NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Using Power Purchase Agreements for Solar Deployment at Universities

Jenny Heeter

Eric O'Shaughnessy

February 24, 2016

Green Power Network Free Webinar

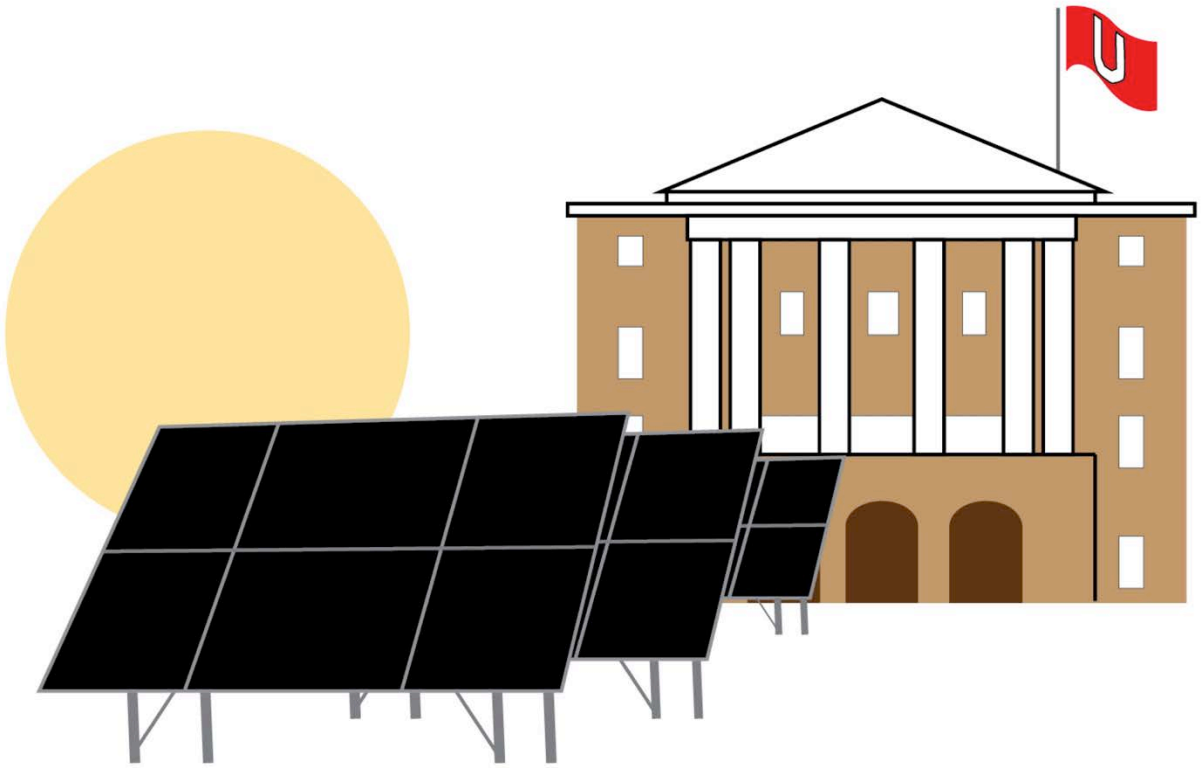
NREL/PR-6A20-66119

Housekeeping

- Participants are joined in listen-only mode.
- Use the Q&A panel to ask questions during the webinar. We will hold all questions until after all speakers have presented.
- Slides will be shared.

