

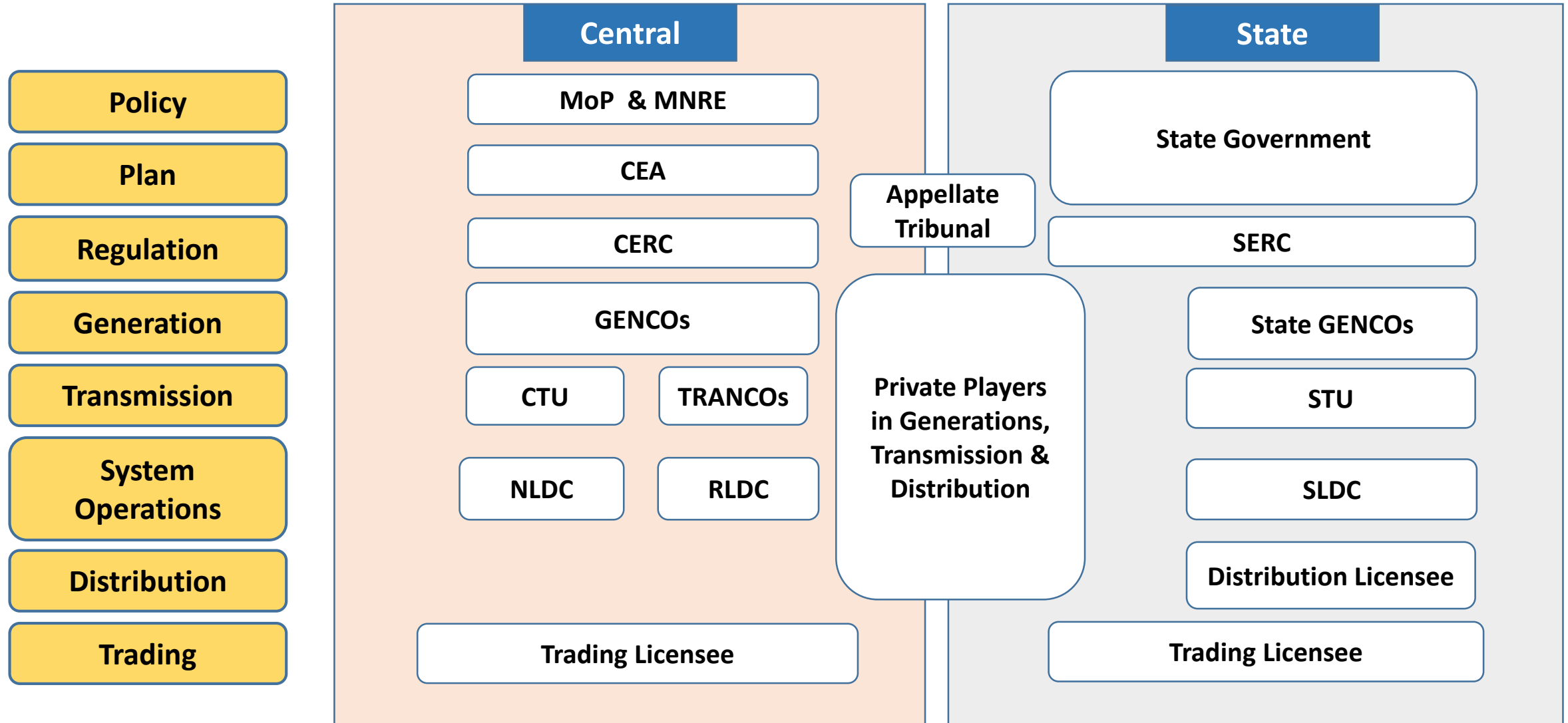
India Smart Grid Institutional Journey

IEA Indonesia Smart Grid Workshop February 26th 2021

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Institutional framework – Power Sector (Grid)



Digitization Historical Initiatives

Digitization has been primarily through Central Initiatives Public Utilities

- Asset & Operation management – GENCOs
- Transmission by Grid Operation Requirements → CTU
 - Unified load dispatch and communication (ULDC) Scheme 1998-2008 > 1500 (now 3500) RTUs and > 30 RLDC/SLDC

Power Exchange and attended data for Market (Exchange) 2008-onward

Digitization in distribution sector was optimization driven and gained momentum with schemes like APDRP, RAPDRP, IPDS.

