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Non-Power Purchase Agreement (PPA) Options for Financing Solar Deployment at Universities

Financing solar using power purchase agreements (PPAs) has facilitated total solar deployment of more than 100 megawatts (MW) at universities—compared to 50 MW using financing models not using PPAs (as of June 2016). This overview summarizes existing financing models and funding mechanisms available for solar procurement, focusing on non-PPA financing models. For more information on solar deployment at universities using PPAs, refer to *Using Power Purchase Agreements for Solar Deployment at Universities.*

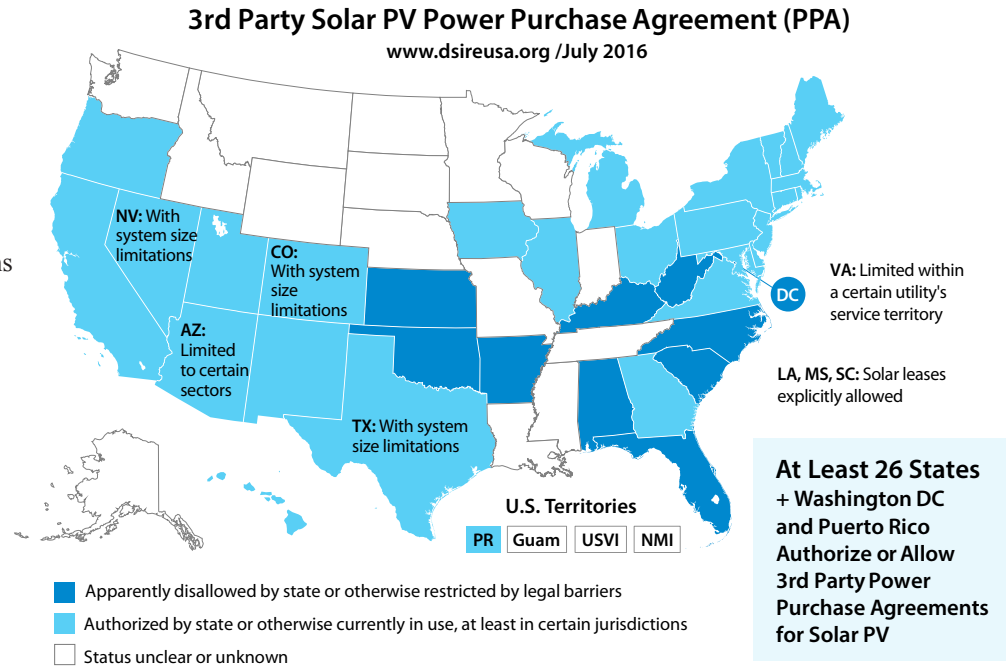

Figure 1: PPA regulations in states across the U.S. *(Source: DSIRE, 2016)*

Non-PPA Solar Financing Models

Institution-Owned and Lease Financing Models

A few non-PPA solar financing models exist, including institution-owned and lease mechanisms. These are frequently used by universities when a PPA is not the best choice. In some states, universities are required to use non-PPA financing models because of restrictive PPA policy regulations. Currently, nine states disallow or restrict the sale of electricity by non-utility providers in regulated electricity markets. Twenty-six states and Washington, D.C., have facilitated PPAs by clarifying that third-party system owners are not subject to regulation as a utility, whereas the remaining states have not, as summarized in Figure 1. Consult the *Database for State Incentives for Renewables and Efficiency (DSIRE)* for the PPA policy in your state.

Institution-owned models allow universities to be the owner of the solar photovoltaic (PV) system. In these models, the university makes an upfront payment to purchase the system. It is also responsible for design, construction, installation, operation and maintenance of the system, although the university may contract these responsibilities to a third party. The university owns the electricity generated by the system as well as its environmental attributes, unless it decides to sell them to another party. Because most universities do not pay federal taxes, they cannot take advantage of the federal investment tax credit or depreciation benefits when owning a system. The university bears the full risk in this model.

Lease models allow a third-party project lessor to finance the solar PV installation. The lessor is responsible for the upfront costs of the project and it owns the solar PV system. Lessors often take advantage of federal tax incentives and depreciation benefits as determined by the contract terms. The university makes lease payments spread over a fixed term to the lessor. The negotiated contract terms determine each party's rights to electricity generated and its environmental attributes. Often, these rights remain with

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the university that is leasing the solar PV system. The risk of solar electricity production is borne by the university or lessor as per contract terms. At the end of the lease contract term, the university may have an option to buy the solar PV system from its lessor or to extend the lease.

