SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

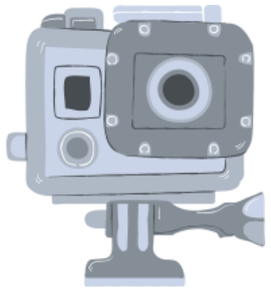
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT 2

SMART GRID TECHNOLOGIES – Real Time Pricing

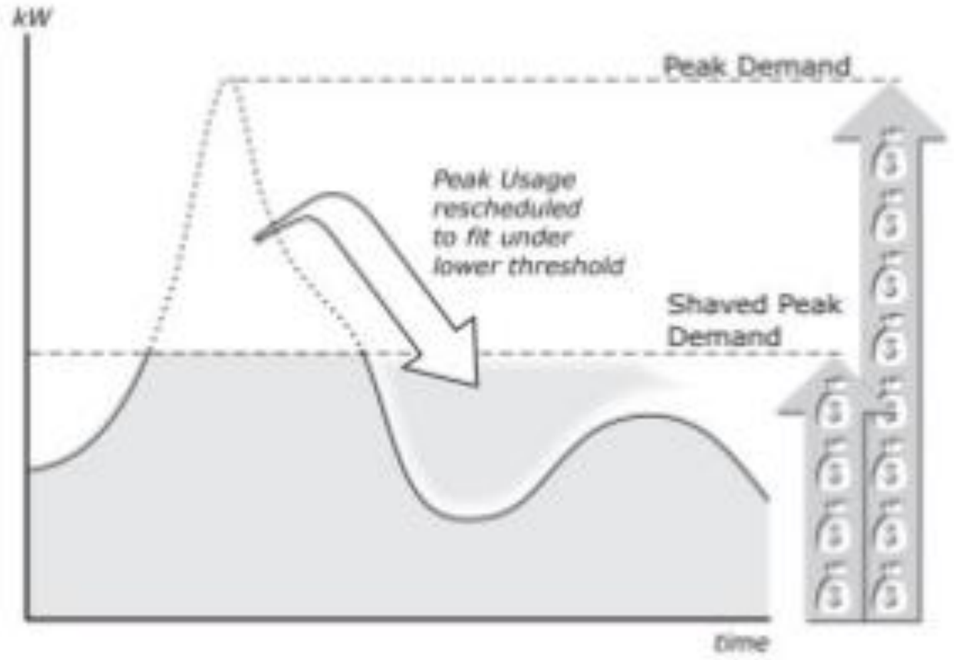
19EEE308 – SMART GRIDS
III year / VI Semester

