



AASHE Green Gigawatt Partnership – On-Campus Solar Project Support

March 8, 2017



Campuses are exposed to volatile power markets due to reliance on large quantities of energy to power campus. Power purchase agreements (PPAs) from renewable energy projects mitigate this long-term risk by reducing exposure to volatile power prices.

Risk Management

Fixed price contracts provide protection against:

- Commodity prices, e.g. natural gas
- Weather events, e.g. Polar Vortex
- Environmental regulation, e.g. Clean Power Plan, MATS, SOX, NOX
- Generator fleet retirements, e.g. nuclear, coal
- Inflation

Cost Savings

- PPA contract priced below leading 3rd party expectations of future market prices

Sustainability

- Energy sourced from wind parks or solar farms
- Renewable Energy Certificates (RECs) are included in contracts

The renewable energy opportunities available to be pursued are priced at a **discount to expected market prices** and are medium to long-term, providing **protection against broader market movements**.

HOW DO RENEWABLE ENERGY PURCHASE AGREEMENTS (REPAs, a.k.a. PPAs) WORK?

Power purchase agreement: contract between electricity generator and electricity user.

The agreement stipulates a price per kilowatt hour (kWh) for power from a specific project for a period of time.

- Price can be flat, escalating, or staggered
- Term is typically 12-25 years
- Projects can be on campus, nearby, or distant from campus

PPA Benefits for Buyers

- No capital cost to buyer
- Long-term duration provides price certainty over time and reduces exposure to fluctuating conventional power prices
- PPAs can save energy costs because the cost of solar and wind can now compete against conventional fossil power
- Environmental benefits can accrue to buyer at no cost

PPA Benefits for Sellers

Renewable energy developers use these contractual purchase commitments from large, credit-worthy energy users as leverage to gain access to low-interest capital needed to build their projects and produce power at competitive prices.

POWER PURCHASE AGREEMENTS (PPA) IN HIGHER ED

Altenex's Director of Higher Education programs ran the sustainability office at American University, where he executed three solar PPAs.

