SOLARworks

an initiative of Gasp

AN ANALYSIS OF UTILITY NETWORK USE CHARGES FOR ROOFTOP SOLAR: WHAT'S FAIR?

Written by

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ABOUT GASP

CLEAN AIR. HEALTHY COMMUNITIES.

OUR MISSION

Gasp's mission is to reduce air pollution, educate the public on the health risks associated with dirty air, and encourage community leaders to serve as role models for healthy air and clean energy production. Founded in 2009 as Alabama First, we adopted the name Gasp in 2010 to honor a student-led coalition in the 1970s that advocated for clean air policies and organized protests around the city. Gasp believes all Alabamians have the right to breathe clean air and that your health should be the first priority when considering policies that affect our community's air quality.

SOLAR WORKS

Solar Works is an initiative of Gasp to raise awareness of the benefits of solar energy in Alabama. Harnessing the power of the sun will improve our health, economy and environment. This white paper aims to explain one aspect of the landscape affecting clean energy for Alabamians. To get involved and become an advocate for clean, renewable energy visit **solar.gaspgroup.org**.

SUPPORT GASP

Becoming a member not only helps us fight for clean air, but also helps build our base of support and shows that Alabamians are concerned about air quality. You can join for as little as $5 today. To join or donate, visit **gaspgroup.org/join**.

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ABSTRACT

Solar energy will be a major part of Alabama's energy supply and is crucial in cleaning up our air. Solar energy receives widespread public support, but policies at the state and utility levels have not reflected this enthusiasm. In 2014, the Solar Energy Industries Association ranked Alabama 49th in the nation for installed solar capacity. There is good news, though. On September 1, 2015, the Alabama Public Service Commission approved Alabama Power's petition for 500 MW of renewable energy capacity. In northern Alabama, the Tennessee Valley Authority is building an 80 MW solar farm. Where industrial and commercial solar are growing in Alabama, there are still many barriers for residential customers who want to install their own solar systems — particularly in Alabama Power's service area.

One of the most important factors for growing the solar energy industry is establishing policies and rate structures that fairly value the energy put onto the grid via rooftop solar systems. As is the case with other fuel sources for electricity generation, a number of factors should be considered and weighed to determine a fair value for solar energy. A net analysis of costs and benefits of solar will look at: avoided fuel and energy costs, avoided investment in power plants, a fixed cost for fuel source and the environmental and health benefits.

In addition, "soft costs" such as network use charges act as regulatory barriers to growing the number of rooftop solar installations in Alabama. Although installing large-scale solar installations are an important step in growing Alabama's solar energy industry, unjustified network use charges for rooftop solar are unfairly burdening residential power customers and stifling the growth of rooftop solar in Alabama.

WHAT IS SOLAR ENERGY?

Solar energy is the conversion of the sun's radiation into sources of power, like electricity. A location's solar radiation depends on numerous factors: geographic location, time of year, landscape, and weather. There are several ways solar energy is deployed: residential panels (PV), community solar installations, and utility-scale solar farms. Alabama receives sufficient solar radiation to produce ample solar energy, yet the state ranks near the bottom for both installed capacity and jobs. Before we explore utility network use charges, it will be helpful to define some common terms.

Distributed Generation. In simple terms, distributed generation refers to power generated at or near where the electricity is consumed. Rooftop and ground-mounted solar installations are examples of distributed generation.

Interconnection. The process of connecting a generation source such as solar PV to the electricity grid.

PV Panels. Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current (DC). Solar cells in a PV panel generate electricity through photovoltaics.

Transmission. The means by which electricity is moved from a power source to the end user, i.e. transmission lines on a power pole.

Distribution. The final stage in electricity reaching the end user from the power source. Distribution is how electricity is carried from a transmission system to a customer by lowering the transmission voltage.

WHY SOLAR MATTERS

Solar energy does not emit carbon and other harmful pollutants associated with traditional sources of power and the sun is an infinite resource for energy generation. It's also attractive because it can provide autonomy. Residential solar systems can help customers reduce their electric bills and give them the power to control their energy consumption.