• GIS	State → 16	DISCOM → 22		
• ERP	23	39		
• IT	24	→ 46	Towns → 1588	
• RT-DAS	21	→ 35	1643	S/S → 3936
• SCADA	20	→ 37	Towns → 59	

One nation-One Grid initiative
Situation Awareness (SA)
Requirement

- URTDSM (2013-2016): Phasor Measurement Units (>1800 PMUs)
 - State/ Regional and National Operator
 - Enhance RE awareness REMC (2015 -18) →
 - Whether Forecast and RE footprint

Smart Grid – Early Institutional Initiative

- Ministry of Power (MoP) had taken early steps in **2010**

India Smart Grid Task Force

Inter-ministerial group created under MoP, Govt of India to provide policy direction to the Smart Grid initiatives in the country.

India Smart Grid Forum

Non-profit voluntary consortium of public and private stakeholders with prime objective of accelerating development of Smart Grid technologies in Indian Power Sector.

Other Institutions Supporting Smart Grid

CEA – Technical Regulation
BIS – Standard development
CPRI – Testing & Training
BEE, EESL - EV & EE Implementation

CPSUs REC, PFC, POWERGRID - Project Management & Consultancy

Vision and Mission

Vision

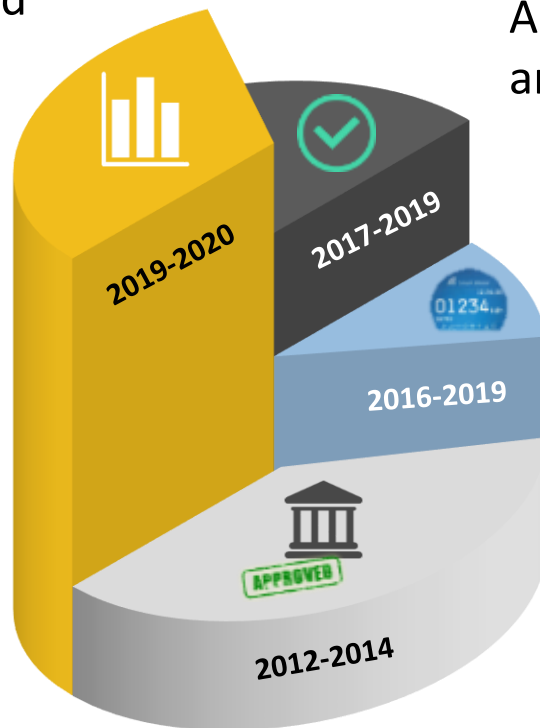
“Transform the Indian power sector into a secure, adaptive, sustainable and digitally enabled ecosystem that provides reliable and quality energy for all with active participation of stakeholders”

Mission

“Enable on-demand access and availability of affordable, reliable quality power for all with optimal mix of conventional and renewable energy (RE) sources.”

Smart Grid Pilot Projects

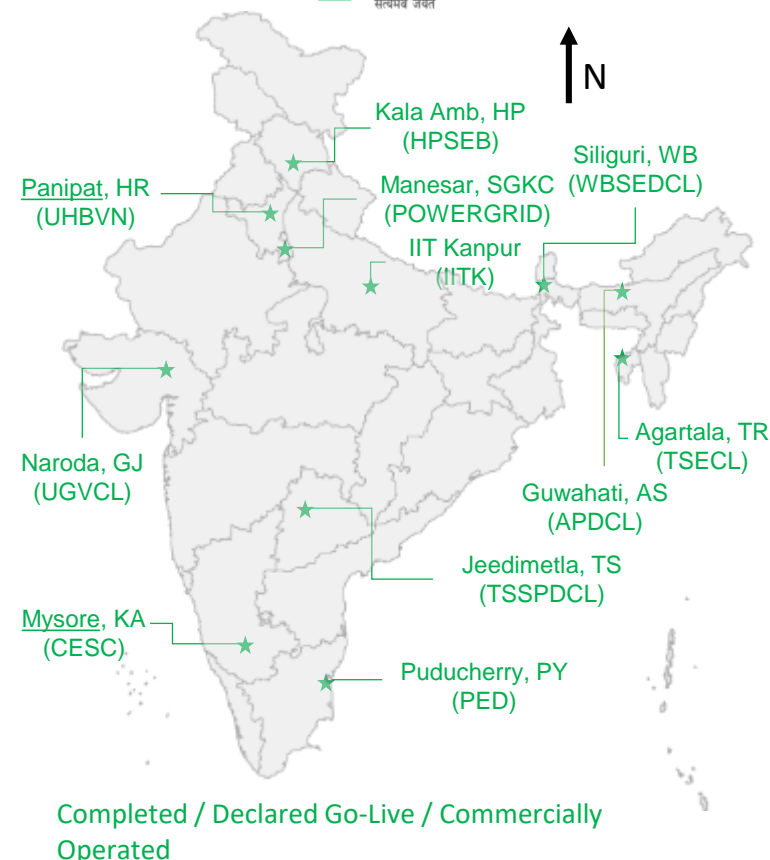
Impact Assessment
Completed



All Pilots completed and
are operational

1.56 lakh Smart
Meters installed

11 pilots including
SGKC



Completed / Declared Go-Live / Commercially
Operated

Map not-to-scale. Source: MEA

- New generation communication technology with improved performance based on RF mesh developed as an evolution of Technology deployed at CESC, Mysore
- Two new product (Smart Meter) developed & deployed
- Developed Products Sustainability especially in International Cooperation – Panipat Pilot Experience

