

## Solar Sacrifice: How an Arizona Church Lost Money by Going Solar—and Solutions for When Energy Incentives Fail to Serve the Needs of Nonprofits

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**ABSTRACT** By policy design, consumers are supposed to save money when they invest in solar energy. This paper presents a case study of what happens when a church goes solar and the finances go wrong. Following the installation of solar-photovoltaic panels, the Arizona church—in the Valley of the Sun, among the sunniest places in the country—decreased its energy consumption, but its electric bills went up. Through oral-history interviews of key stakeholders, the author investigates what happened, and what could be done to prevent other religious institutions and nonprofits from experiencing the church's fate.

### KEY MESSAGE

The current incentives for implementation of solar-photovoltaic energy are designed to meet the needs of individual homeowners and for-profit businesses, but not for religious congregations and other nonprofits. Changes will need to be implemented to the current system of solar-energy incentives in order to meet the special needs of religious congregations and other nonprofits.

### INTRODUCTION

Solar energy on a utility scale is cheaper than it has ever been, and more affordable than most other renewables and fossil fuels [1]. But growth of adoption of solar panels on a distributed scale, such as by solar panels on the roofs of individual homes and businesses, is still largely dependent on fiscal support [2–5]. Incentives for the adoption of solar-photovoltaic energy—such as tax breaks, feed-in tariffs, and net metering—are intended to allow consumers to reduce their electric bills, thereby encouraging their investment in solar-energy systems. But those incentives do not always have their intended effects for religious institutions and other nonprofits, which are not obligated

to pay income and property taxes that are decreased with solar incentives.

After the Community Christian Church in Tempe, Arizona, installed solar-photovoltaic panels in 2012, the church began paying more for electricity. The church even undertook successful energy-efficiency efforts that led to a decrease in electric consumption but nonetheless its electric costs went up with solar, as it was saddled with two monthly electric bills instead of one, resulting in thousands of dollars in extra expenses annually [6, 7]. This paper finds that Community Christian Church's solar endeavors suffered from a perfect storm of failed policy: government incentives not designed for nonprofits, a lack of transparency from a largely unregulated third-party contractor, and excessive charges from a monopolistic utility that is threatened by solar.

The experience of Community Christian Church is also significant for what it portends for the estimated 350,000 religious congregations in the United States and the impression of solar on these congregations' roughly 150 million members [8]. While this study provides information that can be useful for all customers considering installations of solar-photovoltaic power with a power-purchase agreement, the main goal of this study is to shed

light on the unique (and underreported) situation of religious congregations in terms of solar. Of course, some of the findings are universal and some of them are particular to the Community Christian Church. Everything presented in this paper may not be relevant to all consumers considering solar power, but there should be something (and hopefully many things) that potential solar consumers find useful in their decision-making processes.

## CASE EXAMINATION

### *Background*

Religious congregations have been working to install solar-energy systems since as early as the years following the 1970s oil crisis [9–12]. Like the first solar panels that were installed on the White House [13], the first solar panels on the roofs of religious congregations were of the solar-thermal variety [11], designed to heat water, not power lights.

With the exception of the occasional case that has made the news—such as a Washington, D.C., church that was the first to install solar in the city [14], a church that is working to develop community solar in Minneapolis [15], and perhaps most famously, a solar-powered church in Greensboro, N.C., that is at the heart of that state’s debate over who is permitted to generate and sell energy [16]—the history of solar-energy adoption by religious congregations largely has been understudied. Notable exceptions include Mallory McDuff’s book on environmentalism within churches [17] and William Bolgiano’s recently published legal context examination of communal solar housed at religious congregations [18]. However, since the research to date has focused either broadly on the movement of religious congregations to adopt solar or more narrowly on a few specific case studies (as this paper does as well), the overall number of solar-powered religious congregations—both today and historically—is unknown and merits further research.

The case of Community Christian Church is not the first time that well-intentioned solar-energy policy has gone awry. For example, while Australian incentives for solar hot-water systems successfully led to more system installations, the effectiveness of the incentives in decreasing carbon emissions was mixed and was dependent on a host of other factors [19]. Energy systems can be complex beasts, and energy policy does not always generate its intended results.

### *Solar Incentives in Arizona*

In Arizona, there are four solar-energy incentives—three state and one federal—available to nonprofit corporations such as Community Christian Church. All are tax incentives [20]:

- Arizona’s Solar and Wind Equipment Sales Tax Exemption saves those who purchase solar-energy systems from paying sales tax on the purchase;
- Arizona’s Energy Equipment Property Tax Exemption saves property owners from paying extra property taxes based on the additional value that a solar-energy system contributes to a property;
- Arizona’s Non-Residential Solar and Wind Tax Credit provides a tax credit for 30 percent of the cost of a solar-energy system up to \$50,000;
- The federal Business Energy Investment Tax Credit provides a tax credit for 30 percent of the cost of the solar-energy system with no limit.