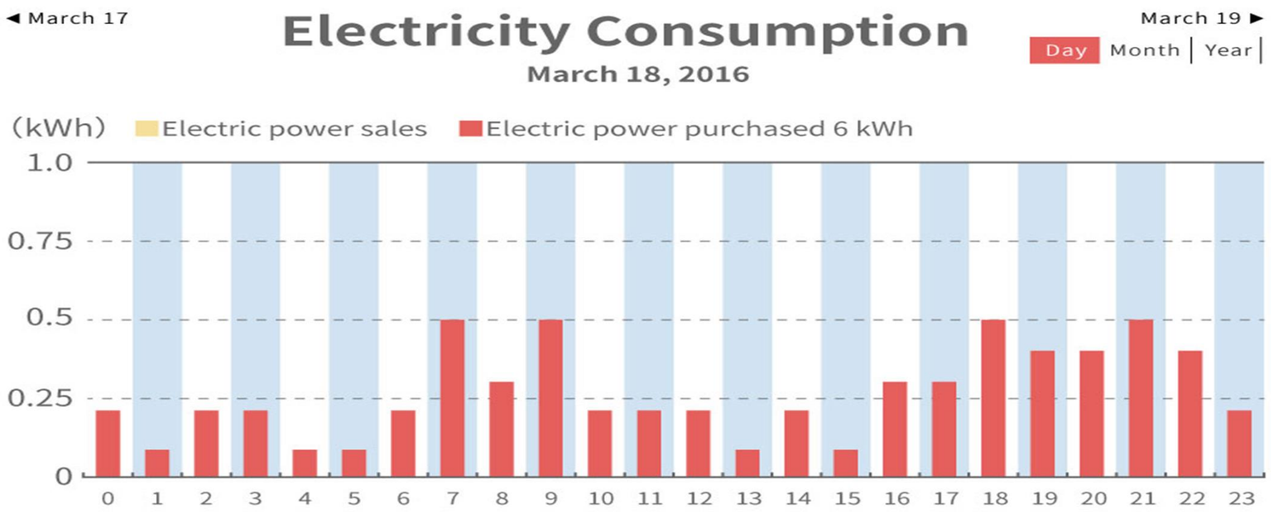


- A new method of electricity pricing has been introduced, which is commonly known as Real time pricing where the electricity rates vary hour-to-hour and are based on the electricity demands.
- Real time pricing requires the installation