ISGAN

International Smart Grid Action Network

Created under the auspices of:



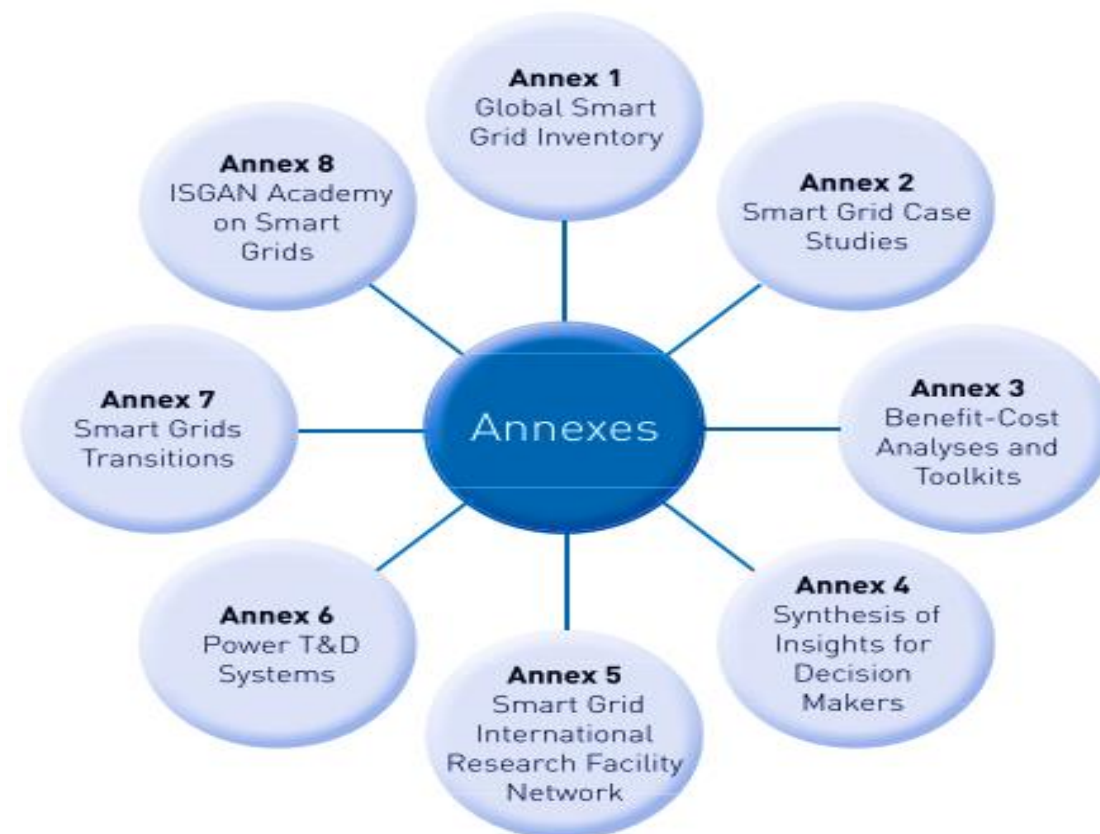
The Implementing
Agreement for a Co-
operative Programme on
Smart Grids



An initiative of the
Clean Energy
Ministerial (CEM)