Onsite Solar Photovoltaics

532 kW on seven rooftops

750,000 kWh / year for 20 years

Estimated lifetime savings = \$671,000

Onsite Solar Hot Water

350 kW equivalent on five rooftops

Displaces natural gas

Savings = 35% discount against gas

Offsite Solar

53 MW on three sites

123,000 MWh / year

Estimated lifetime savings = \$14M



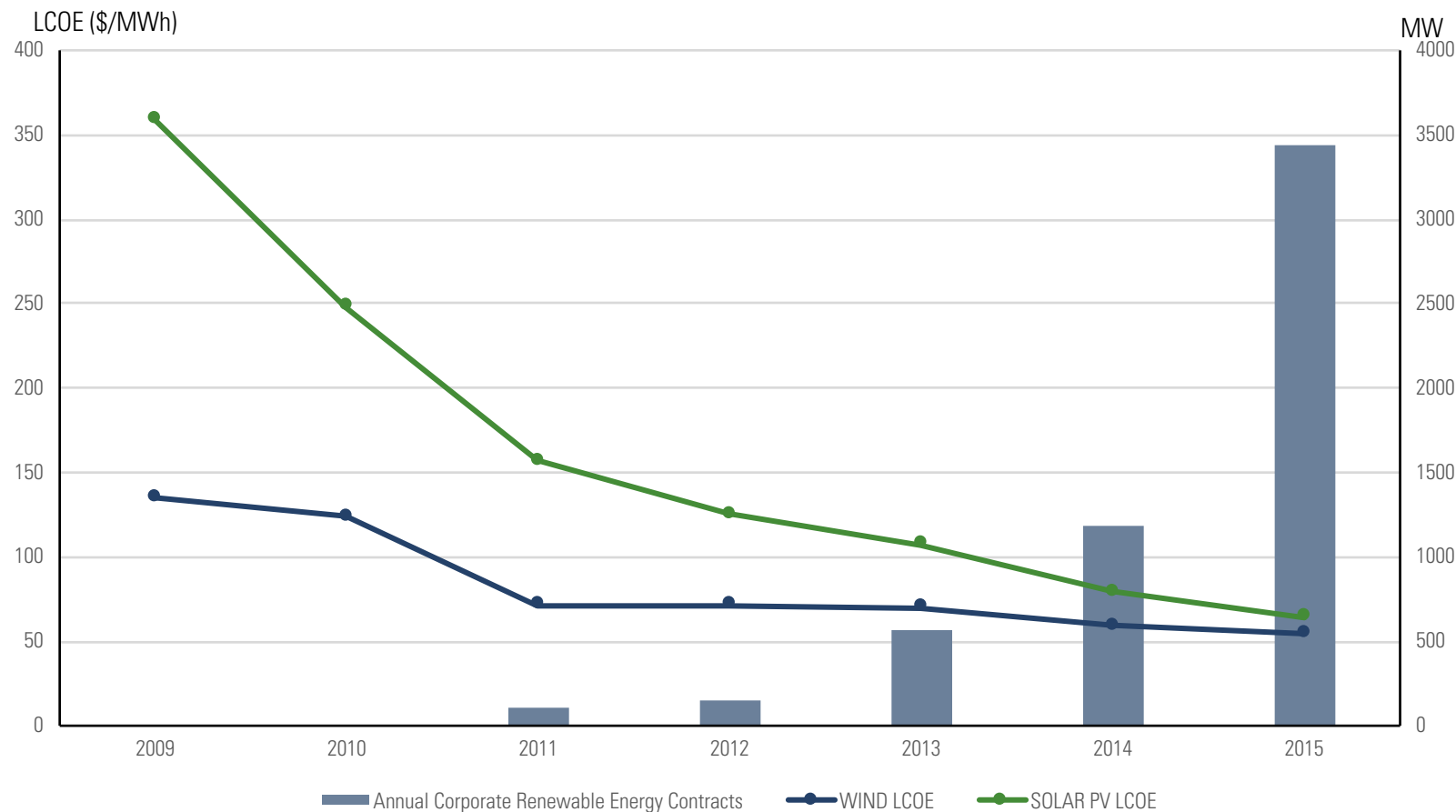
Onsite solar PV



Onsite solar hot water



Offsite solar PV



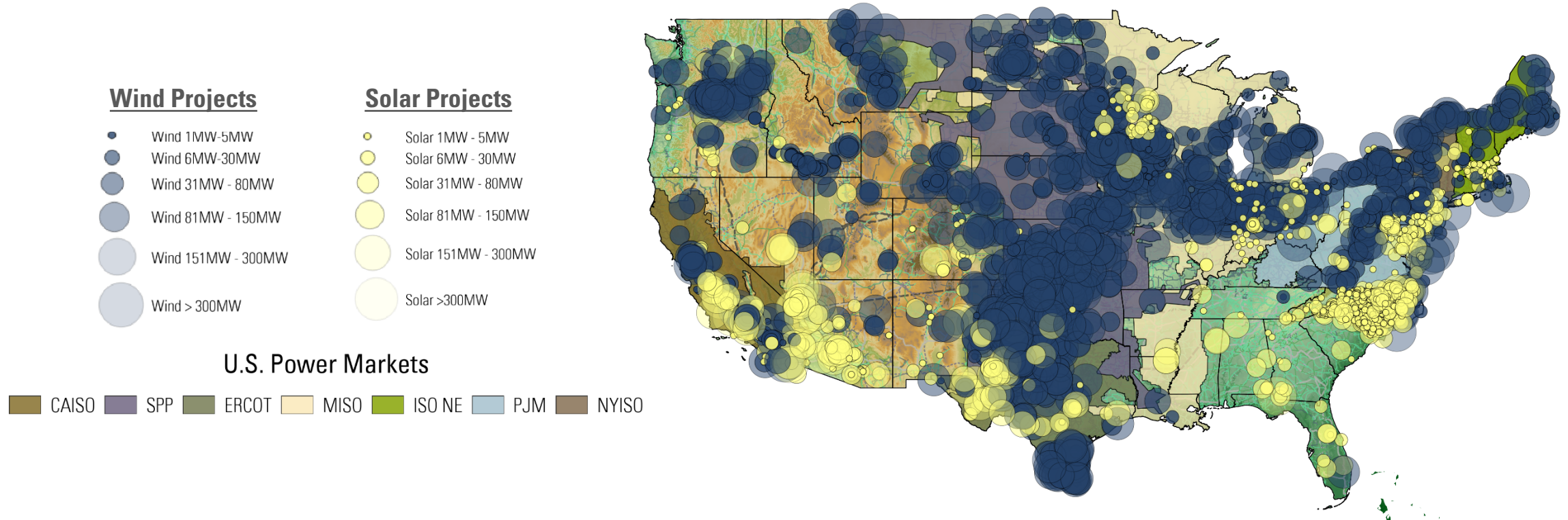
In the last 5 years, corporations have contracted for over **5.7 gigawatts** total capacity of renewable power.