### *Power-Purchase Agreements for Photovoltaic Systems*

In a power-purchase agreement, a third party that is neither the utility nor the electricity customer pays for and installs a photovoltaic system for the electricity customer. (On a utility scale, the utility is also the customer.) The customer then pays the third party, typically on a monthly basis, for the solar panels’ generation of electricity.

The primary advantages to the customer entering a power-purchase agreement are that it spares the customer capital costs, installation-cost overruns, and maintenance costs. The primary disadvantages to a power-purchase agreement are that the customer does not own its photovoltaic system, that the power-purchase obligation may dissuade home buyers [21] (although the evidence of a power-purchase agreement’s impact on home sales is inconclusive [22]), and, perhaps most importantly, any tax credits and other financial incentives accrue to the third party rather than to the customer. In practice, this typically means that a power-purchase agreement leads to lower upfront costs and higher long-term costs when compared to a customer owning its own photovoltaic system [23, 24].

However, if potential customers want to benefit from government incentives for photovoltaics then not all have a choice whether or not to use a power-purchase agreement. Since most government incentives for photovoltaics in the United States are not in the form of direct subsidies but instead take the form of tax breaks, entities that do not pay taxes—such as nonprofits—are unable to take advantage of

the incentives on their own. If nonprofits such as Community Christian Church buy solar-energy systems (at a typical cost of tens of thousands of dollars), they will need to pay the entire cost and will not receive the major tax incentives. In order to benefit from the most significant incentives, such as the federal and Arizona state tax credits that provide 40 percent of a solar-energy system's installation costs, nonprofits need to enter into a power-purchase agreement with a for-profit third-party solar-power provider, which in turn receives the tax benefits for the system on the customer's property. Since for-profit companies pay corporate income and property taxes while nonprofits do not, for-profit companies are able to benefit from the tax-discount incentives for installing solar. (Even if the installation is not done on the company's land, the company retains ownership of the solar panels and is therefore eligible to receive most of the tax incentives.)

Ideally, the third party passes on much of that tax benefit to the customer, but the third party is not required to do so, and even in the best of circumstances, a certain percentage of the government incentives remains with the third party in the form of its profit. Universally, this can be a large factor when customers lose money with solar since customers with power-purchase agreements pay more for solar than those who bought their own systems [23, 24].

Nonprofits do not pay property tax, so they do not benefit from solar-energy incentives in the form of property-tax incentives. (And those larger nonprofits such as private universities and hospitals that give their host cities payments in lieu of taxes likewise are unable to claim property-tax incentives.) Of the four solar-energy incentives in Arizona, the only one that nonprofits such as Community Christian Church can use directly without a third-party contractor is the sales-tax exemption. However, that incentive pales in comparison to tax credits can indirectly subsidize 40 percent of the cost of a solar-energy system through tax credits.

Because of the high capital cost of installing a solar-energy system without tax credits, the leaders of Community Christian Church never considered buying a system outright instead of engaging in a power-purchase agreement [25].

A lot of energy has been spent on thinking of ways to promote and enact power-purchase agreements—there are even patents on doing so [26, 27]—but it is likely that less thought has gone into asking what customers are not served well by power-purchase agreements.