Solar energy is important because it is clean and renewable, and empowers energy consumers to generate their own electricity. A utility customer can use their own property, the roof of their home, for example, to create energy

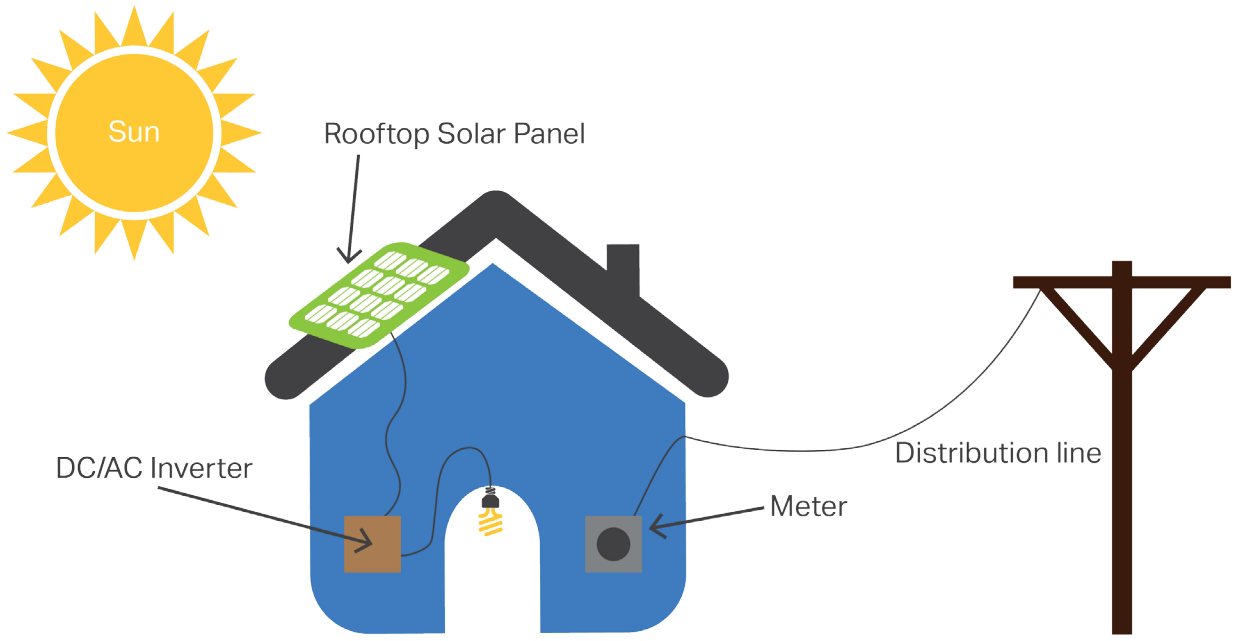


Figure 1. Interconnected Rooftop Solar Example.

by installing rooftop solar. As the price of solar photovoltaic panels continues to drop, the reality of individuals creating their own electricity becomes more distinct. Solar energy allows energy generation to be more democratized, where traditionally energy was generated and transmitted by an exclusive few.

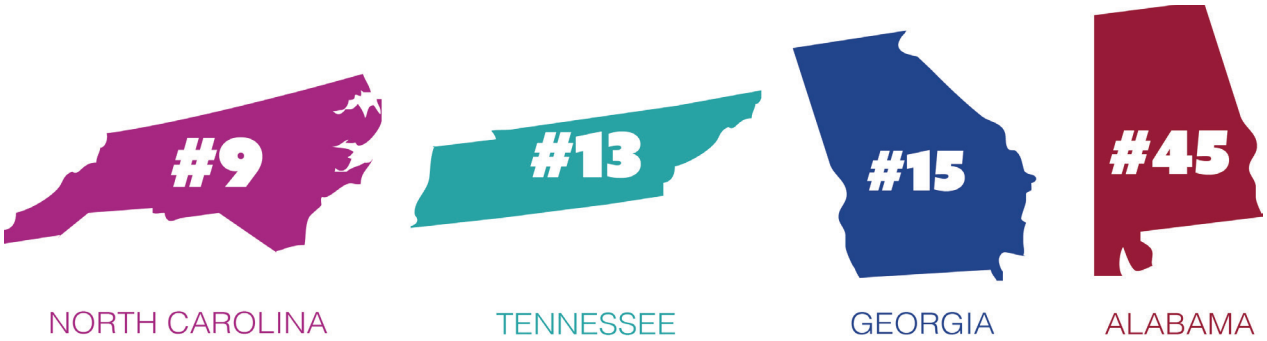


Figure 2: Solar Industry Jobs Rankings. Source: The Solar Foundation

JOBS, JOBS, JOBS!