of a smart electricity meter that can send and receive information about electricity usage and electricity costs and give consumer more information about their own usage.

Time of Use (TOU) pricing

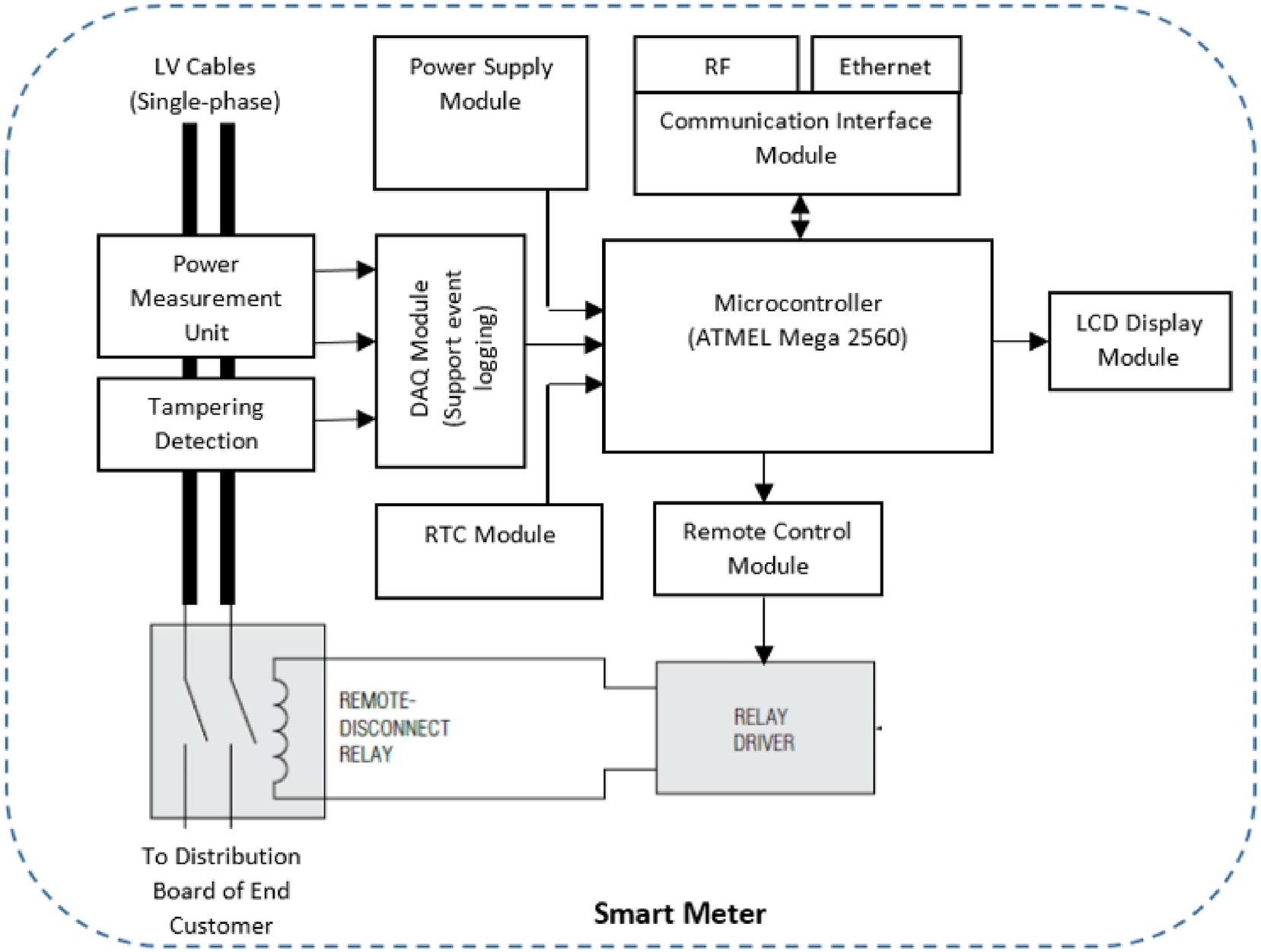
- **Peak**
- **Shoulder**
- **Off peak**



