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India SMART UTILITY Week 2025

9th IEC - IEEE SMART ENERGY STANDARDIZATION COORDINATION WORKSHOP (IN COLLABORATION WITH BIS, IEC AND IEEE)

Session : Emerging Smart Energy Technologies and Standardization Landscape

(EU Policies, Regulations and Standards on Smart Energy)

Presented By

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EU Project SESEI

Project is a local presence in India



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SESEI (Seconded European Standardization Expert in India)
is a local face for the European standardization community in India: Dinesh Chand Sharma



CENELEC

ETSI



EFTA

Why SESEI: India is a major trade partners for EU/EFTA, Increasing role of standards to gain market access, evolving & complex nature of regulatory and standardization landscapes, sharing best practices, and work together as partners

Priority Sectors/topics: Aligned with EU-INDIA TTC, Connectivity Partnership

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.

www.sesei.eu , www.sesei.in

CEN, CENELEC and ETSI are three officially recognised European Standards Organizations ([Regulation EU 1025/2012](#))



Standardization in various
business sectors



Standardization in the
Electrotechnology sector



Telecommunications,
broadcasting and other electronic
communications networks and
services

1 standard in 34 different countries



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Slovenia



Belgium



Estonia



Hungary



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Spain



Sweden



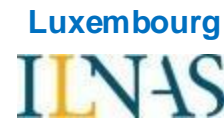
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Switzerland



Croatia



Cyprus



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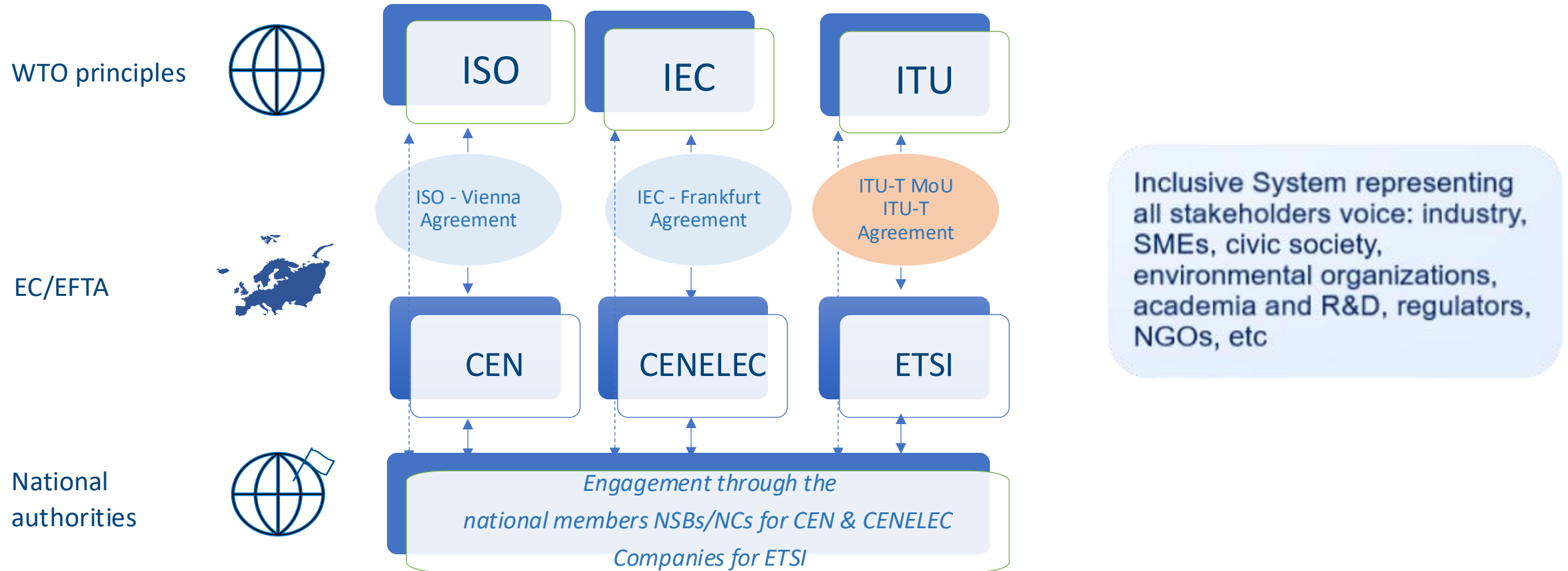