The solar industry creates jobs in manufacturing, design and installation, as well as sales and distribution. According to the Solar Foundation one out of every 78 new jobs created in 2014 was in the solar energy industry. Georgia and Tennessee ranked 13th and 15th for solar job creation in 2015, respectively. However, Alabama ranked 45th even though the state has a similar, abundant solar energy resource to Georgia and Tennessee. Alabama is ranked 50th in solar jobs per capita. Alabama could and should be embracing the new job creation that the solar energy industry offers.

WHAT IS A FIXED CHARGE FOR ROOFTOP SOLAR?

Generally, a fixed charge is a fixed expense that occurs on a regular basis in order to create more predictable budgets. A utility's fixed charges are often based on the utility having fixed costs. There are essentially two types of fixed costs: customer-specific and systemwide.

Customer specific. This includes factors such as metering, billing and maintaining the transmission line from the distribution system to the house.

Systemwide. This means running the electricity distribution system as a whole, so, for example, the cost of maintaining distribution networks in residential neighborhoods.

Utilities across the nation have increased fixed charges that customers with rooftop solar pay. However, fixed charges for solar single out specific members of a utility's customer class, which is against recognized best ratemaking principles.

FIXED CHARGES IN ALABAMA

Fixed charges can, and oftentimes do, inhibit the growth of residential solar. A customer with rooftop solar and battery storage can see a delay by several years in the economics of going solar due to fixed charges. Such fixed charges affect not only the economics of going solar, but also customer choice and satisfaction.

Alabama Power currently imposes a $5 per kilowatt monthly capacity charge on solar and other types of distributed generation. This charge affects not only rooftop solar and residential customers, but also small businesses and schools who rely in part on solar installations to offset the energy they consume and buy from Alabama Power. This particular fixed charge for rooftop solar not only unfairly burdens Alabama Power customers who install rooftop solar, but it also reduces up to 50 percent of the savings Alabama Power customers could enjoy by going solar. Similar, prohibitive fixed charges for rooftop solar have been proposed, approved or rejected across the U.S. To add insult to injury, the Alabama Public Service Commission's (PSC) approved the Alabama Power fixed charge in January 2013 **without any public input or justification**.