^a Data values for graph sourced from U.S. Department of Energy's National Renewable Energy Laboratory, 2015 and the Rocky Mountain Institute, 2017.

OFFSITE RENEWABLES MARKET IS LARGE, COMPLEX, & OPAQUE

Historically, the market has been difficult to access and has lacked clarity. Altenex has developed a proprietary database that provides detailed information and analysis on **over 5,000+ renewable energy projects**. This data is used to help customers identify clean power purchasing opportunities that meet their selection criteria.

Altenex has also transacted 64 MW of deals in the regulated Mexican markets under the past self-supply program.



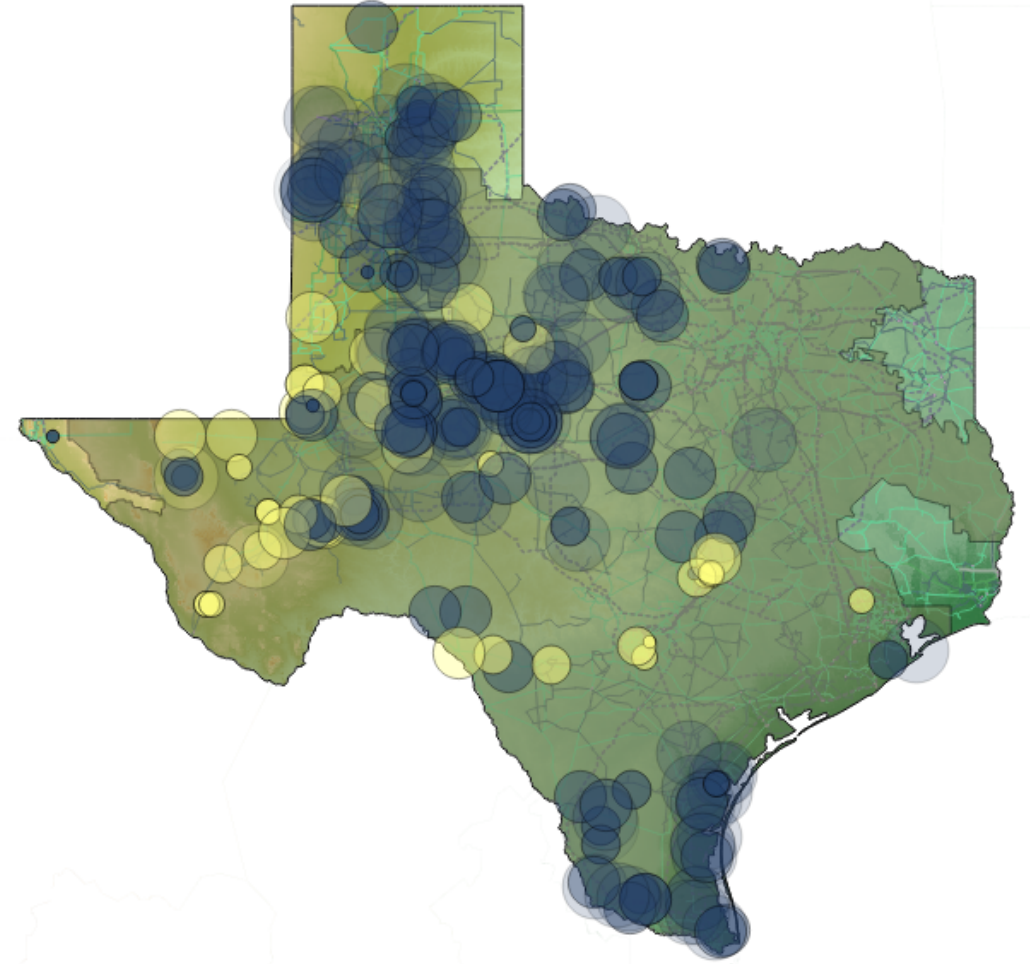
The ERCOT market spans most of Texas and currently represents the largest market for corporate buyers of wind energy in the United States. Key features include robust wind resource and marginal development costs.