A coherent and inclusive system



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Smart Energy: EU Policies/Regulations/Directives

EU Directives concerning common rules for the **internal market for electricity and gas**

- [2019/944/EC](#) for electricity and [2019/692/EC](#) for gas

Energy performance in buildings:

- [Energy Performance of Buildings Directive \(EU 2024/1275\)](#): aiming to promote the improvement of the energy performance of buildings within European Union

Renewable energy:

- [Renewable Energy Directive](#) (amendment [EU/2023/2413](#)), sets an overall renewable energy target of at least 42.5% binding at EU level by 2030 - but aiming for 45%.

Energy efficiency:

- [Directive on Energy Efficiency](#) (EU) 2023/1791, establishing an EU legally-binding target to reduce the EU's final energy consumption by 11.7% by 2030

- **Clean Energy for All Europeans package, 2019**

- ✓ It includes regulations on energy efficiency, renewable energy, and the design of the electricity market, promoting the integration of smart technologies

- **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
- ✓ Strategy involves various existing and emerging technologies, processes and business models, such as ICT and digitalization, smart grids and smart meters

- **EU Action Plan for Grids**

- ✓ Aims to address the missing links of clean energy transition and to ensure that EU grids operate more efficiently and are rolled out further and faster

- **Digitalising the energy system - EU action plan, 2022**

- ✓ It aims at effectively promoting investments in smart grids.

- **Fit for 55 Delivering the European Green Deal**

- ✓ Strategy sets a 55% reduction target in net EU greenhouse gas emissions compared to 1990 and increased EU-level target for the share of renewable energy consumed in the EU to at least 40% with a clause for a possible upwards revision.

- With [Green Deal Industrial Plan](#) and [Net-Zero Act](#), Europe is setting a clear framework to scale up the manufacturing of clean technologies and ensure it is well equipped for the transition to climate neutrality.

- **EU strategy on hydrogen** was adopted in 2020 and it suggested policy action points in 5 areas: **support investment; support production and demand; creating a hydrogen market and infrastructure; research and development and international cooperation.**
- **European Clean Hydrogen Alliance** was launched alongside the EU hydrogen strategy in 2020 as part of the new industrial strategy for the EU.
 - ✓ It brings together industry, national and local authorities, civil society and other stakeholders.
- Hydrogen is also an important part of the **EU strategy on energy system integration**
 - ✓ https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en
- **Clean Hydrogen Partnership** was established in November 2021 to support R&I in hydrogen ecosystem.
- **RePowerEU communication** in March 2022 calls for an EU production target of 10 million tons of **clean hydrogen** along with 10 million tons of imported clean hydrogen by 2030.
- **Fit for 55 package** also put forward several legislative proposals that translate the European hydrogen strategy into concrete European hydrogen policy framework.
- The policy framework was completed with 2 delegated acts, adopted on 20 June 2023, applicable to **renewable hydrogen** under **Renewable Energy Directive**.
 - The first one covers renewable fuels of non-biological origin (RFNBOs) and sets the criteria for products that fall under the 'renewable hydrogen' category.
 - The other one puts forward a detailed scheme to calculate the life-cycle emissions of renewable hydrogen and recycled carbon fuels to meet the greenhouse gas emission reduction threshold set in the directive.