Funding and Revenue Streams

Universities employ a set of different funding and revenue streams in non-PPA solar financing models. An overview of these mechanisms is discussed below:

Grants and incentives are external sources of capital that are not required to be repaid by the university or tax payers. Grants can be accessed from philanthropic institutions or federal, state, and local governments. Similarly, some state and utility incentive programs may offer substantial rebates, although nationally, these types of rebates have declined in recent years. Grants reduce project costs and are beneficial in paying large upfront costs for solar procurement in the institution-owned or lease models. However, the grant application process may be time-and resource-consuming. Universities have adopted different strategies in finding and securing appropriate grants, since opportunities are limited. Government grants often have requirements of matching funds that need to be fulfilled within a short period of time after the grant application is accepted. If these matching funds are not readily available, it may be challenging for universities to access these grants. Hence, availability of a readily available fund such as a green fund or revolving loan fund may be critical in securing grants.

Solar Renewable Energy Certificates (SRECs) represent the environmental attributes of solar energy systems and can be traded separately from commodity electricity. An SREC is created for each megawatt-hour (MWh) of electricity generated from solar energy systems. SRECs provide a valuable revenue stream to universities investing in solar. SREC prices vary in different states and regions. For example, SRECs in New Jersey have sold for more than $200/MWh, but less than $20/MWh in Pennsylvania. In addition, many states do not have an SREC market. In regions with weaker SREC markets, universities may hold on to their SRECs and sell them if market conditions change. SREC benefits can be easily availed by universities in an institution-owned or lease arrangement.

Bond financing is accessible to universities for financing solar projects. Public universities can issue or obtain tax-exempt low-interest bonds to invest in capital projects or to refinance prior-issued bonds. These funds may have restrictions on their use. This method has been used by universities to develop standalone solar projects, as well as solar projects as a smaller part of the university infrastructure development.

Donor funding can partially or fully finance renewable energy projects with lease arrangements. Close and long relationships with donors are critical in developing a mutually beneficial partnership with universities. University employees play a pivotal role in developing and maintaining these relationships. Strong donor relationships may also lead to developing lease arrangements with favorable terms for universities.

Donors can take advantage of tax credits and depreciation benefits when investing in university solar projects, whereas public universities cannot. These tax credits in certain states may be transferrable by sale, which can be financially beneficial for donors. Donors may also determine funding criteria and restrict the use of funds at universities. If donors are inclined to reduce greenhouse gas emissions using renewable energy projects, they may be able to influence the university to prioritize and invest in solar procurement.

Internal funds may be used by universities to finance solar PV projects. Universities may allocate a certain part of their budget, or may draw funds from their internal operating or capital budget, to fund solar procurement. Of course, there may be competition or higher priorities for use of these limited funds.

Sustainability or renewable energy funds are based on a nominal amount charged to students, e.g. charging students an annual fee or charging per credit hour can be implemented by universities. These fees may be initiated by university students or by the administration. It is critical to have institutional support as well as sustainability or renewable energy champions to ensure proper functioning of such tools. This type of fund can be employed to provide matching funds when applying for competitive grants. There are *85 green or sustainability revolving loan funds*[1] at 81 institutions and *154 campus green or sustainability funds*[2] at 136 institutions according to Association for the Advancement of Sustainability in Higher Education Campus Solar Photovoltaics Installation Database (2016). These data are self-reported and should be interpreted as a representative sample rather than exhaustive.

Other mechanisms used by universities for solar PV project funding or project development include:

- Manufacturers providing solar panels *pro-bono* to the university. For example, solar panels for a small installation at the University of Arizona were donated by a local Tucson manufacturer to the university.

1. Revolving loan funds, often referred to as green revolving funds or sustainability revolving loan funds, provide dedicated funding for schools to invest in energy-efficiency or resource-efficiency projects while capturing the cost-savings from the reduced energy and/or resource use (AASHE, 2016).

2. A campus green fund, also called a campus sustainability fund, is a financial mechanism dedicated to the funding of projects such as renewable energy installations, energy retrofits, educational outreach, and the hiring of sustainability personnel occurring on campus and for the benefit of an institution's sustainability efforts (AASHE, 2016).

