



Bloomenergy®

Caltech | Bloom Energy

Parent organization

California Institute of Technology
(Caltech)

Headquarters

Pasadena, CA

Industry

Education

Bloom installation

4.2 MW across 5 sites on campus
with Advanced Bloom Microgrid

Objective

Integrating fuel cells into existing energy infrastructure to lower energy costs, and create a resilient, low-carbon, and scalable microgrid for the Caltech campus



Key Values

Clean Energy: Bloom Energy fuel cells significantly decrease reliance on the utility grid, lower greenhouse gas emissions (NO_x , SO_x , CO), and significantly lower water usage compared to electricity from the grid.

Campus Energy Resiliency: The microgrid provides reliable power during grid outages, ensuring critical research and operations at Chen Neuroscience Research Building continue uninterrupted.

Cost-Effective: The power purchase agreement (PPA) with Bloom Energy ensures Caltech receives clean electricity at a lower cost than the grid, freeing up resources for its core mission of research and education.



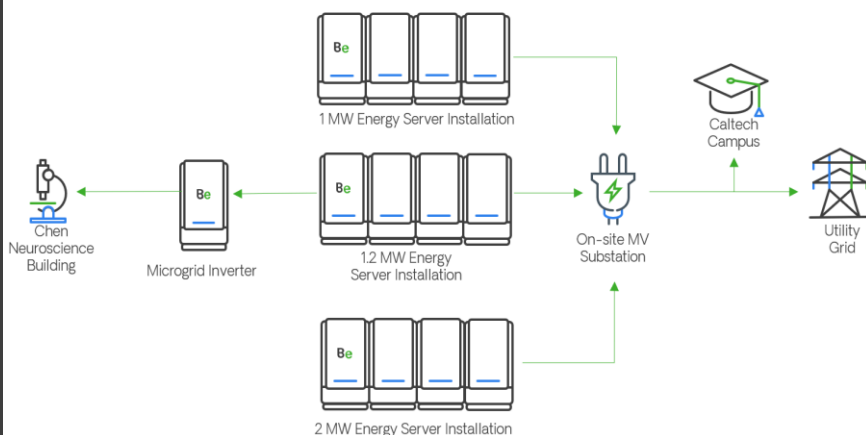
Blooming into Clean Energy

Beginning in 2009, Caltech installed a 1 MW fuel cell capacity to buy clean and economical power through a PPA agreement. The motivation was to meet **increased load demand**, **sustainability goals**, and **reduce utility costs**. The fuel cell operated 24/7 in parallel with the grid, helping offset expensive electricity costs. In 2015, Caltech added more fuel cells to power its campus as part of the PPA, further reducing energy costs.

2009	2015-2019	2021
First Installation 1 MW Primary Power	Expansion 2 MW Primary Power	Expansion 1.2 MW Advanced Bloom Microgrid

In 2021, the addition of the Chen Neuroscience Research Building required additional power on campus. Due to the research's sensitivity to power quality, always-on, reliable power was an important consideration. Caltech chose the Advanced Bloom Microgrid to supply 1.2 MW of uninterruptible, dedicated, load-following power for this application.

System Architecture



Partnering with Bloom has allowed Caltech to secure clean, reliable, and predictably priced electricity while minimizing operational and economic risks. By initiating PPAs, Caltech benefits from Bloom's technological expertise and receives electricity with a lower carbon intensity than the grid. Additionally, Bloom's fuel cells enhance reliability and resiliency in Caltech's campus electricity distribution system."

Seth Fink

Energy & Utility Resources
Manager, Caltech

The microgrid solution operates simultaneously, with two sets of dedicated inverters: one load-following the microgrid and another operating in parallel with the utility grid. Bloom Energy uses custom microgrid controls that allow the microgrid inverter to load-follow Caltech's Chen Neuroscience Research Building. Any additional power generated is exported to the rest of the campus via the MV substation.