Smart Energy: EU Standardization

- **To support and accelerate rollout of smart energy grid solutions, the Commission issued to ESOs**
 - **M/441** mandate for **smart meters** and **M/490** for **smart grids**, in 2009 and 2011 respectively.
 - Mandates were successfully completed by experts of relevant Coordination Groups (SM-CG and SG-CG) who delivered a number of pertinent deliverables and standards. (<https://www.cenelec.eu/areas-of-work/cen-cenelec-topics/smart-grids-and-meters/smart-grids/>)
- In January 2021, these Groups were merged into **CEN-CENELEC-ETSI Coordination Group on Smart Grids (CG-SG)**:
 - CG-SG advises on European standardization requirements relating to smart electrical grid and multi-commodity smart metering standardization
 - CG SG maintains liaisons with European Commission, European Energy Associations and initiatives, as well as with national and international standardization organizations.
- **CG-SG Stakeholders:**
 - Involvement of Technical Committees e.g. CLC/TC 8X, CLC/TC 57, CLC/TC 13 (smart-meters), CLC/ TC 205 (interoperability in the smart-home), ETSI TC ATTU etc.
 - Active contribution of regional standardization bodies from:
 - **India (BIS)**, Japan (JISC), US (SGIP), Canada (SCC), Africa (AFSEC) etc.
 - Close link with IEC System Committee on Smart Energy

Outcome of huge work of SM-CG & SG-CG:

- **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 following 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](#)
- **Smart Grid Co-ordination Group (SG-CG)**
 - ✓ 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 in support of 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 also 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](#)
- All reports are available on CEN-CENELEC website: <https://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/smart-grids-and-meters/smart-grids/>

- **COG Smart Grids:** Work on standards that facilitate management of flexibility (Demand Response) and integration of new usages of electricity in line with European regulations and more generally emergence of “all-electric society”
- **CENELEC BTWG 176-3 All Electric Society (AES):** created to explore the challenges and opportunities of Europe’s electrical transition. Its main tasks include merging the All-Electric Society initiative with the Smart Grid Coordination Group to address overlapping topics and developing a proposal for the terms of reference for a new coordination group in collaboration with stakeholders..
- **BTWG 176-3 All-Electric Society (AES) will be transformed into a Coordination Group as of 07-2025:** coordinate standardization activities on AES, including Smart Grids and Smart Metering, provide recommendations for the **SReq, ICT Rolling Plan, and technical boards** while reporting progress to the EC/EFTA, review and discuss European Commission activities related to AES, align efforts among CEN, CENELEC, and ETSI to support European **decarbonization goals**.
 - The COG facilitates information exchange, identifies standardization gaps, and **integrates international initiatives**. It ensures information exchange and **coordinates standardization gap analysis and work programs with international and regional activities**: group will ensure alignment with IEC/SG 14

CEN-CENELEC TCs on energy infrastructure



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Photovoltaic

CLC/TC 82 'Solar photovoltaic energy systems'
CLC/SR 117 'Solar thermal electric plants'
CEN/TC 312 'Thermal solar systems and components'

Wind

CLC/TC 88 'Wind turbines'

Gas infrastructure

CEN/TC 234 'Gas infrastructure'

Power generation

CLC/TC 8X 'Systems aspects for electrical energy supply'
CLC/TC 82 'Solar photovoltaic energy systems'

Hydrogen infrastructure

CEN-CLC/JTC 6 'Hydrogen in energy systems'
CEN/TC 234 'Gas infrastructure'
CEN/TC 268 'Cryogenic vessels and specific hydrogen technologies applications'

IoT

CLC/TC 65X 'Industrial-process measurement, control and automation'
CEN-CLC/JTC 19 'Blockchain and Distributed Ledger Technologies'
CEN-CLC/JTC 13 'Cybersecurity and Data Protection'
CLC/TC 205 'Home and Building Electronic Systems (HBES)'

Transmission Grid

CLC/TC 95X 'Measuring relays and protection equipment'
CLC/TC 57 'Power systems management and associated information exchange'
CLC/TC 22X 'Power electronics'
CLC/TC 8X 'System aspects of electrical energy supply'

Distribution Grid

CLC/TC 95X 'Measuring relays and protection equipment'
CLC/TC 57 'Power systems management and associated information exchange'
CLC/TC 8X 'System aspects of electrical energy supply'
CLC/TC 22X 'Power electronics'



HV Elec Equipment

CLC/TC 17AC 'TC 17 'Switchgear and controlgear'
CLC/TC 20 'Electric cables'
CLC/SR 36 'Insulators'
CLC/TC 99X 'Power installations exceeding 1 kV a.c. (1,5 kV d.c.)'

