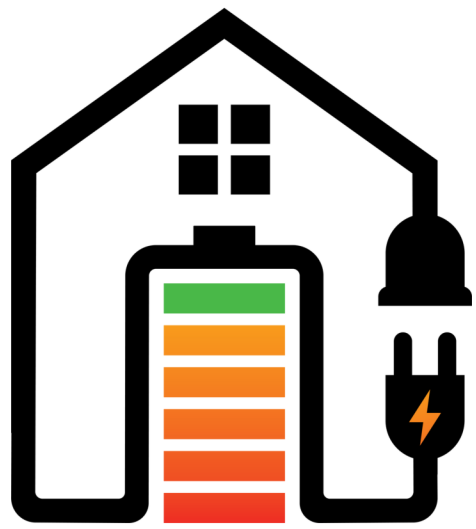


Distributed Energy Resources

What Is It?

Distributed Energy Resources (DERs) are energy systems that are connected directly or close to the place of use. DERs include rooftop solar panels and battery energy storage systems (BESS). DERs feed energy back to the grid allowing for bi-directional energy flow.



Space

DER equipment doesn't require a specialized facility as it is directly managed by Prosumers. The space requirements are dependent upon the technology type and needs of the prosumer. For example, solar panels can be installed onto the roofs of existing buildings.

Why is it important?

DERs allow for energy to be provided to the local consumer bypassing the standard long-distance flow from transmission interconnected generators. This localized generation requires less investment in grid infrastructure.

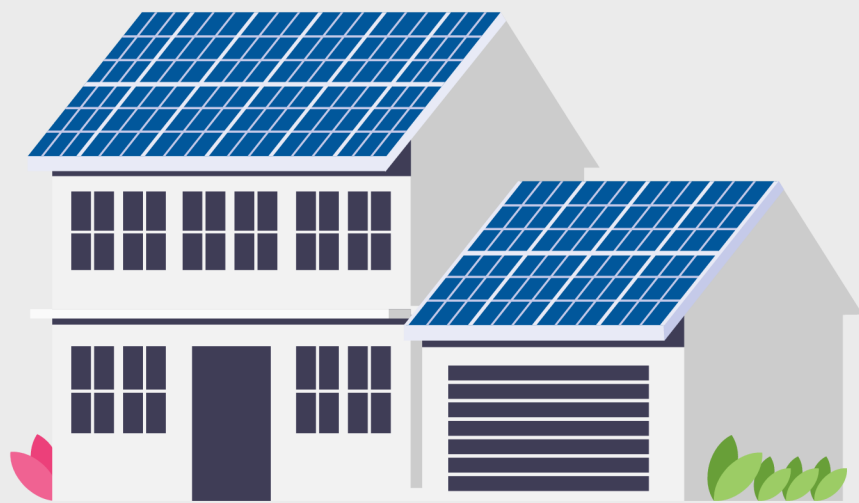
What Does It Cost?

DERs are limited by the space available to the *prosumers* (producers-consumers) so those costs are higher in urban areas where DERs have the most impact. Further, DER costs are dependent upon the generation technology type utilized.



How Does It Work?

1. DERs consist of small, localized energy generators like solar panels, wind turbines, combined heat and power (CHP) units, or fuel cells. These systems generate electricity at or near the point of consumption, reducing dependency on centralized power plants
2. Many DER setups include battery energy storage systems (BESS) to store surplus energy generated during periods of low demand. These stored reserves are used later when the demand increases or when renewable generation is unavailable
3. DC (direct current) power needs to be converted to AC (alternating current) to be compatible with the grid. Inverters handle this conversion, ensuring the energy can be used locally or exported to the grid
4. Locally generated energy from DERs can be used directly on-site by homes or businesses, reducing electricity bills. When excess power is generated, it can be exported to the main grid, often in exchange for credits or payments under net metering policies
5. Many DERs are integrated with smart energy management systems to optimize their performance. These systems monitor production, consumption, and grid status in real time, automatically deciding when to store energy, supply it locally, or send it to the grid



Point

- DERs can operate independently from the main grid ensuring continuous power during outages or emergencies.
- Many DER systems utilize renewable sources like solar and wind, contributing to lower overall grid emissions.
- Locating energy generation closer to the point of use reduces the need for long-distance transmission infrastructure.
- An increase in the price of electricity incentivizes Prosumer installation of DERs.
- Distributed systems can smooth out demand peaks and balance supply by storing excess energy locally.

Counterpoint

- Installing small-scale DER systems or microgrids can be expensive, requiring significant upfront investment.
- Many distributed energy sources are weather-dependent and intermittent.
- Incorporating DER units into the existing grid infrastructure can be technically complex and expensive.
- Protective systems for energy flow patterns in DER systems are still in early development.
- Outdated regulations or lack of supportive policies hinder the deployment and integration of distributed energy systems, limiting growth.

Did You Know?

Large numbers of DERs can reduce strain on the grid so effectively that they sometimes delay or eliminate the need for new energy infrastructure.

What's Next?

As DER adoption continues, new regulations will help it compete with traditional energy resources in the wholesale market. Improvements to innovation and optimization for DERs will improve grid resilience and may be a helpful source of energy in emerging global markets.