



The Quinnipiac wind garden (center) powers half of its York Hill campus' external lighting in a unique public space.

On-Campus Wind Energy

Toward 100% Clean, Renewable Energy on Campus

Installing wind energy systems on or near campuses can help America's colleges and universities shift to 100 percent clean, renewable energy. College campuses across the U.S. are investing in wind energy to reduce their electricity costs, provide learning opportunities for students, and lower their carbon emissions.

Wind Energy Is Key to Building a 100% Renewable Energy System

Installing wind energy systems on campus is a great way for America's colleges and universities to lead the transition to a future of 100 percent clean, renewable energy. In 2016, wind energy across the U.S. achieved greenhouse gas emission reductions equivalent to taking 33.7 million cars off the road – more than all the cars in California, Texas and Florida combined. Wind energy is a key to shifting away from today's carbon-based energy system.

Wind Energy Offers Opportunities for College Campuses

College campuses are uniquely suited to wind energy:

- **Location:** Many universities are good locations for wind installations, and can install full-scale turbines on open fields or microturbines on rooftops.
- **Cost-Effective:** On-shore wind energy has dropped in price by 90 percent since the 1980s, and is often cheaper than energy from fossil fuels, especially when accounting for tax incentives.
- **Training and Research Opportunities:** On-campus wind energy also provides opportunities for training future renewable energy industry workers, and for cutting-edge research and innovation at engineering schools. As of April 2018, wind turbine technician is the second fastest-growing job in the U.S.

Colleges and Universities Are Uniquely Equipped to Overcome Obstacles to Wind Energy

Wind energy is virtually pollution-free, inexhaustible, safe and efficient, but often faces obstacles. Colleges are uniquely suited to tackle the challenges associated with wind energy:

- **Financing:** Universities can enter into power purchase agreements with utilities to develop wind installations on campus without upfront capital costs.
- **Fluctuations in Energy Output:** Colleges are developing strategies to deal with varying wind speeds, like Case Western Reserve University, which treats its campus as a “living laboratory” and uses the Department of Energy's VOLT-TRON software to mitigate variable production from its wind turbines.
- **Freedom to Experiment:** Colleges can experiment with new ways to integrate wind energy on campus, like microturbines that have a smaller footprint in communities. At Quinnipiac University, 25 vertical micro wind turbines on a terrace create a kinetic sculpture garden that also powers half of the external lighting at its York Hill campus.

One of Carleton College's two wind turbines is expected to provide about 25 percent of its electricity needs.

University of Delaware's Big Wind Turbine Provides Power and Research Opportunities

Today, the University of Delaware campus has the only commercial-sized wind turbine in Delaware, and tapping into the East Coast's immense wind energy potential is key to its clean energy goals.

Built in 2010, the wind turbine produces enough electricity to power the buildings at the Lewes campus, as well as 108 homes in the city of Lewes. This results in the university averting carbon dioxide emissions equivalent to taking nearly 750 passenger vehicles off the road.

The University of Delaware has a long history of being at the forefront of clean energy innovation, starting the world's first lab dedicated to photovoltaic research and development in 1972. In keeping with its history, a primary mission of the wind turbine project is to create research and educational opportunities.

To date, students have used the wind turbine to study everything from impacts on birds and bats to the corrosive impacts of salty coastal air, important for advancing understanding of offshore wind turbines. One study resulted in the development of software called Bat Shield, which allows for modification of turbine operation to protect bats during migration season.



Carleton College's Wind Turbines Supply Half of Campus' Electricity

In 2004, Carleton College became the first college in the country to own an active utility-grade wind turbine, located 1.5 miles east of campus. The college added a second 1.68-megawatt turbine in 2011. Carleton's two turbines can supply 55 to 70 percent of the college's electricity demand, and avert carbon dioxide emissions equivalent to those produced by almost 1,400 passenger vehicles.

Carleton used a \$150,000 grant from the Minnesota Department of Commerce to fund the first turbine, and sold the electricity and renewable energy credits to the local utility for the first 10 years until 2014, making the turbines financial winners for the college. The second turbine was a gift from environmentally-minded graduates celebrating their 30th wedding anniversary.

The turbines also provide educational opportunities. Students participated in siting the first turbine, and use the turbines' computer interfaces, which track wind speeds, energy generation and turbine capacity, as learning tools in geology, energy and economics classes.

*This factsheet is one of an 11-piece series.
For citations, and to read the other factsheets,
please visit
EnvironmentAmericaCenter.org/Campus101*



List of Resources

To kick-start wind installation on your campus:

- Assess your local wind resource with the National Renewable Energy Laboratory's Wind Energy Resource Atlas: www.nrel.gov/gis/wind.html
- Find out if your state provides incentives or tax credits for wind installations: www.dsireusa.org
- Use the American Wind Energy Association's Wind Energy Siting Handbook to find the right site: www.awea.org/Issues/Content.aspx?ItemNumber=5726

Photo credits: Front – Shoreline Aerial Photography, LLC;
Back – Robert Hest, via Flickr, CC BY-NC-SA 2.0.