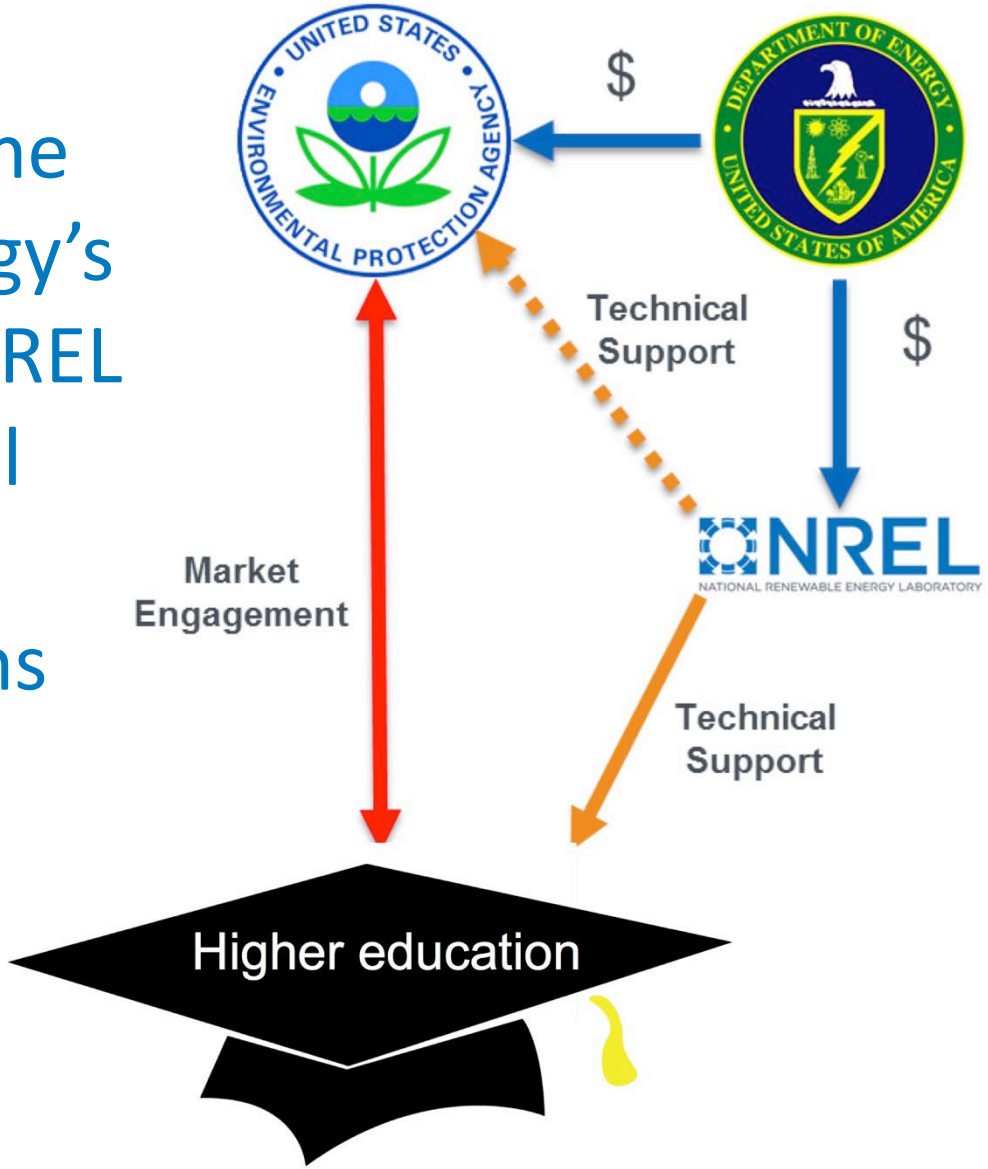
Webinar Plan

- Background on NREL's Solar PV Assistance
- Using solar PPAs at Universities
- Q&A



NREL is Assisting Universities to Deploy PV

- With funding from the Department of Energy's SunShot Initiative, NREL is providing technical support to higher education institutions



Solar Photovoltaic Implementation Assistance

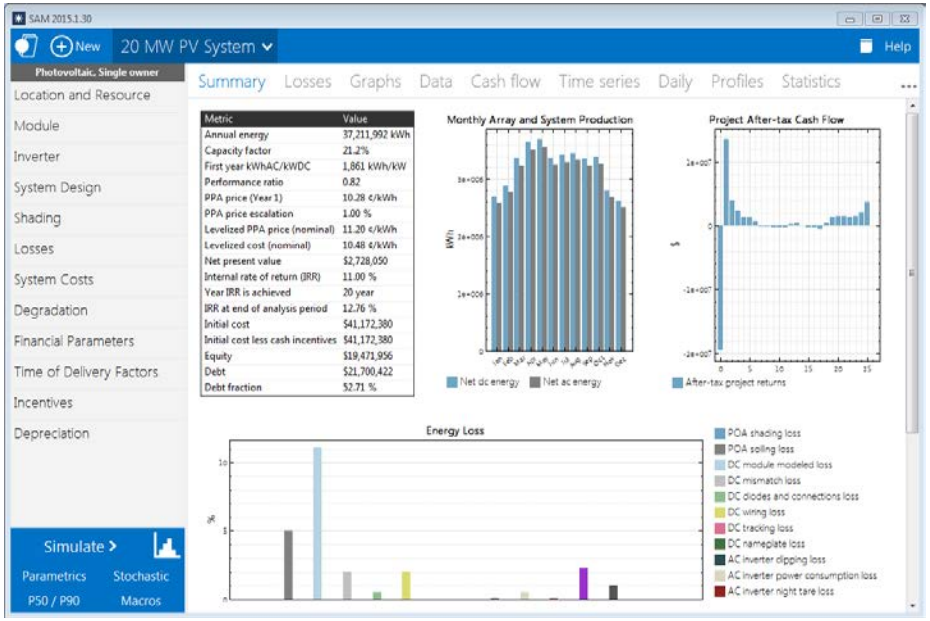
- NREL will provide short-term solar PV implementation assistance to decision-makers in the higher education sector through one-on-one consultations.
- Successful applicants will be partnered with expert NREL staff to determine the most effective use of assistance in deploying mid-scale solar PV.
- NREL will inform the university of existing resources and provide additional information specific to the organization's needs.
- Assistance per university is anticipated to be approximately 40 hours of staff time.

http://www.nrel.gov/tech_deployment/tools_universities.html

Popular Assistance Topics

- Reviewing RFP language
- Financial analysis of RFP bids
- Reviewing PPA contract terms
- Creating a collaborative PV procurement
- Understanding state and utility policy and PV incentive programs

NREL's System Advisor Model



https://sam.nrel.gov

SAM makes performance predictions and cost of energy estimates for grid-connected power projects based on user-input installation and operating costs and system design parameters

Solar Photovoltaic Screenings

- Using the REopt model, NREL will conduct an initial techno-economic assessment of solar PV feasibility at selected universities.
- NREL will provide each university with customized results, including the cost-effectiveness of solar PV, recommended system size, estimated capital cost to implement the technology, and estimated life cycle cost savings.
- Results will be provided for two scenarios: optimizing for cost-effectiveness and optimizing for carbon reduction
- NREL can also offer a more detailed analysis under a separate agreement.

http://www.nrel.gov/tech_deployment/tools_universities.html

First Round Assistance Selections

PV Screening (red points):

- Fairleigh Dickinson University
- Lake Superior College
- Luther College
- University of Minnesota Duluth
- Washington and Lee University
- Milwaukee Area Technical College
- Northern Arizona University
- University of Colorado, Colorado Springs

Implementation Assistance (yellow points):

- North Carolina State
- Ohio University
- Kennesaw State University
- University at Albany
- Southern Connecticut State University
- Parkland College

Why a Fact Sheet on Solar PPAs for Universities?

NREL interviewed 9 universities to understand financial barriers to campus solar deployment

Using PPAs for Solar Deployment at Universities

Background

Solar power purchase agreements (PPAs) have facilitated over 100 megawatts (MW) of solar deployment on campuses around the country.

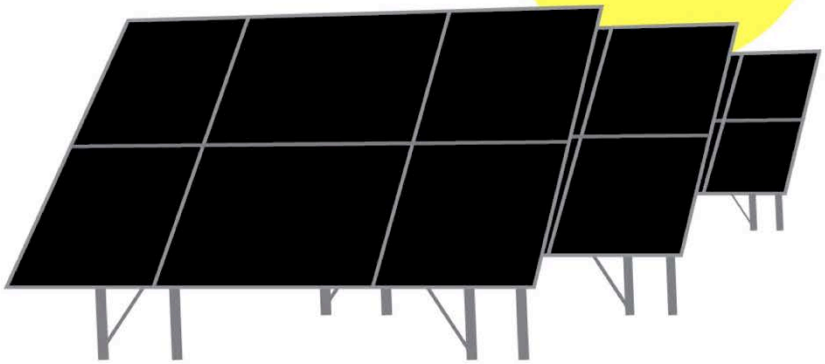
This slide deck provides guidance to universities on the process of using PPAs and how PPAs can make economic sense for campus solar deployment.