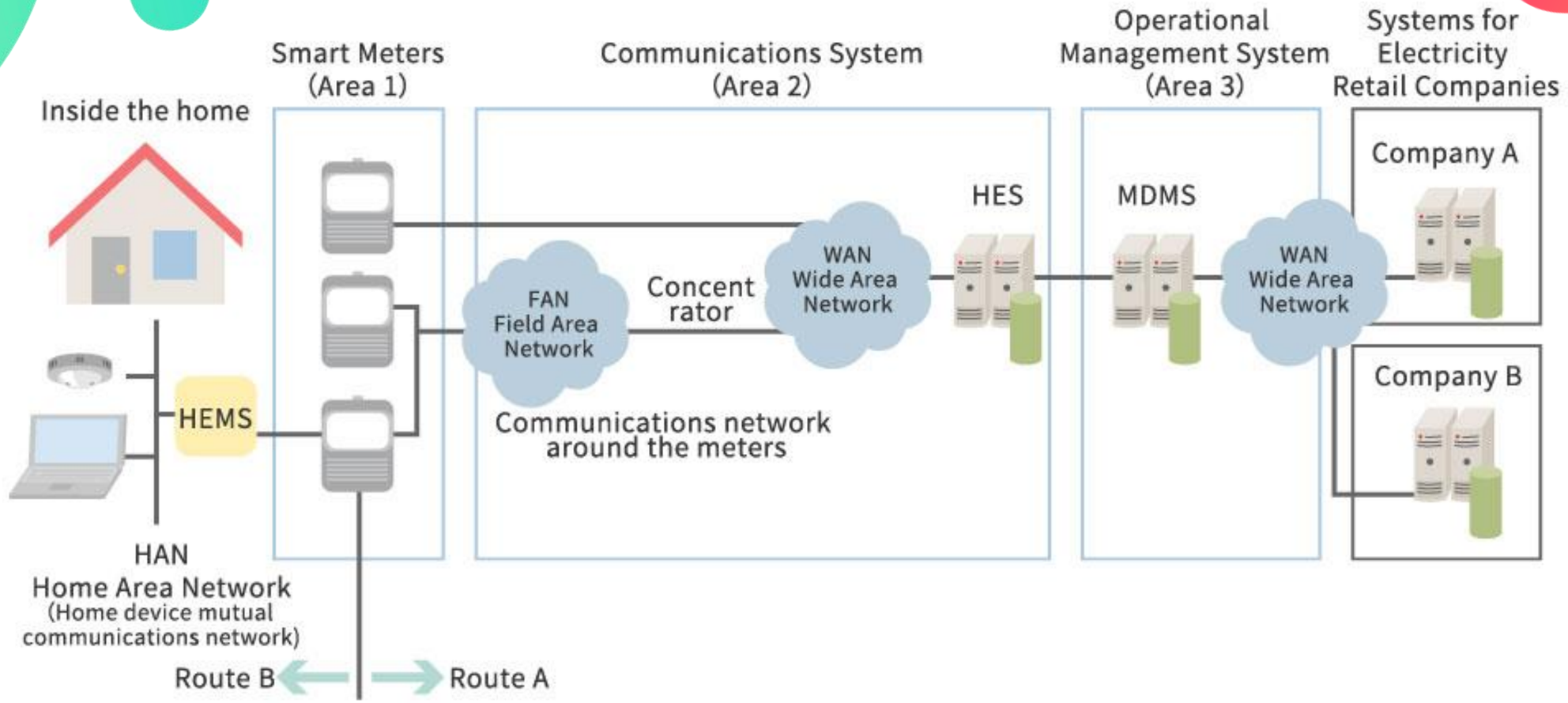


- ✓ The occurrence of price variation can be determined by the load curve.
- ✓ The load curve shows the load variation on the generating station with respect to time.
- ✓ The load curve can be used to determine the maximum demand.
- ✓ **Electricity prices will be greatest when there is high demand on the grid.**
- ✓ This allows customers to limit their energy usage during the periods of maximum demand and shift their electricity consumption to the hours of **less demand and thereby lower prices.**
- ✓ This process of controlling the electric energy usage during the hours of high demand in order to reduce the billing amount is called **Demand Side Management** to achieve peak shaving.

The Hardware Design of Smart Meter Unit



The Smart Meter System

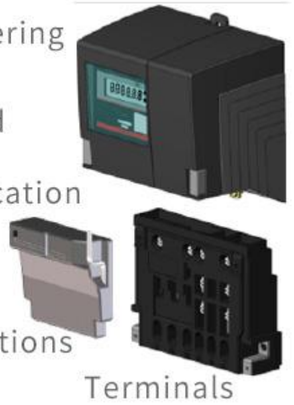


HES: Head-End System (a device that collects data and controls communication)
MDMS: Meter Data Management System (a system for managing smart meter data and equipment, etc.)
HEMS: Home Energy Management System (a system for the intelligent management of household energy)

The Smart Meter Mechanism

Communication Methods

Smart Meters



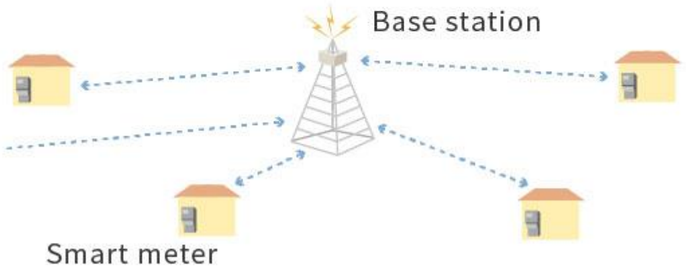
- Separate metering unit and electrical terminals
- Equipped with a communication function
- Bidirectional metering as standard

Conventional Model

- Integrated metering unit and electrical terminals
- Uni-directional metering
- No communication function