MV Elec Equipment

CLC/TC121A 'Low-voltage switchgear and controlgear'
CLC/TC 85X 'Measuring equipment for electrical and electromagnetic quantities'
CLC/SR 121B 'Low-voltage switchgear and controlgear assemblies'
CLC/TC 20 'Electric Cables'

LV Elec Equipment

CLC/TC121A 'Low-voltage switchgear and controlgear'
CLC/TC 85X 'Measuring equipment for electrical and electromagnetic quantities'
CLC/SR 121B 'Low-voltage switchgear and controlgear assemblies'
CLC/TC 20 'Electric Cables'

Lift

CEN/TC 10 'Lifts, escalators and moving walks'

HeatPumps

CEN/TC 109 'Central heating boilers using gaseous fuels'
CEN/TC 113 'Heat pumps and air conditioning units'
CEN/TC 182 'Refrigerating systems, safety and environmental requirements'

EV Charger

CLC/TC 69X 'Electrical systems for electric road vehicles'
CEN/TC 301 'Road vehicles'
CLC/TC 23H 'Plugs, Socket-outlets and Couplers for industrial and similar applications, and for Electric Vehicles'

Building

CEN/TC 89 'Thermal performance of buildings and building components'
CEN/TC 371 'Energy performance of buildings'
CLC/TC 205 'Home and Building Electronic Systems (HBES)'
CLC/TC 219 'Mains communicating systems'