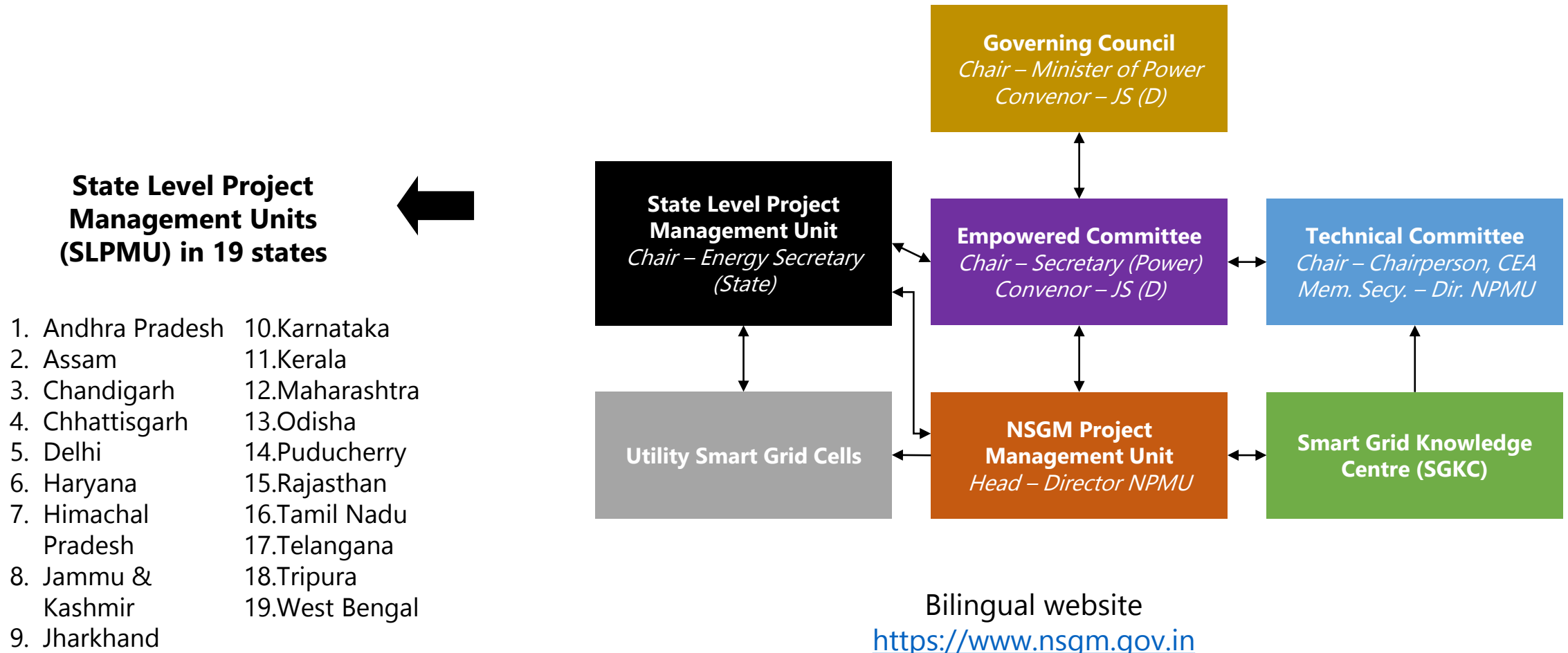
***International Smart Grid Action Network is
the only global government-to-
government forum on smart grids.***

- India - one of the founding members of ISGAN - being represented by Joint Secretary (Distribution), Ministry of Power as primary member. Director NPMU is the alternate member and has also been the Vice-Chair of ISGAN Presidium.



National Smart Grid Mission

NSGM was established in 2015 with following institutional framework:



NSGM Institutional Structure

NSGM Governing Council

Chair – Minister of Power

Objectives

- NSGM policies
- NSGM targets & programs
- NSGM funds
- Program review

NSGM Empowered Committee

Chair – Secretary (Power)

Objectives

- Policy inputs to Governing Council
- Project approvals / revisions / modifications
- Approvals for procedures / guidelines including recruitment, hiring of consultants / experts / advisors
- Program monitoring

NSGM Technical Committee

Chair – Chairperson, CEA

Objectives

- Standard development, selection and guidelines
- Technology selection guidelines
- Technical review of projects / activities / documents
- Guidelines and procedures for training and capacity building

