



MURIEL BOWSER  
MAYOR

MAR 10 2017

The Honorable Phil Mendelson  
Chairman  
Council of the District of Columbia  
1350 Pennsylvania Avenue NW, Suite 504  
Washington, DC 20004

**Re: Solar for All Implementation Plan**

Dear Chairman Mendelson:

Pursuant to the Renewable Portfolio Standard Expansion Amendment Act of 2016, effective October 8, 2016, (D.C. Law 21-154; 63 DCR 12926) (Act) which established the District of Columbia's Solar for All Program (Solar for All), the Department of Energy and Environment is pleased to submit the enclosed Solar for All Implementation Plan.

As established by Section 3(b) of the Act, the Solar for All Program aims to "reduce by at least 50% the electric bills of at least 100,000 of the District's low-income households with high energy burdens by December 31, 2032."

The Solar for All Implementation Plan includes the following elements:

- Background on solar energy, the District's solar market, energy goals, mechanisms to achieve those goals, and market volatility;
- Findings and recommendations to address the District's challenges (e.g., number of low-income households, real estate barriers, grid capacity, customer education and acquisition, and regulatory concerns);
- Short-term actions to help achieve Solar for All goals through grants, strategic partnerships, zoning and building code improvements, real estate mapping, public engagement and education, enrollment in the Low Income Home Energy Assistance Program (LIHEAP) and Community Solar Project, and establishment of a District green bank; and

- Strategies to reach broader program goals through power purchase agreements, Solar Renewable Energy Credit (SREC) risk management, and public-private partnerships.

Please feel free to contact Director Tommy Wells at (202) 535-2600 to discuss any questions you have regarding the Solar for All Implementation Plan.

Sincerely,



Muriel Bowser

# **Solar for All Implementation Plan**

**Government of the District of Columbia**

**Department of Energy and Environment**

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# INTRODUCTION

The Renewable Portfolio Standard Expansion Amendment Act of 2016, effective October 8, 2016, (D.C. Law 21-154; 63 DCR 12926) (the Act) establishes the District of Columbia’s Solar for All Program (Solar for All). Funded by the Renewable Energy Development Fund (REDF), the Act is intended to expand solar capacity in the District and provide the benefits of locally generated solar energy to low-income households, small businesses, nonprofits, and seniors. Specifically, Section 3(b) of the Act requires the Department of Energy and Environment (the Department or DOEE)—through Solar for All—to “reduce by at least 50% the electric bills of at least 100,000 of the District’s low-income households with high energy burdens by December 31, 2032.”

Designated with the responsibility to administer Solar for All, the Department is required to submit a Solar for All implementation plan to the Council of the District of Columbia (Council) by February 1, 2017. The Department established the Solar for All Task Force, which comprised 13 solar professionals in the private and nonprofit sectors, including solar development, affordable housing, and green workforce. The Task Force was formed to recommend ways to effectively design and implement the Solar for All Program (see Appendix C). The Department also released two Requests for Information (RFIs) to solicit public comments on long-term solar program development. The feedback and recommendations received through these outreach efforts have informed the findings, recommendations, and implementation strategies presented in this document.

The Solar for All Implementation Plan includes the following elements:

- Background on solar energy, the District’s solar market, energy goals, mechanisms to achieve those goals, and market volatility;
- Findings and recommendations to address the District’s challenges (e.g., number of low-income households, real estate barriers, grid capacity, customer education and acquisition, and regulatory concerns);
- Short-term actions to help achieve Solar for All goals through funded projects, strategic partnerships, zoning and building code improvements, real estate mapping, public engagement and education, enrollment in the Low Income Home Energy Assistance Program (LIHEAP) and Community Solar Project, and establishment of a District green bank; and
- Strategies to reach broader program goals through power purchase agreements, Solar Renewable Energy Credit (SREC) risk management, and public-private partnerships.

# BACKGROUND

## BASICS OF SOLAR ENERGY

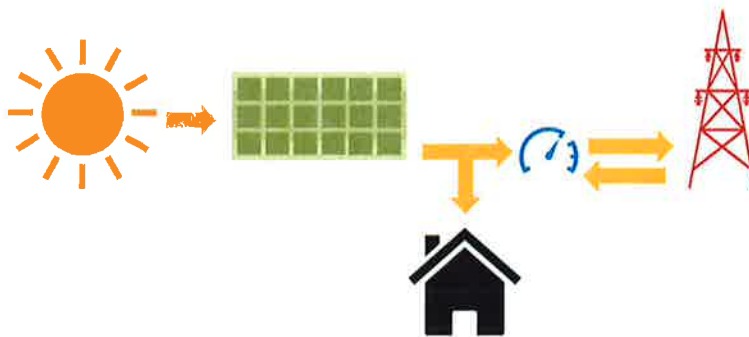
Solar energy is defined as energy obtained from the sun. Its technologies are broadly characterized as passive solar or active solar depending on how they capture and distribute energy or convert it into power. Passive solar energy does not require any specific action or equipment. Methods include strategically placing windows in a home to allow sunlight to enter and provide heat; selecting building materials that store heat or help disperse light; and designing spaces that naturally circulate air.

