

Solar Readiness Package



Psalm 96:11-12

Let the heavens be glad, and let the earth rejoice; let the sea roar, and all that fills it; let the field exult, and everything in it. Then shall all the trees of the forest sing for joy.

A proper for Creation Care

Author of creation: In wisdom you brought forth all that is, to participate in your divine being, and to change, adapt, and grow in freedom. You make holy the matter and energy of the universe that it may delight you and give you praise. We thank you for gathering all creation into your heart by the energy of your Spirit and bringing it through death to resurrection glory; through the One in whom all things have their being, Jesus Christ, your Wisdom and your Word. Amen.

A baptismal vow

*Do you renounce the evil powers of this world which corrupt and destroy the creatures of God?
I renounce them.*

Sacred story, prayer and vows all call us to be good stewards of God's creation. In our world, in our time, we are being called to tend to the earth like no other time in history. Climate change has already irreversibly effected our lives, our world and the earth our grandchildren will inherit. What we can do is be proactive and forthright in our efforts to bring more and more renewable, affordable energy to our churches, homes, and community spaces. What follows is one congregation's efforts to bring solar energy to their church buildings. It is offered as an impetus to other congregations looking to bring solar energy to their neck of the garden. We all strive to be good stewards, but now is the time to put good intentions into action.

As you find your way through the maze that is solar energy, please share your experiences, results, and hurdles with the renewable energy committee on the diocesan Task Force for Creation Care. This booklet can be updated as we learn more and as more and more churches move to renewable energy.

May God's earth survive and thrive under our care,

The Reverend Canon Kelli Grace Kurtz
Rector, All Saints Riverside

Here are some points to consider when trying to assess your building's suitability for solar:

- **Roofing:** What type of roof do you have, and what condition is it in? If you have a composite shingle roof that is fairly new – say 10 or so years into a roof that's projected to last 30 years – then you're probably in good shape. But, if your roof is in poor condition, or is an older clay tile type, then placing solar panels on your roof could get more expensive. But the good news is roofing work can be considered part the total job cost and eligible for the 30% direct pay under the Inflation Reduction Act (IRA). The provisions of the act are outlined below.
- **Building Orientation:** How is the building situated on your property? You want your solar panels to the operate as efficiently as possible and in Southern California that means a south facing roof.
- **Sun Exposure:** How much sun does your roof get? Even if you have a roof with the preferred directional orientation if it's shaded much of the day by trees or other structures, you may not get your money's worth from rooftop solar.
- **Other Options:** If your roof is not suitable for any reason you may still have options for solar panel installation. Consider a shade structure. This can be particularly appropriate if you can provide shade for areas that are used regularly, such as parking lots, play areas or other outdoor spaces used for social events. The same directional orientation is desired so that a south facing solar array will produce the maximum electricity, but shade structures are usually the more expensive option. **In older buildings shade structures may be more earthquake resilient than the buildings on your campus.**
- **Insurance Considerations:** **Rooftop Solar may affect the cost of insurance, as insurers may view them as increasing the possibility of a fire. Be sure to check with your insurance company to determine if a higher rate might affect your decisions. It may be that a shade structure will have a lesser impact on insurance costs, and therefore become more appealing over the long term.**
- **Choosing a contractor:** It is important to know who you are talking to. There are many brokers and lead generators working on the edges of the solar industry and it is advisable to avoid them if possible. Seek sales representatives that work for one specific company. It is also important to remember that although churches are nonprofits, they are also commercial properties, and it seems that there are many solar contractors who specialize in only residential projects. It is therefore recommended that you either seek contractors who advertise that they take on commercial projects or ask the contractors straight off if they do commercial work. Some commercial solar contractors have minimum size requirements on the work they are willing to take on so it is recommended that you have at least a rough estimate of how big a system you will need – the way to do that is outlined below.

- **System Size:** If you think you're a good candidate for solar panel installation the next step would be to try to determine the size of the system you can install. Solar panel size is measured in the number of kilowatts (KW) that can be produced at any given moment. Most utility providers limit the size of a self-generated solar power to 100% of your last 12 months electricity usage. (The City of Riverside, and some other municipalities in the LA diocese, operate their own public utility and have upped their maximum kw rating to 150%). It is important to size the system correctly to ensure you get at least the maximum allowable or the most you can afford. To get less might dampen the benefits of your project.