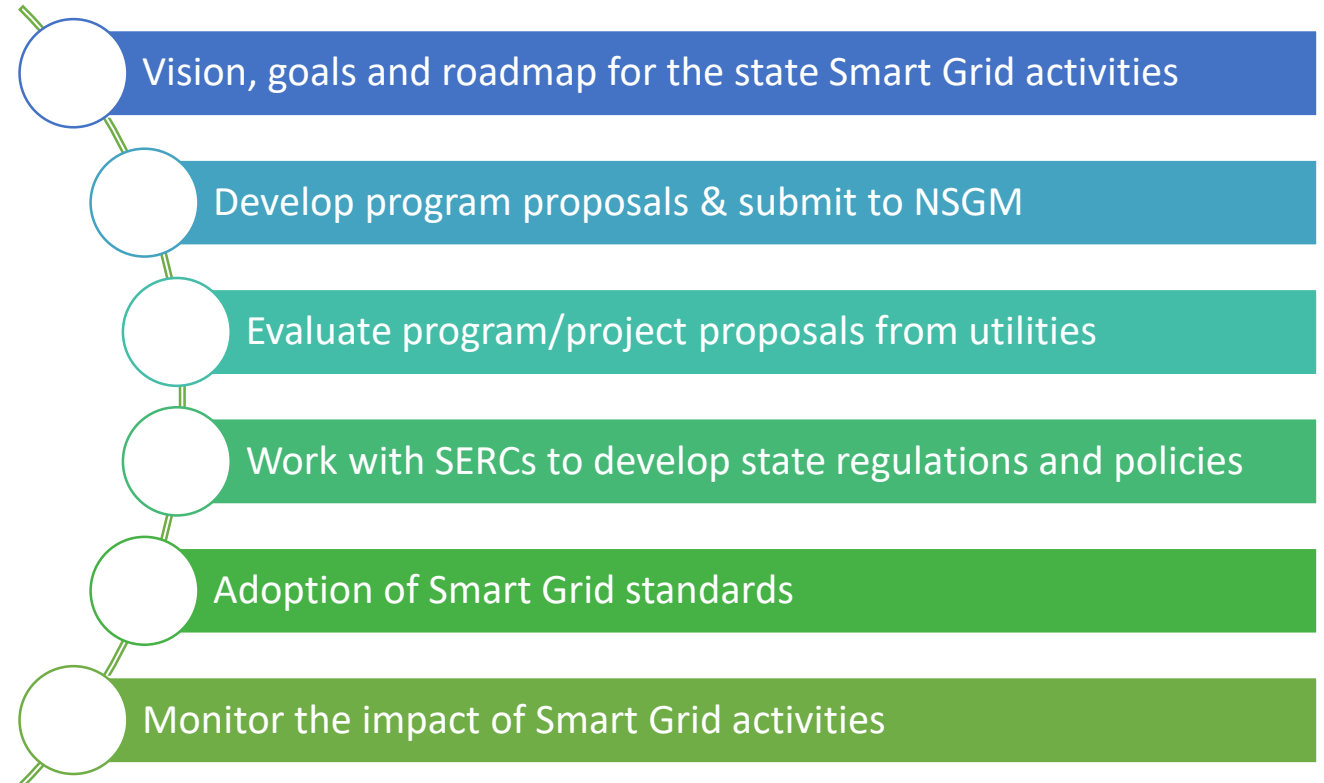
NSGM Institutional Structure

**NSGM Project
Management Unit**
Head – Director NPMU

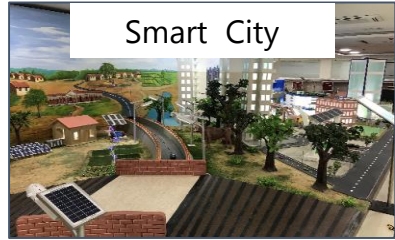
NPMU is the implementing agency for operationalizing the Smart Grid activities in the country under the guidance of Governing Council and Empowered Committee.

Erstwhile India Smart Grid Task Force (ISGTF) Sectt. was subsumed into NPMU. Since then, NPMU had been monitoring the ISGTF/MoP sanctioned Smart Grid Pilot Projects.

