

Definition

Microgrids are locally confined energy supply systems that directly connect renewable electricity generation, storage, and consumers. They can operate in parallel with the public power grid and can be switched to autonomous mode when required.

How Do Microgrids Work?

Generation:

Electricity is usually generated from renewable sources such as photovoltaic systems or wind power. In addition, controllable units (e.g., combined heat and power plants) can be integrated.

Storage:

Battery storage systems balance short-term fluctuations. They ensure that electricity is available when solar or wind generation is temporarily insufficient.

Consumers:

For example, households, businesses, heat pumps, or charging infrastructure for electric vehicles.

Grid & Control:

An intelligent control system ensures that supply and demand remain balanced. Via a so-called point of common coupling, the microgrid can be connected to or disconnected from the public power grid.

What Characterizes a Microgrid?

Local limitation: The grid supplies a clearly defined area

Own control system: Generation and consumption are coordinated

Flexible operation: Grid-connected or temporarily autonomous

Modular design: Expansion possible step by step

Adaptable: Integration of new technologies possible at any time



What are Benefits of Microgrids?

For the Energy System

- Relief of overloaded grids
- Improved integration of renewable energy
- Greater operational flexibility

For Security of Supply

- Continued operation during power outages
- Higher resilience to crises

For Regions and Municipalities

- Local use of energy
- Strengthening of regional value creation
- Greater scope for local decision-making

For Businesses and Consumers

- More stable energy prices
- More efficient use of electricity
- New investment opportunities

Where Are Microgrids Used?

- Industrial and commercial areas
- Residential districts and new development areas
- Regions with high renewable electricity generation
- Charging and mobility hubs

Objectives of Regional Microgrids

- Local use of renewable electricity surpluses
- Relief of distribution grids
- Coupling of generation, consumption, and storage
- Increased resilience and security of supply



Conclusion

Microgrids are an important building block of the energy transition. They enable the local, flexible, and secure use of renewable energy and meaningfully complement the existing power grid. They are particularly successful when implemented gradually, demand-oriented, and realistically.