

GOING SOLAR

An informational and legal clinic
on residential solar energy



Fair Shake[®]

Environmental Legal Services



Welcome!

We believe that all communities should have access to the tools of change, and that everyone should be part of decisions about their air, water, and the land where they live, work, and play.

Everyone deserves a Fair Shake.

Why Solar?

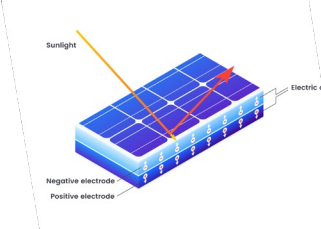
PROS

- ▶ Positive impact on the environment
- ▶ Reduce electric bills
- ▶ Low maintenance
- ▶ Job creation
- ▶ Increased property value

CONS

- ▶ High upfront costs
- ▶ Low solar production at night, cloudy days, and during winter months
- ▶ Regulations can create challenges
- ▶ Finding quality, local solar installers and comparing quotes can be difficult
- ▶ Ongoing environmental justice concerns

Solar in History



- ▶ The first solar panel properties were discovered by French physicist Edmund Becquerel in 1839.
- ▶ Albert Einstein won a Nobel prize in physics for his research on the photoelectric effect which photovoltaic technology is based upon.
- ▶ The space industry began the first serious use of the technology to provide power on spacecraft in the 1960s.

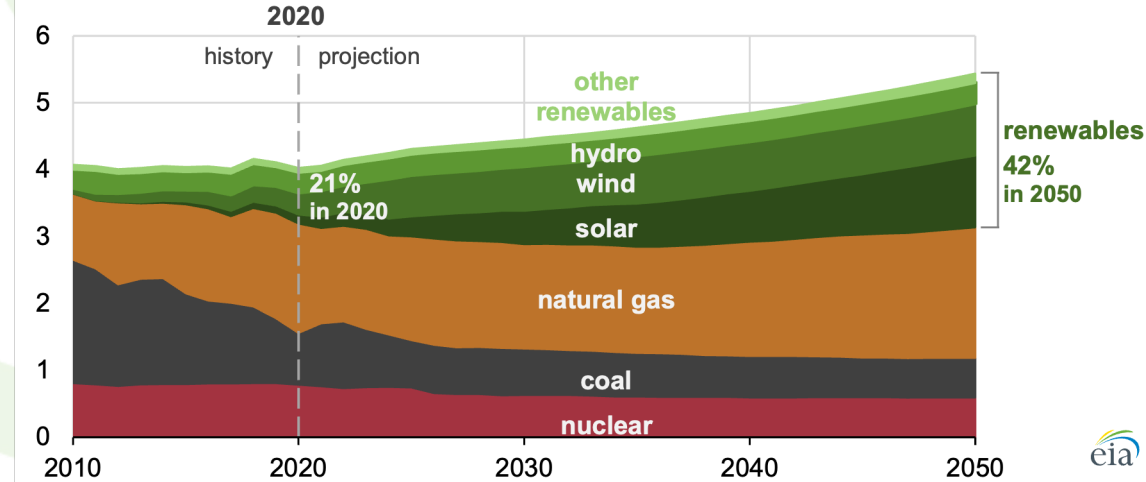
"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."

- Thomas Edison in conversation w/
Henry Ford & Harvey Firestone (1931)




Solar Efficiency Key to US Climate Goals

- ▶ The U.S. Energy Information Administration projects that the share of renewables will increase to 42% by 2050
- ▶ Wind and Solar growth highest type of renewable energy
- ▶ Solar energy anticipated to pass wind energy by 2040 as the largest source of renewable energy

U.S. electricity generation, AEO2021 Reference case (2010–2050)
trillion kilowatthours

