MODULE 1: NSGM INSTITUTIONAL STRUCTURE

1. INTRODUCTION

1.1. SMARTGRID

SmartGrid involves millions of consumers, generators, a large number of service providers and a variety of energy resources with varying controllability (Figure 1). This requires a great deal of intelligence, two way communication, automation, distributed local controls, self-configuring and self-healing capabilities to be built in the grid.

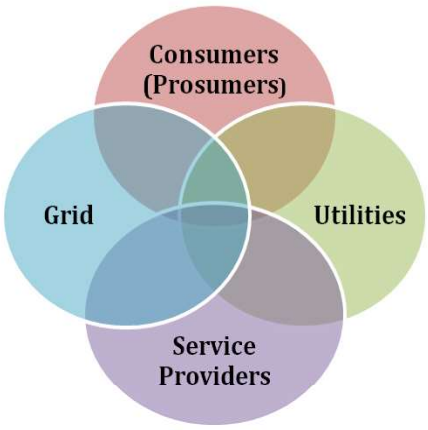

Figure 1: Key SmartGrid constituencies[1]

1.2. NATIONAL SMART GRID MISSION

Considering the need for transition of the grid into SmartGrid, a Vision and Roadmap of Smart Grid for India was approved by the Ministry of Power (MOP) in August 2013. The roadmap document envisaged the National Smart Grid Mission (NSGM) to plan, support and monitor the implementation of the SmartGrid policies and programs in the country.

The NSGM became a reality in 2015, functioning under the aegis of MOP, to plan and monitor implementation of policies and programmes related to smart grid activities in India (OM dated 27th March 2015[2]). Subsequently Guidelines for implementation of NSGM were issued vide OM dated 18th November 2015[3].

At the time of creation of NSGM, it was envisaged that a detailed 'NSGM Framework for Implementation' document will be prepared covering important areas facilitating smart grid implementation in the country. Accordingly the following recommended implementation framework has been envisaged in the present document for NSGM:

- Vision, mission, goals and institutional structure.
- Policy and standards framework.
- Business models.
- Monitoring, review and verification framework.

[1] Devices within consumer premises will become part of the smart grid in future.
[2] OM at NSGM website (http://nsgm.gov.in/sites/default/files/NSGM%20Office%20Memorandum.pdf)
[3] OM at NSGM website (http://nsgm.gov.in/sites/default/files/NSGM%20Implementation%20Guidelines.pdf)

1.3. SMARTGRID VISION AND MISSION STATEMENTS

Vision Statement

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

Mission Statement

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

1.4. PRINCIPLES FOR NSGM INSTITUTIONAL STRUCTURE

Considering the SmartGrid features and aligning them with the NSGM vision and mission, the following broad principles for the NSGM institutional structure have been identified:

- Open consultation, collaboration and involvement amongst various stakeholders.
- Flexibility to create, pilot and implement new concepts, technologies and business models.
- Digitally-driven architecture for management and communication.
- Integration of expertise, experience and resources across number of institutions and programs, national as well as international to evolve appropriate standards, policies, research and development and capacity building initiatives.

Thus, the NSGM is expected to act as a catalyst to facilitate the adoption of SmartGrid technologies and standards by utilities, after initial demonstration of technologies and enabling business models to support public, private capital flows to scale-up SmartGrid deployment.

2. NSGM GOALS

The SmartGrid goals originate from the NSGM's vision and mission statements and are aligned with the national power sector priorities and commitments as communicated by different ministries.

The SmartGrid goals are related to Discoms SmartGrid rollout. These are expected to be achieved by the actions of the NSGM and other ministries and institutions. The SmartGrid goals to be achieved by 2025 (co-terminus with Finance commission) are defined as medium and long term targets to be achieved during two phases.

2.1. SMARTGRID ROLLOUT GOALS

The NSGM will plan, design and support the rollout of the SmartGrid in the country. At the state level, the NSGM will focus on establishment of State Level Project Management Units (SLPMUs), capacity building and developing preparedness for effective implementation of SmartGrid. The NSGM will facilitate formulation of state/utility specific SmartGrid roadmap, regulations and implementation plan.

At the utility level, the NSGM, through state SmartGrid cells, will engage with key stakeholders to ensure that they have the required structure and plans in place for successful implementation of SmartGrid.