ERCOT Market Advantages:

- Very competitive economics for new-build wind projects
- Large and established developer presence
- Mature, deregulated and competitive market
- High dependence on natural gas creates strong correlation with energy prices in other regions around the country

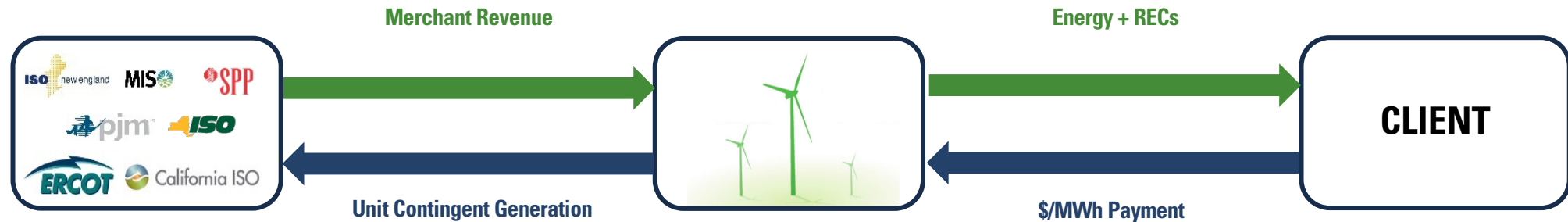
Market Considerations:

- Most competitive projects are able to achieve economies of scale (100+ MW nameplate capacity)
- Hub settlement available
- Pricing generally more competitive at shorter term lengths (12 years)

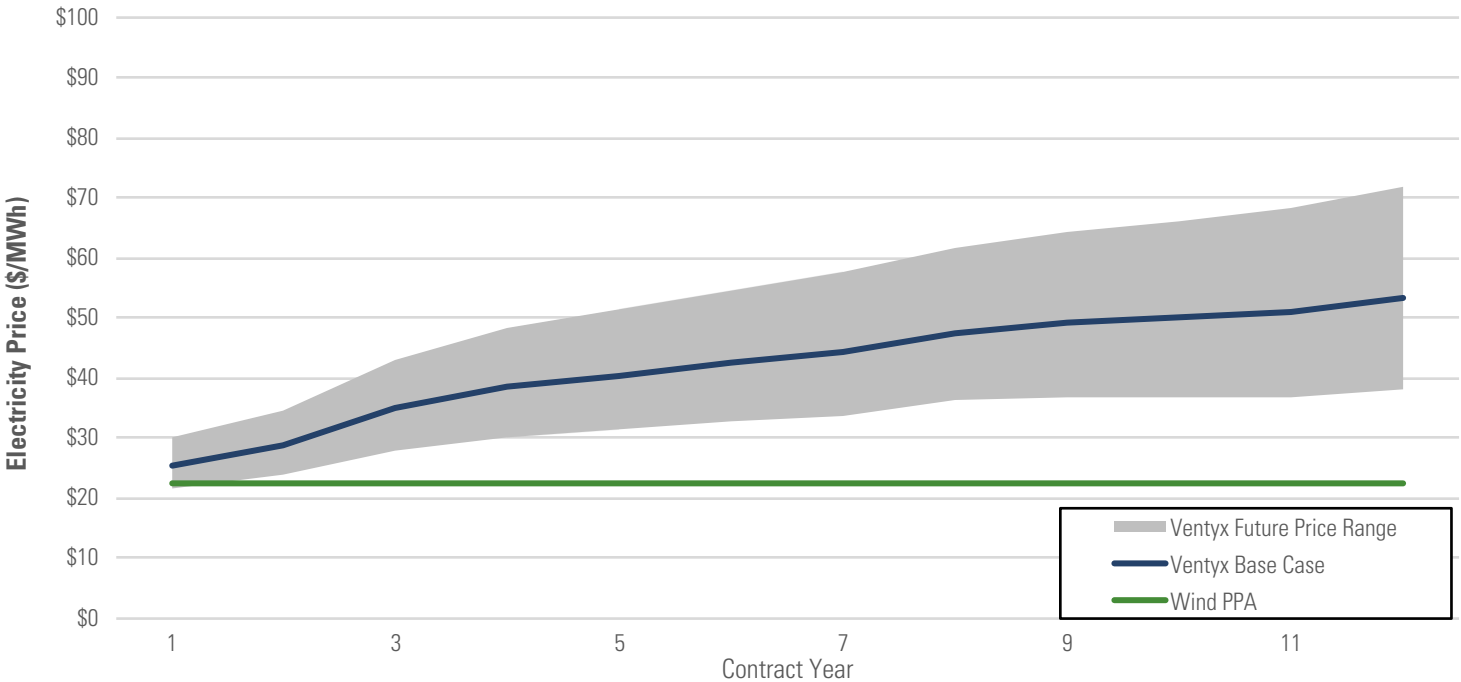


The majority of renewable energy purchase agreements are structured as a contract for differences (CfD):