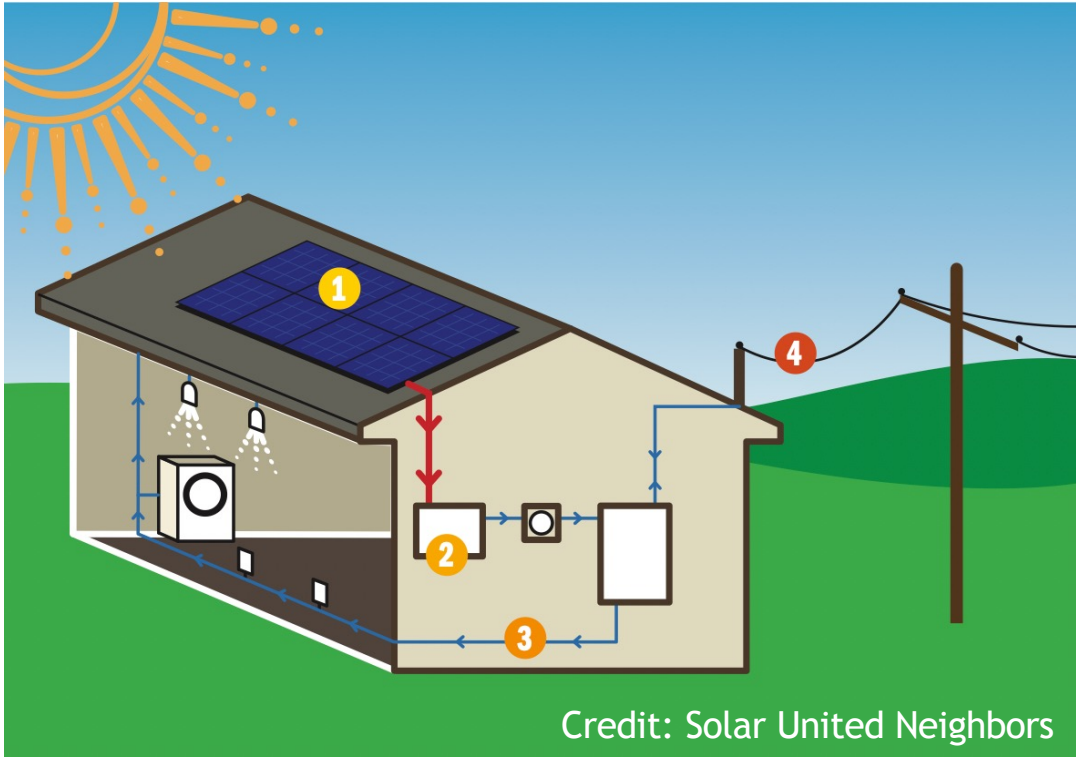


DOE's Solar Energy Initiatives Work To:

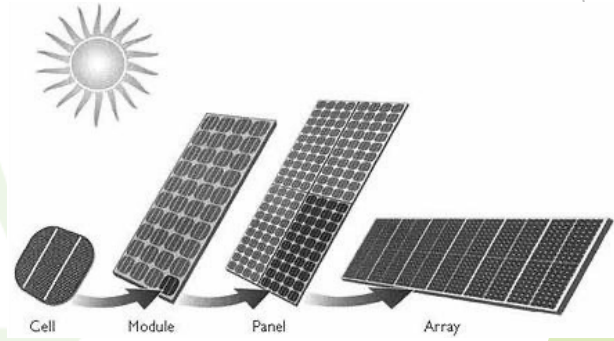
-  Cut the cost of solar energy by **60%** within the next 10 years.
-  Improve the performance of solar technologies and support **good-paying jobs**.
-  Accelerate the equitable deployment of solar to put us on a path to **100% clean electricity** by 2035.



- 1** Solar panels convert sunlight into direct current (DC) electricity
- 2** Inverter converts electricity from direct current (DC) to alternating current (AC)
- 3** Your home consumes the electricity produced by your solar array
- 4** Solar array connects to the local grid, allowing you to receive electricity even when the solar panels aren't producing any



How Does Solar Work?



Mounting Options

Rooftop

- Considerations
 - Size - Avg. panel needs 15 square feet
 - Roofing materials - asphalt, tile, metal
 - Age - roof no more than 15 years old
 - Slope - ideal is 30 degrees
 - Direction - southern facing
 - Hours of sunshine - 6 hours of direct sun

Ground Mounted

- Pros
 - Keeps Rooftop Clear
 - Easier to expand
 - Better output due to more placement options
- Cons
 - More expensive than rooftop
 - Permitting process more extensive
 - Requires more space - larger properties



Interconnectivity

Interconnectivity refers to the ability of a renewable energy generation system to plug into the power grid.

Interconnectivity rules are established by state legislation and utility regulators and include both technical and contractual terms that must be followed by the system owner and the utilities.

Types of fees

- Connection fees
- Monthly demand fees
- Monthly fixed charges
- Other "creative ratemaking" proposals

