

# KPVA Solar Panel Report

## Official Rule-Solar Panels

The KPVA Official Rule-Solar Panels, adopted March 4, 2008, states, "No solar panel or similar device shall be constructed, placed or attached on the roof or other outside portion of the dwelling house nor maintained on any other portion of any lot."

### SOLAR PANELS

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## KPVA Bylaws

Per the Code of Bylaws Article III, Section 3.06, "The Board of Directors shall have such powers as are reasonable and necessary to accomplish the performance of their duties. These powers include, but are not limited to, the power...(f) to adopt, revise, amend and alter from time to time reasonable rules and regulations with respect to use, occupancy, operation and enjoyment of the Property, which rules shall be adopted at regular or special meetings of the Board with notice posted in advance to advise Members that such matters are under consideration." Some KPVA homeowners contest this validity.

## Solar Panel Committee

At the 2021 Annual Meeting, the KPVA President called for a committee of volunteers to compile information on solar panels and issues related to solar panels and to report back to the Board.

## Introduction to Solar Energy Systems

Solar energy systems convert the sun's light energy into useable electricity for home consumption. Sunshine striking photovoltaic (PV) solar panels sends a flow of renewable energy into the home, with excess electricity generated by the solar array going back into the grid. In the absence of sunshine, the electric utility provides the traditional energy source. The US Department of Energy offers primers on [how solar works](#).

In addition to the solar panels atop rooftops, the system includes roof mounting hardware or racking system, wiring from the roof to the ground level, a meter, and a circuit breaker box. An inverter changes the direct current (DC) coming from the solar array to alternating current (AC) that feeds the home's electrical panel. Some owners choose to add a battery to store energy for use during off-peak hours, but it's not required and most homes remain tied to the grid.

If the array of panels are to be occasionally shaded, owners may add small optimizers or micro-inverters under each panel. Without the module add-on, if a panel is shaded and its electricity output is diminished, the output of the entire array comes down to the level of the shaded panel. With optimizers, if a panel is shaded, only that panel's output is lessened while the fully exposed panels yield optimal output.

Solar panels are generally oriented to the south for maximum sun exposure, while those facing east or west operate with less solar capacity per year. Peak performance hours are the three hours before and three hours after local noon. Solar array maintenance is minimal since there are no moving parts, and solar panels last decades, which is why manufacturers often offer 25-year warranties on panels.

Existing asphalt shingle roofs should be 10 years old or less and in good condition. Otherwise, owners need to replace the roof before installing the new solar panels.

Traditionally, homeowners purchase a system sized to meet the demands of their home or less. In sunny months the array may put out more electricity than can be consumed, so the excess electricity is shunted into the public electric grid. The utility company compensates the owner for the energy that goes instead to neighboring homes, saving the company from generating and transporting the electricity.

In a [utility rate](#) program called net metering, when the owner buys electricity from I&M Power, it is at a retail price (about 11 cents per kWh), and when I&M Power buys the clean energy from the homeowner it is the same retail price.

The Indiana Statehouse is phasing out net metering after July 2022. The utility will then pay a wholesale rate (about 3 cents per kWh) plus 25% for the homeowner's excess energy and sell it to the neighbor at full retail rate. For those who make the deadline, even the reduced net metering plan is completely phased out after ten years.

Homeowners are eligible for a 26% [federal tax credit for solar systems](#) installed in 2020-2022, and 22% for systems installed in 2023. The tax credit expires in 2024.

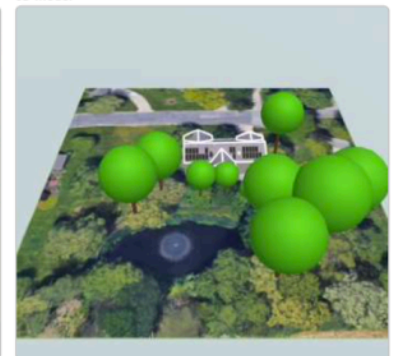
When a potential customer contacts an installer, the company will give an inaugural design and estimate for your address based on two pieces of input--your year-long electric bill and a shade analysis. The bill allows them to match the size of the system to the size of your consumption. With net metering eliminated, there is little incentive to produce excess free energy.