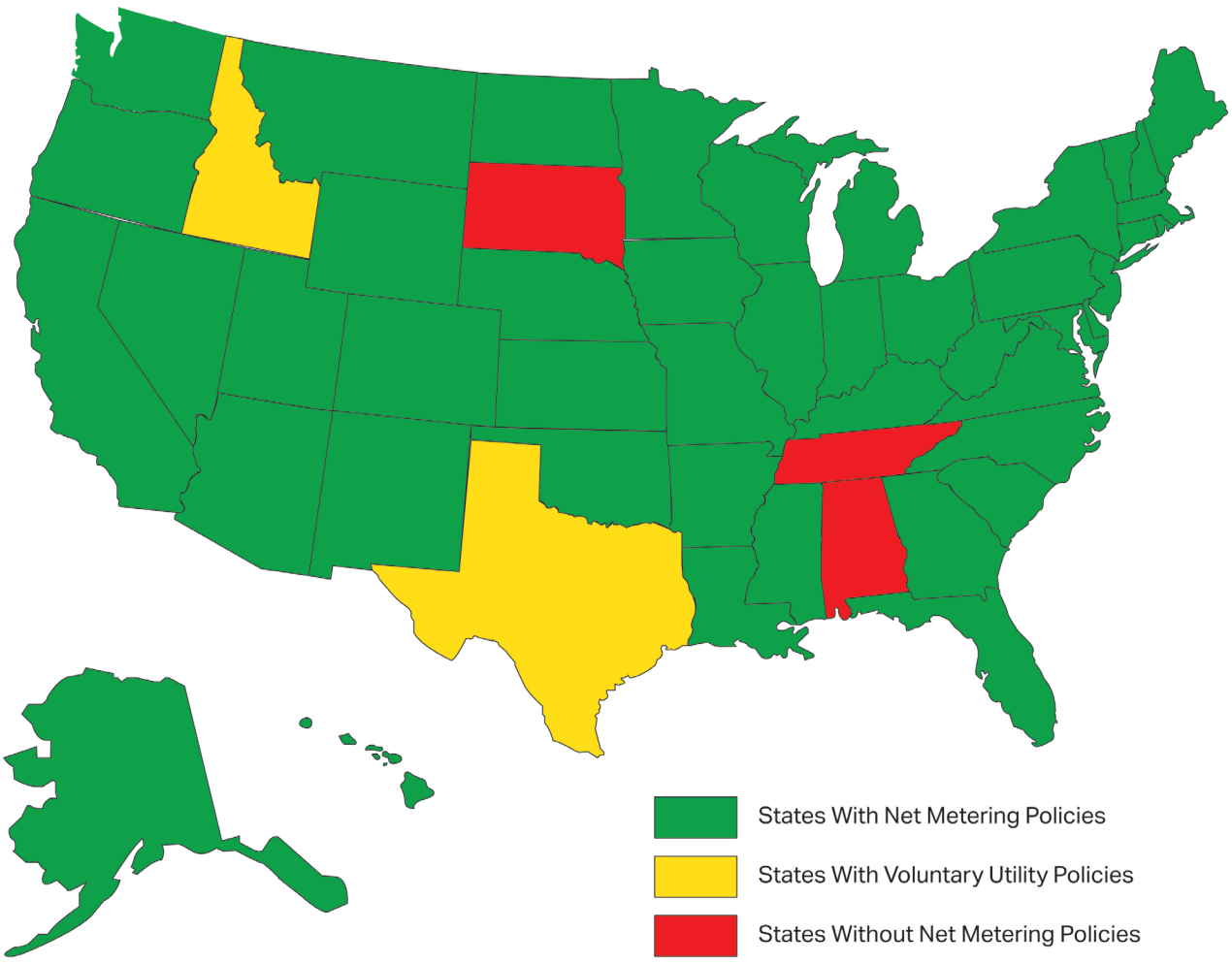


Figure 3: Net Metering Policies by State

A NOTE ABOUT NET METERING

The Solar Energy Industries Association defines net metering as, "a billing mechanism that credits solar energy system owners for the electricity they add to the grid." Forty-five states have net metering policies: Alabama is not one of those states. Net metering means that a rooftop solar owner who is connected to the utility grid is credited at the retail rate (nationally, as of 2015, 12.69 cents/kwh for residential customers) for electricity delivered to the grid. Net metering typically pays at the retail rate, but there's no hard and fast rule. Without a net metering policy, the amounts paid to utility customers in Alabama is completely within the utility's discretion.

STATE	UTILITY	FIXED CHARGE	RESULT
Alabama	Alabama Power Company	• $5/kW per month • $25 per month	Approved
Arizona	Arizona Public Service Salt River Project	• $5 per month • $21 per month • $50 per month	Approved Proposed Approved
Colorado	Intermountain Rural Electric Association	• $9.30 per month	Proposed
Iowa	Pella Cooperative Electric	• $27.50 per month • $85 per month	Approved Proposed
Minnesota	Peoples Electric Cooperative	• $5 per month	Rejected
New Mexico	Public Service Company of New Mexico	• $9.75 per month	Rejected
South Dakota	Black Hills Power	• $5 per month	Withdrawn
Utah	Rocky Mountain Power	• $4.65 per month	Rejected
Wisconsin	We Energies	• $20 per month	Approved
Wisconsin	Rock Energy Cooperative	• $27 per month	Approved

Figure 4: A Select Comparison of Utility Network Use Charges

In the instances above, such proceedings at regulatory bodies involved not only public scrutiny, but also in depth and technical analyses to support or reject the approval of a fixed charge on customers who have installed solar. Furthermore, the states listed above either have more solar capacity than Alabama or net metering policies or both.

This $5/kW charge unfairly burdens Alabama Power customers with rooftop solar and unjustifiably affects their choices as customers of Alabama Power. Such fixed charges are based on theoretical cost-shifting approaches that are unsupported by data. In other words, Alabama Power's fines aim to solve a problem that doesn't exist and ultimately do more harm than good by hampering Alabama's fledgling solar energy industry.

