# Southwest Virginia Solar Working Group Information
# (November 9, 2016)

Participants at an October 4th scoping meeting around solar development in Southwest Virginia identified a few key areas to develop a background document on solar. This information will continue to be added to as the Solar Workgroup meets in the fall 2016 - spring of 2017. Following are brief reports on the five key topics identified, which are:

1. ARC POWER Grant Awards for FY-2016
2. Solar Technologies: Photovoltaic and Solar Thermal
3. Relevant Policy Issues in Virginia
4. Finance and Incentives
5. Solar in Virginia (existing and under development)

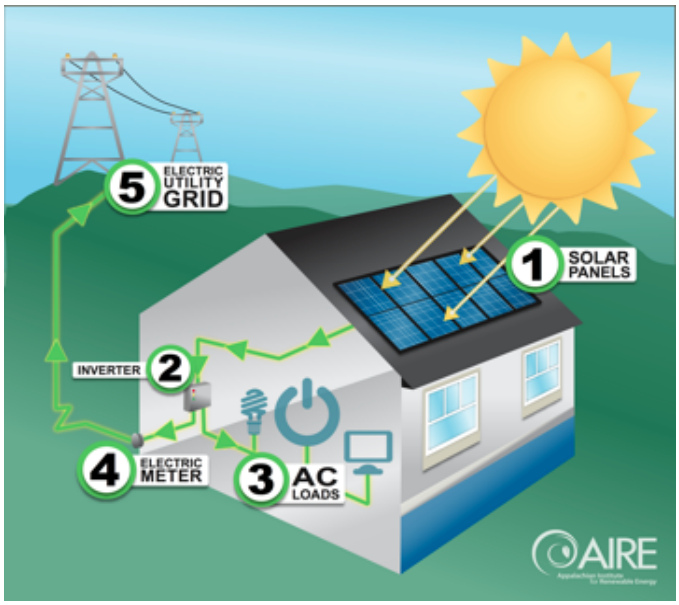
## ARC POWER Grant Awards for FY-2016

ARC awarded $46,584,673 in grants FY-2016. Implementation grants totaled $45,245,243 and technical assistance grants $1,339,430. Thirty-two implementation grant awards were made, with 27 going to organizations in central Appalachia. Two of those were in Appalachian Ohio. Five awards were to organizations in Southwest Virginia to fund projects ranging from cyber security and drone technology to sustainable tourism, food network development and fast-track worker retraining. No implementation grants were related to renewable energy.

A total of 13 technical assistance grants were awarded. No TA grants went to Virginia. Rural Action in Ohio received an award that stands out for its similarity to our SWVA proposal aimed at creating a solar supply chain.[1]

## Solar Technologies: Photovoltaic and Solar Thermal

There are two basic types of solar, **photovoltaic** (PV) and **thermal**. PV generates electricity while thermal produces heat, usually for domestic hot water, but it can also be used for space heating. PV produces DC current ("direct current"), which must be converted to AC (alternating current) by an inverter. Inverters for utility-scale solar projects are about the size of a minivan, and small commercial or residential systems are desktop printer sized. "Micro-inverters" are the size of a paperback book and are paired to each solar panel in the installation.




PV systems are usually connected to the local utility grid (**grid-tied**) and the electricity is used on-site (**behind-the-meter**) or sold to the utility.

Less frequently, PV systems are not grid-tied. Batteries for storage and supplemental power sources are usually incorporated in such systems. Reasons for this arrangement are desire for independence or remote area power needs where power line construction would be cost prohibitive. Rapid advances in micro-grid technology are making this more practical.

