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Smart Metering in EU and India: Market Dynamics, Regulation & Standards

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Outline

- EU Project SESEI
- In brief EU and India Scenario around Smart Meter
- EU and India: Key Directives, Regulation, Policy initiatives and Standardization
- Conclusion

Project is a permanent presence in India

SESEI (**S**econded **E**uropean **S**tandardization **E**xpert in **I**ndia) ***is a local face for the European standardization community in India: Dinesh Chand Sharma***

Why SESEI: India is a major trade partners for Europe, Increasing role of standards to gain market access and Evolving & complex nature of regulatory and standardization landscapes, sharing best practices, and work together on topics of mutual interest..

Priority Sectors/topics:

Digitization: Strategic technologies, digital governance, and digital connectivity

Smart Cities/Urban Development, ITS, Quantum Technologies, **Smart Grid/Meter**, Artificial Intelligence, 5G/6G, Open RAN, M2M/IoT (Cyber-Physical Systems), DECT, Data Privacy, Satellite Communication, Blockchain, Digital Signature, Smart Manufacturing, e-Accessibility, cybersecurity, digital skills, digital platforms including Research and Innovation etc.

Green & Clean technologies : Clean Energy, Energy Efficiency (Green ICT), Environment, Circular Economy including Resource Efficiency, Waste Management, Energy storage technologies, Electric mobility, Green Hydrogen, Advanced biofuels including R&I etc.

Other topics of mutual interests such as Rail, Ropeways, Machinery Safety etc.

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Smart Meter implementation scenario: EU & India

Europe

- EU 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 efficient consumption.
- According to a **study from December 2019** on deployment of smart meters in EU:
  - ✓ By 2030, investment in smart metering systems can reach an aggregated amount of €47 billion (if 266 million smart meters are installed, corresponding to a penetration of 92%).
  - ✓ It was estimated that the cost of installing a smart meter in EU is on average between €180 and €200
- According to EU Agency for Cooperation of Energy Regulators (ACER) **Market Monitoring Report**
  - ✓ 54% of European households had an electricity smart meter at the end of 2021, while in 13 EU countries, the penetration rate was over 80% at the end of 2022.

India

- India targets to reduce emissions intensity to 45% by 2030 from the 2005 level and achieve 500 GW of renewable energy installed capacity by 2030.
- India's Smart Meter Programme to enable approx. €17 billion investment in prepaid smart meter implementation over the next five fiscal years
- According to NSGM, approximately 222 million **smart consumer meters** have been sanctioned on a pan-India basis:
  - ✓ Only 12.6 million smart meters had been installed as of July 2024.

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Key Policy initiatives: EU & India 1(3)

Europe

- **Directive 2019/944 on Common Rules for the Internal Market for Electricity**:
  - ✓ Recognizes smart meters as essential tools for energy efficiency and consumer empowerment.
  - ✓ Emphasizes the need for interoperability and data protection in smart meter deployment.

- **Implementing Regulation (EU) 2023/1162**:
  - ✓ It aims to improve access to metering and consumption data by introducing requirements for interoperability and non-discriminatory access.
  - ✓ It maximizes the value of metering data, especially the high potential offered by fit-for-purpose smart meters
  - ✓ Recently, **guidance document** was published to support the streamlined reporting of national implementation of these rules.

- **Energy Efficiency Directive (EU/2023/1791):**
  - ✓ Requires Member States to ensure the security of smart meters and data communication, and the privacy of final customers for natural gas, in compliance with data protection and privacy law

India

- **India Smart Grid Forum (ISGF):**
  - ✓ Indian Government in 2011 established "ISGF", a public–private partnership, to accelerate electric grid modernization and energy transition in India.

- **Smart Grid Vision and Road map for India released by MoP** in 2013:
  - ✓ It offers a series of time-framed, specific, target driven measures, to enable the development of an Indian Smart grid model.
  - ✓ The roadmap covers the 12th, 13th, and 14th: Five year plan periods from 2012 to 2027.

- **UJWAL DISCOM ASSURANCE YOJANA (UDAY) 2015**:
  - ✓ Improve operational efficiency via ensuring compulsory smart metering, upgrading transformers and meters.

Key Policy initiatives: EU & India 2(3)

Europe

- **EU strategy on energy system integration**
  - ✓ As part of European Green Deal, and to encourage energy sector integration, European Commission presented its EU strategy for energy system integration on 8th July 2020.
  - ✓ It involves various existing and emerging technologies, processes and business models, such as ICT and digitalization, smart grids and smart meters.
- **Digitalizing the energy system - EU action plan**
  - ✓ To further promote the digitalization of energy sector, European Commission has formally re-established the existing Smart Grids Task Force (SGTF) and the group is renamed as 'Smart Energy Expert Group'
    - It will have a greater responsibilities while involving all Member States and additional relevant stakeholders.
- **Clean energy for all Europeans package**
  - ✓ It will help in transforming Europe's energy systems, while also maintaining a high level of security - reinforcing cybersecurity of digital transformation in energy sector.

India

- **Integrated Power Development Scheme (IPDS) 2015:**
  - ✓ strengthening of sub-transmission and distribution network, Metering, IT application etc. to reduce AT&C losses.
- **National Smart Grid Mission (NSGM), launched by MoP in 2015:**
  - ✓ It aims to accelerate Smart Grid deployment in India.
  - ✓ So far, 12 Smart Grid pilot projects were approved under NSGM, adopting the functionalities such as Advanced metering infrastructure, Peak Load Management, Cybersecurity, Distributed generation, Micro grid, Power quality measurement, Smart City Control Center, Smart homes, Advanced IT infrastructure, Renewable Energy Integration, EV with charging infra, Home energy management center, AMI (Smart Metering), Outage management system, Customer engagement social media for utility.