Powering Caltech through a Utility Outage

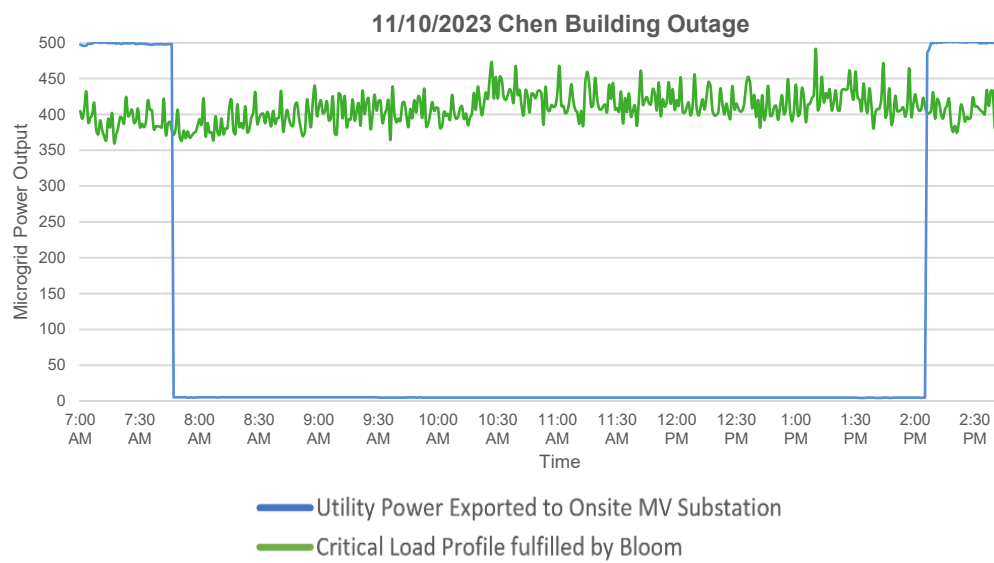







Figure 3 shows Bloom Energy's microgrid powering Chen Neuroscience facility through a 6-hour utility outage, ensuring 24/7 UPS quality power. With Bloom’s microgrid inverters maintaining the loads off the grid, utility interruption will not affect the power delivered to the facility. The grid-connected inverters safely disconnect during an outage and reconnect to the grid once normal operations resume.

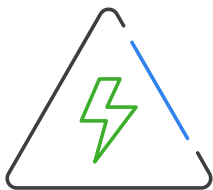
Sustainability Metrics for the 1.2 MW Microgrid

Metrics	Since 2021 (– Nov. 2023)
 Avoided Downtime	4 Outages; ~6.5 Hours
 Longest Outage Duration	~6 Hours
 CO ₂ Reduction (lbs.)	11,157,176
 Total kWh Delivered	40,780,106
 Gallons of Water Saved per MWh	2,304

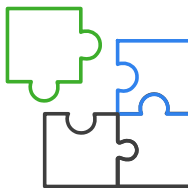
Caltech has been able to advance its sustainability goals using the Bloom Energy Server®. In less than 4 years, Bloom’s fuel cell technology has helped reduce Caltech’s CO₂ footprint by over 11M pounds¹, when compared to utilizing local power from the grid. Furthermore, Bloom's on-site power generation results in significant water savings of over 2,000 gal/MWh, compared to the local utility grid.²

1 Calculated from eGrid Data <https://www.epa.gov/egrid>
2 Calculated from USGS Water Data for the Nation for LA County https://waterdata.usgs.gov/nwis/water_use/

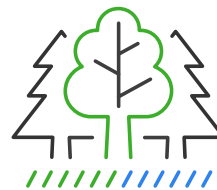
Our Value



Power Quality



Modularity



Sustainability

Power Quality & Reliability: As global power demand grows, power quality has become an increasingly important criterion for decision-making, especially for critical research facilities (data centers and semiconductor manufacturing). Bloom Energy's microgrids ensure 24/7 grid-independent, UPS-quality power and dedicated remote monitoring to ensure reliable power is delivered to facilities.

Expansion & Modularity: Bloom is equipped to help companies meet their power needs as businesses grow and expand. Bloom's Energy Server is easily scalable, meeting various installation sizes and implementing upgrades. The modular architecture allows customers to scale up as needed and flexibly meet critical infrastructure needs.

Sustainability: Bloom Energy helps customers lower their carbon intensity throughout the entire contract lifecycle and beyond. Bloom advances sustainability metrics by lowering greenhouse gas emissions and water consumption today, while providing a path to upgrade to operating on zero-carbon fuels like Hydrogen in the future.

Towards the Future

As the Hydrogen economy expands, Bloom Energy's fuel cells and microgrids are equipped to seamlessly transition from natural gas to biogas, hydrogen, or a hydrogen blend.

Learn more about this project:



[Chén Neuroscience
Research Building Awards](#)



[Bloom Energy Powers Caltech
with Fuel Cell Technology \(Video\)](#)



[Press Release Article:
SoCalGas & Bloom Energy](#)



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Accelerate your path to
a zero-carbon future.