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A Framework for Energy Independence via Solar Hosting Farms

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INTRODUCTION

Imagine for a moment that you live in an apartment building, rent commercial space in a shopping center, lease office space in a building, own a house in a densely wooded area, or manage a government agency in a building that does not receive much sunlight due to surrounding structures. Now imagine that you want to purchase solar panels and install them on your premises in order to have some degree of energy independence.

The scenarios mentioned above are real-life examples of barriers that make it more difficult for consumers to use solar panels at their home or business. The first three scenarios represent a barrier that is caused by a lack of ownership. Tenants must have a landlord's permission to install solar panels on the landlord's property. Even if the landlord were amenable to this arrangement, tenants will likely choose not to install solar panels if they plan to relocate in a few years. The last two scenarios represent another type of barrier: insufficient sunlight for energy generation.

Many of us have probably considered buying solar panels at one time or another only to pass on the idea when confronted by some type of barrier. Since we are limited to deploying solar panels at our place of residence or business, we are essentially prevented from investing in solar energy if our place of residence or business faces one, or more, of these barriers. But, what if we had another option at our disposal, i.e. the Solar Hosting Farm (SHF)? SHFs would overcome most, if not all, of these barriers. Located on a plot of land with an abundant source of sunlight, SHFs could be designed and developed for the sole purpose of hosting solar panels for both residents and businesses. Energy generated at SHFs would be sold directly to the grid with the income received by SHF customers used to offset utility bills. If SHFs were readily available, might consumers change their minds about buying solar panels? The answer may be yes for a large number of residents and businesses.

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In order to answer the question above, a framework should be developed around the concept of SHFs by asking additional questions: What are the common types of barriers encountered in traditional solar panel deployments? Is there a similar type of hosting model being used successfully in another industry that might serve as a guide? What would a SHF look like? What benefits might residents and businesses gain from a SHF? What energy and tax policies might be enacted by federal and state governments to encourage the use of SHFs? What key metrics can we evaluate at a high level to gain an understanding of existing and potential solar panel adoption levels in the United States? Finally, what actions are necessary to facilitate the development of SHFs?

I. TYPES OF BARRIERS

To install solar panels residents and businesses may confront many types of barriers, including:

- Lack of ownership and control over the premises;
- Insufficient source of sunlight due to neighboring trees, hills, mountains, or surrounding structures that block out sunlight;
- Cost of solar panels and related equipment;
- Cost of labor associated with installing solar panels;
- Insufficient and/or dysfunctional space on the rooftop or lot;
- Risk of relocation in the near term; and
- Insufficient knowledge about the permitting process, types of solar panels, financing options, available tax credits, installation process, and maintenance requirements for solar panels.
- These barriers have a negative impact on decisions to buy solar panels.

One type of business model that is being used to overcome some of these barriers is the cooperative. For example, the Cooperative Community Energy Corporation (CCEnergy), located in San Rafael, California, states: "The intent behind forming a cooperative is to influence the market and *breakthrough these barriers*, starting at the local level."[1] Some of the barriers reflected on their website include the following: (1) lack of consumer awareness and understanding; (2) lack of purchasing channels; (3) lack of trained installers and inspectors; and (4) minimal financing options.[2]

These types of cooperatives are useful in dealing with some of the barriers—for example, permitting, cost, and installation. For instance, they focus on pooling large numbers of residents and businesses together in certain geographic areas in order to drive down prices for solar panels and installation costs. One major disadvantage of this business model is that residents and

1. Cooperative Community Energy (CCEnergy), About the Co-op, http://www.cooperativecommunityenergy.com/co-op/index.html (last visited June 26, 2009) (emphasis added).

2. *Id.*

businesses must have a place to deploy their solar panels. This requirement can be a significant drawback for residents or businesses that either rent, own a building or land with unusable or limited space, or reside in an area that receives insufficient sunlight.