FIXED CHARGES IN ACTION

To illustrate the effect of these fixed charges on real customers, let's explore two different scenarios and compare the payback period (return on investment) for a grid-tied solar system with an off-grid, battery-tied system in Alabama Power Territory.

Calculations below provided by Elizabeth Scribner, M.S. Mathematics, PhD Candidate and Instructor of Mathematics at the University of Alabama at Birmingham

SCENARIO 1: GRID-TIED SOLAR.

The cost of a grid-tied system is around $3 per watt, so let's consider a 4 kilowatt system. This system will cost you $12,000 — after the Federal Solar Tax Credit, the cost is reduced to $8,400. You can expect your 4kW system to produce 16 kilowatt hours (kwh) of energy per day. Multiply this by 365 days, and you can expect an average annual production of 5840 kwh.

With a grid-tied system, you will realize solar savings at the retail rate of $.12 per kwh rate when the sun is shining and the home is demanding close to 4kw of energy. This only occurs when the air-conditioning is running, the oven is on, the dryer is on, hairdryer, or other very "large-energy-pull" appliances are in use. Let's assume a "best-case" scenario in which the home-owner actually directly uses half of the solar power generated at the retail rate and sells back the rest to Alabama Power (APCo below) at $0.035 per kwh.

Annual Solar Savings:	(2920 x $0.12) + (2920 x $0.035)	
	= $350.4 + $102.2	**$452.60**
APCo fixed charge:	4kw x $5 per kw x 12 month	**-$240**
Net Solar Savings:	$452.60-$240	**$212.60**
Payback Period:	$8,400 / 212.6	**40 years***

*exceeds the 25-year lifespan of the system

For comparison, the same customer in TVA Territory, where there are no penalties and net-metering, would save 5840 kwh x $0.12 = **$700.80** annually, and pay off the system in **12 years**.

SCENARIO 2: OFF- GRID, BATTERY-TIED SOLAR.

The cost of an off-grid system is around $6 per watt, double that of the grid-tied system. This system will cost you $24,000 out of pocket. After factoring in the Federal Solar Tax Credit, the cost is $16,800. Using the same assumptions as above, you can expect the industry standard of 5840 kwh of solar production per year.

With an off-grid system, you still may not use all the power you harvest during the day when the sun is shining at its peak, but you are storing that excess power in batteries and then using it during the other 18–20 hours when the sun

is not directly overhead. To calculate these savings, we'll use the retail rate of $.12 per kwh as we did above.

The "best-case" scenario occurs when you size the system right to closely meet your energy demands over a 24-hour period. In other words, for this particular system, your home would use about 16 kwh of energy over a 24-hour period. A comprehensive load analysis is required before any solar installation (residential or commercial), but let's assume that the installer was off a bit and you are only using, on average, 95% of the power generated by your system. That leaves us with an annual production of 5548 kwh.

Annual Solar Savings:	5548 kwh x .$12 per kwh	**$665.76**
Payback Period:	$16,800/$665.76	**25 years**

*15 years less than that with grid-tied and within the expected lifespan of the system

A NOTE ABOUT "VALUE OF SOLAR TARIFFS"

It is very important to not confuse a value of solar tariff (VOST) with the factors involved in analyzing a fair value of solar that Gasp is encouraging. Although many utilities are considering VOSTs, so far only Minnesota and Austin have them.

A standard VOST is a buy-all sell-all approach. This means that solar customers are not using the power generated by their solar systems. Instead, 100 percent of the energy they generate is sold to the utility while the customer is using electricity provided by the utility. In the traditional VOST structure, there are legitimate concerns that rooftop solar owners would be subject to income tax for what utilities pay them for the energy they produce. Similarly, solar owners could be at risk of losing the 30 percent federal investment tax credit under a traditional VOST.

Experts suggest that a VOST can avoid these pitfalls. However, utility regulators must be engaged in transparent ratemaking with well-run, open stakeholder processes. For Alabama Power customers, a VOST could prohibit the growth of solar energy where our Public Service Commission decidedly does not have a transparent process nor allows public participation in ratemaking.

FACTORS TO CONSIDER IN A FAIR VALUE OF SOLAR ANALYSIS

1. **Avoided Energy.** This would be the most straightforward calculation. Energy produced by solar customers is energy that the utility does not need to purchase. Similarly, solar customers can deliver the equivalent of capacity, displacing the need to purchase this capacity elsewhere.

