



An Environmental, Economic and Health Imperative

Increasing Access to Solar in Virginia

Report by
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March 2016



Abstract

Solar energy has the potential to solve many of the most pressing issues facing society today, most notably climate change and public health. However, purchasing solar panels is prohibitively expensive to all but the affluent, and many are not aware of cheaper options such as leasing panels. In response to this problem, I propose that the state of Virginia should enact a refundable income tax credit, modeled after the successful earned-income tax credit, to consumers who purchase or lease solar panels. This would be paid for by a moderate increase in the state's tobacco tax, further improving public health outcomes.

Introduction

When most people think of solar energy, they think of it as a way to replace fossil fuels (and their deleterious effects on Earth's climate) as humankind's primary form of energy. As a result, in discussions about mitigating global climate change, the many other benefits of "going solar" can get lost. In addition to providing a clean source of energy that could end our dependence on fossil fuels, solar energy can have a more immediate impact on myriad vexing policy issues.

Switching from fossil fuels to solar energy on a large scale would lead to significant improvements in public health and reduce energy poverty—the inability to afford sufficient energy to power one's residence and provide necessities such as hot water. This paper will explore the many benefits that areas such as rural Virginia could see from adopting policies conducive to increased deployment of solar energy and will propose that the state of Virginia institute a refundable tax credit of up to \$3,000 to allow residents to purchase or lease solar panels for their residence.

What's Holding Back the Spread of Solar Energy?

There is an inherent policy conundrum that makes it difficult for many people to take full advantage of the benefits of solar energy: Purchasing a set of solar panels has a significant upfront cost of roughly \$17,000, and the people and communities that would benefit the most from "going solar" are, generally speaking, rural and impoverished.¹ Combined, these two factors can make the switch to solar prohibitively expensive. While solar panels can often be leased for significantly less than this amount, even that total can be prohibitive to families living at the margins.

While some relatively minor policies have been implemented at the federal and state levels in an attempt to buttress the rise of solar energy infrastructure, many have proven woefully insufficient. As a result, the United States currently receives only 0.4 percent of its total energy from solar.²

Rural communities such as those in southwestern and south-central Virginia are the most in need of reforms in energy policy. According to a pioneering study of the state of Utah published in the *Western Journal of Agricultural Economics* in July 1982, energy use in rural communities significantly exceeds that of comparable urban communities, often due to significantly higher transmission costs.³ This fact, combined with the fact that poverty rates in rural communities exceed that of metro areas in every region of the United States according to the United States Department of Agriculture, underscores the need for a cheaper energy source in rural communities.⁴



Furthermore, the remote location of rural communities means that they must import energy and electricity from more distant locations compared to their urban and suburban counterparts. According to a 2014 study from the Center for American Progress, this phenomenon hampers the ability of these communities to connect to the modern electric grid and can leave them vulnerable to high energy costs.⁵ As mentioned previously, this is particularly worrisome given the higher incidences of poverty in these rural communities.

The state of Virginia provides an excellent case study for a region that would greatly benefit from increased solar deployment. According to a January 2014 report from the University of Virginia, Virginia's statewide poverty rate was 9.2 percent in 2014, the eighth lowest of all states, and the poverty rate in most counties in Northern Virginia, within reach of Washington, D.C., was in the single digits, far below the national average of 14.3 percent. This can mask the fact that the poverty rate in the rural southwestern and south-central regions of the state exceeds 20 percent.⁶ Many of these regions were once economically dominated by the coal and tobacco industries, both of which have seen significant declines in recent years. It is imperative that economic development policy works toward revitalizing these communities.

What Can Be Done to Promote Increased Solar Usage?

Effective public policy to increase the use of solar energy in targeted populations should be tailored to defray the upfront costs, which would in turn allow rural, impoverished communities to take significantly better advantage of the benefits of solar. This can be done by creating a refundable tax credit of up to \$3,000, similar in structure to the earned-income tax credit, that can be used to buy or lease solar panels. This would help improve public health, alleviate levels of energy poverty in the state's vast rural areas, and accelerate a transition towards solar energy in the state. It would also provide targeted poverty relief to families in need, who are often least able to access the many benefits of solar energy, in the form of lower energy and health care costs.

A credit of up to \$3,000 is appropriate because, while solar panels can be leased in many places for less than this amount, the relatively large size of the credit serves as a powerful incentive for Virginians to alter their energy source. If the credit were simply equal in size to the cost of purchasing or renting solar panels, many households could decide that it was not worth the time, energy, and disruption that a significant renovation to their residence would entail. Furthermore, a larger credit puts more cash into the hands of residents with the greatest marginal propensity to spend it, increasing economic output in local communities. As this paper will explain, similarly structured tax credits, such as the earned-income tax credit, have proven to be beneficial for economic development.