- Universities lease out land available to private companies to install solar systems that feed electricity into the local grid. The only revenue generated for universities in this case is rent for the land. One example is the solar technology park at the University of Arizona in Tucson, Arizona.

Solar Procurement Processes within the University

Universities may outsource the complete solar procurement procedure to consultancies or undertake it internally within the university. In cases of using external procurement methods, Requests for Proposals (RFPs) are used to select consultancies that can manage technical and financial aspects of project development with oversight from university management. If the university completes the solar procurement procedure internally, then multiple departments—including facilities, operations, finance, accounts, and grants—are involved in the process. A mix of different financing methods may be used at the university's discretion. Some universities also develop a separate entity for handling project financing.

Financial analysis, payback period, and return on investment of the project are critical for decision makers in assessing long-term financial viability of the project before approving an investment in solar procurement. This process of approval is complicated and may involve several university officials from different departments—including the facilities manager, president, Board of Regents, and trustees—depending on the university management structure. Processing time for project approval of different financing models varies. Although PPAs can take substantially longer to obtain approval, institution-owned models have a faster processing time.

Solar procurement at universities may be driven by sustainability champions and students, or by the vision of management at the university and an institutional mandate. These drivers, further elaborated below, are particularly critical in non-PPA solar financing models used by universities:

- ***University commitment.*** University commitments to reduce greenhouse gases can guide budget allocation and fund-raising efforts, which ensures better funding availability for solar procurement in universities. They can also ensure buy-in from upper management, which expedites the university approval process.
- ***Solar energy champion.*** As in any solar project, a campus solar champion can speed deployment through initiating solar projects, strategizing and procuring new funding opportunities, maintaining and strengthening key relationships with donors, and ensuring buy-in from upper management at the university.
- ***Student initiatives.*** Students can be influential in motivating university administrators to prioritize solar energy.
- ***Sustainability branding.*** Sustainable design and architecture of campus buildings using solar can build the school's reputation as a "green" campus. Further curricula designed around solar PV projects can teach students transferrable skills for the job market.

Case Studies

This section provides examples of non-PPA options used by universities to finance solar deployment.

Austin Community College District (ACCD): Leveraging Grant Funding with a Campus Green Fund

ACCD in Austin, Texas is a leader in sustainability and has installed over 670 kilowatts (kW) of solar on their campuses. As a Climate Leadership Commitment (CLC)[3] signatory, the college has invested in hiring staff to develop a sustainability and energy team. This team has championed solar deployment within the college. Solar projects at ACCD primarily use the institution-owned model, with a mix of different funding mechanisms elaborated below:

- Riverside Campus and Rio Grande Campus, 2.4 kW: ACCD was awarded two Solar for Schools grants by Austin Energy under the U.S. Department of Energy's Solar City program in late 2007 to develop two 2.4 kW solar demonstration projects.
- Riverside Campus, 11.6 kW: Installed in 2009, funded by a WorkSource Grant and a utility rebate (Austin Energy).
- Northridge and Eastview Campus, 345 kW: Installed in 2010, funded by the American Recovery and Reinvestment Act (ARRA). ACCD received $1.6 million in federal grants and invested $400,000 as matching funds for the grant in this project. ACCD met the 20% matching-fund requirement through sustainability funds collected by the college. ACCD collected $1 per semester credit-hour from students to create this sustainability fund. ACCD estimates that the sustainability fee generates $750,000 a year, which is used for solar procurement, along with other activities.
- Round Rock Campus, 325 kW: Installed in 2011, $900,000 funded by federal ARRA grants and $300,000 in university matching funds. A utility grant (Encore) was used by the university to match ARRA funds.
- Upcoming projects: ACCD has two upcoming solar projects. $150,000 EBSCO Information Services solar grants were awarded to ACCD in June, 2016 for installing a solar array on a library rooftop. Another $28,000 grant

3. Over 650 schools have signed the American College & University Presidents Climate Commitment (ACUPCC). In 2015, the ACUPCC was renamed the Climate Leadership Commitments. ACUPCC signatories commit to measure and report their greenhouse gas emissions, take immediate actions to reduce them, and develop and implement a plan to go climate neutral. Please refer to *http://ecoamerica.org/programs/american-college-university-presidents-climate-commitment/* for more information.

for local GHG emission reduction was awarded for a proposed 100 kW system.

