Distributed Generation vs Microgrid: What’s the Difference?

Learn the key differences between distributed generation and microgrids in renewable energy systems with clear examples and explanations.

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As renewable energy continues to grow, more people are asking: **what's the difference between distributed generation and microgrids?** The two terms sound similar, but they are not the same. Let's break it down.

What is Distributed Generation (DG)?

Distributed Generation (DG) refers to **small, decentralized power sources** located close to where the energy is used.

Examples include rooftop solar, small wind turbines, natural gas turbines, and fuel cells.

Key features of DG:

- Capacity is usually small (from a few kW up to a few MW).
- Often connected directly to the main grid.
- Helps reduce electricity bills and peak demand.
- Usually **only generates electricity** — without storage or advanced control systems.

Example: Rooftop Solar in Shanghai

An office building installs a 300 kW rooftop solar system. During the day, solar power is consumed by the building, and excess electricity is sold back to the grid. This is classic **distributed generation**. It saves money, but if the main grid fails, the building still loses power.

What is a Microgrid?

A Microgrid is more than just power generation. It's a **complete small-scale power system**.

A microgrid typically includes:

- Distributed energy sources (solar, wind, gas, etc.).
- Energy storage systems.
- Loads (buildings, factories, communities).
- A smart control and management system.

Microgrids can operate in two modes:

- **Grid-connected mode:** running together with the main grid.
- **Island mode:** supplying electricity independently when the main grid is down.

Example: Industrial Park in Shandong

An industrial park installed 5 MW of solar, 2 MW/4 MWh of energy storage, plus a gas turbine. Normally, it works with the main grid to cut peak demand and reduce electricity costs. During a blackout caused by a typhoon, the system switched to **island mode** and kept key production lines running. That's the power of a **microgrid**.

Distributed Generation vs Microgrid: The Easy Analogy

DG = individual small power plants.

Microgrid = an integrated local power network that can stand alone.

Conclusion

The difference between **distributed generation vs microgrid** is clear:

- **Distributed generation** is about single, decentralized power sources.
- A **microgrid** is about integration — combining distributed generation, storage, loads, and smart controls into a reliable, flexible system.

As the world moves toward more resilient and sustainable energy, both DG and microgrids will play a key role. But understanding their differences helps businesses, communities, and policymakers make smarter energy choices.

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