The refundable nature of the credit will allow it to efficiently target low- and moderate-income households. Were the tax credit non-refundable, as most credits are, households could only claim the credit up to the point where their state tax bill reached zero. Since poor rural households already pay a fairly small sum in state taxes due to their incomes, it is imperative that the credit be refundable in order for it to be most effective.



If 50,000 households in Virginia take advantage of this credit, that would amount to \$150,000,000 in lost revenue for the state before any economic growth impacts from solar or lower health care and energy costs are taken into effect. This may seem prohibitively costly, but there is a simple way to keep Virginia's budget in balance, as required by state law, without cutting valuable social services. Currently, Virginia imposes a \$3 tax on each carton of cigarettes sold within the state—nearly 57 million in 2013, according to state figures.⁷ Doubling this tax would more than cover the cost of the solar tax credit, with the added public health benefit of making cigarettes more expensive and therefore decreasing consumption.

What Would This Policy Accomplish?

Economic Benefits for Rural Communities

Solar energy provides opportunities for economic revitalization in many of Virginia's rural communities, which have been significantly harmed by globalization and the decline of the coal industry in recent decades. An Organization for Economic Co-Operation and Development (OECD) report published in 2012 laid out myriad economic benefits rural communities see from increased deployment of solar. The report analyzed the results of increased deployment in several high-income, industrialized countries, including the United States, and found that increased solar deployment increased job opportunities in the affected communities. The solar industry is labor-intensive, and many so-called "green-collar" jobs do not require high levels of education. The communities themselves, according to the OECD report, often see a larger tax base and higher average incomes as a result of increased solar deployment as well.⁸

A January 2015 report by the Solar Foundation found that the solar industry increased its employment numbers at a rate relative to the economy at large by a factor of more than 20 in 2014. The same report found that those responsible for installing the panels themselves earned an hourly wage of \$20–\$24, an important factor to note as the nationwide push for a \$15-per-hour minimum wage continues to grow. The report, in fact, singles out Virginia as one of the standout states in this regard.⁹

Another key finding in the OECD report was that many of the regions studied saw their residents' average energy bills decrease, as solar allows households and firms to effectively produce much of their own energy.¹⁰ Many can even sell excess energy back to the electric grid, boosting household incomes in many regions that can only be described as economically destitute. This can be an extremely efficient economic development policy in regions that have recently seen significant declines.

Reducing Harm and Health Risks Caused by Fossil Fuels

While burning fossil fuels is not as damaging to public health as burning charcoal and wood, it poses significant risks. According to a February 2013 study published in *Environment International*, the costs of health ailments afflicting Americans due to coal and oil pollution, such as cardiovascular and respiratory illnesses, are between 2.5 and 6.0 percent of annual U.S. GDP.¹¹ An August 2011 study in *Scientific American* found that such health problems lead to more than 5 million lost workdays in the United States each year, reducing economic output and growth.¹²



The human costs of maintaining an overwhelming reliance on fossil fuels are truly massive. An August 2013 study from the Massachusetts Institute of Technology (MIT) found that outdoor air pollution is responsible for 200,000 early deaths each year in the United States.¹³ If a newly discovered disease or drug were claiming the lives of 200,000 Americans each year, a state of emergency would be declared throughout the United States. The horrifying impacts of pollution from fossil fuels unequivocally deserve the same level of attention.

Furthermore, adverse health impacts and lost workdays tend to disproportionately affect low-income people and people of color. Nitrogen dioxide, a particularly potent pollutant, affects people of color at startlingly different rates: When controlling for socioeconomic status, people of color are exposed to 46 percent more of the pollutant in their living spaces and local neighborhoods, according to an April 2014 study from the University of Minnesota. This inequality is literally fatal: The difference leads to an additional 7,000 deaths of nonwhite citizens annually.¹⁴ The problem persists throughout the country, and Virginia's longtime status as a coal-dependent state makes the issue of life-threatening pollutants contained in coal particularly salient. Solar energy does not emit the toxins described in the University of Minnesota study, making it not only an economical and environmentally superior alternative to fossil fuels but also a matter of life and death.

Reducing Fossil Fuel Dependence

The devastating impact of reliance on fossil fuels demonstrates that it is necessary for the United States to transition to a clean alternative. The potential for solar to fill the void is significant. A July 2012 study by the National Renewable Energy Laboratory found that the United States has the capability to produce nearly 400,000 terawatt hours per year from solar alone.¹⁵ This is a truly enormous number, more than 100 times the annual energy use in the United States currently, and this effect is even more pronounced in southern states such as Virginia that see higher-than-average levels of sunlight.¹⁶ For decades, politicians have championed refrains such as “energy independence” and “being free from foreign oil” without actually implementing policies that significantly lead the United States closer to either goal. Solar provides an opportunity to change that.