Luther College: Using Donations and the Lease Model[4]

Luther College in Decorah, Iowa is committed to achieve its sustainability goals and is one of the charter signatories on the CLC. This institutional policy has driven solar procurement in the college. Luther College has seven solar installations across its campus, of which six installations use non-PPA financing models:

- Sustainability House, 4 kW: Installed in August 2011, the project cost $22,595 and was entirely donor-funded.
- Baker Village, 280 kW: Completed in October 2012, the project cost was $1.2 million. It generates 355,000 kWh annually and is estimated to avoid 250 metric tons of CO_2 emissions. The college used a lease model to finance this system. The system was leased for seven years from Decorah Solar Field, LLC, which is owned by a local resident and donor to the college, and it used federal and state tax credits. The lease payments were paid by avoided utility costs, sale of SRECs, and donor investment. SRECs were sold by Luther College to the Winneshiek Energy District, which resold the SRECs to Decorah Bank & Trust to reduce the bank's carbon footprint. Some donors interested in financing solar projects contributed toward the lease payments. Excess generation from this solar PV system is eligible for net metering at the retail rate, thus providing revenue for the project. Luther College will acquire ownership of the facility after the lease period ends.
- President's House I, 5.3 kW: Installed in August 2013, the project cost $16,165 and produces 6,360 kWh annually. This system was donor funded (80%) and benefitted from a utility rebate (20%).
- President's House II, 13.66 kW: Installed in August 2016, the project cost $37,537 and is projected to produce 12,500 kWh annually. It was entirely donor-funded.
- Shirley Baker Commons, 20 kW: Installed in August 2013, the project cost $82,500 and it produces 26,500 kWh annually. It was financed by a U.S. Department of Energy grant (40%), donors (40%), and utility rebates (20%).
- Preus Library, 96 kW and Regents Center, 725.76 kW: Installed in the fall of 2015, the project cost $1.6 million. It was financed via a third-party PPA at a fixed price for 10 years with Oneota Solar, LLC, which is owned by the owner of Decorah Solar Field, LLC, a local resident and friend of the college.

Support of upper management and the board of regents has made the project implementation process less cumbersome. Sustainability champions at Luther College have played an instrumental role in planning, approval, and implementation of several solar procurement projects and partnerships. The college's development staff maintains a strong and trustful relationship with donors. The college is exploring new avenues of working with the electric utility to make solar investments, and with non-taxable entities to establish a shared solar array that would introduce virtual net metering in Iowa.

Rutgers University: Monetizing High-Value SRECs

Rutgers University in New Jersey has two large solar projects, sized at 1.4 MW and 8 MW and completed in 2009 and 2012, respectively. The 1.4 MW ground-mounted solar installation uses an institution-owned financing model and provides 10% of the energy needs at the Livingston campus. The system costs about $10 million, half of which was paid for by New Jersey's Clean Energy Program rebates. The university used bond financing for the remaining investment. The university sells the SRECs from the project; SRECs in New Jersey have sold from $200/MWh-$600/MWh in recent years. This solar installation has estimated annual savings of 1,200 tons CO_2 and approximately $200,000 in utility costs[5].

The 8 MW project is a solar parking-canopy installation spreading over 32 acres. The two systems combined produce over 60% of the electricity needs of the Livingston campus. This project cost over $40.8 million dollars and the university has a 15-year lease. The lessor takes advantage of the federal tax credits and depreciation benefits. The university can buy out the solar lease at the end of its contract period at a fair-market value. The project cuts utility bills annually by almost $1.2 million and saves over 6,364 tons of CO_2 emissions per year[6]. The project has a high return on investment and it is projected to net $28 million for the university over a 20-year period.

Producing local solar energy helps universities in avoiding high transmission and delivery costs imposed by third-party providers in the deregulated New Jersey market. It also contributes to emergency power options, essential to campuses managing research and data. Furthermore, sale of SRECs in a relatively strong New Jersey SREC market produces a good revenue stream, which makes the solar plants financially viable.

Campus Non-PPA Projects by the Numbers

A total of more than 50 MW of university solar capacity has been procured by universities and colleges using non-PPA financing options (as of June 2016). Below are some key numbers and figures that summarize the universities' experiences to date. These summaries are based

4. For a detailed case study on financing models used for solar deployment at Luther College please refer to *http://www.solarendowment.org/resources/*. This link also contains information on solar financing models used by other universities and colleges including Wake Technical Community College and Appalachian State University.