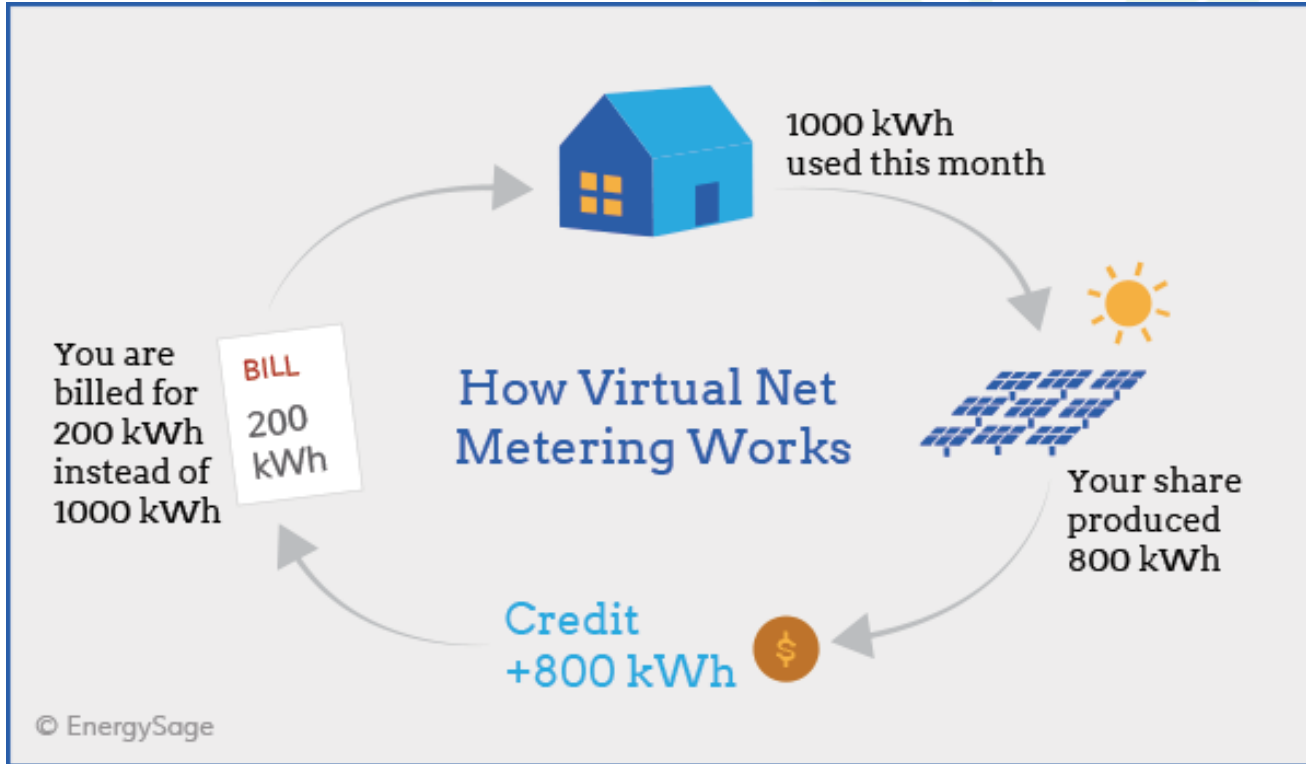
Solar Penalty

- Flat monthly charges or hidden fees charged by utility providers for solar generating customers
- Utility companies justify charges to cover operating costs such as reading meters, running electric lines, and administrative overhead
- Increases amount of time to recover investment in solar system (aka Solar Payback Period)

Off Grid

- Not tied to any utility power lines
- Most common in remote areas where connection to utility grid is more expensive than an off-grid system
- Batteries needed to store solar for use at night

Net Metering



- Solar producers receive a credit on their electric utility bills for any extra electricity created that they don't use and that flows back into the grid.
- Solar producer's electricity bill is lowered by the amount of electricity you generate.

Ohio

- Limited to 120% of customer's electricity needs (based on prior year)

Pennsylvania

- Residential Solar systems cap 50 kWh

West Virginia

- Residential Solar system cap 25 kWh
- Public Utility Comm. tasked w/ adopting new net metering standards

Cost of Solar Panels

▶ Ohio

- ▶ \$12,580 to \$17,020 average cost to install
- ▶ \$2.52 to \$3.40 on cost per watt (\$/W) basis
- ▶ 13.04 years is the average Solar Payback period

▶ Pennsylvania

- ▶ \$12,962 to \$17,538 average cost to install
- ▶ \$2.59 to \$3.51 on cost per watt (\$/W) basis
- ▶ 10.27 years - years is the average Solar Payback period

▶ West Virginia

- ▶ \$12,368 - \$16,732 cost of solar system
- ▶ \$2.91 average cost of solar per watt



How Can I Pay For It?

Loans - incur interest payments over the loan's terms.

Power Purchase Agreement (PPA) - allows the installer to own & operate the solar panels on your roof while you purchase energy the panels produce each month.

Lease - installer will own, operate, and maintain the solar system, while you pay a fixed monthly rate for the panels.

PACE (Property Assessed Clean Energy) - financing assessed through local property tax authority over time. Commercial (C-PACE) and residential (R-PACE) programs available depending on locality.

How to Pay for Solar Panels

	Pros	Cons
Cash	<ul style="list-style-type: none"> • Full ownership • Federal Tax Credits (thru 2023) • Lowest cost to purchase 	<ul style="list-style-type: none"> • Expensive upfront cost
Home Equity Loan or HELOC (Home Equity Line of Credit)	<ul style="list-style-type: none"> • Less upfront cost • Ownership subject to loan terms • Federal Tax Credits (thru 2023) 	<ul style="list-style-type: none"> • Higher cost over time due to interest on loan • Additional or Higher Mortgage Payment
Solar Loan	<ul style="list-style-type: none"> • Unsecured and Secured options • Ownership subject to loan terms • Federal Tax Credits (thru 2023) 	<ul style="list-style-type: none"> • Interest rates vary • Higher cost over time due to interest on loan
Lease or Solar Power Purchase Agreement (SPPA)	<ul style="list-style-type: none"> • Less upfront cost • Less maintenance of system • May be able to lower energy costs based on contractual energy rates from owner of solar system 	<ul style="list-style-type: none"> • No Ownership of panels • Third Party Owns system and right to access the panels • Not Eligible for Federal Tax Credit - May be available to installer • Long lease terms (20yrs common) • Harder to Sell Home b/c new owner must accept terms of lease or SPPA as part of home purchase
PACE (Property Assessed Clean Energy)	<ul style="list-style-type: none"> • Financed through a special assessment on property and paid over time through property tax • Some terms mandated by local legislation • Panels owned and Federal Tax Credits can be used • May reduce barriers to entry into solar market 	<ul style="list-style-type: none"> • Locality must pass legislation to create PACE program • Home subject to foreclosure for delinquency tax • Not all consumer protection laws apply • May make sale of property harder: <ul style="list-style-type: none"> • Assessment stays with home until paid off • Some lenders do not back mortgages w/ PACE