What Current Policies Encourage Solar Installation and Renewable Energy?

Residential Renewable Energy Tax Credit

The main policy in the United States that currently attempts to help defray the upfront costs of installing solar panels is the federal residential renewable energy tax credit. Established as part of the bipartisan Energy Policy Act of 2005, the credit establishes a 30 percent rebate for consumers' renewable energy purchases, including home solar systems.¹⁷ This is a worthwhile program but suffers from two significant flaws.

The first flaw is that the credit only applies to the purchasing of solar panels and not the leasing of them, which creates a scenario in which the credit disproportionately benefits higher-income solar consumers who can afford to purchase panels as opposed to renting them. The second flaw is that the credit is not truly refundable, which similarly limits its use by lower-income consumers. According to the Department of Energy, if the amount of the credit exceeds a consumer's total tax



liability in a given year, the difference can “roll over” to the next year.¹⁸ This structure is superior to non-refundable tax credits (a category that includes most federal tax credits), which do not allow for any further economic relief once a taxpayer’s total tax liability reaches zero. However, this structure lacks the immediate economic relief of traditional refundable tax credits, which can serve as a “negative tax” on low-income taxpayers and increase their overall income. Therefore, the structure of the residential renewable energy tax credit is not as effective in expanding access to solar as it could be. The very nature of poverty dictates that targeted relief in the form of a fully refundable tax credit will be more immediate than a nonrefundable or partially refundable credit.

Earned-Income Tax Credit

Although the earned-income tax credit is not a policy that specifically addresses solar use, its structure and results are important to understand when framing a new policy, as its success serves as the basis for the refundable solar tax credit suggested by this policy. The EITC is a refundable tax credit that supplements the earnings of low- and moderate-income workers, with the exact amount dependent on household income and the number of children in the household. At very low levels of income, the credit can lead to families paying “negative tax”—that is, the amount of money a family can claim via the credit can exceed their total income tax liability.

The structure of the EITC has important implications for the success of the solar tax credit. For example, much of the economic stimulus resulting from a similarly structured refundable solar credit would place money in the hands of the residents of southwestern and south-central Virginia—in other words, it would inject money directly into the economically distressed region. This can be deduced from empirical evidence regarding the similarly structured EITC. A 2004 study by the University of Baltimore found that two-thirds of EITC payments in Baltimore, Maryland, were spent inside the city limits.¹⁹

A 2006 study by the Federal Reserve Bank of Atlanta also found significant fiscal stimulus impacts of the EITC. According to the study, each dollar distributed via the EITC in Nashville, Tennessee, created \$1.07 in economic impact in the city.²⁰ This helps cement the EITC’s place as an extremely cost-efficient, pro-growth tax policy. By targeting the households with the greatest marginal propensity to spend (those on the lower end of the income scale), refundable tax credits can serve as a powerful economic incentive. By comparison, the Economic Growth and Tax Relief Reconciliation Act of 2001, which had massive tax cuts that disproportionately benefited the wealthiest taxpayers, created only \$0.35 in economic impact for each dollar “spent” on the cuts, according to the Economic Policy Institute.²¹

Policies Promoting Other Alternatives to Fossil Fuels

Many other policies in the United States that have sought to increase deployment of other types of renewable energies (such as wind) do not have structures that future policies should emulate. The production tax credit (PTC) for wind has helped the level of wind energy in the United States grow significantly since its introduction in 1992; however, it is a very flawed policy that should act as a cautionary tale for policymakers seeking to promote the growth of renewable energy.²²

The PTC is temporary rather than permanent policy, and five times it has expired and needed to be reinstated at a later date, per the Union of Concerned Scientists (UCS).²³ This creates uncertainty in the wind energy market and retards its growth as a result. With the future of economic incentives such as the PTC constantly in doubt, investors are naturally wary of making long-term



investments and embarking on relatively large projects. This does not bode well for growth in any industry, and renewable energy is no exception. Any future tax credits tied to expanding access to renewable energy should be permanent to create the necessary market certainty.

This concern is validated by a report by the UCS, which shows that significant decreases in the growth in wind energy deployment have followed each of the five expirations of the PTC.²⁴ Furthermore, as shown in the report, the credit is applied to energy producers (utility companies) as opposed to consumers. A consumer-based tax credit would more closely target the actual people that the policy is trying to affect. A May 2015 report by the International Advanced Research Journal in Science, Engineering, and Technology (IARJSET) states this explicitly; noting that one factor retarding solar growth is “insufficient consumer-based energy incentives.”²⁵ This is a reference to the fact that the overwhelming majority of energy tax credits and subsidies encoded in current policy are given to energy producers rather than energy consumers (the population at large). These current incentives are valuable, but in order to provide an effective incentive to consumers, tax credits will have to target them directly as well.