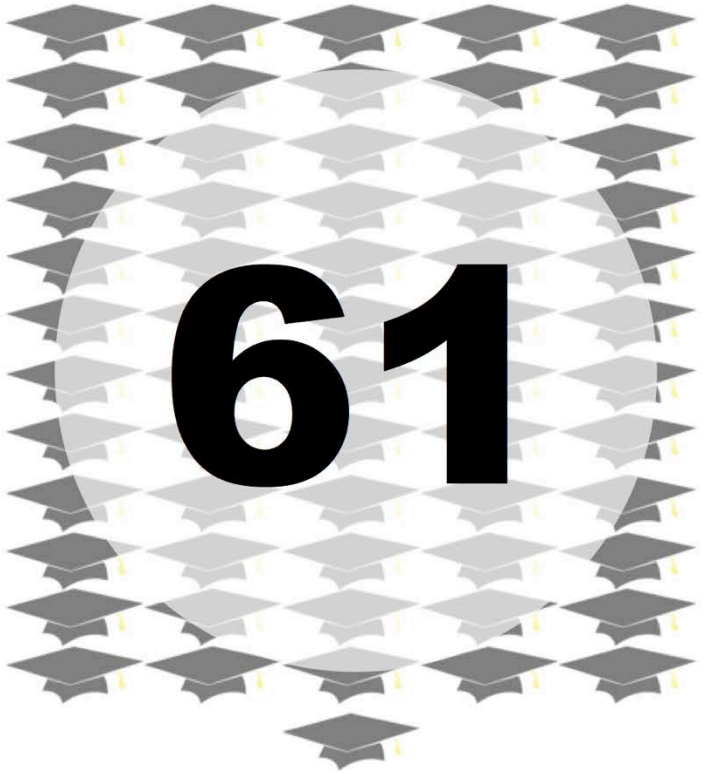
17.4 MW array at Mount Saint Mary's in Maryland, procured with a PPA.

Campus PPAs: Key Numbers

>100 MW

of university solar capacity has been installed through PPAs





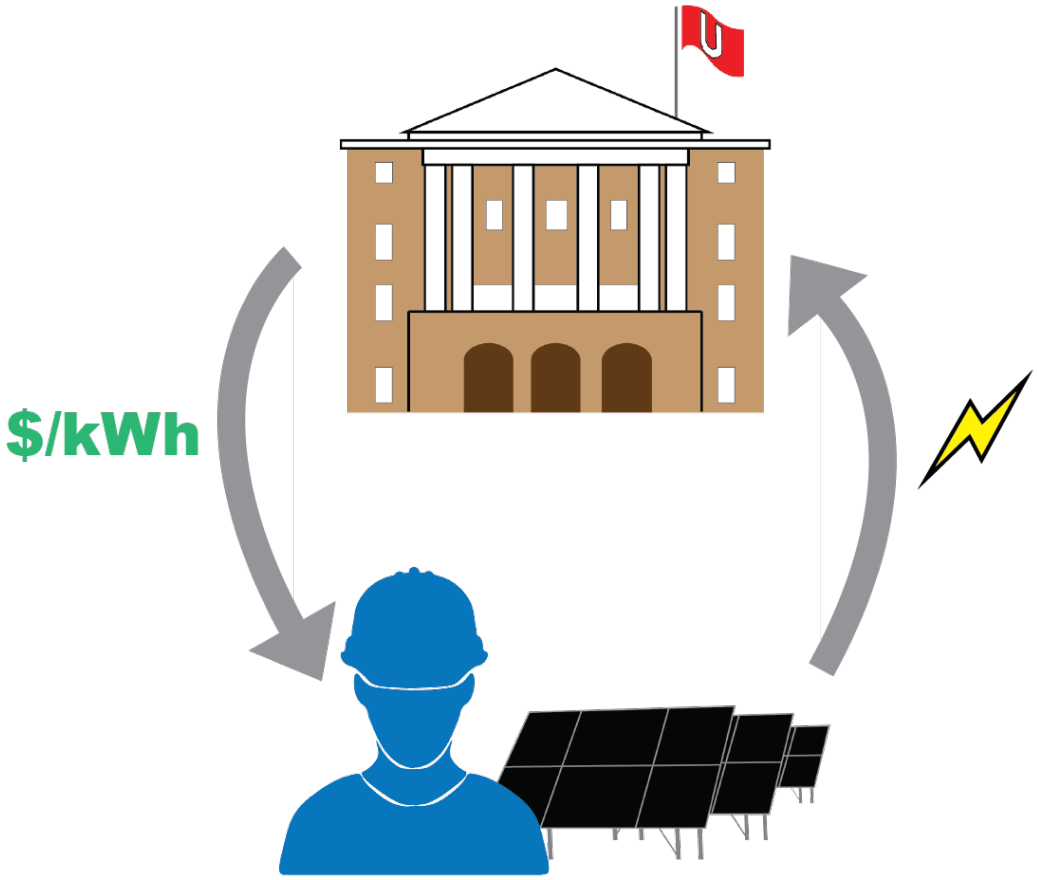
universities have signed a solar PPA

Source: Data from AASHE

How Does a PPA Work?

The university (offtaker) buys power at a negotiated PPA **rate** ($/kWh) for a specified PPA **term** without taking ownership of the system.

The project **developer** or a **tax equity** investor owns the system. The developer is responsible for all permitting, installation, maintenance, and decommissioning.