The shade analysis looks at aerial images of your rooftop (and its obstructions) and the combined amount of sun it receives over the course of the year. If the

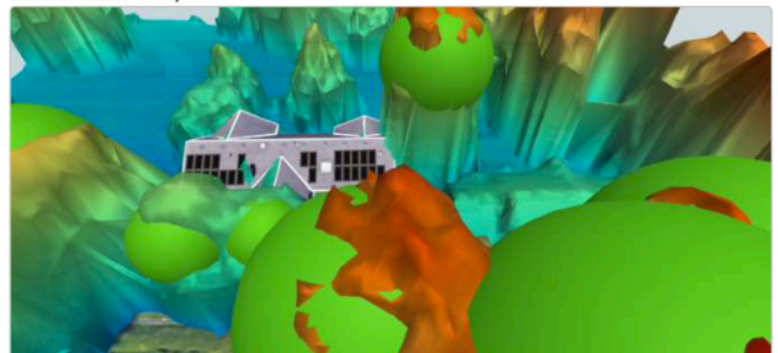
Zoomed out satellite view



3D model



3D model with LIDAR overlay



homeowner follows up on the initial bid, the installer will come to the site for a more accurate measurement of the roof.

The County must issue a permit to confirm compliance with local and national codes. The full roof is not available for coverage because the upper few feet of the ridge must remain clear for the fire department to access the house. Prior to connection to the grid, the utility must inspect and approve the installation as well.

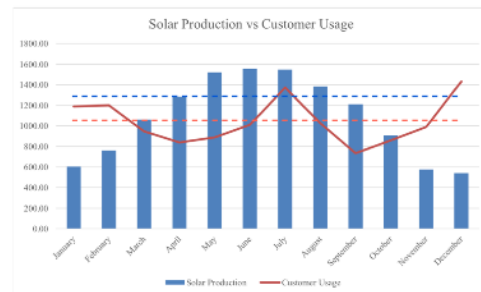
Unlike most home infrastructure, a solar array can pay for itself. A snapshot of your home's rooftop potential is available from [Project Sunroof](#) and other [solar calculators](#). Based on your past electrical consumption, the installer will give a more accurate depiction of your projected savings and return on investment.



Per the City of South Bend Division of Sustainability, using data from 2015 and 2016, the average annual electricity use by a house in Indiana is 11,568 kilowatt- hours (kWh). This amount of electricity can be provided by a 9.3 kilowatt (kW) solar photovoltaic system, for which the installation cost would be about \$17,600 before taxes and \$13,728 net after the 22% Federal tax credit is applied. These numbers, representing one possible system cost, will vary depending on equipment, the installer, special circumstances, etc.

Monthly electric bills from I&M Power have increased 29% over the last four years, and I&M Power has a request before the Indiana Utility Regulatory Commission for an additional 6% increase. The savings in electricity costs will typically pay for the initial cost of installation within 10 years. With the discontinuation of net metering in Indiana, after July 2022 that payback period will likely be extended.

When you generate excess electricity in the summer months, the credit to your account carries over and compensates for your reduced generation in the winter months. The installer's estimate takes into consideration seasonal fluctuations.



## Home Values

The US Department of Energy asserts, "[Solar boosts home values](#)." There the DOE lists guides to buying, appraising, marketing, selling, determining value, and more.

In its [Spotlight on Solar and Real Estate](#), the DOE states, "Just like a renovated kitchen or a finished basement increases a home's value, solar has been shown to boost home valuation and shorten a home's time on the market...The real estate market is embracing solar..." Other studies reinforce the DOE findings.

The Solar Energy Industries Association (SEIA) released [How Owning a Solar System Impacts My Home Value: A Guide to Valuing Residential Solar Energy Systems](#). They describe three methodologies that should be considered when seeking the value of a residential solar system—income, cost, and comparable sales—and recommend the Income approach as the most appropriate.

A study led by U.S. Department of Energy’s Lawrence Berkeley National Laboratory [concludes](#) “home buyers consistently have been willing to pay more for homes with host-owned solar photovoltaic (PV) energy systems —averaging about \$4 per watt of PV installed—across various states, housing and PV markets, and home types. This equates to a premium of about \$15,000 for a typical PV system.”