Sizing a system can be done in consultation with a solar contractor, who may be able to gain access to your parish's electric bills if your utility provider subscribes to an online energy use calculator that allows (with your permission) a contractor, to gain access to your energy use history. Or, if you are trying to determine in advance what a solar panel system might cost, a simple analysis of your utility bills as follows will help:

Retrieve from your bills the kilowatt usage for each of the preceding 12 months. Even if you choose to go straight to a contractor for sizing you may need this data, preferably in a digital format. Add up the Kw hours used from each month. Then go through the following steps:

1. Divide total KW by 12 to compute the approximate average monthly use.
2. Divide the monthly by 30 to get approximate average daily use.
3. Divide the daily average by 5.5 (5.5 is a rough average of the daily peak sunshine hours in So Cal)
4. Multiply that number by 1.2 (1.2 is a factor used to compensate for cloudy days think, June Gloom)
5. An Example:
6. During a 12-month period a parish used 53289 Kw hours of electricity
7. $53209 / 12 = 4440.75$ (monthly average)
8. $4440.75 / 30 = 148$ (daily average)
9. $148 \text{ divided by } 5.5 = 26.9$
10. $26.9 \times 1.2 = 32.3$ This equates to an approximate 32.3 Kw solar energy system.

Please note that this is only a tool used to get a rough idea of how big a system you might qualify for, and the potential cost as outlined below. Solar contractors

use sophisticated software that consider other factors and will probably provide a slightly different estimate. However, your calculated estimate can be used when talking to contractors to give them an idea of what system size you have in mind.

- **Per Watt Cost Analysis:** A useful way of looking at system size and of comparing bids is to request, or calculate, the per watt cost. Per open source internet information, on average a completed rooftop solar installation project in California costs between \$2.41 and \$3.25 per watt.

- **Use of Per Watt Analysis to Estimate Potential Costs:**

Returning to the 32.3 Kw system in the example posted above and applying the typical per watt cost of rooftop solar in California, you can obtain a rough idea of how much a solar panel energy system will cost. Apply the per watt equation to this project yields:

$$32 \times 1000 = 32,000 \quad \text{Note: a kilowatt is 1000 watts}$$

$$32,000 \times \$2.41 = \$77,120$$

$$32,000 \times \$3.25 = \$104,000$$

$$(77,120 + 104,000) = 181,120 \text{ divided by } 2 = \$90,560$$

There is nearly a \$27,000 spread between high and low estimates, so take the 1/2-way point of \$90,560 and consider your estimate can vary in either direction, but will likely approach the \$100,000 mark. While imperfect, this can at least give you a starting point for planning purposes.

Bid Comparison

Or consider you have 3 bids for a 34 kw system and want a simple method of making comparisons:

Use this calculation to determine cost per watt:

Cost divided by 34 X 1000 (34,000) Note: a kilowatt is 1000 watts

$$\text{Bid 1: } \$135,500 / 34,000 = \$3.97 \text{ per watt}$$

$$\text{Bid 2: } \$146,000 / 34,000 = \$4.29 \text{ per watt}$$

$$\text{Bid 3: } \$94,860 / 34,000 = \$2.79 \text{ per watt}$$

These are actual bids for rooftop solar at All Saints Riverside.

Note that two of the three bids are greater than the average cost per watt cited above. This is an example of how a complicated or compromised roofing structure can affect cost. ASR's roofs are composed of historically correct, old clay tiles placed on a tongue and groove substrate. In order to install solar panels on the roof, contractors would first need to strip the tiles from the areas where the panels would reside and then lay down felt and composite shingles. They would then frame in the area around the solar array with the original tiles so that it would appear the whole roof remained tiled. This labor-intensive process contributed to a higher than average cost for roof top solar.

Also note that the difference between the lowest and middle bids is over a dollar per watt while the difference between the middle bid and the highest bid is .32 cents per watt. While it was tempting to jump on the low bid, a closer look at the scope of work (we had to ask the low bidder for this information) revealed that the low bidder intended to simply strip the tile and lay down felt before panel installation. Although they had planned to frame the solar array with existing clay tiles, they had not considered reroofing the area under the panels.