Federal Incentives

Residential Energy Efficient Property Credit

- ▶ Must claim in the year Solar installed
- ▶ Must be installed in primary or secondary residence
- ▶ Offset's tax liability - nonrefundable credit (reduces tax amount you owe)
- ▶ May be carried forward
- ▶ **30% Credit through 2032; 26% in 2033; 22% in 2034; Expires 2035**
- ▶ The solar storage equipment expenses included in the ITC have expanded.
 - ▶ Energy storage devices that have a capacity rating of 3 kilowatt hours or greater are included starting in 2023. This includes stand-alone storage.
 - ▶ Battery must be power 100% by solar panel system to qualify
- ▶ Savings from ITC for average residential PV system: \$7,500.

State Incentives

Solar Renewable Energy Certificates (SREC)

- ▶ State mandated portion of renewable energy utility companies are required to produce
- ▶ Utilities use Renewable Energy Certificates (RECs) as proof they generated “green electricity”
- ▶ Homeowners can earn one SREC for every megawatt hour the panel generates
- ▶ Rates vary state to state if available
- ▶ RECs sold on open market

STATE	SREC PRICE*	ANNUAL EARNINGS**
Pennsylvania	\$42	\$420 - \$546
Maryland	\$59	\$590 - \$767
D.C.	\$300	\$3,000 - \$3,900
Virginia	\$40	\$400 - \$520
Ohio	\$4	\$40 - \$52

**SREC price based on Aug. 2022 selling values*

***Annual earnings assumes 10 – 13 certificates per year*

Community Solar

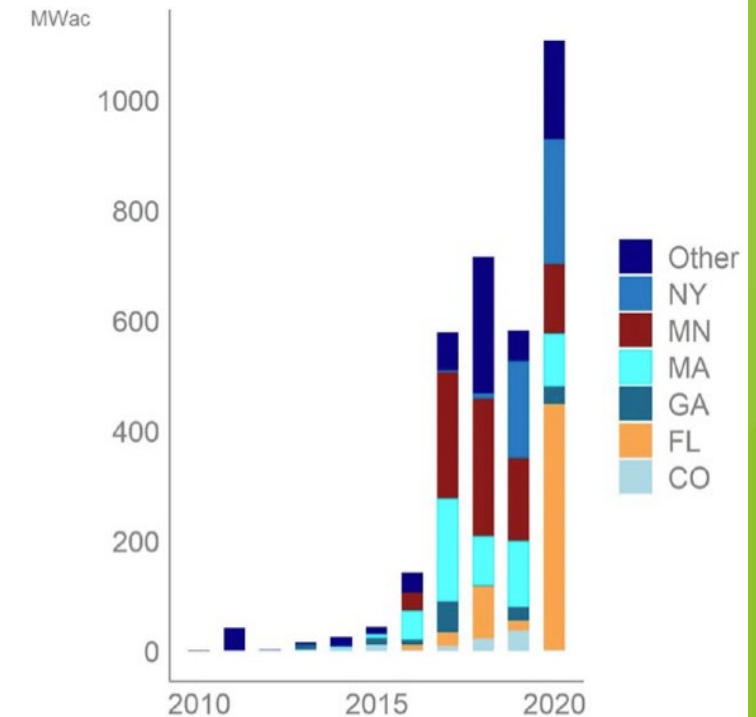
Solar installation with multiple owners, referred to as “subscribers.” The subscribers enter into a contractual relationship with the owner or operator of the installation (or an intermediary) to receive some or all of the financial returns from a predefined share of the installation’s output.

Benefits of Community Solar

- Net metering credits shared amongst subscribers
- Equal access - not limited to property owners
- Easier - no need to have home evaluated for installation
- Federal Tax Credit available for subscribers share of equipment and installation cost of community solar

Status of Community Solar in Region

- Not currently available in Ohio, Pennsylvania, or West Virginia
- Watch state legislatures for legislation authorizing community solar programs