- Mostly wind and solar projects with 10-15 year contract terms
- Project sells the unit contingent generated renewable energy to the ISO/RTO and receives the spot price (floating market valuation)
- Project provides environmental attributes to the buyer (as well as the generated energy if physical delivery is requested)
- Buyer pays fixed \$/MWh for the energy delivered and captures the difference between market (floating) and fixed price



Expected Performance vs. ERCOT North Hub



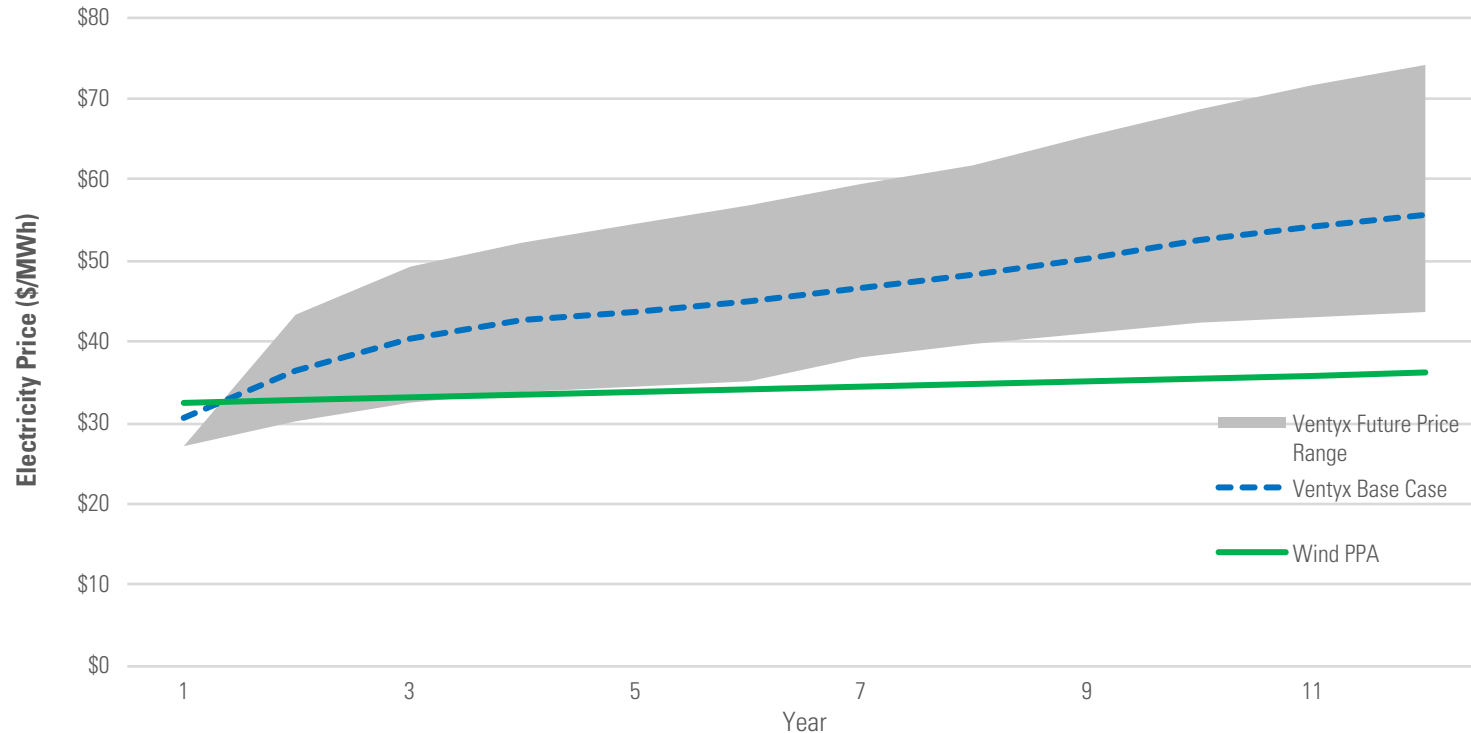
¹ Ventyx market forecasts are used for future market pricing scenarios. The grey shaded region captures the latest the High, Base and Low market forecasts for ERCOT.
² Includes Green-e certified RECs.