On another point, and to add emphasis to the importance of proper sizing, the 34 KW sizing cited above resulted from the analysis of ASR's utility bills conducted by each of the bidders. The bills were submitted in the Spring of 2022 for the previous 12-month period. We suspected that the system's size based on that group of bills would not accurately reflect ASR's future need for electricity as many of the bills were from the Covid lockdown period. Community based groups were returning to the use of parish facilities, and a long dormant wing of the church campus was leased to a nonprofit childcare organization that did not begin operations until mid-year. When we compared electricity usage for the period June to September 2022, we discovered about a 30% increase over the same period of the previous year. Had we gone ahead with the 34 KW assessment we would have not covered our usage with clean, self-generated energy. We would have missed some economic benefits of self-generation, and also missed the opportunity to contribute to climate change mitigation efforts to the greatest extent possible.

Ultimately, ASR decided to have solar panels installed on top of a shade structure and according to the contractor, the building of the basic structure added one dollar per watt to the \$2.78/watt solar array cost.

Batteries: Self-generation of electricity via solar only occurs when the sun is shining. Storing excess energy in a battery is the best way to use self-generated solar energy to mitigate climate change and realize at least some economic benefits. At night your church's power needs are fed from the traditional grid, and depending on where you are, much of that electricity is generated via means that produce greenhouse gas emissions. If you can afford batteries, you should get them, but remember that battery technology is quickly evolving, and many contractors advise that installing batteries at commercial sights is expensive and complicated. If you choose to wait on batteries for any reason, work with your contractor to make sure they can be easily added to the system.

Net Energy Metering: NEM is simply the difference between the energy produced by solar self-generation and the amount of energy consumed from the power grid. Excess energy from self-generation flows back into the grid and utility providers are required to purchase that energy at a set rate. Although that rate has been greatly reduced due to recent regulatory changes, reimbursements from your utility provider can help offset the cost of self-generated electricity. If less energy is consumed than produced the parish could see a greatly reduced electric bill. If the parish uses more than produced, they could offset their electric bill but would still receive one.

Maintaining a Solar Panel Energy System:

Solar Panel systems, like air conditioning systems, need regular attention. Many solar installers offer maintenance contracts. They can be purchased at the time of installation and included in the total cost of the system for IRA/Direct Pay. Contracts can be for any period up to the life expectancy of the system – roughly 20 years. However, it may be best to choose a shorter term like 5 or 10 years for maintenance contracts to allow for flexibility in vendor choice.

Funding:

The Inflation Reduction Act's Implications for Nonprofits

The IRA includes many changes that make it easier for nonprofit organizations to switch to solar energy for their facilities. Note: much of this information was found on the Catholic Energies web page. Catholic Energies' mission is to provide "trusted project development and management services designed specifically for Catholic organizations."

Through a number of provisions, IRA alters the financial landscape for solar projects for nonprofits. All options existing prior to the passage of the IRA remain, including Power Purchase Agreements (PPAs) and leases, however cash or financed projects became more cost effective with the implementation of the IRA.

Although this legislation has passed into law in 2022, the regulations governing how the IRA will be implemented is still a work in progress. The new rules will go into effect 60 days after they are published. It makes sense to continue, or start to develop projects now; industry expectations are that the new rules will take effect in early 2023.

Here are some highlights of IRA components:

The Investment Tax Credit (ITC): Previously the solar Federal Investment Tax Credit (ITC) was directly available only to US taxpayers. Previously nonprofits could indirectly access the cost savings of the ITC through a PPA with a third-party taxpayer investor, but only if PPA transactions were permitted by the state or local utility.

- The current 26% ITC was scheduled to step down to 0% over the next three years but is now fixed at 30% through 2032 [1] – this applies to Direct Pay as well.

Direct Pay: Via a new mechanism called Direct Pay, US nonprofits can receive a cash payment in lieu of the ITC – this means that owning solar just became at least 30% cheaper for a nonprofit.

- There are three potential additions to the 30% Direct Pay in 10% increments. The additional increments are for using domestic materials, serving low-income communities, and/or being located in traditional "energy communities."

