “Green Abstraction Layer” (GAL)
  - ES 203 682 on “Green Abstraction Layer (GAL); Enhanced Interface for power management in Network Function Virtualisation (NFV) environments
- Network standby mode for household and office equipment
- Circular economy standard for ICT solutions
- Power feeding solutions based on higher DC voltage to reduce losses on the distribution cabling and innovative efficient storage solution

https://www.etsi.org/committee/ee

EU regulations, initiatives on energy efficiency of ICTs

- *Directive 2009/125/EC (21 October 2009) on eco-design and associated implementing measures*
  - *Framework defining the «rules» for setting product-specific requirements/ legislation on energy efficiency and further parameters.*
- *Implementing measures affecting ICTs*
  - *Simple set-top boxes regulation No 107/2009*
  - *External power supplies regulation No 278/2009*
  - *Televisions regulation No 642/2009*
  - *Standby and Off Modes regulation No 1275/2008 (17 December 2008)*
  - *Networked Standby regulation No 801/2013 (22 August 2013) amending regulation No 1275/2008*
  - *Servers and storage products 2019/424/EU*
- *Other initiatives:*
  - *Mandate 462 on Standardization in the field of ICT to enable efficient energy use in fixed and mobile information and communication networks*
    - *End-user equipment under the scope of directive 2009/125/EC are excluded*
    - *Addressed to improve the energy efficiency of the provider infrastructure to counterbalance the growth in telecommunications networks*
  - *Code of Conducts*
    - *Energy Consumption of Broadband Communication Equipment, Data Centres Energy Efficiency, Digital TV Services, Efficiency of External Power Supplies and AC Uninterruptible Power Systems*

Eco-design standards

- *Material efficiency (Mandate M/543)*
  - *Work is done in CEN/CENELEC JTC10 for the CEN/CENELEC deliverables*
  - *ETSI TC-EE for the ETSI WIs on ICT Network equipment*
    - *ETSI TR 103 476 V.1.1.2 Circular Economy (CE) in Information and Communication Technology (ICT); Definition of approaches, concepts and metrics*
    - *ETSI EN 303 808 "Specific metrics, methods and parameters for assessment of material and resource efficiency aspects of ICT network infrastructure goods in the context of circular economy"*
- *Server and Storage equipment (Mandate M/573; EU Regulation 2019/424)*
  - *DEN/EE-EEPS44 (EN 303 804) on new EN on "Energy efficiency metrics and measurement methods for storage equipment"*
  - *DEN/EE-EEPS47-2 (EN 303 800-2) on "secure data deletion functionality"*
  - *DEN/EE-EEPS47-3 (EN 303 800-3) on "availability of firmware and of security updates to firmware"*
  - *DEN/EE-EEPS47-4 (EN 303 800-4) on "critical raw materials"*
  - *DEN/EE-EEPS47-5 (EN 303 800-5) on "disassembly and disassembly instruction"*
  - *REN/EE-EEPS42 on revision of EN 303 470 "Energy Efficiency measurement methodology and metrics for servers"*

Energy Efficiency of ICT equipment/network

- *Wireline Broadband Access equipment: EN 303 215*
- *Wireless Broadband Access equipment: ES 202 706-1 for "Static method" and TS 102 706-1 for "Dynamic method"*
- *Customer Premises equipment: EN 301 575*
- *Core Network equipment: ES 201 554*
- *Transport equipment: ES 203 184*
- *Switching and Router equipment: ES 203 136*
- *Server equipment: EN 303 470*
- *Mobile networks: ES 203 228*
- *Network standby: EN 303 423*
- *Storage equipment: in preparation (EN 303 804)*
- *Network Function Virtualisation (NFV): EN 303 471 and ES 203 539*

Conclusion

- Digital and sustainable transformation of energy system across European Union (EU) is seen as essential to become independent on fossil fuels, tackle the climate crisis and ensure affordable access to energy.
  - **Digitalising the energy system - EU action plan** will help unlock the potential of digitalising the energy sector and important energy savings, benefitting all consumers."
- Standards play an important role in implementing smart grid and meter projects
  - standardization work will continue to cope with technical improvements and new technologies
- CEN-CENELEC-ETSI Smart Meters Coordination Group is pioneer for smart grid and metering standardization
- For Smart Energy, we shall also need to promote energy efficiency
  - Eco-design of the products
  - Interoperability to achieve economies of scale
  - Energy monitoring and management etc.

Dinesh Chand Sharma

(Seconded European Standardization Expert in India)

Director – Standardization & Public Policy

SESEI C/O EBTC, DLTA Complex, Gate No 3, 1st Floor, 1, Africa Avenue, New Delhi 110029

Mobile: +91 9810079461, **Tel:** +91 11 3352 1525,
dinesh.chand.sharma@sesei.eu

www.sesei.eu ⇔ **www.sesei.in**