SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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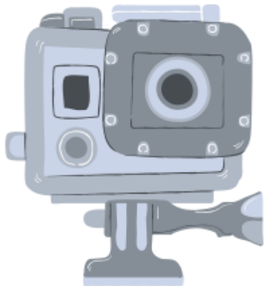
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEE308/ SMART GRID

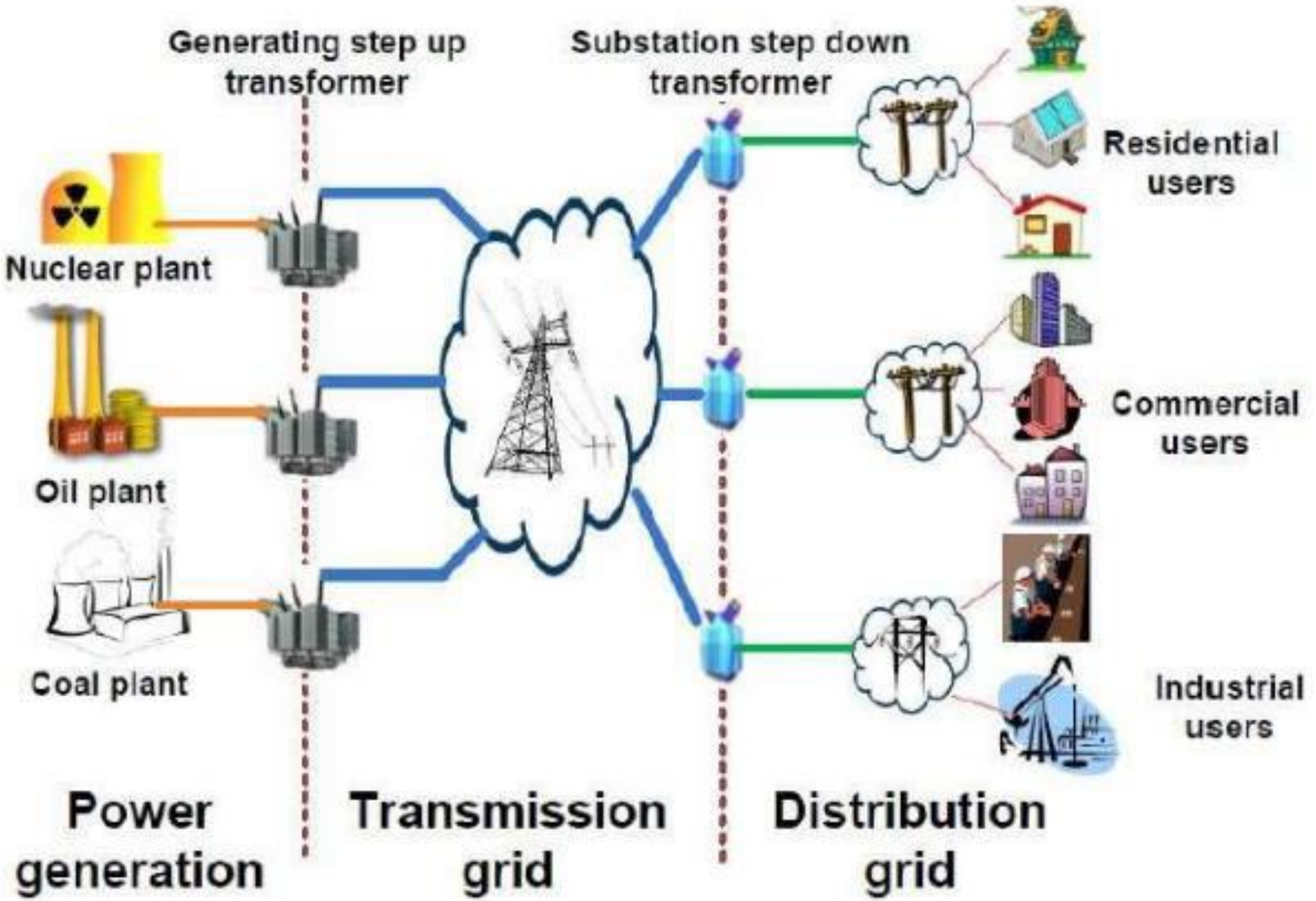
III YEAR / VI SEMESTER

Unit 1 –OVERVIEW OF SMART GRID

Topic 1: CONCEPT OF SMART GRID



ELECTRIC GRID:



