

UNIT-III

Applications of Electrical Energy Storage

Present Status of Applications

- ▶ Time shifting
- ▶ Power quality improvement
- ▶ Emergency supply
- ▶ Investment deferral

Utility Applications

- ▶ Reduce generation cost using PHS
- ▶ Maintain voltage and frequency
- ▶ Reduce congestion
- ▶ Provide backup power

Pumped Hydro Storage (PHS)

- ▶ Stores water at higher elevation
- ▶ Used during peak demand
- ▶ Large scale storage technology



Pumped Hydro Storage

Compressed Air Energy Storage (CAES)

- ▶ Compressed air stored underground
- ▶ Used for peak load management
- ▶ Improves grid stability



Compressed Air Energy Storage

Li-ion Battery Applications

- ▶ Used for frequency regulation
- ▶ Supports renewable integration
- ▶ Installed in substations



Lithium Ion Battery

Consumer Applications

- ▶ Load leveling
- ▶ UPS systems
- ▶ Power quality improvement

NaS Battery Applications

- ▶ Used with renewable energy systems
- ▶ Provides stable output
- ▶ Supports wind farms



NaS Battery

Renewable Energy Applications

- ▶ Supports PV systems
- ▶ Stores excess solar energy
- ▶ Smoothens wind power fluctuations

Smart Grid

- ▶ Bi-directional power flow
- ▶ Demand side management
- ▶ Renewable integration



SmartGrid

Smart Microgrid

- ▶ Autonomous small-scale grid
- ▶ Scalable battery systems
- ▶ Reliable emergency operation

Smart House

- ▶ Energy efficient homes
- ▶ Battery integrated systems
- ▶ Optimized electricity usage



Smart House

Electric Vehicles

- ▶ Uses advanced battery systems
- ▶ Reduces carbon emissions
- ▶ Supports hybrid and EV technology



Electric Vehicle

Advantages of EES Applications

- ▶ Supports renewable energy
- ▶ Improves reliability
- ▶ Reduces electricity cost
- ▶ Enhances power quality

Conclusion

- ▶ EES is essential for future power systems
- ▶ Supports smart grids and EVs
- ▶ Multiple technologies serve different applications

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the frame, creating a modern, layered effect. The central area is a clean, white space.

Thank You