

# Autonomous Energy Systems



## Empower Distributed Energy Resources With Information and Controls

**Futuristic energy technology is already here. Time to make use of it.**

Sensors, controls, and data can add value to energy systems, but there are millions of touchpoints to consider and harness. It all depends on the right integration strategy, and through the National Renewable Energy Laboratory's (NREL's) research into Autonomous Energy Systems (AES), we are creating options that work for anyone.

### Hone Your Approach

The challenge of updating energy systems is how to leverage new devices to balance often competing goals of clean energy, customer satisfaction, and cost savings. AES provides methods to:

- Optimize fleets of devices
- Automate microgrid control configurations
- Manage industrial loads
- Coordinate electric vehicle charging
- Use resource flexibility for grid services
- Isolate threats and outages
- Proactively design for resilience against disruptions.



### Why Autonomous?

Autonomous is shorthand for automatic, intelligent, adaptive, and optimal—essential features of modern energy systems. An autonomous energy system implies that parts of the grid can now run on their own and grid management can be simplified in the face of growing complexity.

# Pilot Demonstrations



In the Roaring Fork Valley of Colorado, the local utility cooperative, Holy Cross Energy, is using **AES to integrate renewable energy**. The co-op has automated a neighborhood's energy system and is now designing a reorganizable distribution system that uses airports, buildings, and electric buses to coordinate power.



Detroit utility DTE Energy, NREL, and several other partners are creating a method to dynamically connect networked microgrids. The method partitions the grid to achieve metrics for **energy justice, reliability, and resilience**.



Southern Company and NREL are evaluating an AES strategy for a feeder with high PV penetration to address reverse power flow challenges and **optimal use of utility-scale and behind-the-meter batteries**.

**NREL** can help partners form an AES strategy, simulate and validate approaches, and develop a pilot. In the lab, we can connect any energy device to simulated power systems and technologies, allowing partners to run and refine their solutions before going live.

## Get Connected

If you are interested in developing your distributed energy strategy, reach out to Ty Ferretti at [Ty.Ferretti@nrel.gov](mailto:Ty.Ferretti@nrel.gov) or visit the website at [www.nrel.gov/grid/autonomous-energy.html](http://www.nrel.gov/grid/autonomous-energy.html)