Scenario	Year 1 Savings	Total Savings	NPV
High	\$4.2 M	\$180 M	\$91 M
Base	\$1.9 M	\$110 M	\$55 M
Low	(\$45.4 k)	\$53.5 k	\$26 M

Key Facts

- Contract begins Q4 2018
- 100 MW wind project
- Includes National Green-e RECs
- Settlement at ERCOT North Hub
- Savings expected in Year-1

Expected Performance vs. ERCOT North Hub



¹ Ventyx market forecasts are used for future market pricing scenarios. The grey shaded region captures the latest the High, Base and Low market forecasts for ERCOT.

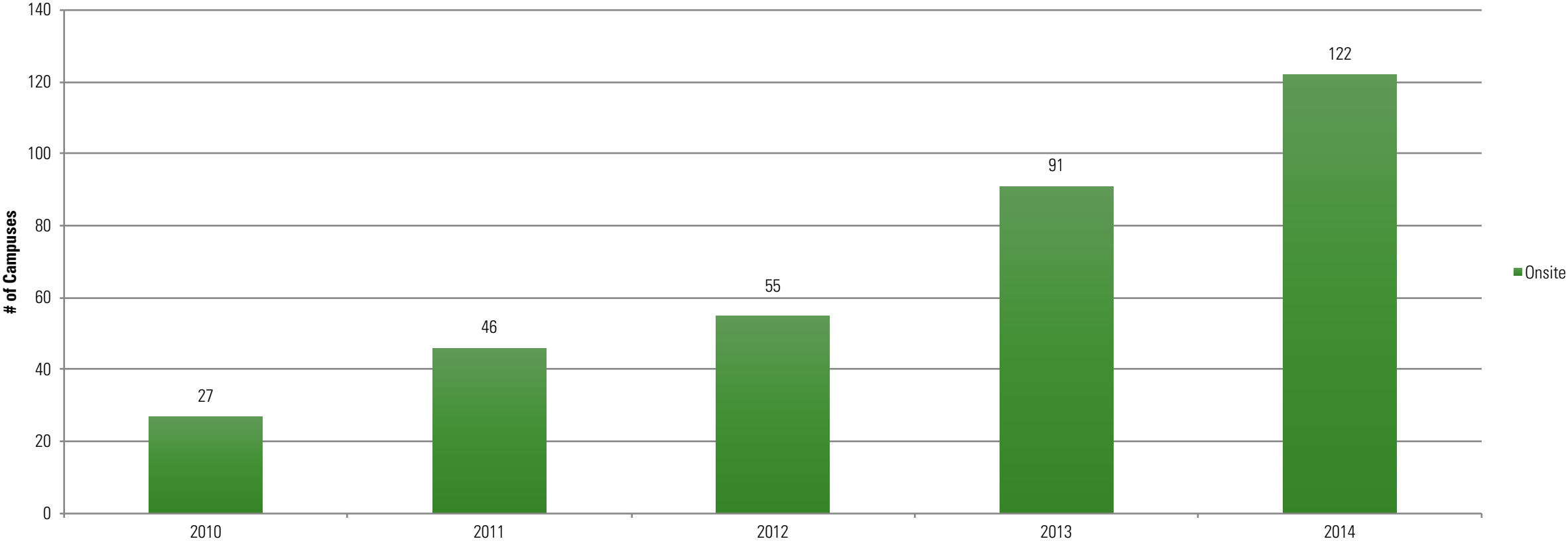
² Includes Green-e certified RECs.

Scenario	Year 1 Savings	Total Savings	NPV
High	\$1.2 M	\$21 M	\$10 M
Base	\$410 k	\$6 M	\$2.8 M
Low	(\$185 k)	\$43.6 k	\$ 860 k

Key Facts

- Contract begins Q4 2018
- 15 MW wind project
- Includes National Green-e RECs
- Settlement at ERCOT North Hub
- Savings expected in Year-1