5. Refer to *http://www.njcleanenergy.com/files/file/success_stories/Rutgers%20Success%20Story%20-%20final.pdf*

6. Refer to *http://news.rutgers.edu/news-releases/2011/04/rutgers-board-of-gov-20110405#.V72hGGPlyFI*

on data from *The Association for the Advancement of Sustainability in Higher Education Campus Solar Photovoltaics Installation Database (2016)*. Data are self-reported and should be interpreted as a representative sample.

These installations are in 72 universities across 27 states, making this model more widespread (in number of installations) than PPA models in the university community. There are greater numbers of projects employing non-PPA models as compared to PPA models, and twelve states have universities that use solely non-PPA financing models. However, the average capacity per project for a non-PPA model is lower than for PPA models. As a result, the total capacity of PPA projects is greater than of non-PPA projects. This variation in states employing PPA and non-PPA models can be seen in Figure 2 (installed capacity) and Figure 3 (number of universities).

Description	Quantity
University solar capacity installed through non-PPA models	>50 MW
Number of universities using a non-PPA model	72
Number of states with universities using a non-PPA model	27
Percentage of university capacity installed using a non-PPA model	31%
Average system size with a non-PPA model	447 kW

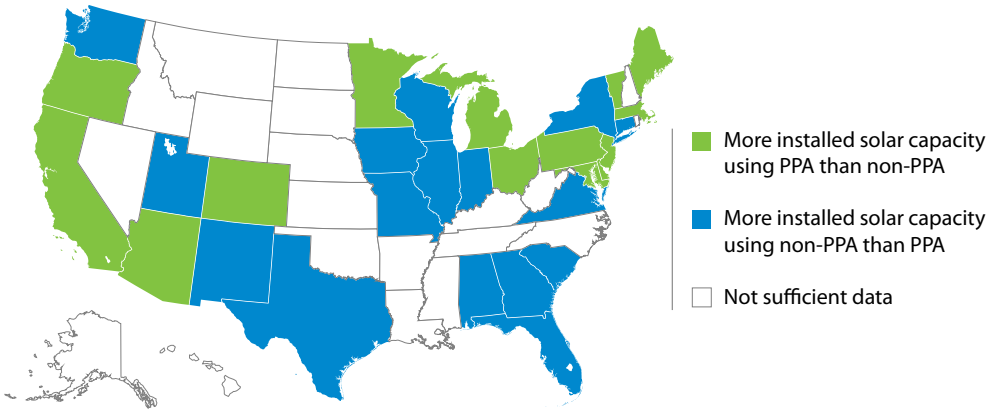

Figure 2: State variations in installed capacities of solar projects using PPA and non-PPA models *(Source: Based on AASHE, 2016 data)*

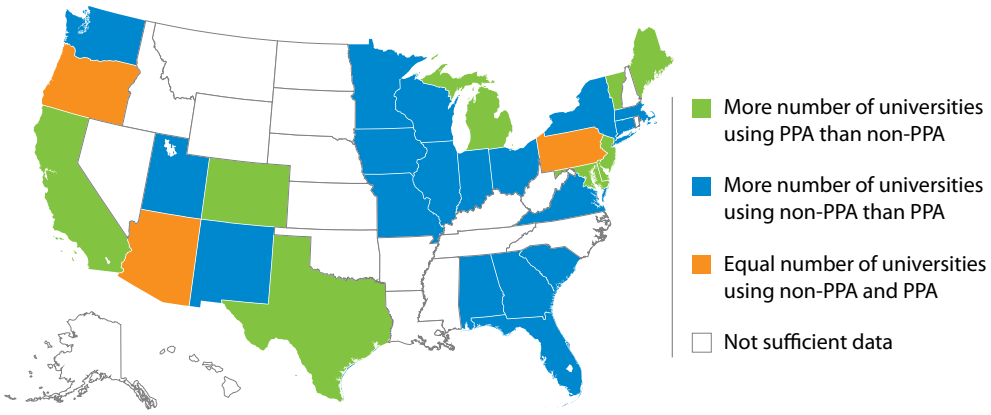

Figure 3: State variations in number of universities implementing solar projects using PPA and non-PPA models (*Source: Based on AASHE, 2016 data)*

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15013 Denver West Parkway
Golden, CO 80401
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