The NSGM goals relating to SmartGrid rollout are distributed in two phases and are expected to be achieved by 2025 (Table 1). The goals are prescribed for the following SmartGrid aspects:

- **SLPMUs:** The NSGM will provide support for the establishment of SLPMUs and will work with the state units to develop the respective state's SmartGrid regulations and roadmaps, etc.
- **Utility Level Actions:** Apart from building the capacity of utilities (that are reflected in the utility maturity score), the NSGM will coordinate with SLPMUs to facilitate the actions at the utility level. The NSGM will ensure that the utilities establish a SmartGrid cell as per the guidelines and develop respective SmartGrid roadmaps. Further, it will also facilitate the formulation of requisite utility level policies.
- **Utility Preparedness:** Specific to SmartGrid rollout, the NSGM will focus on utility preparedness and ensure that the utility's capacities are developed to equip them technologically, and have policies and processes in place to launch and support the SmartGrid intervention. To measure the utility's maturity, a standard Smart Grid Matrix can be used[4].
- **Advanced Metering Infrastructure (AMI):** AMI is the basic building block for SmartGrid implementation as this facilitates a real time two-way communication between the consumer and the utility. This is critical for efficient flow of information between the utility and the consumer for decision making and ensuring service quality.

[4] *NSGM may develop* a maturity level framework for utilities to assess their readiness for implementing smart grid in their respective areas of operation

- **Network Mapping and Consumer Indexing:** Mapping of network and consumer indexing are important aspects of SmartGrid intervention as it supports AMI installation, energy demand forecasting and outage management, among other things.
- **Distribution Automation/Supervisory Control and Data Acquisition (SCADA):** The automation of the distribution system function includes planning, construction, operations and maintenance (O&M) of the power system and interaction with the end-users as an essential function for achieving the comprehensive benefits offered by SmartGrid. SCADA/Distribution Management System (DMS) shall be implemented along with sub-station automation in select areas for achieving comprehensive benefits associated with SmartGrid.
- **Microgrids and renewable integration:** Country-wide microgrids rollout as a strategy for increasing access to electricity and energy generation from small-scale RE projects will also be facilitated by the SmartGrid. In this regard, it is expected that all utilities will gain experience in RE microgrid projects (capacity ≤1 megawatt [MW]) within a stipulated timeframe.
- **Electric vehicle**: SmartGrid deployment encourages the adoption of EVs allowing bidirectional energy exchange between the EVs and the grid. The National Electric Mobility Mission Plan (NEMMP) works on the expansion of electric mobility by supporting recharging infrastructure and related policies. Goals related to the utilities are gaining adequate tools, experience and expertise to successfully participate in the NEMMP.

2.2. DEFINING MILESTONES FOR SMARTGRID ROLLOUT

The goals are defined considering the current status and maturity of the power sector, grid and its constituents in the country. Global benchmarks and norms for SmartGrid implementation are also considered for identifying the milestones.

Table 1: NSGM goals relating to SmartGrid rollout

Goals Relating to SmartGrid Rollout	Phase I Up to 2020	Phase II 2020-2025
1. SLPMU- actions (number, percentage of utilities taking action)		
1.1 SLPMU units	100 percent	
1.2 SmartGrid regulations	100 percent	
1.3 SmartGrid roadmap formulation		100 percent
2. SmartGrid - utility level actions (number/percentage of utilities taking action)		
2.1 SmartGrid Cell formation by utilities	100 percent	
2.2 SmartGrid Roadmap preparation by utilities		100 percent
3. Utility preparedness (Number of utilities with target maturity level, total number of utilities)		
3.1 Preparation of Maturity level framework	By 2020	
3.2 Assessment of Utilities as per Finalized Framework / self-assessment	100 Percent	
4. AMI		
4.1 Utility's having AMI experience[5]	10	100 percent

[5] AMI experience is a required condition for SmartGrid rollout.

Goals Relating to SmartGrid Rollout	Phase I Up to 2020	Phase II 2020-2025
4.2 AMI rollout in all towns[6]	25 number	100 percent
5. Network mapping and consumer indexing		
5.1 Number of utilities with network mapping and consumer indexing (live and updated)	100% (Urban)	100 percent (Rural)
6. Distribution automation		
6.1 Distribution automation (SCADA/DMS)in Urban census towns with population as per IPDS		100 percent
7. Microgrid and renewable integration		
7.1 Utilities with institutional capabilities to manage renewable integration	10	100 percent
7.2 Utilities having the technological capabilities to manage local generation and microgrid projects (at least demonstration project implementation by utilities)	10	100 percent
8. Electric Vehicles		
8.1 Utilities with technological capabilities to deploy EV Infrastructure	10	100 percent

[6] National Tariff Policy, 2016 suggests 100 % coverage of AMI for consumers with consumption of 200 units per month by 2019. 100% AMI target is prescribed to ensure that consumers benefit from SmartGrid interventions.