The PPA Process

Step 1: Preliminary Assessment

- Assess PV suitability on campus
- Study whether PV is an economically viable option or whether PV is in line with other university goals

Arizona State University has procured nearly 24 MW of solar capacity, mostly through PPAs

The PPA Process

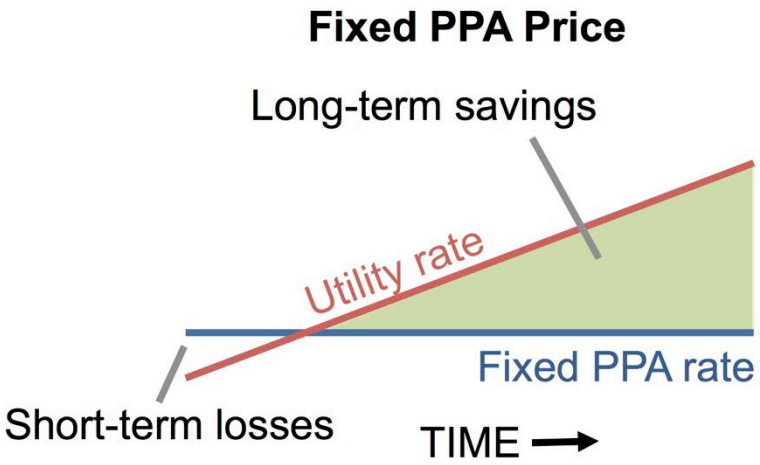
Step 2: Finding a Project Developer

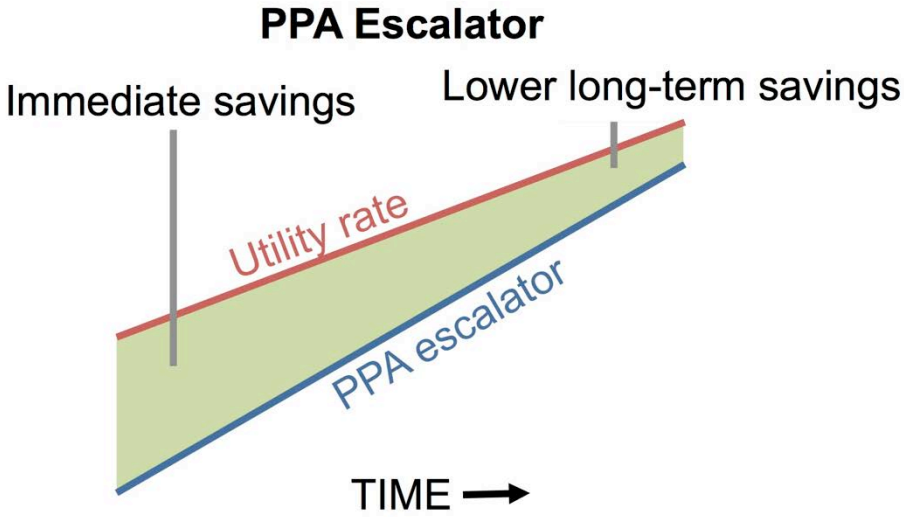
- Request For Proposal (RFP) to solicit competitive PPA bids
- RFP: sufficiently prescriptive but flexible
- Terms: negotiable and non-negotiable
- Possible criteria: developer experience, financial stability, and willingness to provide performance guarantees

The PPA Process

Step 3: PPA Negotiation

- Contract terms: generally 15 to 25 years
- Pricing structure: fixed or escalator?
- Who owns the renewable energy (RECs)?