New community solar capacity (MWac) by year and state



Solar sales tactics to look out for

- ▶ “Act now or miss out on government rebates” “You’ll receive a check for Federal Tax Credit”
- ▶ Federal tax incentives are available until 2034
- ▶ “Free Solar Installation” “Free Energy” “First Year Free”
- ▶ Solar Energy is an investment. Free services or equipment is likely built into amount financed or other lease terms.
- ▶ Offering Solar Lease Only
- ▶ Solar leases cost less upfront but require long term commitments and often cost more overall
- ▶ Get multiple estimates and compare lease and purchase options
- ▶ Offering system too large or too small for your needs
- ▶ If your system is too small it will take longer to recover your investment
- ▶ If you system is too large, you may not be able to take advantage of your state’s Net Metering

DO's and DON'Ts

Do	Don't
<p>Do get multiple estimates</p> <p>Check company reviews and complaints BBB and Attorney General's Office</p> <p>Ask questions</p> <ul style="list-style-type: none">Warranties included?Installers licensed and insured?Who handles permits and maintenance? <p>Consider how your electricity needs may change</p> <ul style="list-style-type: none">Purchase of electric vehicleGrowing family or business needsMake energy improvements before going solar to "right size" your system	<p>Don't rush to sign a contract</p> <p>Don't rely on one source of information</p> <p>Don't rely on any verbal commitments</p> <p>Don't take the lowest offer</p> <ul style="list-style-type: none">Low end solar panel may be less durable decreasing long term investmentConsider warranties and maintenance costs <p>Don't assume your contractor is licensed or certified</p> <ul style="list-style-type: none">North American Board of Certified Energy Practitioners offers directory of certified installersMinimal licensing requirements vary by state <p>Don't try to DIY</p> <ul style="list-style-type: none">Leave it to the professional to prevent safety, improper installation, and code compliance issues

Trusted Resources

Energy Sage

- U.S. Dept of Energy (DOE) funded marketplace for installers and informational resource
- <https://www.energysage.com/>

DSIRE (Database of State Incentives for Renewables & Efficiency)

- DOE funded database of state incentives for renewable energy operated by North Carolina State University's N.C. Clean Energy Technology Center
- <https://www.dsireusa.org/>

SolSmart

- DOE Solar Energy Technology Office (SETO) funded national designation program addressing barriers to and fostering growth of solar energy
- <https://solsmart.org/>

Solar United Neighbors

- Nonprofit advocating for interests of solar owners and supporters. Offers Co-op opportunities and info on how to start a solar Co-op
- <https://www.solarunitedneighbors.org/>



We are here to help!

Thank you
for joining us!



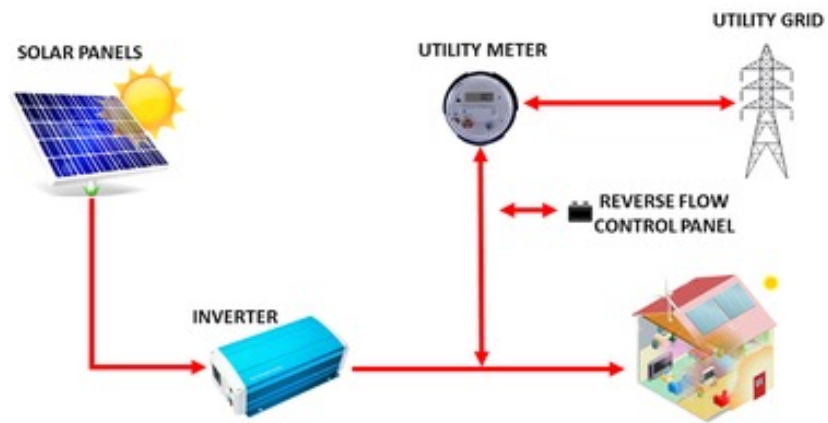
Fair Shake[®]
Environmental Legal Services

Sources

- ▶ <https://www.energy.gov/eere/solar/homeowners-guide-going-solar>
- ▶ <https://www.energysage.com/>
- ▶ <https://science.nasa.gov/science-news/science-at-nasa/2002/solarcells>
- ▶ <https://www.energy.gov/eere/solar/goals-solar-energy-technologies-office>
- ▶ <https://energywv.org/wv-energy-profile/renewable-energy/solar-energy>
- ▶ <https://www.forbes.com/advisor/home-improvement/leasing-vs-buying-solar-panels/>
- ▶ <https://www.ohiorealtors.org/blog/1621/residential-pace-loans-too-good-to-be-true/>
- ▶ <https://news.energysage.com/srecs-complete-overview/>
- ▶ <https://www.eia.gov/todayinenergy/detail.php?id=46676>
- ▶ <https://www.irs.gov/newsroom/energy-incentives-for-individuals-residential-property-updated-questions-and-answers>
- ▶ <https://codes.ohio.gov/ohio-administrative-code/rule-4901:1-10-28>
- ▶ <http://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/052/chapter75/subchapterBtoc.html&d=reduce>
- ▶ <https://programs.dsireusa.org/system/program/detail/2380>
- ▶ <https://www.npr.org/2019/06/02/728761703/to-some-solar-users-power-company-fees-are-an-unfair-charge>
- ▶ https://eta-publications.lbl.gov/sites/default/files/rps_status_update-2021_early_release.pdf
- ▶ <https://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/052/chapter75/chapter75toc.html&d=>

Additional Information

Component of Solar Energy System




► **Watts (W)** measure rates of power over a period of time.