Role of SLPMU



SGKC – Existing Functionalities



Smart City



Micro Grid & Grid
Connected RE



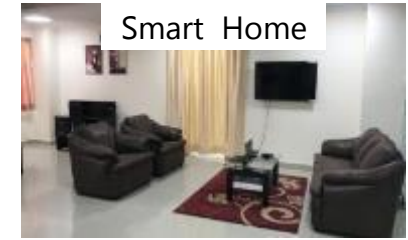
AMI



OMS



Power Quality



Smart Home

- Inauguration →
- 19th Sept 2018



US delegation & USAID
Jun 2019 &
Aug'2019
SARI Jan 2020



Periodic Residential
Trainings
140 Execs, 6 Batches

Framework

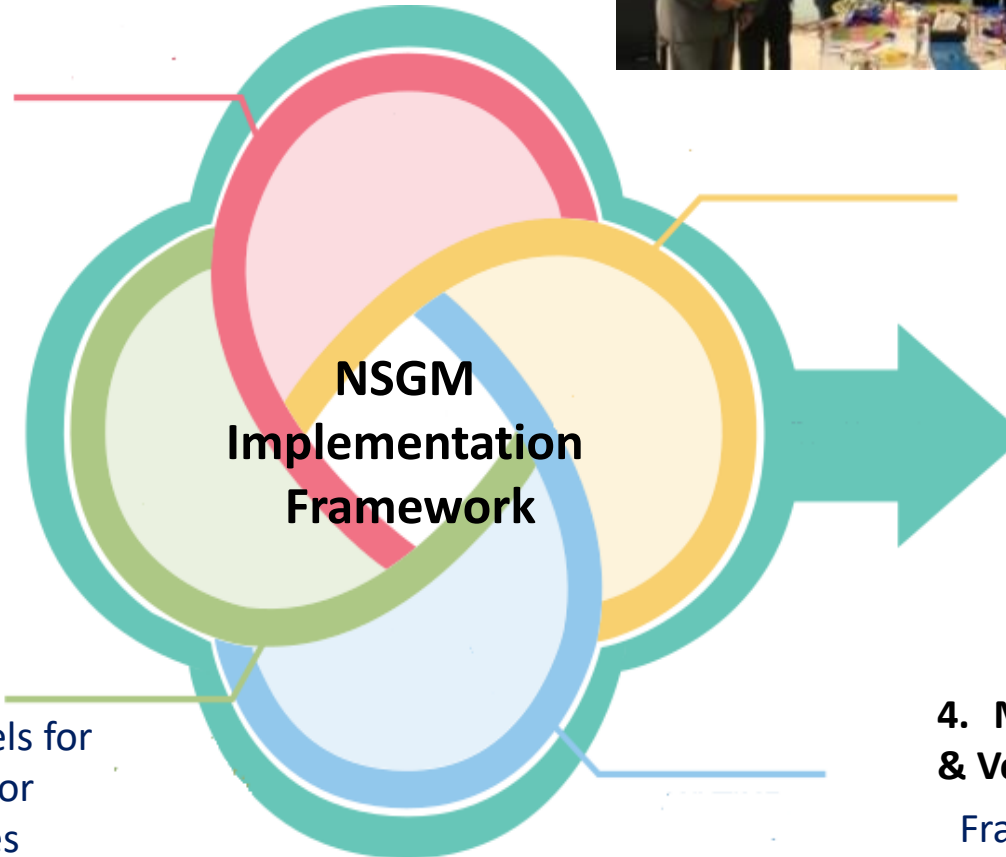


2. Standards and Policy Framework

Policies for SmartGrid project implementation
Standards required for IT and OT for SmartGrid

3. Business Models

Different business models for catalyzing investments for SmartGrid functionalities



1. Vision and Institutional Structure

- SmartGrid rollout goals
- Institutional structure and 4 NPMU Units
- Role of centre and states in NSGM governance structure
- Operational budget

4. Measurement, Reporting & Verification Framework

Framework for effectively monitoring the progress of NSGM goals

NSGM Goals

Access to affordable and quality power

- Aligning with the objectives of GoI
- Better power quality measurement and management
- Development of micro grids
- SAIDI/SAIFI indices Improvement

Reduction in AT&C losses to single digit

- Smart metering and AMI deployment
- Integrated communication and IT infrastructure

Better peak load and outage management

- Dynamic tariffs and incentives, peak load shifting
- Better asset management and proactive measures
- Demand Response programs and Demand Side Management

Proliferation for EV and charging infrastructure

- Policies for facilitation of EV charging infrastructure

Journey so Far

To assess technology maturity 11 smart grid pilot projects have been implemented across India, more than 150,000 smart meters have been installed