### *Solar at Community Christian Church*

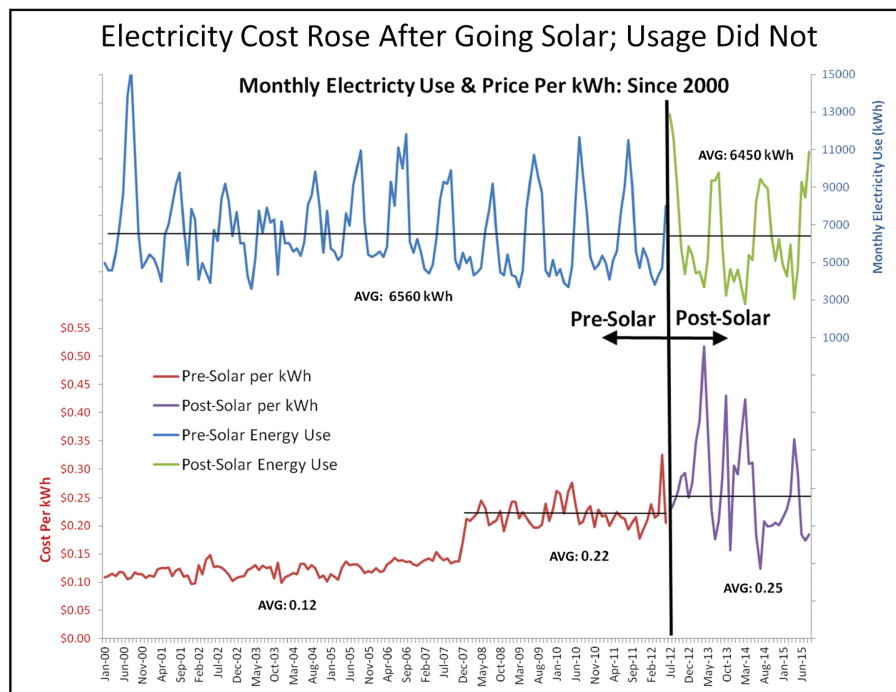
The idea to implement solar at Community Christian Church came from the church's green team, which would later morph into its solar team. The individuals on the team were inspired by what they see as a religious obligation to care for the Earth and that includes mitigating the effects of climate change [6, 7], which in turn involves reducing emissions of carbon-based greenhouse gases. Installing solar-photovoltaic panels is one way of decreasing one's reliance on carbon-emitting fossil fuels.

Because incentives for solar in Arizona are mostly tax based, and nonprofits such as Community Christian Church do not pay taxes on their revenues or property, nonprofits typically need to go through a third-party contractor—rather than simply buying the solar-photovoltaic systems outright themselves—in order to take advantage of solar incentives. In 2011, the church signed a 20-year power-purchase agreement with a third-party solar-power provider, with the latter responsible for installing and maintaining the solar arrays and the church responsible for buying all of the solar arrays' electric output from the third-party contractor at a set rate. The panels went online in 2012. They constitute a 35-kilowatt installation on two elevated south-facing arrays that provide shaded parking for 30 cars [6, 7].

There were three goals in installing solar-photovoltaic panels on the southern side of the church's complex [6, 7]:

- 1) reduce the church's carbon emissions by reducing the amount of energy that it consumed from Arizona's electric grid, which in turn is powered mainly through the burning of fossil fuels;
- 2) provide shade for the church's southern parking lot;
- 3) lower the church's electric bills.

The church was only successful in two of its three goals. After installation of the solar panels, the church's electric bills went up—including payments to both the utility and the solar contractor—from an effective kilowatt-hour (kWh) rate of 22 cents before the solar installation to an effective kWh rate of 25 cents after the solar installation. However, there was no rate increase from the utility, Arizona Public Service (APS). And over the same time period, the church's electric consumption actually went down, thanks to a host of energy-efficiency projects that the church undertook, such as by plugging up existing



**FIGURE 1.** Electricity Cost Rose After Going Solar; Usage Did Not. Courtesy of Chuck Necker of Community Christian Church.

holes in the envelope of the church’s 60-year-old building, swapping out old windows with energy-efficient ones, and planting additional trees on the church grounds to shade the building (while not shading the solar panels) [6, 7]. Still, the church’s effective electricity cost rose about 3 cents per kWh, which may not seem like much, but it adds up, costing the church thousands of dollars more per year in electricity.

Over the same period of time, the church’s energy consumption declined by an average of 100 kWh per month [6].

The third-party solar contractor touted its solar as “win-win-win”—a win for the church’s monetary savings, a win for the contractor’s profits, and a win for the Earth. But the church paid thousands of dollars more per year in energy costs with solar than without, all while energy consumption declined [6]. (See Figure 1 for a detailed graph of energy consumption and costs over time.)

In 2014, in response to complaints from church leadership, the third-party contractor reduced the fixed rate paid by the church for the solar panels’ output by 5 cents per kWh, or about 25 percent—but the church continued to pay more for electricity with the panels than it had without. Still, that discount is not in writing, it is just a goodwill agreement. That means that the rate could be

hiked back up at the whim of the contractor, and/or if the contractor sells the power-purchase agreement to another company.

Although many in the congregation are proud of the church’s effort to reduce carbon emissions through solar energy, the higher cost of electricity has left the community divided over whether or not adopting solar was a good thing [6, 7]. The church has since held solar workshops for other religious congregations so that lessons can be learned from its situation.