Siting and project scale are also important variables in the sustainable production and consumption of electricity. In recent years, many large **utility-scale** solar farms have been built. While these projects represent a large portion of total installed solar capacity, they can only be built on large sites due to the acreage needed. Projects of this nature are considered **centralized** projects and often export their power to the grid much like a traditional power plant. Alternatively, **distributed generation** (pictured right: Berea Municipal Utility), which can vary in size, but typically refers to much smaller projects, are sited within the immediate proximity to electric demand, and are beneficial for several reasons, including levelized cost, better potential for local ownership, and keeping money in the local economy. The assumption that very large projects are of greater value and benefit has been the subject of recent critical analysis.[2]

**Energy efficiency** (EE) technologies also play an important role in optimizing the value of solar. Technologies may be as simple as a caulk gun or LED light bulb and as sophisticated as new building science and electronic control devices.

## Relevant Policies in Virginia

**Net [Energy] Metering** is an arrangement with the electric utility whereby the customer generates solar electricity for on-site use and any excess generated is purchased by the utility. Customers may not install more than their expected usage. The utilities, in other words, discourage independent surplus generation by limiting the amount of solar electricity a customer may produce. In Virginia there are several policies that limit net metering. First, total net metering cannot exceed 1% of each utility's total peak load forecast. Secondly stand-by charges and other fees have been implemented by utilities that impact the amount a customer is paying and thus placing another barrier on the number of customers who are able to "go solar" at their homes or businesses. Virginia allows solar system owners to retain ownership of the **renewable energy credits** (REC's).[3] There are several sub-categories of net metering. Virginia offers only one, **meter aggregation.** Agricultural customers with multiple meters on their property can aggregate their electricity usage and offset it with one solar installation. Cost and paperwork reduction are its main benefits.

**Third-party sales** is a finance arrangement where a solar developer sells electric output directly to the customer. Virginia lags the nation on this important pro-solar policy. There have been efforts to extend third party sales beyond the existing pilot programs, but due to differences in interpretation of

existing Virginia law, this issue is currently under review by the State Corporation Commission. A slight variation is **third-party owned** (or TPO) where a third party owns and finances solar on property it does not own, but cannot sell the electricity directly to the tenant. In Virginia, third-party owners must sell all of the electricity to the utility, usually at wholesale (**avoided cost**).

All PV systems that are grid-tied must have **interconnection** approval from the utility. The application process, insurance requirements and costs to gain approval vary with the size of the project and with the grid characteristics at the point of interconnection. Virginia has different interconnection rules for net-metered systems.[4] Project developers must secure additional permits and approvals dealing with health, safety and environment. Virginia's **permit by rule** (PBR) streamlines this process for projects with a rated capacity of 100MW or less. PBR essentially means that if a project meets all mandated requirements it is deemed to have a permit.[5] Other policies at federal, state and local levels apply to solar, however, we cannot address them in in this document.

## Finance and Incentives

The broad concepts used to finance solar projects are equity, debt, and grants, often used in combination. Incentives work specifically with equity or debt finance structures.[6] For example, commercial developers routinely use **tax equity finance** and rely heavily on the federal **investment tax credit (ITC)**. Along with the ITC, commercial projects also use a type of depreciation deduction called **MACRS** (modified accelerated cost recovery system). Homeowners can also take the residential version of the ITC, but not depreciation. Congress extended the ITC in December 2015, stabilizing the credit at 30% through 2020, and then declining incrementally to 10% in 2022 and beyond. One's ability to use the tax credit, especially in a commercial project where passive income is necessary in most cases, can be challenging and require knowledgeable tax council. [7] A taxpayer's marginal tax rate will also drive how much the credit will be worth in actual dollars.

Taking on **debt** (borrowing money) to install a home or business system can be economical, especially if the ITC can be used, solar costs continue to decline while power bills go up, and installation costs are reasonable. USDA REAP (Rural Energy for America Program) **loan guarantees** can help local banks extend credit for solar installations. The U.S. Department of Energy has a similar loan guarantee program. REAP also makes **grants** of up to 25% of project cost (capped at $500,000) for agricultural and rural small businesses for solar and other renewable energy technologies.[8] Foundations and other organizations may also offer grants for solar adoption. Local **solarize programs** have the potential to lower cost with cooperative, bulk purchasing and to make debt financing more accessible and affordable.[9] Commercial banking loan products that often accompany solarize programs vary in quality, cost, and accessibility. For community solar projects at hospitals, schools, critical public infrastructure, and others, there are highly integrated project capital stacks that can include **impact investment funds**, foundation **project-related investing**, and **crowdsourced capital** (subject to state and federal securities laws).