This last factor, energy communities, may be significant for nonprofits in Los Angeles, Ventura, San Bernardino and at least parts of Orange Counties as an additional 10% may be added to the 30% Direct Pay offered by the federal government. The following is from a website generated by the *Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization*.

As defined in the Inflation Reduction Act (IRA), the Energy Community Tax Credit Bonus applies a bonus of up to 10% (for production tax credits) or 10 percentage points (for investment tax credits) for projects, facilities, and technologies located in energy communities. Increased credit amounts or rates are available to taxpayers that satisfy certain energy community requirements under [Section 45, 48, 45Y, or 48E of the Internal Revenue Code](#). The IRA defines energy communities as:

1. A “brownfield site” (as defined in certain subparagraphs of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA))
2. A “metropolitan statistical area” or “non-metropolitan statistical area” that has (or had at any time after 2009)
 - 0.17% or greater direct employment or 25% or greater local tax revenues related to the extraction, processing, transport, or storage of coal, oil, or natural gas; and
 - has an unemployment rate at or above the national average unemployment rate for the previous year
3. A census tract (or directly adjoining census tract)
 - in which a coal mine has closed after 1999; or
 - in which a coal-fired electric generating unit has been retired after 2009.

The US Department of Energy has determined that counties mentioned above qualify for the added 10% direct pay offered via the IRA, and have provided a web based map to help nonprofits determine if they qualify as energy communities. The map can be accessed via the portal below.

[https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?data_id=data Source 3-188bf476e26-layer-6%3A136&id=a2ce47d4721a477a8701bd0e08495e1d](https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?data_id=data%20Source%203-188bf476e26-layer-6%3A136&id=a2ce47d4721a477a8701bd0e08495e1d)

- Other Direct Pay Benefits:
 - Roofing repair or replacement costs in the total project cost for the purpose of Direct Pay.
 - Maintenance Contracts can also be included in the total costs for Direct Pay purposes.
 - Solar + battery storage projects can also qualify for Direct Pay

What is a PPA?: A Power Purchase Agreement (PPA) is essentially a lease. A third-party funder pays for the solar installation and covers the maintenance fees for a

period of time up to the projected life of the system (typically 20 years). The lessee (your parish) substitutes paying the third-party lessor for the electricity produced by the solar array. One advantage PPA's offer to the parish is that the cost of electricity is usually fixed at a lower rate than what their utility provider charges and is likely to remain fixed for a longer period of time. Another is that the third party takes care of maintaining the system and assumes the risk should the system not perform as expected. Your parish will be paying the third party for the solar generated electricity. Unless a battery is installed, electricity consumed when the solar power is not being generated will be purchased from your utility provider.

What is Bad About PPA's?: If the PPA is kept for a 20-year term the cost of the system to the church will at least double. The parish can still end up in an overall cash positive position if the cost of energy from a utility provider continues to rise, and the solar energy cost remains stable. There is an option for early buyouts and this should be explored. PPA's often carry the ability to encumber real property if a parish fails to adhere to contract terms. Any such arrangement requires diocesan approval.

What is Good About PPA's: A parish with limited financial resources can still help mitigate the effects of climate change with the use of clean energy while enjoying a more modest return on their investment.

Other Third Part Agreements:

There are other benefits to third part investors paying for the cost of solar energy generation installed at nonprofit commercial properties. A church can elect not to receive the 30% direct pay offered by the IRA, and in that case the tax incentives offered to for profit enterprises not only still hold, but have been raised from 27% to 30%. Further, the third party can benefit by writing off the depreciated value of the system, and this can be a substantial benefit. Everything good and bad about PPA's also applies to other third party lease agreements.

A Note on Timing and Cash Flow:

Applying for the IRA direct pay may be a daunting task to many, and parishes may encounter delays of up to 18 months to receive the payment. There are contractors who have paired with financiers who will process the IRA application for you. They may charge a fee for doing this, and may also benefit from their ability to capture an accelerated depreciation of the solar equipment for tax purposes. Further, ASR spoke to two contractors who stated they could process the application and receive the funds in about 90 days. Details and the veracity of these claims has not been established. Again, such arrangements cannot encumber any parish real property without diocesan approval.

What all of this this Means: The provisions of the IRA makes solar more feasible for nonprofits, and if you believe your buildings are suitable for solar. Now is the time to start planning and development.