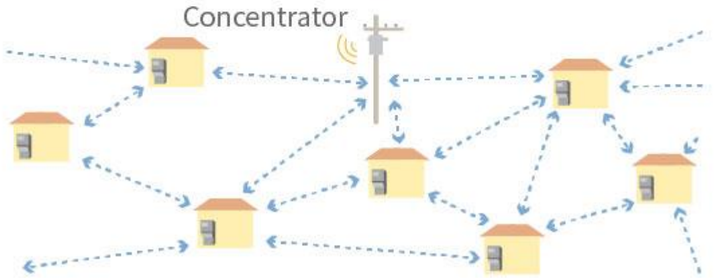
Wireless Star Network

Communication using 3G or LTE networks
Ideal for suburban and mountainous areas

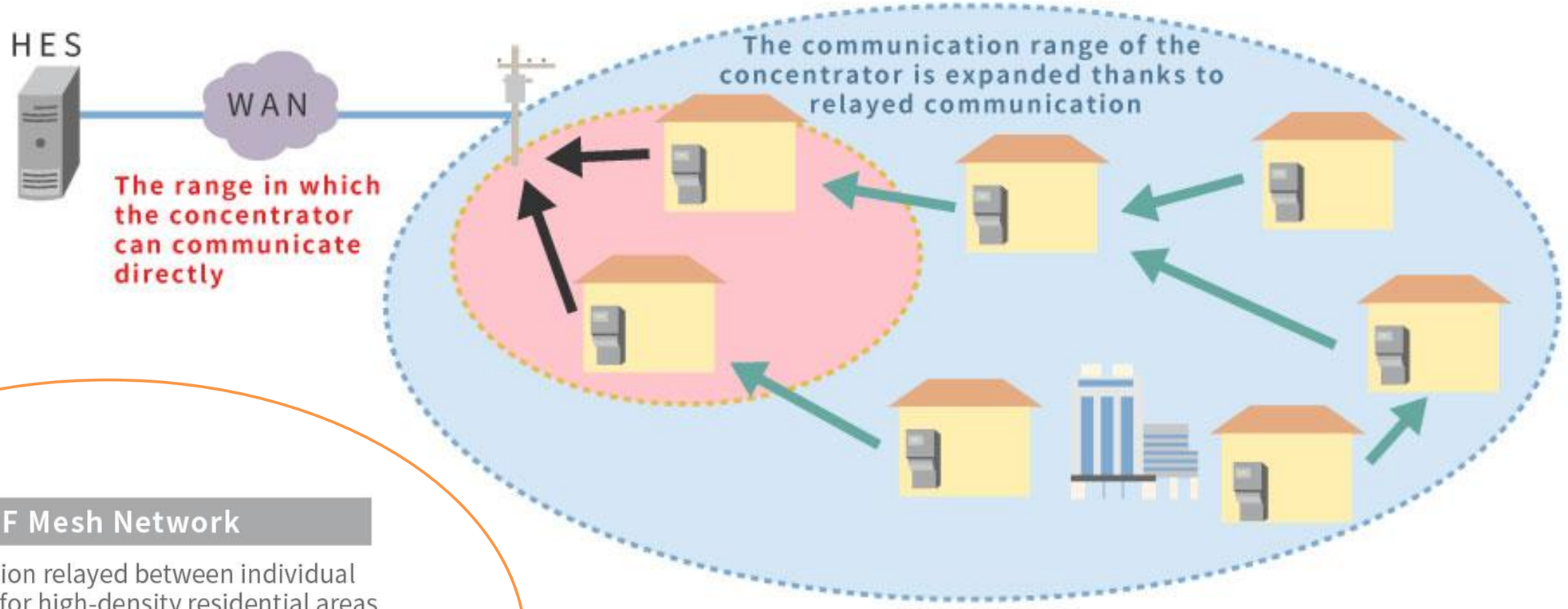


RF Mesh Network

Communication relayed between individual meters Ideal for high-density residential areas