Solar United Neighbors-Indiana suggests homeowners typically get out of the home sale the money that they put into solar panels. From a selling standpoint, they write, solar panels make the home more attractive to buyers, regardless of whether the panels affect the price.

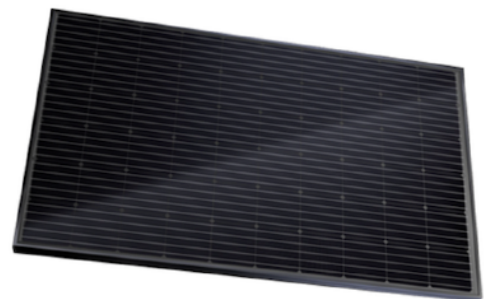
As future buyers become more responsive to the demands of climate change and seek energy independence, it is plausible that prohibitions on renewable energy will have a detrimental impact on home values or will outright discourage home purchases.

## Appearances

A major consideration for homeowners is the appearance of solar panels on a rooftop. While technology has evolved and new products lessen the visual impact, there are several items to address.

As mentioned earlier, a southerly exposure is preferred, which dictates where solar panels should be installed. If multiple rooflines or obstructions prevent a continuous array of panels, the individual panels may be arranged in a disjointed pattern on multiple roof sections for maximum sun exposure. Panels are typically mounted on a frame affixed to the roof, which raises the top surface and exposes edges.

Early solar systems were based on polycrystalline panels, which have prominent white grid lines, corners, and frames. While the older technology remains available and less expensive, newer monocrystalline panels are both more efficient and more expensive. The upside is that the newer panels and frames can be all black, resulting in a more uniform and muted appearance.



Q-Cells-G6-340W-All-Black-Split-Cell-Monocrystalline-Solar-Panel

Gaining attention are solar roofing and solar shingles, both of which integrate the solar panels into the roof as if the panels were roofing material themselves. Solar roofs, like those substituting for slate and metal roofs, mimic the appearance of the original roofing material and cover the entire roof. With solar shingles that emulate asphalt shingles, the new panels are affixed directly to



the roof rather than being mounted on a racking system, and new proprietary asphalt shingles about the array with a finished edge to yield a cleaner demarcation line.

Alternatives like solar roofs and solar shingles, while more attractive, have several shortcomings. Generally they are not available in our market. They cost much more than traditional systems mounted on suitable roofs. They essentially require a roofing replacement, even if your roof is in good condition.



Tesla now requires that you purchase its Powerwall battery system with its solar roof. SunTegra panels are about 16% less efficient, and other models are likely comparable. Dow sold its Powerhouse line of solar shingles to RGS Power, which filed for bankruptcy in 2020. Each manufacturer of solar roofs and solar shingles uses proprietary technology that commits you to a single purveyor over the years.

A significant issue for sites with some shading is that solar roofs and solar shingles do not integrate power optimizers or microinverters. You cannot compensate for shading, so if one panel has reduced output because of shading, the entire system drops down to that level of production, even if the other panels are in full sunshine. While solar roofs and solar shingles may serve treeless areas well, a view of the [Project Sunroof](#) map shows most homes in the KPVA neighborhood would be affected by this liability.



A new product on the market is a [solar skin](#), a thin film with an image (of a simulated asphalt roof) that covers the array to disguise the dark panels underneath. A solar skin is akin to an advertisement on the entire side of a bus where the passengers can still see out the windows. One manufacturer notes the solar skin diminishes the amount of sun reaching the panel with a 15% drop in how much electricity is generated. Since there are no long-term installations of solar skins, their durability is not proven.

## **Board Responsibilities**

Clearly, solar technology is evolving and ways to improve panel appearance will continually change. Any solar panel Rule must be flexible to honor the neighborhood's visual appeal while offering homeowners known options for embracing clean energy. Board members are volunteers who should not be tasked with judging engineering and aesthetic suitability. An ideal solution should offer clarity about which roofs are suitable for all parties.

Additional material about solar panels and issues related to solar panels is under the *Solar* menu item at <https://www.kpvillas.org>.