► A **kilowatt (kW)** is 1000 watts.

► A **watt-hour (Wh)** is a unit that measures the amount of electrical energy used over a period of time.

► A **kilowatt hour (kWh)** is 1000 watt-hours.

► A **megawatt hour (mWh)** is 1000 kilowatt hours.



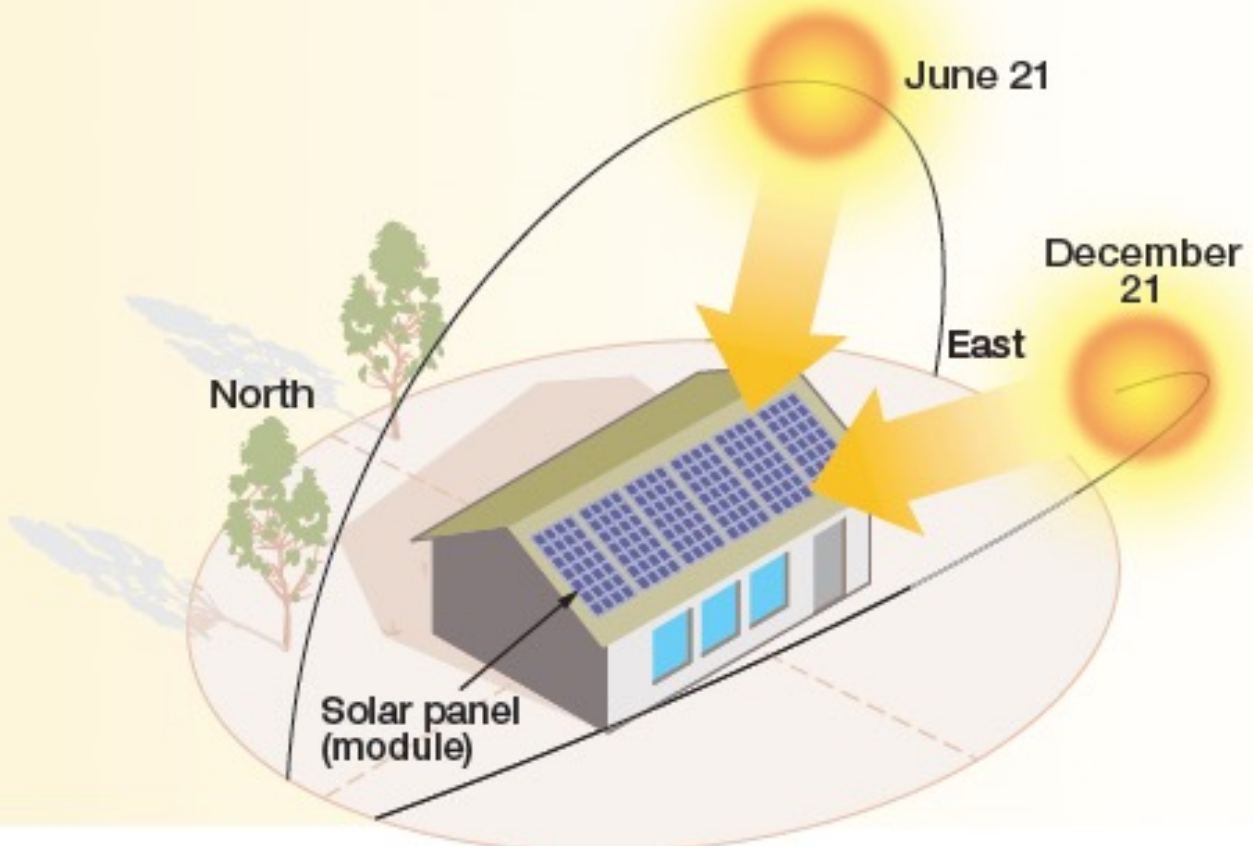
Price per watt (\$/Watt) is a more useful metric to determine if you're paying a fair price for your whole solar system.

Price per watt is not always included in a solar proposal. Here is how you can calculate it.

PRICE PER WATT

$$\$/\text{Watt} = \frac{\text{System Cost}}{\text{System Size (Watt, 1 kW = 1,000 Watt)}}$$

Sun's Path During Summer and Winter



Electric Providers in Ohio

Provider	Interconnection Information Website	Tariff Information Website
AES Ohio	https://www.aes-ohio.com/interconnection-applications-and-requirements	https://www.aes-ohio.com/rates-tariffs
American Electric Power (AEP)	https://www.aepohio.com/lib/docs/business/builders/InterconnectionProcess.pdf	https://www.aepohio.com/lib/docs/business/builders/NetEnergyMeteringService2-10-2020.pdf
Duke Energy Ohio	N/A	https://www.duke-energy.com/home/billing/rates/electric-tariff
First Energy Company (Ohio Edison, Illuminating Co., Toledo Edison)	https://www.firstenergycorp.com/feconnect/ohio.html	https://www.firstenergycorp.com/customer_choice/ohio_/ohio_tariffs.html