#### Findings

A number of factors led to the church paying more for electricity with solar than without. In some ways, the church was stuck in a nationwide effort by utilities to squeeze out distributed solar power [28, 29]—an effort that was particularly acute in Arizona [30]. There were no issues with the panels themselves, which produced energy as expected. The biggest single impact on the result may have been the bad terms of the church’s contract with its third-party solar contractor.

The contractor sold the congregation on a 25-percent savings on electricity costs; however, the costs were calculated by the contractor incorrectly, either out of ignorance

or deception. The contractor simply divided the church's total electric cost from the year prior to the solar installation by the church's total electric consumption from that year to surmise an effective kWh rate. The contractor then discounted that rate by 25 percent to calculate the rate that the church would pay for solar. This may sound straightforward, but the details make the difference. What the contractor did not disclose—and what church leaders did not fully grasp—was that the church would continue to be billed separately and significantly by APS. And since APS has a state-sanctioned monopoly for providing grid-based electricity in its coverage area, it is in its financial interest to fiscally punish customers who otherwise would threaten its revenues by installing their own energy-generating solar panels that decrease customers' consumption of grid energy from APS [31, 32].

Before adopting solar, the church only had an electric bill from one company—its utility, APS. However, after adopting solar, the church had two monthly electric bills, one from APS and one from its third-party contractor. While each individual new bill was less than any of the old bills, the cost of the two new bills together was greater than any of the old bills.

In any given month, as little as 20 percent of the church's APS bill is for the church's electric consumption. The remainder constitutes 16 taxes and fees—including charges just for being hooked up to the grid—and what utilities call a “demand charge,” an extra fee based on the period of highest usage that at this time APS only charges commercial customers. (APS treats nonprofits such as the church the same as for-profit businesses.) APS uses the 15 minutes of highest usage in a month to determine peak usage [33].

The church's peak usage takes place when the solar panels are not generating electricity—in the early evening and night, when the church runs its air conditioning to accommodate the people it houses who are homeless. (For about half the year in Arizona's Valley of the Sun, the ambient temperature is still around or above triple digits Fahrenheit at sunset.) The subsequent demand charge makes up the highest percentage of the church's APS bill—the demand charge alone can be twice the amount of the charge for direct electricity consumption. While church leadership bought into the idea of 25-percent savings, the continuing APS fees and demand charge negate the theoretical savings.

Additionally, the rate that the solar contractor charges the church for the solar panels' electric production, as stipulated in the contract, is not competitive. That rate is about one-third more than a sample contract that I and my fellow Arizona State University researchers—Saurabh Biswas, Wesley Herche, Jeffrey Iles and Soumya Parthasarathy—obtained from another third-party solar contractor. Even after the contractor lowered the church's rate per kWh in 2014, the amount that the contractor was charging the church remained higher than the rate in the sample contract we received from the other third-party solar contractor.

While other religious institutions have been able to save money with solar, Community Christian Church's bad contract may be the biggest single factor in the church paying more for electricity after solar. Unfortunately, Community Christian Church did not comparison shop in advance of the church's signing of its 20-year power-purchase agreement with the solar contractor. The terms of the church's contract effectively bind the church to pay above-market rates. But much of the problem is systematic: the church relied on a third-party contractor in the first place—instead of just buying its own panels—in large part because solar incentives in Arizona, like in so many states, are structured not as direct payments but as tax credits that nonprofits such as Community Christian Church cannot utilize without a third-party for-profit contractor, which should, in theory, pass the savings on to the nonprofit. But there are no regulations that govern the rates that third-party contractors can charge nonprofits.

Because of the bad contract, some may choose to blame Community Christian Church for its money-losing outcome. However, it is important to remember that there is an information imbalance between small nonprofits such as Community Christian Church and for-profit solar contractors, and that nonprofits seeking solar energy are doing so within a system that is not designed to benefit them.

### *Solutions and Conclusions*

Community Christian Church is stuck in its 20-year contract, so very little can be done to help it except for sending donations. (The church can buy the system from the third-party contractor at a to-be-determined mutually agreed-upon fair-market value at the end of the sixth and tenth years of the power-purchase agreement, but that will require a large capital payment that the church is unlikely to be able to afford.) There are, however, a number of sys-

tematic solutions that could prevent other religious congregations from suffering the same negative effects.

Current policy favors residential and corporate adoption of solar. Government incentives could be realigned to better serve nonprofits and religious institutions as well, and/or new incentives could be developed that are designed specifically for nonprofits and religious institutions. For example, if direct subsidies replace tax breaks, then nonprofits and religious institutions would not need to rely on third-party contractors and power-purchase agreements to benefit from governmental solar-power incentives. Such a change in policy would enable religious institutions and other nonprofits to use incentives to buy their own solar panels. Additionally, a change also may benefit for-profit and residential consumers, who may be more motivated to invest in solar if they receive rebates and direct subsidies [3].