II. THE COLOCATION CENTER APPROACH

One example of a successful hosting model that is used in the high-technology industry that could be used as a guide for developing a SHF is the Colocation Center. According to Online Tech Inc., the term "colocation" is described as follows:

> Colocation is the practice of putting your equipment, generally Internet Servers, into another's data center. While scary at first thought, the Telecommunication industry has succeeded with colocation for decades. At the core, colocation is the markets response to the enormous capital required to provide high quality, reliable environments for critical communications equipment. By spreading the costs across multiple organizations everyone gets more for less.[3]

According to Data Center Map, a web service that tracks colocation centers globally, there were 1302 Colocation Centers in 59 countries throughout the world.[4] Of that total, 688 Colocation Centers were located in the United States with 120 Colocation Centers in California.[5] These numbers indicate that the high technology industry's hosting model is proven and thriving around the world, especially in the United States.

Both individuals and businesses alike host their servers at Colocation Centers rather than operating their servers at their place of residence or business. Colocation Centers are attractive because they provide access to high speed broadband service, back-up power, added security, and an ability to scale up or down due to available racks, power, cooling, IP addresses, etc. with a minimum of cost and complexity. Hosting servers at a Colocation Center greatly reduces the costs and hassles of owning servers. This model, if applied to solar power via a SHF, could provide similar benefits for SHF customers, including the elimination of the permitting process, lower installation costs, reduced solar panel prices, lower financing costs via the pooling of hosting customers, and ready access to the grid.

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3. ONLINE TECH INC., CO-LOCATION BASICS FOR SMALL TO MEDIUM SIZED BUSINESSES 2 (Sept. 2009), http://www.onlinetech.com/downloads/white_papers/colocation_white_paper.pdf.

4. Data Center Map, Colocation Data Centers, http://www.datacentermap.com/datacenters.html (last visited June 26, 2009).

5. Data Center Map, Colocation USA, http://www.datacentermap.com/usa/ (last visited June 26, 2009).

III. THE SHF MODEL

A SHF would look like any other solar farm with one significant difference—it would include a "hosting" component. Likely candidates for owning and operating a SHF include utilities, privately-held companies, and non-profit organizations. Developing a SHF will involve several steps. First, the SHF would be created through the formation of a legal entity such as a limited liability corporation or a non-profit organization. Next, the SHF would need to enter into a long-term land lease at a minimal cost with the federal or state government. Thereafter, the SHF would enter into power purchase agreements [6] (PPAs) with both the hosting customers and a utility. The PPA entered into between the hosting customers and the SHF would include a hosting fee paid by the hosting customers to the SHF. Finally, the SHF would then be in a position to secure a long-term loan necessary to fund the cost of onsite and offsite improvements, including permits, ground-based racks, wiring, inverters, meters, storage units, security fence, and other related equipment including a connection to the grid.

In return for this arrangement, the owner of the SHF would create access to another source of electricity without having to pay for the entire cost of the solar farm since the cost of the solar panels would be paid for by the hosting customers. The hosting fees received by the SHF from the hosting customers would provide a return on investment for constructing the SHF, hosting the solar panels, and storing, selling, and distributing energy. Non-profit organizations would certainly have a financial advantage due to their tax-exempt status. Zero taxes would translate into additional funds to recoup the upfront investment in the SHF and pay for ongoing maintenance.

A. Benefits of a SHF

<u>Possible Benefits for SHF Owners</u>

- Opportunity to expand a portfolio of renewable energy;
- New type of revenue source (e.g. hosting fees); and
- Reduced capital requirements since solar panels will be purchased and owned separately by hosting customers.

<u>Possible Benefits for Hosting Customers</u>

- Income from solar panels can be used to offset utility bill at place of residence or business;
- No requirement to own a building or a plot of land to deploy the solar panels;
- Opportunity to receive a fully integrated solution to ease the acquisition, financing, and installation of solar panels;

6. Clean Power Finance, Power Purchase Agreements, http://www.cleanpowerfinance.com/solar/commercial-loans/power-purchase-agreemment/ (last visited June 26, 2009).