Electric Providers in PA

Provider	Interconnection Information Website	Tariff Information Website
Citizens' Electric Company	https://www.citizeselectric.com/safety-service	https://citizeselectric.com/customer-info/#tariff
Duquesne Light Company	https://www.duquesnelight.com/energy-money-savings/customer-owned-generation	https://www.duquesnelight.com/service-reliability/service-map/rates/tariff-resources
FirstEnergy Corporation, Met-Ed, Penelec, Penn Power, West Penn Power	https://www.firstenergycorp.com/feconnect/pennsylvania.html	https://www.firstenergycorp.com/customer_choice/pennsylvania/pennsylvania_tariffs.html
PECO Energy Company	https://www.peco.com/SmartEnergy/MyGreenPowerConnection/Pages/TransmissionInterconnection.aspx	
Pike County Light & Power	Call 570-832-2988	
PPL Electric Utilities	https://www.pplelectric.com/utility/about-us/electric-rates-and-rules/customer-owned-generation/application-process.aspx	https://www.pplelectric.com/utility/about-us/electric-rates-and-rules/current-electric-tariff
UGI Utilities, Inc. - Electric Division	https://www.ugi.com/resources-for-customer-generation	https://ugi.outsystemsenterprise.com/UGITariff_FO/Tariffs?Division=Electric
Wellsboro Electric Company	https://wellsboroelectric.com/products-services/customer-generators	https://wellsboroelectric.com/customer-service/tariff-supplements/

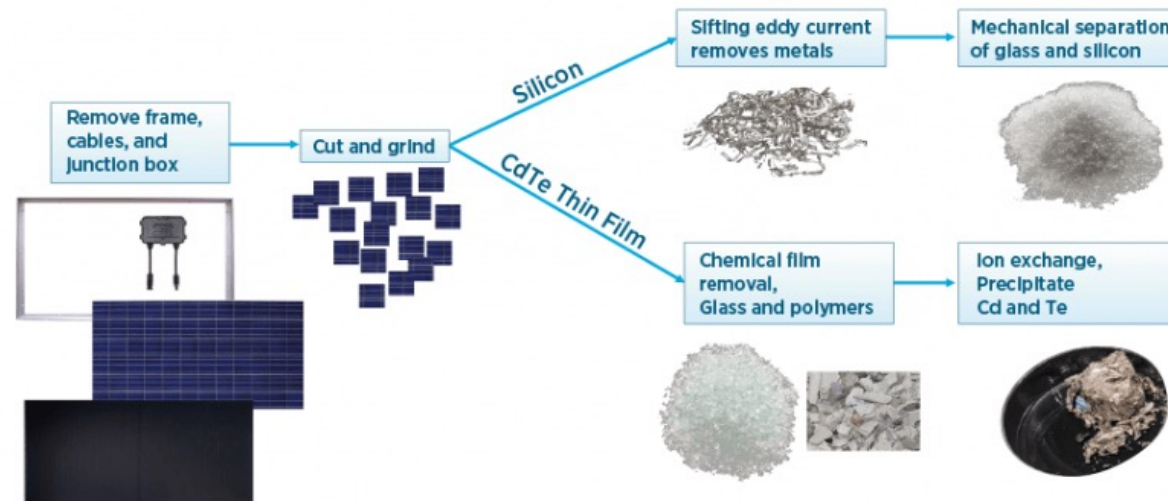
Electric Providers in WV

Provider	Interconnection Information Website	Tariff Information Website
Appalachian Power Company	https://www.appalachianpower.com/business/builders/generating-equipment	https://www.appalachianpower.com/lib/docs/ratesandtariffs/WestVirginia/2021ENECTariffSheetsEff3-2-22.pdf
Dominion Energy West Virginia	N/A	https://www.dominionenergy.com/west-virginia/rates-and-tariffs#:~:text=Residential%20customers%20will%20see%20an,or%20printed%20in%20the%20newspaper
FirstEnergy Company (Mon Power, Potomac Edison)	https://www.firstenergycorp.com/feconnect/westvirginia.html	https://www.firstenergycorp.com/customer_choice/west_virginia/west_virginia_tariffs.html

PV End of Life Management

- ▶ 70% of PV Systems deployed in last 5 years
- ▶ Lifespan of PV Module is 30-35 years on average
- ▶ By 2050, estimates project 78 million tonnes of raw materials embodied in the mass of EOL photovoltaic (PV) modules,
- ▶ Processes for recycling them at EOL continue to be developed as projected growth of these technologies could become constrained by raw material availability,

Commercial Module Recycling Processes



The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the page, framing the central text. The overall aesthetic is clean and modern.

Research on Municipal Solar Power Programs

What Can Your Local Government Do? Federal Programs

▶ Department of Energy (DOE)

▶ Weatherization and Intergovernmental Programs

- ▶ Local officials can work with the Department of Energy to integrate energy efficient and renewable energy programs and best practices.