Incentives and finance resources can also be established for solar adoption and solar industry cluster development by local governments and regional development agencies. Virginia Coalfield Economic Development Authority and the Tobacco Region Revitalization Commission are examples of agencies

that could fund solar-related economic development although we know of no current efforts on the part of these agencies.

## Solar in Virginia (existing and under development)

Virginia ranks 42nd nationally in the number of solar systems installed. As would be expected, California is first by a landslide, but some of the other states ranking higher might be a surprise. Northern latitude states such as New Hampshire, Wisconsin, New York and Massachusetts rank far higher than Virginia.[10]

Total installed capacity is another way to frame state rankings. Using this method, large utility-scale projects put North Carolina in second place with almost 2,000MW of solar.[11] Virginia by contrast, ranks 32nd with only 49MW, but due to a provision passed in 2015 that smooths the way for utilities to develop or buy up to 500 MW of solar, the commonwealth is on track to improve its rankings in the coming years.[12] Virginia's solar growth, like North Carolina, is linked to server farm recruitment and very large solar projects, with Microsoft and Amazon leading the way. Large scale projects look impressive in size, but the opportunities and benefits for local economies are greater with distributed solar. Furthermore, "community-scale solar" is an untapped national market of 30,000MW by 2020 that local and regional interests strategically develop.[13]

## Endnotes

[1] Sources https://www.arc.gov/images/grantsandfunding/POWER2016/POWER2016_Awards_WHFactSheet_8-24-2016.pdf and https://www.whitehouse.gov/the-press-office/2016/10/26/fact-sheet-administration-announces-additional-economic-and-workforce.
[2] See for example https://ilsr.org/utility-solar-may-cost-less-but-its-also-worth-less/.
[3] For information on net metering, see http://programs.dsireusa.org/system/program/detail/40. Note that REC's (sometimes known as S-REC's for solar) have market value as a "green attribute" of renewable energy. As such, REC's may be sold on voluntary markets or compliance markets. For example, Solarize Abingdon sold RECs through an aggregator into the Pennsylvania compliance market.
[4] interconnection http://programs.dsireusa.org/system/program/detail/808. Federal interconnections standards are also established. See http://programs.dsireusa.org/system/program/detail/2774.
[5] Virginia Department of Environmental Quality "Permit by rule" information can be sources at http://www.deq.virginia.gov/Programs/RenewableEnergy/SolarEnergy.aspx.
[6] NREL has a project finance group that researches and publishes on solar finance. See https://financere.nrel.gov/finance/content/nrel-finance-team-publications.
[7] Information and summaries for all federal incentives can be found at http://programs.dsireusa.org/system/program?state=US.
[8] FY-2017 Solicitation information can be found at https://www.gpo.gov/fdsys/pkg/FR-2016-10-18/pdf/2016-25163.pdf.
[9] See "Solarize Abingdon" at http://www.solarizeabingdon.org/. To see other solarize projects in Virginia, see http://solarizeva.org/ and http://www.vasun.org/solarize-virginia/. Solarize has learned a great deal since piloted in Portland, Oregon. The U.S. Department of Energy published the second edition of a useful guide and can be accessed at http://www.nrel.gov/docs/fy12osti/54738.pdf.
[10] According to National Renewable Energy Laboratory's "The Open PV Project" found at https://openpv.nrel.gov/rankings.
[11] According to PV Magazine http://www.pv-magazine.com/news/details/beitrag/north-carolina-now-ranked-second-in-us-for-installed-solar_100026095/#axzz4OfRY19hT.
[12] According to Solar Energy Industries Association http://www.seia.org/state-solar-policy/virginia-solar.
[13] *Community-Scale Solar: Why developers and buyers should focus on this high-potential market segment*. Rocky Mountain Institute. March 2016.