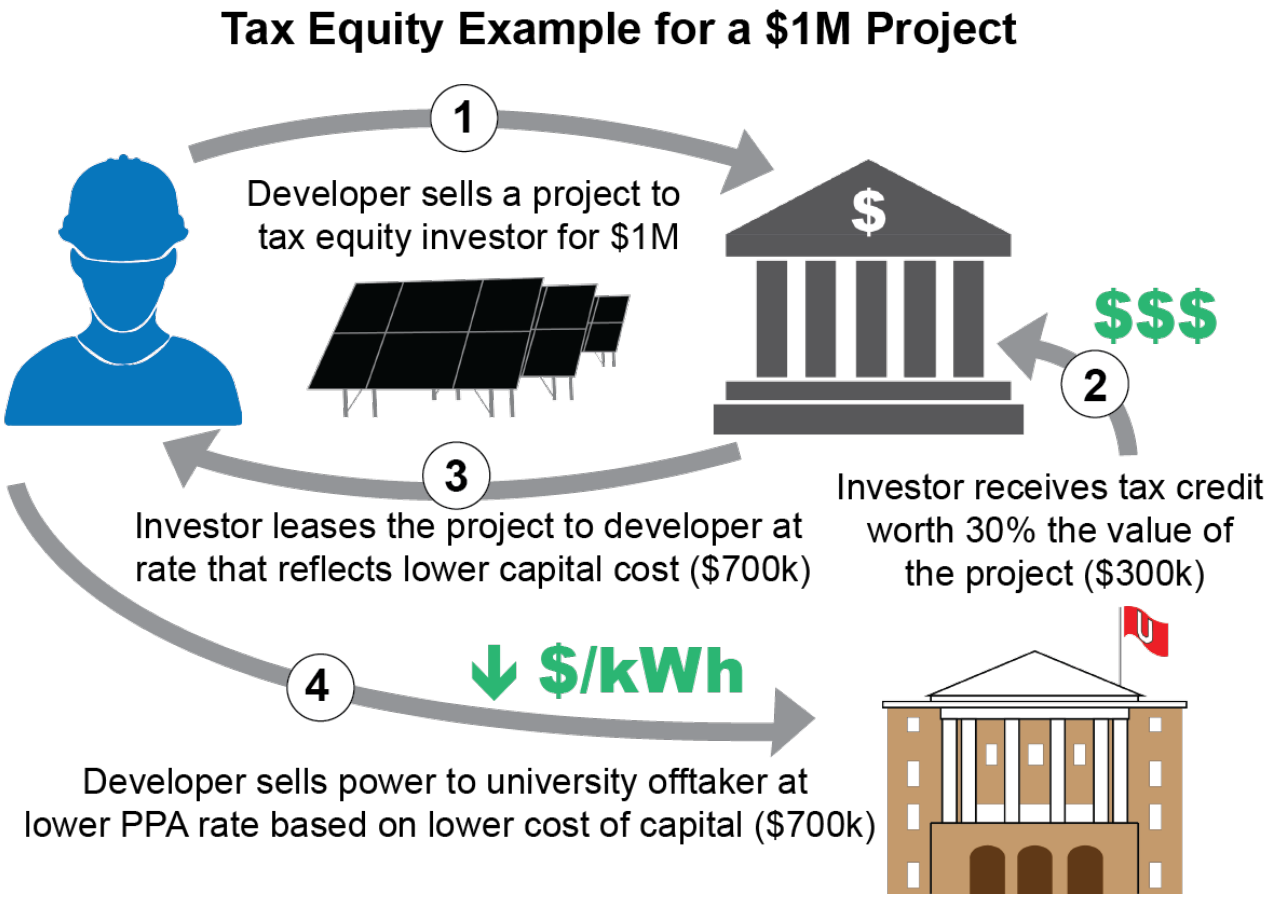




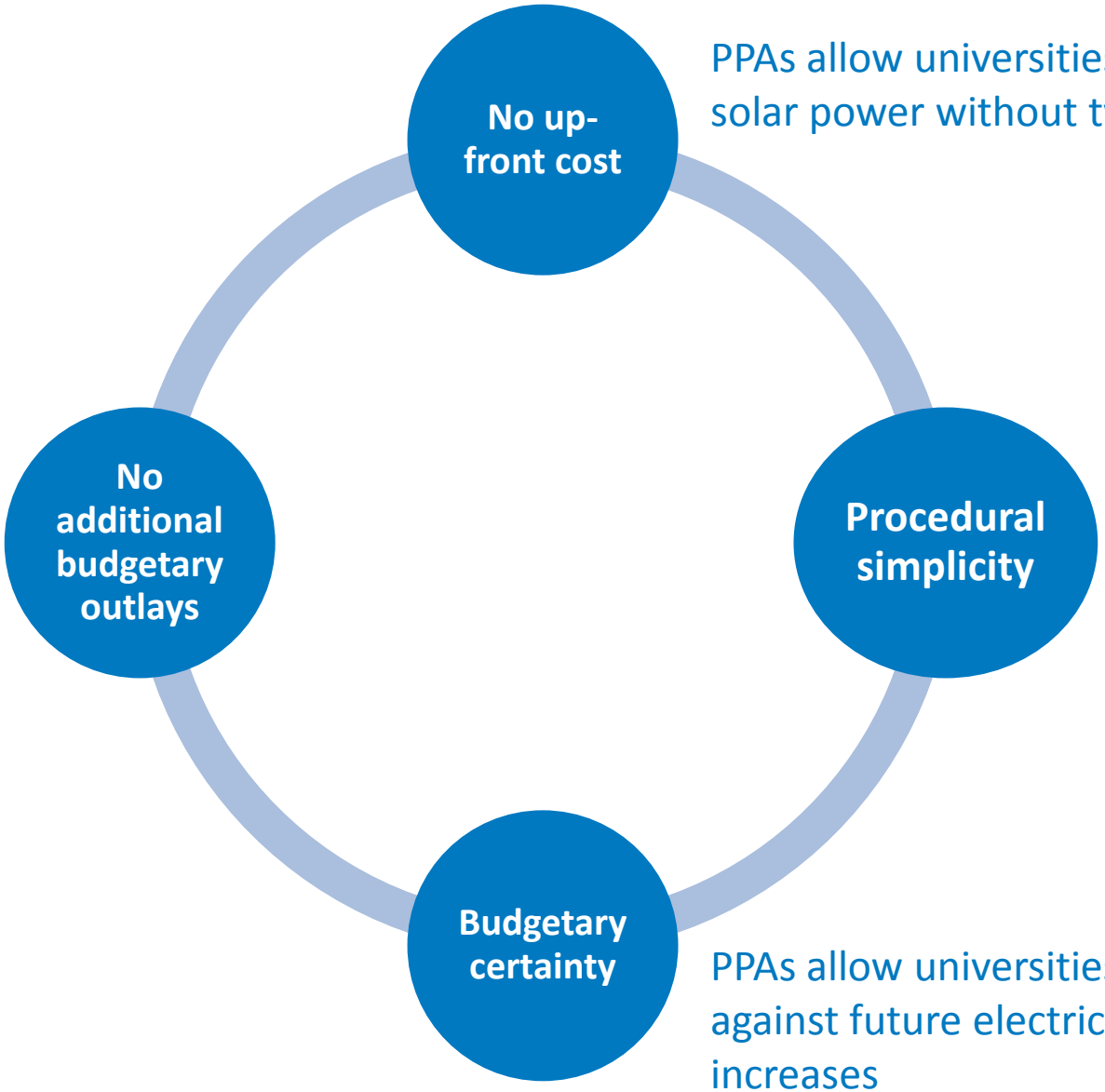
PPA Benefits

Tax Equity

- Allows tax-exempt entities to indirectly benefit from tax credits through a lower PPA price



Other PPA Benefits



PPAs allow universities to invest in solar power without tying up capital

Developer is responsible for operations and maintenance

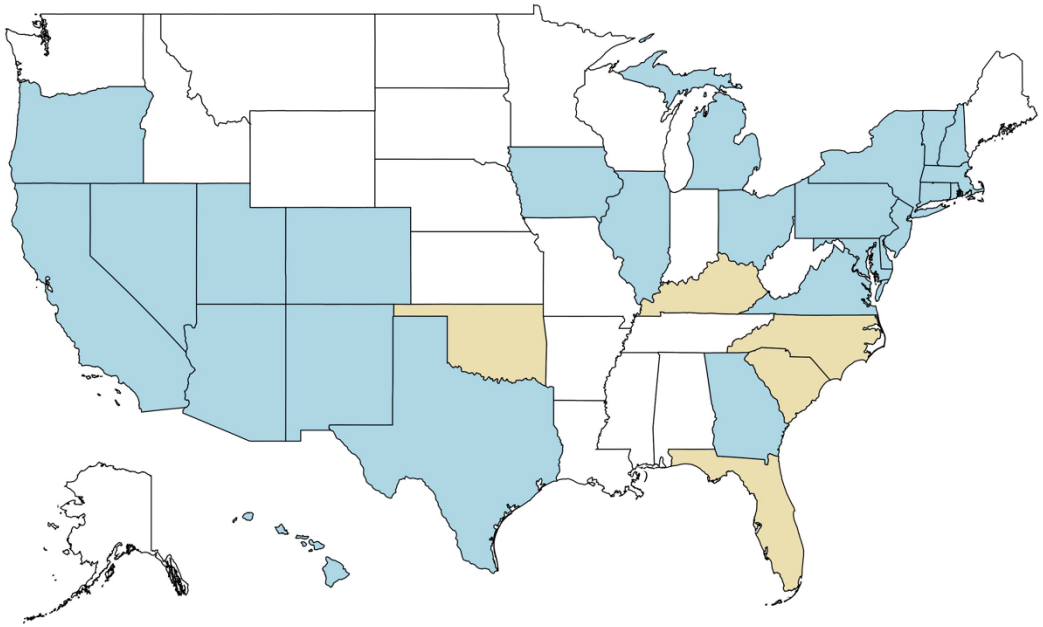
PPAs allow universities to hedge against future electricity price increases

Universities can pay PPA costs from existing budgets (e.g., utility)

Challenges

- On-site PPAs are not available in all states
- PPAs entail a learning curve for university staff
- Some university CFOs may be hesitant to enter into a long-term contract for power
- Low university creditworthiness can result in higher PPA prices

Where are on-site PPAs allowed?



