

## Definitions of the IEEE Smart Grid Domains

(Source: NIST)

### **Bulk and Non-Bulk Generation**

Electricity generation is the process of creating electricity from other forms of energy, which may include a wide variety of sources, using chemical combustion, nuclear fission, flowing water, wind, solar radiation, and geothermal heat.

### **Customer**

A Customer is the end user of electricity. Traditionally, customers have been broken into three different types of residential, commercial and industrial. Customers may also generate, store, and manage the use of energy.

### **Distribution**

The Distribution system consists of the electrical network carrying the flow of electricity from bulk transmission system to the customers. The Distribution system can also provide the network connection for Distributed Generation, Distributed Energy Resources and storage systems to supply electricity to customers.

### **Foundational Support Systems**

Foundational Support Systems include the non-energy industry process which supports energy industry processes. Examples of these processes include information technology (IT), cyber and physical security, architecture solutions for IT support systems, cost benefits analysis and other supporting processes which need to be executed to support energy industry processes.

### **Markets**

In the deregulated energy industry, there are two markets; Energy market and Transmission market. The Energy market provides a competitive market place for energy and other energy products (e.g. ancillary services), whereas the Transmission market provides a competitive market place for transmission rights to carry electricity from one place to another.

### **Operations**

Power system operations involve the management of electricity flow ensuring that the electricity is delivered in a reliable, safe and economic manner. Power

system operations can be divided into bulk Transmission Operation, Distribution Operation and Field Devices Operations.

### **Service Provider**

A Service Provider is the organizations providing services to electrical customers and to utilities. Service Providers perform services to support the business processes of power system producers, distributors, and customers. These business processes range from traditional utility services, such as billing and customer account management, to enhanced customer services, such as management of energy use and home energy generation

### **Transmission**

Transmission systems connect the Bulk Generation systems to the Distribution system carrying electricity over long distances. These systems are normally designed to operate at very high voltage levels to minimize the electricity losses.

## Definitions of IEEE Smart Grid Sub-domains

(Source: NIST)

**Advanced protection:** Solutions dealing with digital and adaptable transmission and distribution protection systems.

**Architecture:** Studies and solutions dealing with conventions, rules, and standards employed in technology design.

**Asset Management and Optimization:** Technology solutions dealing generation, transmission and distribution asset maintenance and optimization.

**Business Process Re-engineering:** Technology solutions and methods for streamlining and reengineering of the business processes.

**Communication Systems:** Technology solutions associated with transferring data between two points.

**Customer Enablement:** Technologies enabling customers to monitor and control electricity usage.

**Demand Response:** Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.

**Distributed Energy Resources:** Distributed energy resources are electric generation units (typically in the range of 3 kW to 50 MW) located within the electric distribution system at or near the end user.

**Distributed Generation:** A variety of small Grid connected devices producing or storing electricity.

**Distribution Automation:** Technology solutions enhancing the distribution system flexibility and performance.

**Distribution Operation:** Management of electrical power on the “wires” between the transmission system and the end-use customer.

**Economic Justification, Cost Recovery Models:** Assessment and models associated with economic viability of a solution.

**Education and Training:** Solutions and discussions associated with enhancing the work force knowledge.

**Energy Storage Systems:** Technology and solutions associated storing electrical energy.

**Environmental Impacts and Efficiency:** Studies and assessment of environmental impacts and efficiency enhancements.

**Field Operation:** Management of field devices.

**Generation Advancements:** Technology solutions enhancing generation technology.

**Information and Data Management:** Technology solutions managing data and information.

**Market Enablement:** Technology solutions enabling electricity and transmission markets.

**Micro-Grid and Nano-Grid:** A micro-grid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that act as a single controllable entity with respect to the grid and can connect and disconnect from the grid, operate in grid-connected or island mode. A Nano-grid is a smaller version of a micro-grid consisting of one building.

**Plug-in Vehicle:** An electric vehicle that can be plugged into an outlet or charging device to recharge its battery.

**Power Quality Management:** Studies and solutions associated with the quality of electricity.

**Service Provider Enablement:** Technology solutions enabling crews providing services.

**Smart City:** A smart city uses digital technologies to enhance performance and wellbeing, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens.

**Smart Metering Systems:** Technologies and solutions associated with measuring the customer energy consumption.

**Strategy, Policy, Procedure and Standards:** Long-term technology roadmaps, methods and conventions, and rules used in the technology design and development.

**Substation Automation:** Technology solutions dealing with improving substation performance and flexibility.

**System Resiliency:** Studies and solutions associated with NERC Critical Infrastructure Protection, compliance and other reliability enhancement measures.

**Transmission and Distribution Planning:** Studies and methods associated with long-term transmission and distribution additions.

**Transmission Automation:** Technology solution enhancing the transmission system flexibility and performance.

**Transmission Operation:** Management of electrical power on a national or regional level transmission system.

**Visibility and Control:** Technology solutions providing visibility and control to operators.