- Opportunity to reduce purchase price of solar panels and financing costs through the aggregation of a large number of hosting customers;
- Reduction in installation costs by placing solar panels on ground-based racks rather than on rooftops;
- Greater return on investment if location of SHF offers more sunlight;
- Possible use of ground-based sun tracking racks that allow the solar panels to track the sun thereby increasing the production of solar energy relative to having solar panels fixed on rooftops;
- Easier for operator to clean solar panels on ground-based racks than for traditional owners to clean rooftop panels;
- Opportunity to connect hosting customers to the SHF via a web interface to track kWh generated, purchase price of electricity, hours of sunlight, etc.;
- Higher probability of using onsite electrical storage units, i.e. batteries, as a result of economies of scale when spreading the cost amongst several hosting customers via a hosting fee;
- Opportunity to create a secondary market for buying and selling solar panels when the solar panels are located on a SHF; and
- Ability to relocate to another place of residence or business while retaining solar panel ownership.

Some of these benefits can be realized via the cooperative business model described above, particularly with regard to costs and installation process. CCEnergy touts the benefits of collective bargaining noting "[w]e seek out the lowest prices for solar electric and other renewable energy equipment and pass the savings on to our members." Further, the co-op provides management and technical expertise that most residents and businesses lack, such as "project management services that include site inspection, design review, installer referrals, rebate and permit processing, quality assurance, and post-installation inspections."[7]

Cooperatives such as CCEnergy serve as a useful business model for dealing with barriers such as permitting, cost, and installation. However, cooperatives are not designed to overcome certain barriers such as a lack of space for the deployment of solar panels or an insufficient source of sunlight. Further, the cost of installation without a cooperative will likely be significantly higher relative to installing solar panels on ground-based racks. However, SHFs can address these barriers which, in turn, give them a huge advantage in increased access to a significantly larger market.

7. Cooperative Community Energy (CCEnergy), CCEnergy Member Benefits, http://www.cooperativecommunityenergy.com/co-op/benefits/index.html (last visited June 26, 2009).

B. Assistance from Federal and State Governments

Federal and state governments are uniquely qualified to assist in the development of SHFs for two important reasons. First, they control vast quantities of land that are located in areas that provide abundant sunlight and, second, they control our energy and tax policies.

The federal government owns approximately 650 million acres of land, or nearly 30 percent of the entire area of the United States.[8] Many federal- and state-owned lands offer abundant sunlight[9] and would not interfere with environmentally-sensitive habitats.[10]

Focusing solely on the land owned by the federal government, it would appear that there is an ample supply of land that would be suitable for SHFs.[11] Similar analysis of state-owned lands would likely yield additional suitable sites. Once sites are selected, both the federal and state governments could enact policies to set aside such land at minimal cost under long-term leases to the owner/operator of the SHFs in order to increase the financial viability of SHFs and incentivize the development of private renewable energy. Policy makers could also revise the tax codes so hosting customers would be excused from paying taxes on the revenue generated from their solar panels located on SHFs.

IV. SOME PERSPECTIVES AND OPPORTUNITIES

In the fall of 2008, about 40,000 homes were equipped with solar panels in the United States.[12] The number of homes tied to the grid using photovoltaics was about 50,000 as of March 2008.[13] While these numbers are expected to rise sharply in the next few years, they are small when compared to the 127.9 million housing units in the United States.[14] In California alone, there were about 13.3 million housing units in 2007.[15] In 2000, the percentage of housing units in multi-unit buildings was 26.4 percent in the United States and 31.4 percent in California.[16] If we turn our attention to the number of businesses,

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8. Nationalatlas.gov, Printable Maps - Federal Lands, http://www.nationalatlas.gov/printable/fedlands.html (last visited June 26, 2009).

9. Quinn O'Toole, *Power Hungry: Reinventing the U.S. Electric Grid*, NPR.ORG, April 24, 2009, http://www.npr.org/news/graphics/2009/apr/electric-grid/.