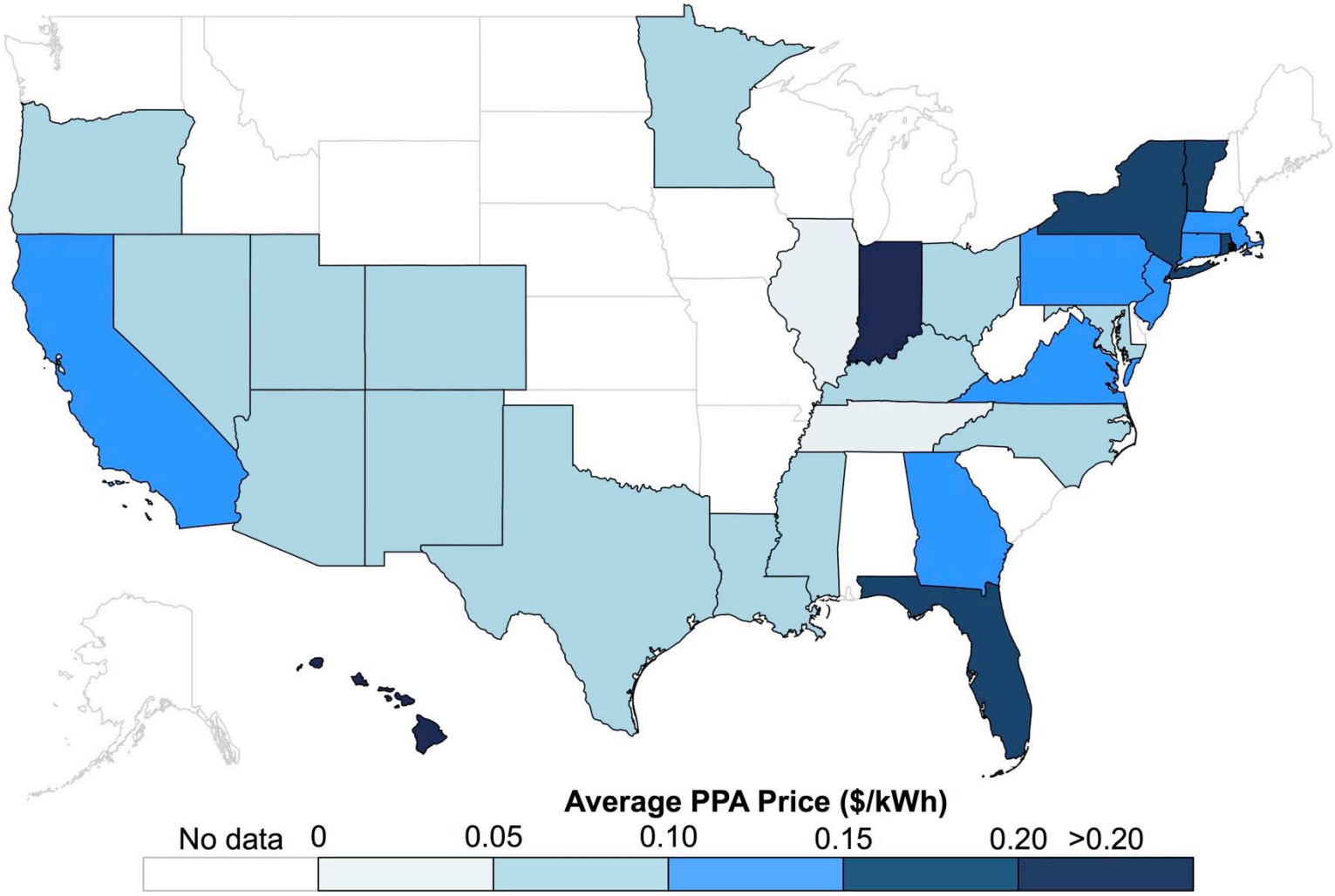
25 25 states (including DC) explicitly authorize third-party solar PPAs through policies that exempt PPA transactions from utility regulation

21 21 states do not address PPAs through state-level policy. PPAs in these states may be subject to utility regulation on a case-by-case basis

5 5 states have policies that explicitly prohibit or restrict PPAs

Source: DSIRE

What are typical offtaker rates?

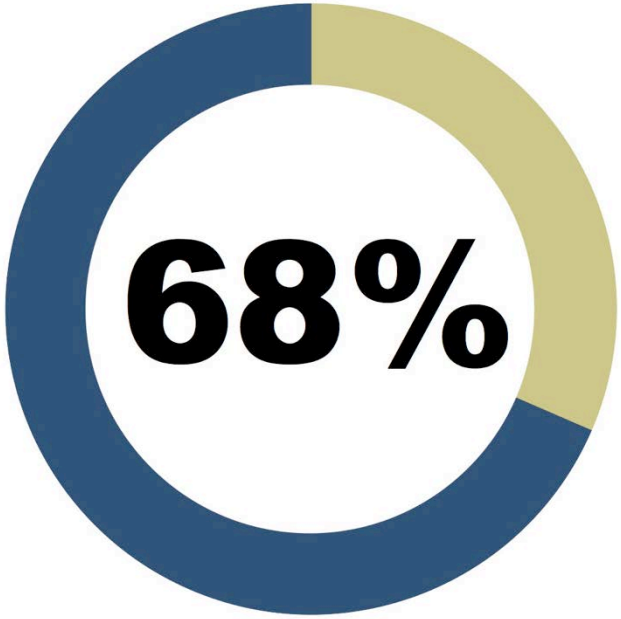


Note: In states with PPA restrictions (e.g., FL, KY, NC) offtakers may sign "financially-settled" PPAs with out-of-state projects