Number of Campuses With Onsite Solar Power



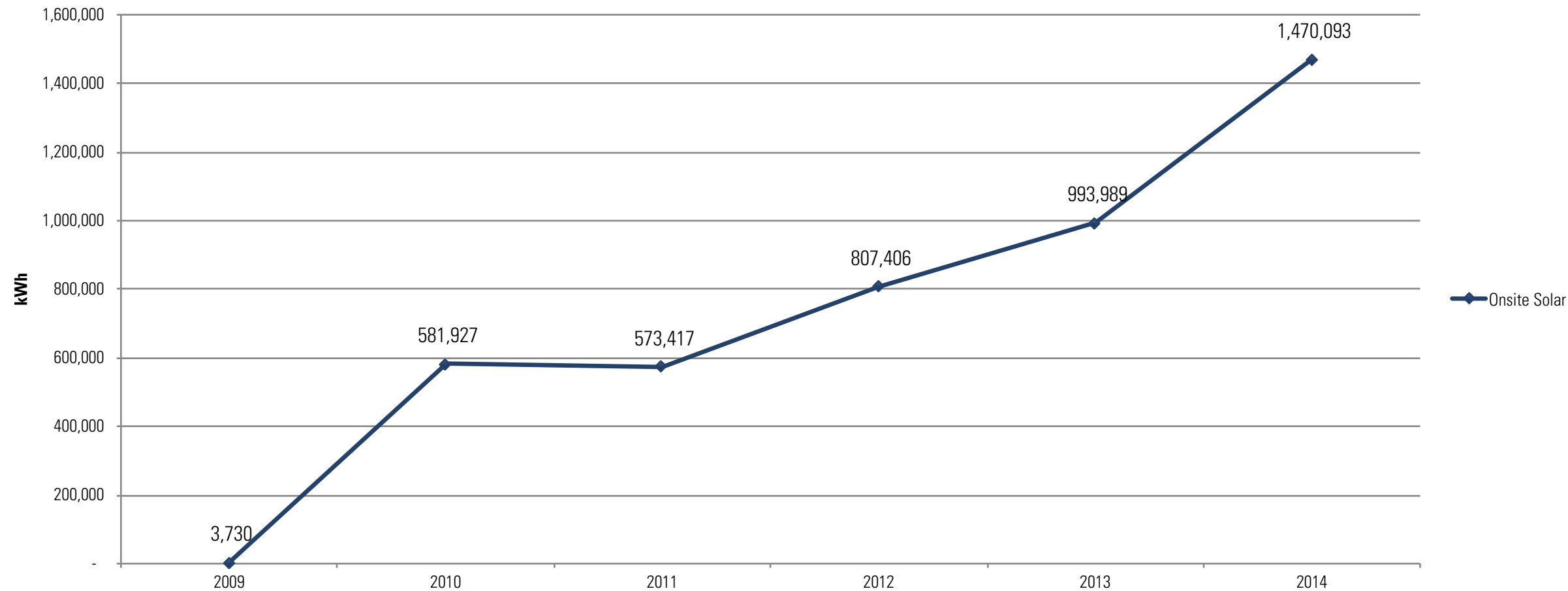
Adelphi University
 American University
 Appalachian State University
 Assumption College
 Auburn University
 Bryn Mawr College
 Bucknell University
 Butte College
 California State University - Fullerton
 California State University-Bakersfield
 California State University-Monterey Bay
 California State University-Northridge
 California State University, Sacramento / Library and The WELL
 California State University, San Bernardino
 Calvin College
 Carleton College
 Carnegie Mellon University
 Chesapeake College
 Clemson University / Ravenel District
 Colby College
 Colby-Sawyer College
 Colorado College
 Colorado State University
 Cornell University
 DePaul University
 Dickinson College
 Eastern Connecticut State University
 Florida Gulf Coast University
 Florida State University
 Furman University
 George Washington University
 Georgia Institute of Technology

Hamilton College
 Hartwick College / Pinelake Environmental Campus
 Heartland Community College
 Hibbing Community College
 Hobart and William Smith Colleges
 Hofstra University
 Illinois Institute of Technology
 Indiana University Bloomington
 Iowa State University
 Johnson County Community College
 Joliet Junior College
 Juniata College
 Kankakee Community College
 Lane Community College
 Lewis & Clark College
 Lewis and Clark Community College
 Loyola Marymount University
 Luther College
 MA Maritime Academy
 Madisonville Community College
 Maryville College
 Marywood University
 Middlebury College
 Mills College
 Muhlenberg College
 Naropa University
 Niagara University
 Northampton Community College / Monroe Campus
 Northern Arizona University
 Northwestern University
 Oberlin College
 Ohio University
 Oregon State University