Bi directional relationship

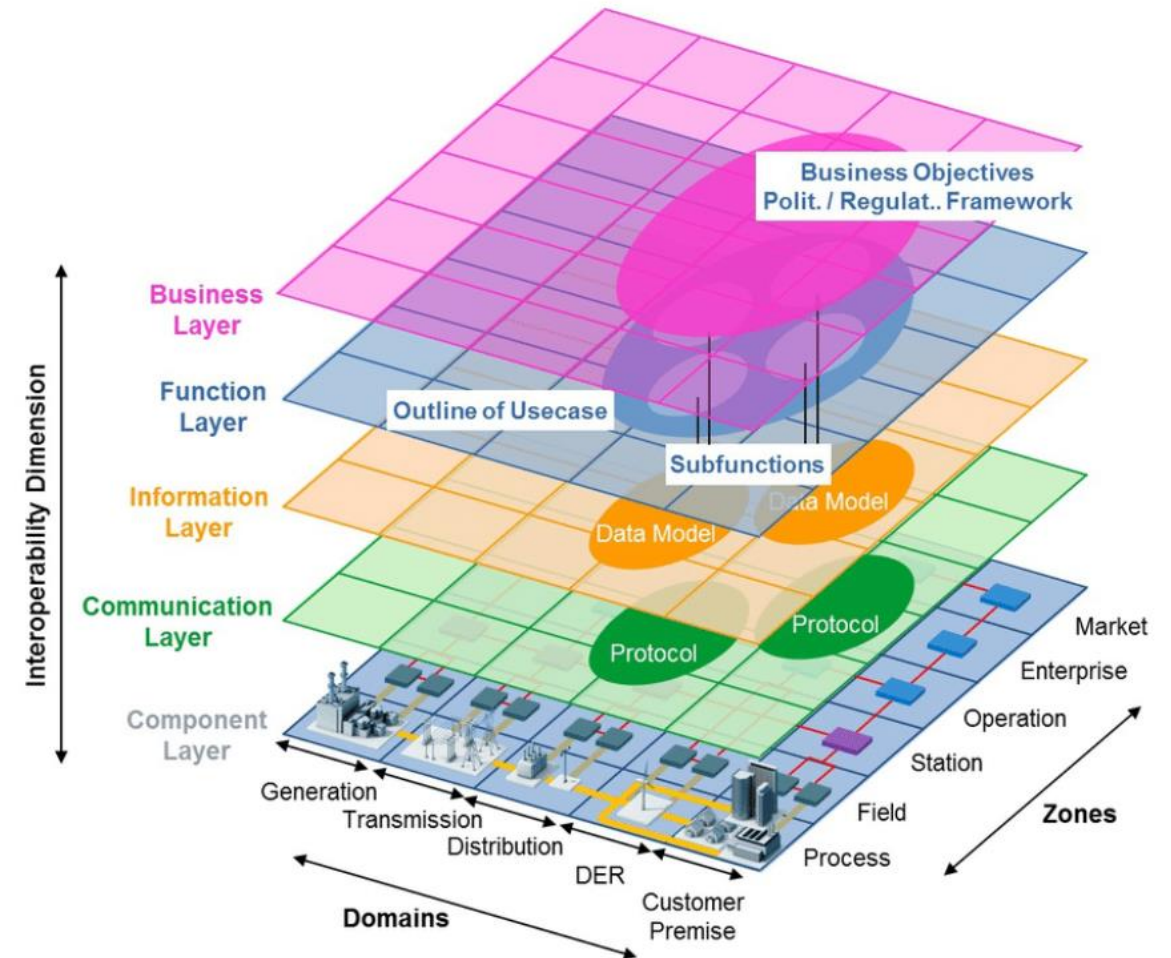
Smart Grid Architecture Model



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CEN and CENELEC were at the forefront of the development of standards allowing the deployment of smart grids in Europe (development of Smart Grid Architecture Model – SGAM).



Smart grid architecture model (SGAM) with interoperability layers.

CLC/TC 57 ‘Power systems management and associated information exchange’ - work focuses on European specificities, including CIM data models needed for the functioning of markets and access to consumption and production data

- **EN IEC 61850** ‘Communication networks and systems for power utility automation’ pave the way for the use of a variety of digital technologies relating to smart energy and the integration of renewable energies and distributed energy resources (DERs) within the electrical network
- All work of IEC/TC 57 is also closely monitored e.g. work on virtualisation, Management System, configuration language and integration of DER.
- Important links with the standardisation of smart meters and the development of smart charging are also the subject of attention

- **ETSI TC for Access, Terminals, Transmission and Multiplexing (ATTM)**

- ✓ Main ETSI entry point of ETSI participation in **CEN/CENELEC/ETSI Smart Grids/Energy 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)).

- **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 V2.1.1 \(2024-07\)](#): 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

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

EU-India partnership on Smart and sustainable urbanization:

- Under [EU-India partnership on smart and sustainable urbanisation](#), EU provides support to Indian cities to develop plans for sustainable development, transport, industry, water and waste management and has established city-to-city cooperation between European and Indian cities.
- EU is also providing support to Indian cities to join [Global Covenant of Mayors](#) (GCoM) for climate and energy.
 - The largest global alliance for city climate leadership across the globe, built upon the commitment of over 12,500 cities and local governments and these cities hail from 6 continents and 144 countries and In total, they represent more than 1 billion people.

- Digital and sustainable transformation of energy system across European Union (EU) is seen as essential to become independent of 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 help achieving the energy savings benefitting all consumers.
- **Standards** play an important role in implementing **Smart Energy (smart grid and meter) and All Electric Society** projects
 - ✓ Standardization work will continue to cope with the technical challenges, advancement and introduction of new emerging technologies but together we can address them efficiently.
- **CEN-CENELEC-ETSI Coordination Group** is pioneer for smart grid and metering standardization and now All Electric Society.
- 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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For discussions/suggestions/queries email: isuw@isuw.in

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Links/References (If any)