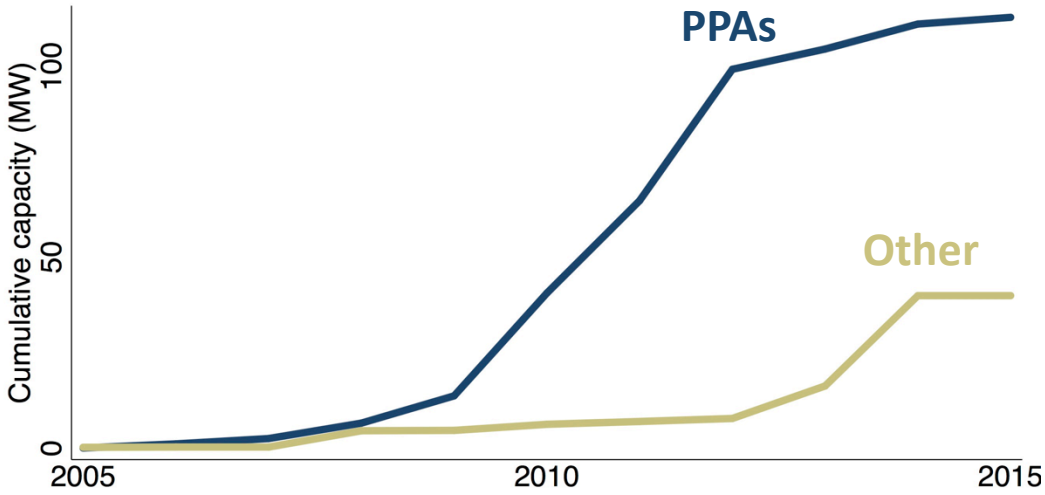
Source: Data from Mercatus

Trends in Campus Solar PPAs

PPAs have become the preferred method for solar procurement at many universities



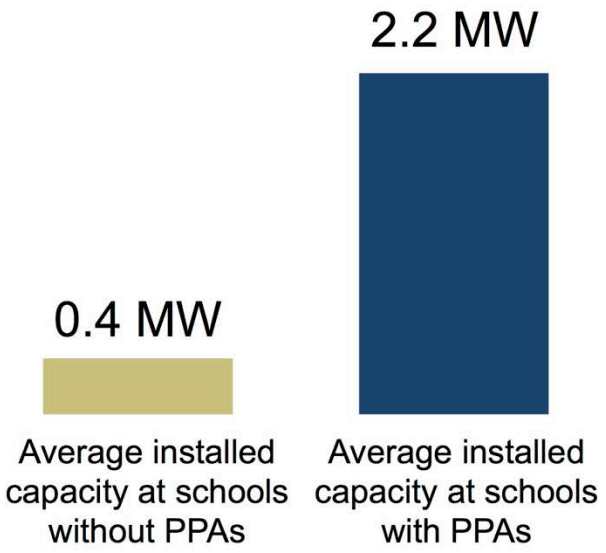
Percentage of university capacity installed through a PPA