RF Mesh Method



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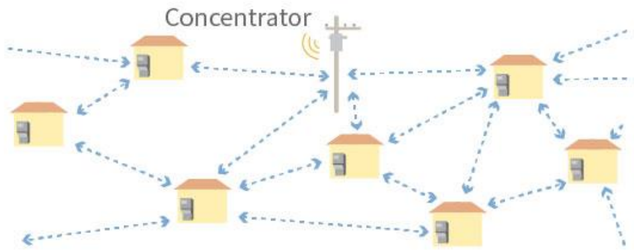
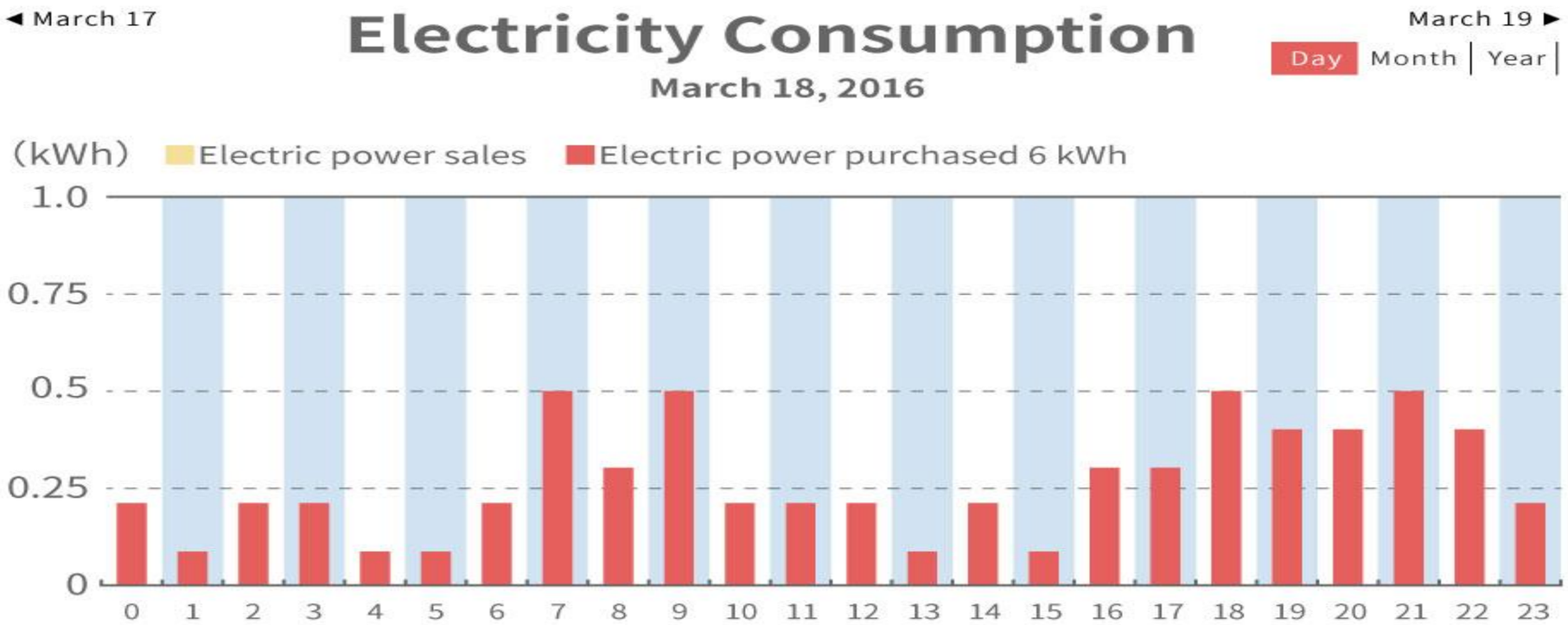


Benefits of Smart Meters



- Smart meters are equipped with the electricity meter information transmission service (route B).
- This makes it possible to transmit the smart meter's measured value to the HEMS controller* in real time.
- Being able to visualize the amount of electricity used based on the information received from the smart meter is expected to allow more efficient energy-saving performance.
- For example, the customer can allow the HEMS controller to limit the use of home appliances in periods when there are higher levels of electricity consumption.
- * The HEMS controller must be prepared by the customer.