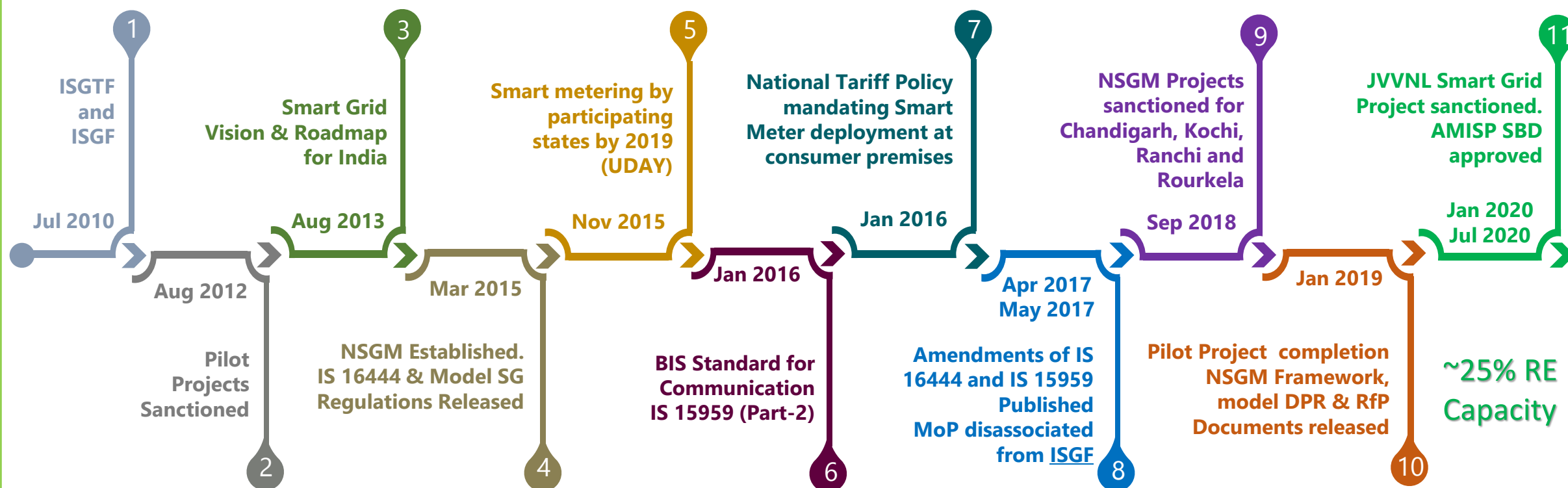
- New generation communication technology with improved performance based on RF mesh developed
- Successful demonstration of PLC technology for smart metering
- Benefits showcased were- loss reduction, faster revenue realization, **RE integration**, faster outage detection & restoration and **peak load** shaving etc.

In 2017, Energy Efficiency Services Ltd. (EESL) entered the AMI landscape to bring down the smart meter costs through demand aggregation and bulk procurement.

- As of Jan'2021, EESL has deployed ~ 1.5 Million Smart Meters and portfolio of 8 Million SM – Business Model Success

21 Smart Meter Mfr are Certified by BIS for 1p & 3p whole current smart meters. Whereas, 9 manufacturers have been certified for 3p CT/PT operated smart meters.