Disadvantages of Existing Electri Grid :

- Over strained and interregional bulk power transfer is limited
- Cannot fully support the integration of renewable energy
- Low reliability of power and outages
- Fluctuating Power quality
- Lack of Consumer Discipline
- Increasing levels of Green house gases
- Almost Zero Customer Participation
- Low billing and collection
- Less Efficiency

SMART GRID

- The term “Smart Grid” was coined by Andres E. Carvallo on April 24, 2007 at an IDC energy conference in Chicago.
- Definition: Smart grid is integration of an electric power system, communication network, advanced Sensing, metering, measurement infrastructure, complete decision support and human interfaces software and hardware to monitor, control and manage the creation, distribution, storage and consumption of energy.

SMART GRID CONT…

- A Smart Grid is an electricity network that can intelligently integrate the actions of all users connected to it – generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies.
- ➢ System (Generation, Transmission, Distribution) with an advanced two- way communications system
- ➢ Enables real-time monitoring and control
- ➢ Provide greater visibility and transparency
- ➢ Consequently, enables cost reduction and efficiency improvement

Challenges in Indian Electricity System

Presently the Indian Electricity System faces a number of challenges such as:

- ✓ Shortage of power
- ✓ Power Theft
- ✓ Poor access to electricity in Rural areas
- ✓ Huge losses in the Grid
- ✓ Inefficient Power Consumption
- ✓ Poor reliability

To overcome these problems; smart grid is needed.

Smart grid drivers & functions

- **Increasing demand**: Information and communications technology, Measurement and control Demand response, Advanced metering infrastructure (AMI)
- **High Aggregate Technical &Non-Technical, Losses**:18%-62%
- **Ageing Assets**: Transformers, Feeders etc.,
- **Grid to carry more power**: Need for, Reliability and greater Security
- **Billing and collections**: Profitability of distribution companies

Smart grid drivers & functions

- **Energy mix**: Need for Renewable Energy [Hydro Power, Solar Thermal Energy, Wind, Biomass, Biogas] to reduce carbon footprint
- **Deliver sustainable energy**: Voltage & VAR control, Resource planning, analysis, and forecasting tools, Fault Detection, Identification, and Restoration (FDIR)
- **Increased efficiency**: Direct load control, Distributed energy resources, Distributed energy resources integration, Energy storage, Advanced metering infrastructure (AMI)
- **Empower consumers**: Consumer education and awareness, Residential consumer energy management, Information and communications technology
- **Improve reliability**: System wide monitoring, Measurement and control, Distributed energy resources, Distributed energy resources integration, Energy storage, Advanced metering infrastructure (AMI)

Challenges of Smart Grid

- **Challenges of Smart Grid**
- ✓ Policy and regulation
- ✓ Ageing and outdated Infrastructure
- ✓ Lack of integrated communication platform
- ✓ High Capital and operating costs
- ✓ Big Data Handling
- ✓ Compatibility of older equipment
- ✓ Lack of standards for interoperability
- ✓ Smart Grid Cybersecurity
- ✓ Lack of Smart consumers

Benefits of Smart Grid

- ➢ Self-Healing :A smart grid automatically detects and responds to routine problems and quickly recovers if they occur, minimizing downtime and financial loss.
- ➢ Resists Attack: A smart grid has security built in from the ground up.
- ➢ Motivates and Includes the Consumer: A smart grid gives all consumers industrial, commercial, and residential-visibility in to real-time pricing, and affords them the opportunity to choose the volume of consumption and price that best suits their needs.
- ➢ Reduction in AT & C losses
- ➢ Reduction in CO2 Emission
- ➢ Enabling Energy Audit
- ➢ Reduction in Cost Billing
- ➢ Remote Load Control
- ➢ Shifting of Peak requirement to non-peak time [Peak Shaving]
- ➢ Integration of Renewable Energy
- ➢ Clean Energy Development.
- ➢ Provides Power Quality
- ➢ Optimizes Assets and Operates Efficiently
- ➢ Safety, Reliable and Efficient
- ➢ Improved National Security
- ➢ Improved Environmental Conditions
- ➢ Improved Economic Growth


Thank
You!