



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



UNIT-III- Needs & Applications of Microgrid



Needs of Microgrid



Needs of Microgrids:

1. Energy Reliability and Resilience:

1. Island Mode Operation: Microgrids can **operate independently** from the main grid during power outages, ensuring a continuous energy supply to critical facilities.

2. Grid Support: Microgrids can **support the main grid by supplying excess power** or by balancing supply and demand, especially during peak usage periods.

2. Integration of Renewable Energy:

1. Solar and Wind Integration: Microgrids facilitate the **integration of renewable energy** sources like solar panels and wind turbines, reducing reliance on fossil fuels and lowering greenhouse gas emissions.

2. Energy Storage: Microgrids often **incorporate energy storage systems** (such as batteries) to store excess energy generated during peak times for **use during periods of high demand or low renewable energy production**.



Needs of Microgrid



3. Energy Efficiency:

- 1. Combined Heat and Power (CHP):** Microgrids can use CHP systems to **maximize energy efficiency** by simultaneously generating electricity and **utilizing the waste heat for heating or cooling purposes.**
- 2. Demand Response:** Microgrids enable **better management of energy demand**, allowing **consumers to adjust their electricity usage in response to price signals or grid conditions.**

4. Remote and Off-Grid Communities:

- 1. Remote Areas:** Microgrids provide a practical solution for **delivering electricity to remote or isolated communities** that are not connected to the main grid.
- 2. Emergencies and Humanitarian Aid:** Microgrids can be rapidly deployed to **disaster-stricken areas or refugee camps**, ensuring access to electricity for essential services and improving living conditions.



Microgrid Applications



Most common applications for microgrids:



Community and residential microgrids

Community and residential microgrids provide a way for neighborhoods, cities, towns and tribal areas to meet their energy needs locally. Some make a community's electricity more reliable and sustainable while others serve critical infrastructure such as fire, police and water treatment facilities.

Grocery store microgrids

Grocery stores are “critical facilities” that must be kept up and running during a disaster. In addition, there is a strong economic motivation for stores to avoid power outages. Even relatively short power outages can be costly to grocers.



Microgrid Applications



Health care microgrids

Health care facilities, such as hospitals, long-term care facilities and **surgical clinics**, are another form of critical infrastructure that must have reliable power. Health care microgrids can **replace or reduce reliance on diesel backup generators, which shrinks the facilities' carbon emissions.**

Military microgrids

The military has demonstrated sophisticated and innovative microgrids that serve as a learning ground for microgrids developed for the civilian sector. A microgrid can meet all of the **military facility's power needs while islanded.** Microgrids come into play in the battlefield, too, in the form of **mobile units that can be quickly installed.** The military is also installing microgrids to **improve cybersecurity through energy independence** — as are utilities. In addition to **advanced controls, microgrids include wind, solar, natural gas and energy storage.**



Microgrid Applications



Ports and airports

Microgrids are increasingly being built by ports and airports to ensure safe **passage of people and goods**. A microgrid can serve as either **the primary power source for an entire airport or provide backup power to ensure terminals, the airfield and fuel stations remain online during an outage**.

School and campus microgrids

Campus microgrids help **schools and universities meet their sustainability goals** when used with renewable energy sources. They also reduce energy costs. Local schools often serve their **communities as gathering points during times of crisis**, and microgrids can provide the **reliable power they need to fill that role**.



Microgrid Applications



Utility microgrids

Microgrids not only help the grid manage renewables, but utilities are also increasingly incorporating them as their primary energy sources, coupling them with energy storage and backup generators.

Other microgrid applications include:

- Agricultural operations.
- Data centers and others focused on power quality.
- Telecommunications services.
- Retail and wholesale businesses.
- Oil and gas refineries.
- EV charging stations.
- Remote islands or outposts.



THANK YOU