It is worth noting that in the wake of the U.S. Supreme Court ruling in the *Citizens United* case that greatly expanded the ability of corporations such as APS to spend “dark money” on political campaigns, regulatory capture has become a larger obstacle to progress [34]. And that is particularly an issue with APS and its regulator, the Arizona Corporation Commission [35, 36]. If the current system is to remain, though, it would be wise for the government to restrict the fees that utilities can charge consumers with solar and regulate the rates that third-party contractors are permitted to charge consumers, particularly nonprofits and religious institutions.

In jurisdictions with a demand charge, it may be best for religious congregations to install energy storage—such as batteries—along with their photovoltaic systems, allowing solar energy from the day to be stored and used to lower the peak usage of energy from the grid, thereby lowering the corresponding demand charge. And APS and other utilities could treat religious institutions and other nonprofits more like residential customers—without a demand charge—than like for-profit corporations. The revenues of Community Christian Church, after all, do not approach those of commercial ventures with similar energy footprints, such as offices and convenience stores. Simply put, religious congregations and other nonprofits tend not to have access to the same fiscal and informational resources as for-profit ventures do, so utilities should not treat religious congregations and other nonprofits the same as for-profit companies.

The problems that Community Christian Church encountered also could have been avoided with better advisement. Community Christian Church did not shop around for the best offer from third-party contractors [6], but it probably should have done so. Its leaders just did not know that they should have. And inadequate information is a widespread problem for consumers [24]. Clearly, there is asymmetric information between third-party solar contractors and their customers. Universities and other nonprofits could step forward by developing free solar-consulting programs for religious institutions and other nonprofits. And it would be helpful if new regulations require third-party solar contractors to provide more information, such as long-term comparisons of the fiscal cost of buying a photovoltaic system outright versus entering into a power-purchase agreement. In the absence of new regulations or a consultancy program, religious leaders should seek out third-party solar contractors who have experience addressing the energy needs and the financial situations of religious congregations.

Community Christian Church is not alone; while solar has been a successful investment for some religious institutions, inevitably the system has also worked against other religious institutions. When it comes to nonprofits, particularly small-scale nonprofit religious institutions, there is a misalignment between policy goals and outcomes—and action is needed by nonprofit, university and public-sector actors in order to better incentivize small-scale religious institutions and other nonprofits to switch to renewable energy and not regret doing so.

While religious congregations likely have not been ignored intentionally, many of them do have different circumstances than typical residential or commercial electric customers—and even different when compared to other nonprofits. If we are going to transition to a renewable-energy economy, then we cannot leave our nation’s religious communities behind. Bold leadership can ensure that adopting solar energy at religious congregations and other nonprofits need not be a sacrifice.

## CASE STUDY QUESTIONS

1. What is it about nonprofits that make them different from for-profit ventures when it comes to energy consumption and energy incentives?
2. Given the Community Christian Church’s example, what do you think is the most important



thing to do when considering a power-purchase agreement for solar power?

3. What kinds of policy changes could be enacted to help ensure that religious congregations and other nonprofits save money with solar power?
4. What do you think that consumers can learn from the situation of Community Christian Church?

## ACKNOWLEDGEMENTS

This paper is based on research originally conducted by David Krantz along with colleagues Saurabh Biswas, Wesley Herche, Jeffrey Iles and Soumya Parthasarathy, all of Arizona State University's School of Sustainability. The author thanks them for their support and teamwork. He is grateful for the wise guidance of Sonja Klinsky, the inspiration of Alon Tal, and the valuable feedback of George Basile, Chuck Necker, Janet Reyna, and three anonymous readers from the journal *Case Studies in the Environment*. And the author thanks Doug Bland, Chuck Necker, Janet Reyna, and Thomas Sharp for their participation in the interview process, as well as for their determined efforts to help build a more sustainable world. He also thanks all others who have helped and encouraged his learning over his academic and professional career.

## FUNDING

David Krantz (ORCID 0000-0001-6062-6628) is supported by an IGERT-SUN (Solar Utilization Network) fellowship funded by the National Science Foundation (Award 1144616).

## COMPETING INTERESTS

The author declares no conflict of interest. The funding sponsor had no role in the design of the research; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results. The author serves on the board of directors of Arizona Interfaith Power & Light alongside some of the leaders of Community Christian Church who were interviewed as part of the research for this paper.

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