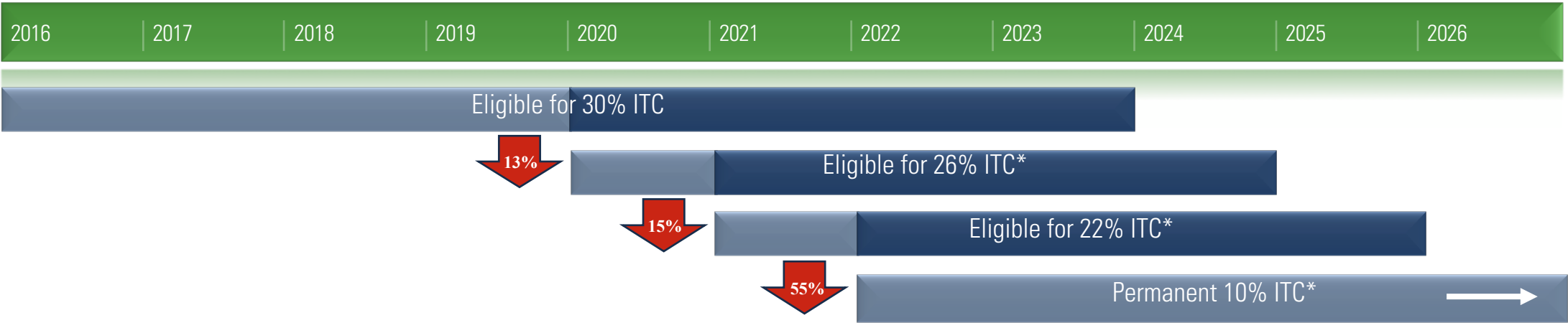
Pacific Lutheran University
 Pittsburg State University
 Pitzer College
 Point Loma Nazarene University
 Pomona College
 Portland State University
 Raritan Valley Community College / Main Campus
 Rochester Institute of Technology
 Santa Clara University
 Sewanee - The University of the South
 Skagit Valley College
 Southern Oregon University
 Southwestern Illinois College
 St. Lawrence University
 St. Mary's College of Maryland
 State University of New York at Albany
 State University of New York at Buffalo
 State University of New York at Cortland
 Sterling College
 Stevens Institute of Technology
 Stony Brook University
 Temple University
 The Evergreen State College
 Tufts University
 Union College
 Unity College
 University of California, Merced
 University of California, San Diego
 University of California, Santa Cruz
 University of Houston
 University of Illinois at Urbana-Champaign
 University of Iowa / Main Campus Buildings
 University of Kentucky

University of Maryland College Park
 University of Minnesota, Morris
 University of Missouri - Columbia
 University of North Carolina, Greensboro
 University of Southern Maine
 University of Tennessee, Knoxville
 University of Texas Arlington
 University of Texas Rio Grande Valley
 University of Utah
 University of Virginia
 University of Washington
 University of Wisconsin-Green Bay
 University of Wisconsin-Oshkosh
 Virginia Commonwealth University
 Wake Forest University
 Washington University / Tyson Research Center
 Weber State University
 Wellesley College
 West Valley College
 Western Kentucky University
 Westminster College
 Whitman College
 Whitworth University
 Williams College

Avg Annual Solar Power Production per Campus



The time is now for solar. The Investment Tax Credit (ITC) is scheduled to phase down.



Decline in ITC value



Solar project commence construction date



Solar placed in service date

* The Treasury and IRS departments are currently drafting guidance on the definition of “commence construction” for solar projects, which will inform developers of which ITC percentage they qualify for. The Consolidated Appropriations Act of 2016 phased the ITC down from its full value of 30%, for projects that begin construction by the end of 2019, to 26% for those that begin construction by the end of 2020, and 22% by the end of 2021. After 2022, commercial and utility investors will be eligible for a 10% ITC.

AASHE partnered with Altenex to launch the GGP, aiming to:

- Catalyze a gigawatt of renewables in higher ed by 2020
- Provide renewable energy advisory support to campuses
- Recognize and celebrate campuses implementing renewable energy

Altenex

- Provides fully integrated renewables advisory services from screening to education to RFP to implementation
- Recently advised **Howard University** on implementing **1.3 MW of onsite solar**
- Partnered with **ENERActive** to pilot an “**onsite solar screening**” for **Cedar Valley College**
- Is now supporting AASHE members by offering **no-cost solar advisory services** for up to **five campuses**

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"Altenex is the bridge GM was looking for to source large-scale renewable energy for our facilities"



"Altenex has helped us take the steps required in the offsite renewable energy sector. We would have been unlikely to pursue these projects without a partner that had deep knowledge in the sector"



"Altenex improves our ability to identify and evaluate cost-effective clean energy projects"