Key Policy initiatives: EU & India 3(3)

Europe

- **European Grid Action Plan**
  - Grid Action Plan presents a number of actions to ensure that cross-border and local European electricity grids will operate more efficiently and will be rolled out further and faster.

- **Delegated Act on the new Network Code on Cybersecurity for electricity sector**
  - It lays down sector-specific rules for cyber security aspects of cross-border electricity flows, including on common minimum requirements, planning, monitoring, reporting and crisis management.

India

- **Smart Meter National Program (SMNP)**
  - It is aiming to replace 250M conventional electricity meters with prepaid smart meters, along with upgrading infrastructure such as feeders and transformers.

- **CEA guidelines for cybersecurity in the power sector**
  - In October 2021, Power ministry and Central Authority of Electricity (CEA) have released the guidelines for cybersecurity in the power sector to be adhered by all Power Sector utilities to create cyber secure eco system.

Standardization work (Europe and India)

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Europe (ETSI/CEN/CENELEC)

- **CEN/CLC/ETSI/CG-SG: CEN-CENELEC-ETSI Coordination Group on Smart Grids (CG-SG)**
  - ✓ EU Standardization mandates (M/441 & M/490)
  - ✓ It promotes the deployment of open and interoperable data architectures, based on European/international standards.
  - ✓ The scope also Includes any standards needed to design, operate and maintain electrical grids securely and efficiently.

- **CLC/SR Smart Energy**
  - ✓ Standardization in the field of Smart Energy to provide systems level standardization, coordination and guidance in the areas of Smart Grid and Smart Energy, including interaction in the areas of Heat and Gas.

- **CLC/TC 57: Power systems management and associated information exchange**
  - ✓ Develops European standards, in collaboration with the IEC, for power systems control equipment and systems including EMS, SCADA

India (BIS)

- **ETD-13: Equipment for Electrical Energy Measurement and Load Control (Smart Meter):**
  - ✓ Standards for equipment for electrical energy measurement, tariff - and load control, customer information, payment, local and/or remote data exchange, using electromechanical and/or electronic, technologies for applications ranging from electrical energy generation to residential. It is mirroring technical committee of IEC TC-13 (P): Electrical energy measurement and control.
    - **IS 15959 (Part 2 and Part 3):** Data exchange for electricity meter reading tarif and load control - Companion specification
    - IS 16444: 2015: AC static direct connected watthour smart meter class 1 and 2 – Specification

- **ETD 46: Grid Integration:**
  - ✓ Standards in the field of Grid Integration comprising of LT (ON Grid, Off Grid and Hybrid with and without storage), HT and EHT for all capacities.

Europe (ETSI/CEN/CENELEC)

- **ETSI TC SET (Secure Element Technologies)** responsible for core platform specification and defining the interface between a UICC (universal integrated circuit card) and a terminal (TS 102 221)
  - ✓ 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 V1.2.1 (2023-11): SmartM2M; Extension to SAREF; Part 1: Energy Domain
  - ✓ ETSI TS 103 410-12 V1.1.1 (2023-11): SmartM2M; Extension to SAREF; Part 12: Smart Grid Domain
  - ✓ ETSI TR 103 904 V1.1.1 (2023-04)*:* SmartM2M; SAREF extension investigation Requirements for the Smart Grid domain

India (BIS)

- **ETD 50: LVDC Power Distribution Systems:**
  - ✓ Standards for: a) LVDC System Requirements, Safety and Installation Guidelines b) LVDC products including electrical wiring accessories and Applications c) Integration of DC Infrastructure d) Non-Traditional Distribution Networks/**Microgrids.**

- **LITD 10: Power system Control and associated Communications:**
  - ✓ Standards relating to: a) Power system control equipment and systems including EMS (Energy Management System) b) DMS (Distribution Management System) c) SCADA (Supervisory Control and Data Acquisition) d) Distribution automation, Smart Grid, tele-protection and associated communications used in planning, operation and maintenance of power systems.
    - IS/IEC 62488-1: 2012: Power line communication systems for power utility applications Part 1: Planning of analogue and digital power line carrier systems operating over EHVHVMV electricity grids.

EU-India Partnership

EU-India Clean Energy and Climate Partnership, established in 2016:

- To guide the energy and climate policy dialogue between both regions and to support joint projects and research.
- To promote access to and dissemination of clean energy and climate-friendly technologies and it encourages research and development of innovative solutions.
- Current areas of collaboration includes activities in offshore wind energy, rooftop solar and solar parks, integration of renewable energy and storage, **smart grids**, biofuels and energy efficiency in buildings.

EU-India Trade and Technology council, established in Feb 2023:

- Three working groups:
  - ✓ WG-01: Strategic technologies, digital governance and digital connectivity
  - ✓ **WG-02: Green & clean energy technologies**
    - In synergy with the EU-India Clean Energy and Climate Partnership, the Green & Clean energy technologies Working Group will focus on green technologies, including investments and standards, with an emphasis on research and innovation.
  - ✓ WG-03: Trade, investment and resilient value chains

Conclusion

- Standards play an important role in implementing smart grid and meter projects and interoperability.
  - Standardization work will continue to cope with technical improvements and new technologies
- Digital and sustainable transformation of energy system across European Union (EU) and India is seen as essential to become independent on fossil fuels, tackle the climate crisis and ensure affordable access to energy.
- For Smart Energy, Energy efficiency is also an integral part hence:
  - ✓ Energy monitoring and management etc.
  - ✓ Eco-design of the products
  - ✓ Interoperability to achieve economies of scale
- EU and India cooperation continues through various instruments such as Horizon Europe, TTC, SESEI and is ready to build further on existing experiences, such as the EU-India High-Level Platform on Smart Grids.

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