10. Natural Resources Defense Council, Clean Energy and Conservation, http://www.nrdc.org/land/sitingrenewables/default.asp (last visited June 26, 2009).

11. U.S. Dept, of Interior, Bureau of Land Management, *Solar Energy Study Areas*, June 2009, http://www.blm.gov/wo/st/en/prog/enery/solar_energy/Solar_Energy_Study_Area.html.

12. Adam Aston, *Will Demand for Solar Homes Pick Up?*, BUSINESSWEEK, October 23, 2008, *available at* http://www.businessweek.com/magazine/content/08_44/b4106088155598.htm?chan=rss_topDiscussed_ssi_5.

13. Solarbuzz, Fast United States Solar Energy, Power Industry and Market Facts, http://www.solarbuzz.com/FastFactsUSA.htm (last visited June 26, 2009).

14. U.S. Census Bureau, California QuickFacts from the U.S. Census Bureau, http://quickfacts.census.gov/qfd/states/06000.html (last visited June 26, 2009).

15. *Id.*

16. *Id.*

there were about 7.6 million private nonfarm establishments in the United States and nearly 1 million in California in 2006, all of which represent another significant pool of untapped investors.[17]

Certainly, the United States has a long way to go, but, there are also plenty of opportunities for growth given the numbers above if solar panel deployment mechanisms can be expanded. Perhaps federal and state governments can lay the groundwork for SHFs. After all, vast sections of land and coastal areas have already been opened to energy, timber, and mining companies. Isn't it time to return the favor to the American taxpayer by opening up certain sections of public land for SHFs?

V. RECOMMENDATION FOR NEXT STEPS

Both the federal and state governments must play a vital role in creating energy and tax policies to enable the use of SHFs. Building on its track record as a trendsetter for environmental issues, California should take the lead by creating a pilot program to construct two SHFs. The construction of the two SHFs would require the following steps:

- Selection of state-owned land to be made available under a long-term lease at minimal-cost for the construction of the two SHFs;
- Selection of a utility, privately-held company, or non-profit organization that will operate the SHFs to sell the electricity under a PPA;
- Payment for the onsite and offsite improvements by the State of California;
- Creation of a marketing campaign;
- Creation of a lottery system to accept applications from home owners, apartment renters, and businesses using the volume of the three types of applicants as a metric for measuring interest in SHFs; and
- A turn-key solution offered by the SHF to assist hosting customers with the purchase, financing, and installation of solar panels, the application for tax credits, and sale of electricity via a PPA with the SHF. The PPA will include a hosting fee arrangement between the hosting customers and SHF.

The results of the first SHF must be evaluated by both the state and the SHF to apply the lessons learned to the construction of the second SHF. After evaluating the results from the second SHF, the state could then make a final assessment to determine if this business model should be rolled out on a larger scale throughout California. Such lessons should also be shared with other states, utilities, and the federal government to replicate the program elsewhere.

17. *Id.*

CONCLUSION

The number of homes equipped with solar panels throughout the entire United States was a mere 40,000 by one account, and 50,000 by another. Such numbers are insignificant when compared to the total number of housing units in the United States, which was a staggering 127.9 million. The low adoption rate for solar panels by residents seem to indicate that current methods of solar panel deployment may not be capable of providing the broader spectrum of residents access to solar energy due to the various barriers mentioned above. Businesses, non-profit organizations, and governments are also feeling the effects of these barriers. One type of business model—the cooperative—has succeeded in overcoming some of these barriers such as permitting, cost, and installation. However, this model also has limitations since it cannot overcome other types of barriers such as lack of ownership, unusable/limited space, and an insufficient source of sunlight.

We do have a choice in where we go from here. We can choose to ignore these barriers and suffer the same consequences, or we can choose to overcome these barriers by changing the way we deploy our solar panels. If we choose the latter path, we must take the next step by lobbying our federal and state legislators to enact energy and tax policies that will assist in the development of SHFs. Thereafter, we must demonstrate our conviction by embracing this business model and making SHFs a reality.