▶ Department of Agriculture (USDA)

▶ Rural Energy Pilot Program (REPP)

- ▶ Provides financial assistance for rural communities to further develop renewable energy.

▶ Rural Energy for America Program (REAP)

- ▶ Helps rural small business, agricultural producers, and local governments by conducting and providing energy audits and assistance.

▶ Federal Tax Credit

- ▶ While municipalities are generally not eligible to apply for the federal tax credit for solar power, they can install their systems through solar financiers or third parties who can get the credit and pass it on to municipalities in price discounts.

What Can Your Local Government Do? (Ohio)

- ▶ Appalachian Solar Finance Fund (SFF)
 - ▶ Public institutions and nonprofits in southern and eastern Ohio can obtain funds through SFF to bring solar power to the region and diversify the local economy.
- ▶ Energy Audit
 - ▶ Through Ohio's Energy Efficiency Program, local governments can participate in an energy audit to reduce energy use and improve efficiency.
- ▶ Perform Audits on Municipal Services
 - ▶ Cities performing audits on services, such as meters or streetlights, have found they were paying for meters they were not using or light that no longer existed.
- ▶ Tax Abatement Programs
 - ▶ Municipalities can promote greener buildings by offering tax abatements for those investing in greener homes, as seen in Cincinnati and Cleveland.

What Can Your Local Government Do? (West Virginia)

- ▶ [Appalachian Solar Finance Fund \(SFF\)](#)
 - ▶ Public institutions and nonprofits in West Virginia can obtain funds through SFF to bring solar power to the region and diversify the local economy.
- ▶ Energy Audit
 - ▶ Through West Virginia's [Energy Audit Program](#), local governments can participate in an energy audit to reduce energy use and improve efficiency.
- ▶ Perform Audits on Municipal Services
 - ▶ Cities performing audits on services, such as meters or streetlights, have found they were paying for meters they were not using or light that no longer existed.
- ▶ Sponsor Solar Co-ops
 - ▶ Municipalities can sponsor solar co-ops to bring affordable solar power to their community, as seen in [Morgantown](#).

What Can Your Local Government Do? (Pennsylvania)

▶ Solar Energy Program

- ▶ Provides municipalities financial assistance in the form of grant and loan funds to promote use of solar energy in Pennsylvania.

▶ Energy Audit

- ▶ Through the Pennsylvania Sustainable Energy Finance Program, local governments can participate in an energy audit to reduce energy use and improve efficiency.

▶ Perform Audits on Municipal Services

- ▶ Cities performing audits on services, such as meters or streetlights, have found they were paying for meters they were not using or light that no longer existed.

▶ Solar-Friendly Policies

- ▶ To bring solar power to their community, local governments can offer tax abatements to those investing in greener homes or sponsor solar co-ops.

Supply Chain Issues

- **As of 2021 China Dominates Solar Supply Chain**
 - **Polysilicon 72% • Ingots 98% • Wafers 97% • Cell 81% • Modules 77%**
 - 54% of Chinese polysilicon is from Xinjiang where forced labor allegations cause imports to be banned
 - Uyghur Forced Labor Prevention Act (UFLPA) prohibits imported products from Xinjiang unless proof by clear and convincing evidence goods are not produced using forced labor
 - Imports from other southeast Asian countries linked to Chinese manufacturing
- **Solar Panel Tariffs**
 - President Biden waived tariffs for 24 months
 - Jumpstart to installations
 - Helps US further clean energy goals



Permit and Zoning Considerations

- ▶ Focus Ordinance restrictions on *SAFETY*
 - ▶ International Code Council publishes International Solar Energy Provisions (ISEP)
 - ▶ Model code sections related to Solar from Intl. Building Code, Intl. Fire Code, etc.
- ▶ Encourage
 - ▶ Use By Right - allows small rooftop and ground mounted solar w/o zoning review
 - ▶ Standardized permit requirements and post on municipality's website
 - ▶ Solar-friendly design - solar-ready construction standards such as roof orientation
- ▶ Discourage
 - ▶ Restrictions related to visibility unless historic district
 - ▶ Screening requirements does not treat all residents equally due to solar placement limitations
 - ▶ Restricting generation to on-site use
 - ▶ Contrary to Net Metering
 - ▶ Can prevent new ownership models like Community Solar

Solar & My HOA



▶ OHIO

- ▶ SB 61 - becomes effective September 2022
 - ▶ Limits restrictions on residential solar panel installation for
 - ▶ Unit owner must be individually responsible for roof or HOA must specifically provide regulations on the type and installation of solar modules and establishes responsibility for maintenance
 - ▶ Unit must not have other units directly above or below

▶ Pennsylvania

- ▶ No laws limiting HOA restrictions on Solar
 - ▶ SB 826 - Introduced July 2021- Referred to Urban Affairs and Housing Committee & Died

▶ West Virginia

- ▶ WVA Code §36-4-19. Solar energy covenants unenforceable
 - ▶ Prohibits future restrictions on installation and use of Solar
 - ▶ Does allow “reasonable restrictions” for historical preservation, architectural significance, and religious or cultural importance to the community