   Embedded in this value are the net economic impacts associated with avoided fuel costs and the net impacts on generation and power plant Operation and Maintenance costs. TVA included in their Value of Solar analysis in 2015 the value of marginal system energy, fuel, variable operations and maintenance and start-up value of generation displaced by distributed generation.

2. **Avoided transmission and distribution.** Distributed solar projects generate energy at the point of use, reducing consumption of energy from the utility grid. Studies have shown that the cost of deployment for solar generation is negligible at low penetration and remains manageable for a solar capacity penetration of 30%. Accordingly, the relief solar customers provide to a utility purchasing capacity elsewhere should be fairly compensated.

   Transmission and distribution line-loss are usually calculated separately from one another because values differ for each system. Solar power generators should be fairly compensated by the utility when they export power to the distribution grid when solar generation exceeds load.

3. **Fuel Price.** Solar energy production does not depend on commodities whose prices fluctuate on short term scales and will likely escalate substantially over the long term. Accordingly, because the fuel source, the sun, is free and finite, solar energy production is a low risk investment and should be valued accordingly.

   A fair value of solar should reflect that distributed solar systems provide insurance against future fuel price uncertainty while adjusting for any increase in using traditional fuels at conventional power plants to accommodate for intermittency in solar production. In their Petition to install up to 500 MW of solar, Alabama Power cites renewable energy generation

CLEAN ENERGY & HEALTH

The costs that a utility customer cannot currently recoup from the generation of electricity from fossil fuels are also worth mentioning. One of the biggest, most important examples of this type of cost are the health costs attributed to the burning of fossil fuels. In 2014, the World Health Organization asserted that air pollution has become the world's single greatest environmental health risk.

The EPA concluded that the Clean Power Plan, the first ever regulations to cut carbon pollution from power plants, would lead to climate and health benefits worth an estimated $55 billion to $93 billion per year in 2030. This includes avoiding 2,700 to 6,600 premature deaths and 140,000 to 150,000 asthma attacks in children.

Although utility customers cannot recoup the health costs, going forward utility customers who generate solar electricity should be fairly compensated for their contribution to the health benefits associated with decreasing air pollution from the burning of fossil fuels at power plants.

as a means of protecting the "continued supply of cost effective electric service by protecting existing loads."

4. **Environmental Benefits.** As more solar and distributed solar is implemented, environmental benefits occur as conventional generation is displaced and their related pollutants are reduced. Solar energy should be evaluated the same as any new source in terms of environmental benefits. The emissions values assigned on a dollar/ton basis should be similar to those used to evaluate other electricity generating resources. Similarly, solar can impact O&M costs for associated pollution control equipment.

   Solar market penetration is just becoming significant, so the calculation of these impacts is subject to different assumptions and methodologies. So while environmental benefits should be factored into valuing solar fairly, benefits embedded with costs in other categories should not be double-counted.

5. **Economic Development.** As previously mentioned, the solar energy industry created 1 of every 78 new jobs in 2014. Distributed generation can cause regional job and economic growth.

   TVA included in their Value of Solar analysis in 2015 economic development as it relates to program design considerations. In their Petition to install up to 500 MW of solar, Alabama Power cites renewable energy generation as a means of "enhancing the chances of the state's leaders attracting new industry and growing the job base for citizens."