Benefits of Smart Meters

Example of Business Efficiency Improvements Due to Smart Meters

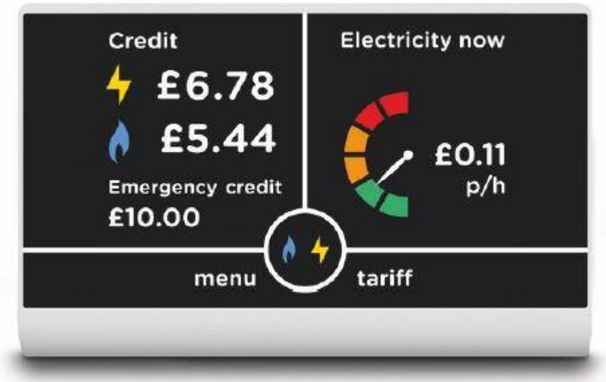
Manual meter reading

Circuit breaker replacement upon a contract change

Power connection and disconnection work

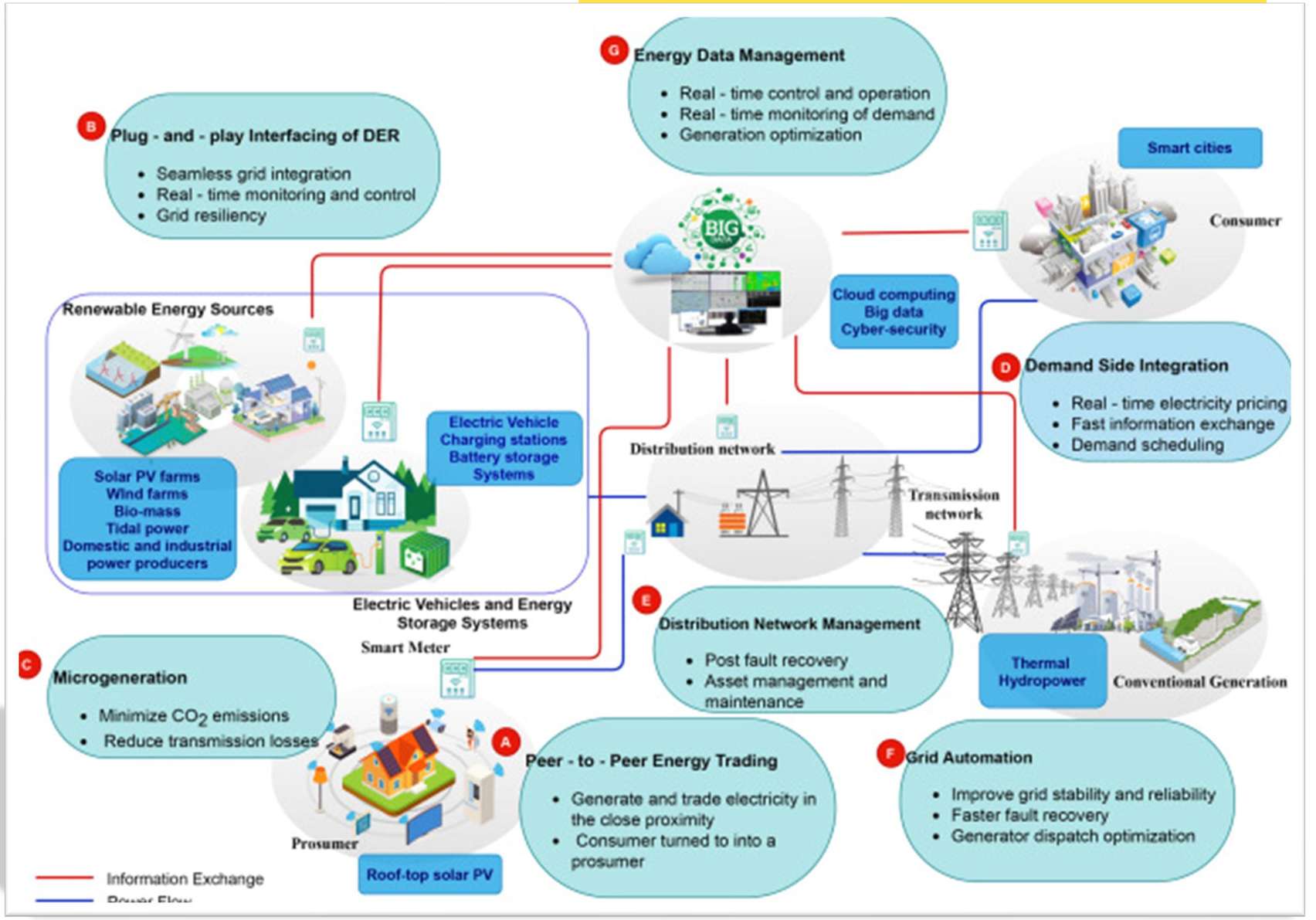
Automation and remote operation of smart meters

Benefits of Smart Meters



- ✓Allows for faster outage detection and restoration of service
- ✓Provides customers with greater control over their electricity use when coupled with time-based rates
- ✓Allows customers to make informed decisions by providing highly detailed information
- ✓Helps the environment by reducing the need to build power plants, or avoiding the use of older, less efficient power plants as customers lower their electric demand.
- ✓Increases privacy because electricity usage information can be relayed automatically to the utility for billing purposes without on-site visits by a utility
- ✓Smart Meters are the first step toward creating a Smart Grid

Benefits of Smart Meters



Summary

Activity

KEEP
LEARNING..

Thank u

SEE YOU IN NEXT CLASS