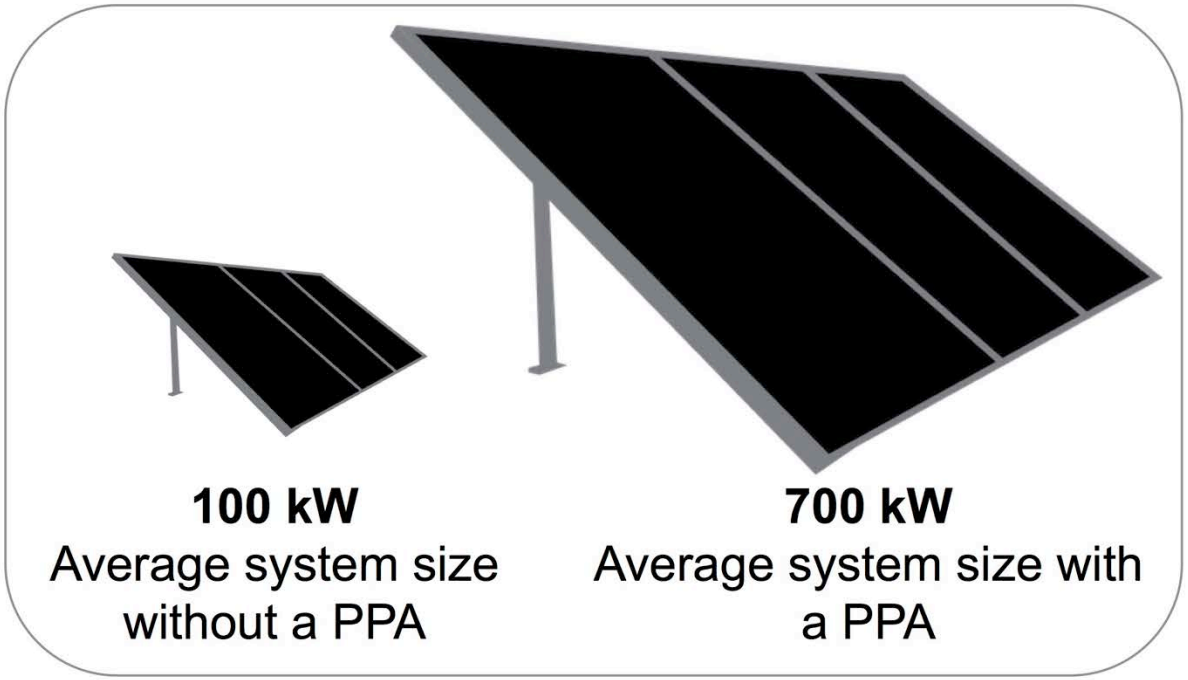
Source: Data from AASHE

Trends in Campus Solar PPAs

PPAs allow schools to procure more solar



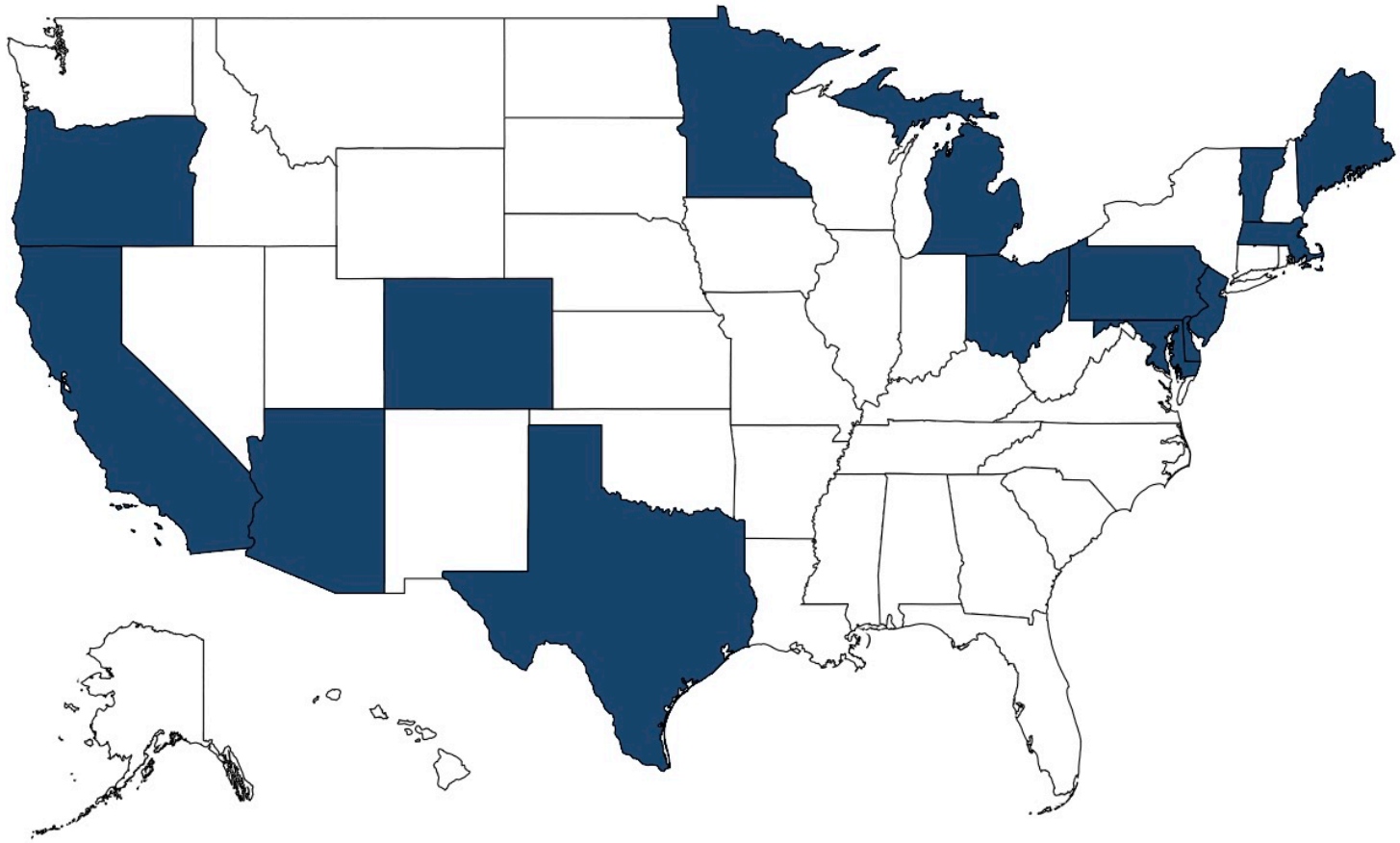
PPAs facilitate larger projects



Source: Data from AASHE

Trends in Campus Solar PPAs

Universities have used PPAs in at least 16 states as of February 2016



Source: Data from AASHE

PPA Resources

NREL Brochure "Using Power Purchase Agreements for Solar Deployment at Universities"
http://www.nrel.gov/docs/gen/fy16/65567.pdf

IREC's Solar Power Purchase Agreements: A Toolkit for Local Governments (Includes an annotated model PPA)
http://www.irecusa.org/publications/solar-power-purchase-agreements-a-toolkit-for-local-governments/
Archived webinar: https://vimeo.com/125871846

Example PPAs:
Standard Commercial PPA version 1.1 (Developed by a working group of financial professionals)
https://financere.nrel.gov/finance/content/solar-securitization-and-solar-access-public-capital-sapc-working-group#standard_contracts

New York K-Solar PPA Template
http://www.p12.nysed.gov/facplan/documents/K-SolarPPATemplatePerformanceWarrantyandPurchaserCreditAgreement.pdf

IREC: Sample PPA (Word version)
http://www.irecusa.org/wp-content/uploads/2015/04/Final_Clean_PPA_Template.docx

Key Components and Terms

Assignability: The ability of the project developer to transfer site rights to another party.

Contract term: The period during which the offtaker agrees to purchase power from the system owner.

Escalator: Contract clause under which the PPA price increases over time, generally less than 3%.

Expiration: Conditions defining the offtaker's options at the end of the contract term, including whether the offtaker will have the option to purchase the system.

Environmental attributes: The ownership of the environmental attributes (renewable energy credits) of the system's output.

Liabilities: The contract defines the obligations of the offtaker and the system owner for system maintenance, repair, or other liabilities arising from unforeseen events.

Offtaker: The purchaser of renewable energy.

Performance terms: The PPA specifies the obligations of both the offtaker and system owner concerning the system's performance, including any exclusions under which either party is exempt from compliance with contract terms

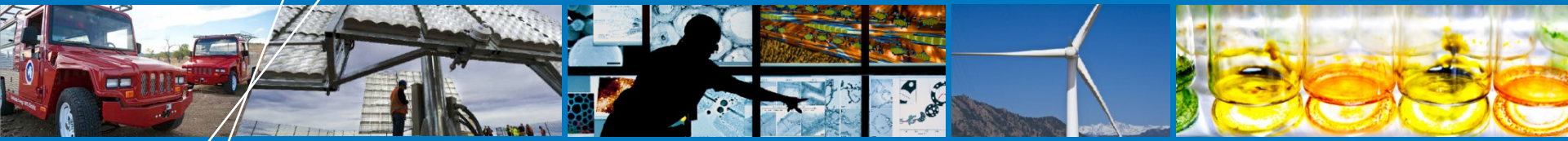
PPA price: The contract specifies the rate ($/kWh) at which the offtaker will pay the project developer for the system's output.

Site right agreement: Agreement defining the developer's rights to access and use the offtaker's property for project development, operation, maintenance, and decommissioning.

Tax equity: Capital raised from a taxable entity in return for the receipt of tax incentives.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

THANK YOU!



Contacts: Eric O'Shaughnessy
<Eric.OShaughnessy@nrel.gov>
Jenny Heeter
<Jenny.Heeter@nrel.gov>