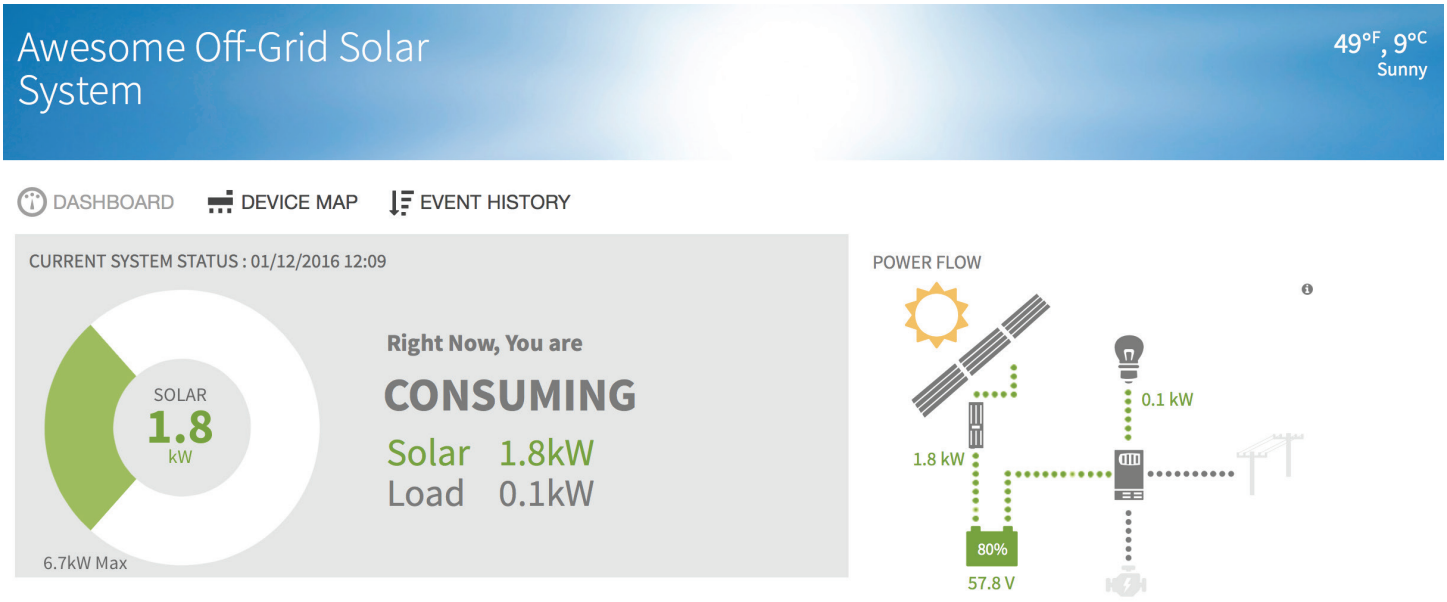
6. **Customer Choice.** When energy generation becomes more democratized, customers have more choices. Customer choice helps create competitive energy markets, which is definitely a benefit. Furthermore, it's important to remember that this doesn't apply only to large corporations. Individual customers deserve choice and autonomy as well.

   The TVA analysis also cites customer satisfaction as "enhanced customer value due to preference, optionality or flexibility." In its Petition to install up to 500 MW of solar, Alabama Power points to customer demand as an impetus for filing the Petition by saying "the Company is now receiving inquiries from existing and potential customers as to whether the Company can facilitate those customers' compliance with internal corporate goals relating to renewable energy consumption, carbon footprint reduction or both."

CASE STUDY: THE SCRIBNERS

"Our family went solar primarily due to our Christian calling to be good stewards. Next, we chose an off-grid solar power system due to the lack of grid-tie incentives from Alabama Power combined with the additional solar fee of $5 per kw for solar customers. For our system, this fee would add up to $35 per month if we were grid-tied, which is half the amount we are saving some months with an off-grid, battery-tied system. It made more sense to pay double on the purchase of a battery-tied system and then save more than double on most of our monthly utility bills. Most days, we generate more power than we need, meaning that if we were grid-tied, we could love our neighbors as ourselves by putting clean power back to the grid for them to use."

— Elizabeth Scribner, M. S. Mathematics, PhD Candidate and Instructor of Mathematics at UAB



CONCLUSION

With such an abundant solar resource, Alabama should not be ranked in the bottom 10 nationally for solar capacity. Although Alabama Power and TVA have made important strides in 2015 to growing Alabama's solar energy industry, regulatory and policy barriers still exist that impede the growth of rooftop solar. The PSC should not have approved the $5/kW charge that unfairly burdens Alabama Power customers who want to install rooftop solar.

Utilities and regulators in Alabama should be promoting and approving policies that allow Alabama to benefit from the job growth, customer autonomy and environmental benefits of solar energy. A major step in realizing these benefits would be the PSC revisiting the $5/kW charge and considering public input and justification for reducing or eliminating the charge.

Visit solar.gaspgroup.org to contact the Alabama Public Service Commission, Alabama state legislators, or write a letter to the editor about these unfair penalties against solar customers.

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