Current State of Renewable Energy in Virginia

Current renewable energy incentives at the state level in Virginia are severely lacking. The most significant policy is a property tax exemption for the value of the solar panels on one’s residence. This provides some incentive to receive one’s energy from solar but does nothing to mitigate the upfront costs of purchasing or renting panels. While this is certainly superior to a policy of no incentives, it also fails to target those who could most benefit from increased deployment of solar, as the benefits accrued from property tax breaks disproportionately flow toward the wealthy. The state lacks any tax policy that would benefit low-income consumers in any tangible way.

Partially as a result of these severely insufficient policies, Virginia’s level of solar energy use is extremely small. Virginia currently ranks 31st among all states in generating solar power, according to the Solar Energy Industries Association. In a state of well over 8 million residents, there is currently only enough solar energy being produced to power 1,500 homes.²⁶ By contrast, the neighboring state of North Carolina is currently producing enough solar energy to power 116,000 homes, despite having only twenty percent more persons than Virginia.²⁷ And while the economically struggling southwestern and south-central regions of Virginia are in the most desperate need of increased solar deployment, the largest solar system in the state is located in the affluent northern suburb of Woodbridge.²⁸

What Could Be Better

A potential way to accomplish the goal of increasing access to solar energy in lower-income communities would be to structure renewable energy incentives as refundable tax credits. This would be similar in design to the EITC for low-income families. First enacted in 1975, the EITC provides working families with low-to-moderate incomes (the exact cut-off is dependent both on income and family size) with a federal tax credit that supplements their annual earnings.²⁹ The credit, which historically has appealed to policy analysts on both the left and right, averaged \$3,074 for a family with children during the 2013 tax year, according to the Center on Budget and Policy Priorities (CBPP).³⁰



The EITC is refundable, which, as noted above, means that it is possible for families to pay a negative income tax if the tax credit they are eligible for exceeds their tax liability for a given year.³¹ This attribute is rare for federal tax credits, and it has significant implications for individual families and for the overall economy. It allows the benefits of the credit to be more easily targeted at low-income families, making it an efficient anti-poverty policy as well as an exceedingly effective one. According to the CBPP, the EITC raised nearly 6.2 million people, more than half of them children, over the federal poverty line in 2013, the last year for which data is currently available.³² The credit also boosts labor force participation significantly, which is imperative as the United States will need to increase its tax base by a large margin in upcoming years in order to fund the significant increase in spending that is projected for age-related programs such as Social Security and Medicare.³³

A 2001 study in the *Quarterly Journal of Economics* similarly finds significant benefits to both low-income individuals and the country as a whole from the EITC. The study found that expansions of the EITC were responsible for a full half of the increase in employment among single mothers between 1984 and 1996.³⁴ Refundable tax credits clearly have a significant impact on poverty rates and consumer behavior, and it is reasonable to believe that structuring energy tax credits in a similar manner could impact the aggregate demand for solar energy. The refundable nature of the credit also allows it to provide the greatest effect for those who truly need it most: those on the very bottom of the income distribution. If the goal is to expand access to solar among lower-income Americans, similarly structured tax credits provide a strong option.

Structuring this benefit as a refundable tax credit also may aid its political feasibility. Virginia remains extremely politically divided, with a Democratic governor and both legislative houses controlled by Republicans, albeit by vastly different margins.³⁵ The earned-income tax credit has received bipartisan praise since its enactment as a way to aid poor and moderate-income families while promoting work. Making citizens of Virginia aware of the credit is imperative to its success, and while private solar companies will likely engage in a heavy public relations push to raise awareness of the credit, state agencies will have to work to promote it as well.

Conclusion

The benefits of increased access to solar energy are numerous and help to solve many of the most pressing issues in public policy today. This policy will allow Virginia to become a leader in the production of solar energy, fostering job creation, better public health, and poverty alleviation. However, many regions with high incidences of poverty are often unable to make the transition from fossil fuels to solar due to the high upfront costs of the panels themselves. While programs allowing for the lease as opposed to the purchase of solar panels have increased access for lower-income families and communities, leased panels are often ineligible for existing economic incentives at both the federal and state level. Therefore, a refundable tax credit worth up to \$3,000 offered to families that either purchase or lease solar panels for their homes would help correct this problem and provide a strong economic incentive for people to transition away from fossil fuels and to solar. Rural communities across the United States, and particularly Virginia, will be better for it.

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