Smart Grid – Historical Perspective

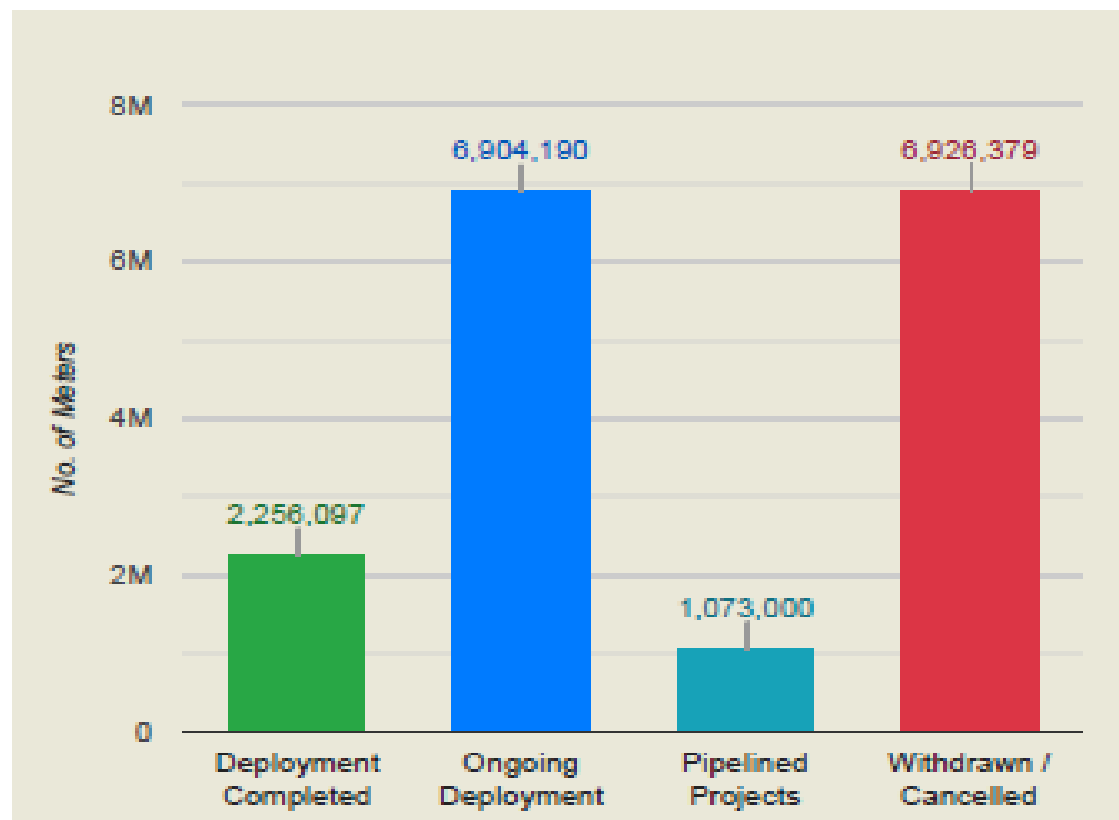


ISGTF – India Smart Grid Task Force
 NSGM – National Smart Grid Mission
 UDAY – Ujjwal Discom Assurance Yojana
 DPR – Detailed Project Report
 AMISP – Advanced Metering Infrastructure Service Provider

ISGF – India Smart Grid Forum
 IS – Indian Standard
 BIS – Bureau of Indian Standards
 RfP – Request for Proposal
 SBD – Standard Bidding Documents

Smart Meter Stats: Pan India Details

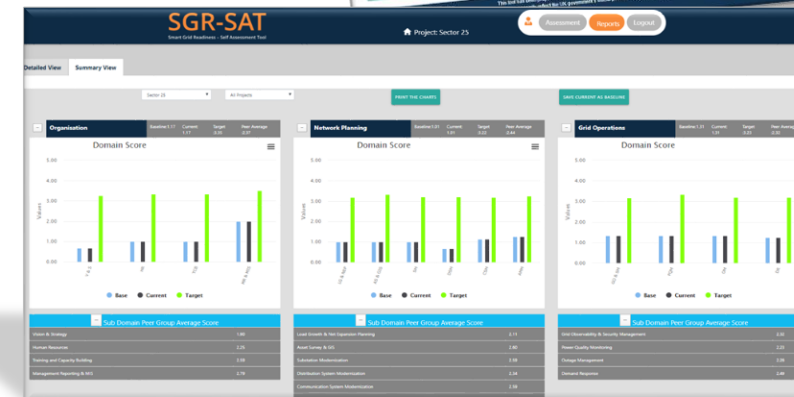
Smart Meters (Nos.) Installed in India



Details accessible at <https://www.nsgm.gov.in/en/content/sm-stats>


















Smart Grid Readiness - Self Assessment Tool

- Not a ranking tool but for assistance in Utility Smart Grid journey
- 6 Domains
 1. Organization
 2. Network Planning
 3. Grid Operations
 4. Revenue Management
 5. Customer
 6. Regulatory & Policy
- Each domain with 2 to 6 sub domains (total 24)
- Each sub domain with 5-level maturity



Investment Analysis Tool

- Objective is to:
 - Conduct holistic assessment of **financial, environmental and social impact** of the investments in utility modernization projects
 - Strengthen project planning and evaluation** – Assess benefits under different use-cases and implementation scenarios

Utility's Financial Benefits			Societal Benefits		Consumer's Benefits	Environmental Benefits
 AT&C Loss Reduction	 Operations Improvement – Metering & Billing	 Asset Failure Reduction – Transformer/ Meters	 Increased economic productivity	 Improved Utilization of Personnel	 Bill Reduction- Solar PV adoption, PLM incentive/ dynamic tariff	 Reduction in Air Emissions – EV Adoption; Enhanced Solar PV Generation; Reduced Thermal Generation
 Improved Customer Service	 Reliability Improvement – Outage Restoration	 Load Management – Deferred Capacity Investment	 Oil Import Reduction - Security	 Carbon Neutrality Investment		
 Revenue Generation – EV Charging Infra	 Reduction in Power Procurement – PV Generation	 Better Demand Projection – Reduced Deviation	 Job Created- Direct/ Indirect	 Avoided Generation Capacity		

Way Forward

SLPMU

- Self-assessment of Utilities using [SGR-SAT](#)
- Investment analysis for modernization projects using [CBA tool](#)
- State specific Smart Grid roadmaps
- SLPMU formation
- [Reliability](#) indices data mining (**feeder wise**)
- **Training** & capacity building

DISCOM

- **Prepaid smart meter** deployments on **OPEX** model
- Regulatory experiments for **dynamic tariffs**
- **Demand Response** ([DR](#)) programs
- Energy storage as against [network capacity](#) expansion

Technology

- [Interoperability](#) requirements
- **Standardization** towards interoperability
- **Plug and play** communication module
- **Integration** of multiple systems

Best Practices

- Whitepaper / technology selection guidelines on newer technologies like **5G**, **NB-IoT**, **Cloud** etc. for Smart Grid applications
- Consumer rights

Thank You



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