Active solar energy requires equipment or an action to convert it into a useful form. One example is the use of solar panels to absorb the sunlight and convert it into electrical power that can be used in the home. Most solar energy systems in the District are solar photovoltaic (PV) systems installed on rooftops or mounted on the ground.

### Solar PV Systems

Electricity from a solar PV system may be used by the building where it is installed, supplied directly to the electrical grid, or both. If the PV system generates more electricity than the amount needed for the building, the excess is supplied to the grid. If the PV system generates less electricity than the amount needed for the building, the grid supplies additional power to the building. Through a mechanism called “net-metering,” the owner of the PV system receives credit for any electricity supplied to the grid.

*Figure #1 How a Typical Interconnected Solar PV System Works*



## Community Solar Systems

A community solar system (also called a community renewable energy facility or CREF) enables individuals or entities to purchase a subscription to an established system and share electricity output. Through a mechanism called “virtual net-metering,” subscribers receive credits on their monthly electric bills based on their share of the overall electricity the community solar system generates. A major benefit is that community solar systems can provide the benefits of solar energy to renters or homeowners with roofs unsuitable for PV systems.

*Figure #2 How a community solar system works*



## RENEWABLE ENERGY IN THE DISTRICT

The District has taken significant action to build the foundation for a clean energy economy, including the developing and implementing the Sustainable DC Plan. This plan sets ambitious goals to reduce greenhouse gas emissions by 50%; increase the percentage of District’s energy supply that is generated by renewable sources to 50%; and reduce overall energy use by 50%—all by year 2032. The District has also enacted several legislative requirements to help make clean energy available to all District businesses and residents:

- **Renewable Portfolio Standard (RPS)**, enacted in 2005, requires the District to obtain a certain amount of its energy from renewable sources, including wind, solar, biomass, or geothermal.
- **Clean and Affordable Energy Act (CAEA)**, enacted in 2008 to amend RPS, increases the RPS requirement and alternative compliance payment amounts (the penalty paid by electricity suppliers if they fail to meet the RPS).
- **Community Renewable Energy Amendment Act**, enacted in 2013, allows for the creation of community renewable energy facilities that benefit District residents.
- **Renewable Portfolio Standard Expansion Act**, enacted in 2016, increases the RPS to 50% and the solar requirement to 5% by 2032.



## Mechanisms to Achieve the District's Solar Energy Goals

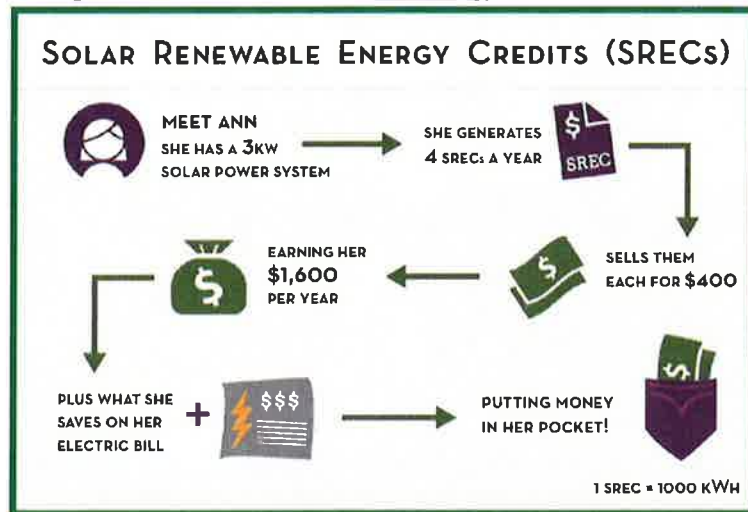
### Renewable Portfolio Standard

RPS requires all electricity suppliers in the District to purchase a certain portion of their supply from renewable energy sources. Suppliers who fail to meet this requirement must pay a penalty known as an Alternative Compliance Payment.

### Solar Renewable Energy Credits

Each time a solar system generates the equivalent of one megawatt hour (MWh) of electricity, an SREC is issued to the system owner. This credit is a tradable certificate that represents the clean energy benefits of the electricity generated and has monetary value.

*Figure 3. Solar Renewable Energy Credits (SRECs)*



SRECs are bought and sold on the open market, providing the means for electricity suppliers to meet the regulatory requirements laid out in RPS. SRECs also help incentivize the solar energy industry by generating additional revenue for solar PV system owners (see Figure 2). The District currently has the highest SREC prices in the country. As of January 10, 2017, the District's market price was \$470 per SREC.<sup>1</sup>

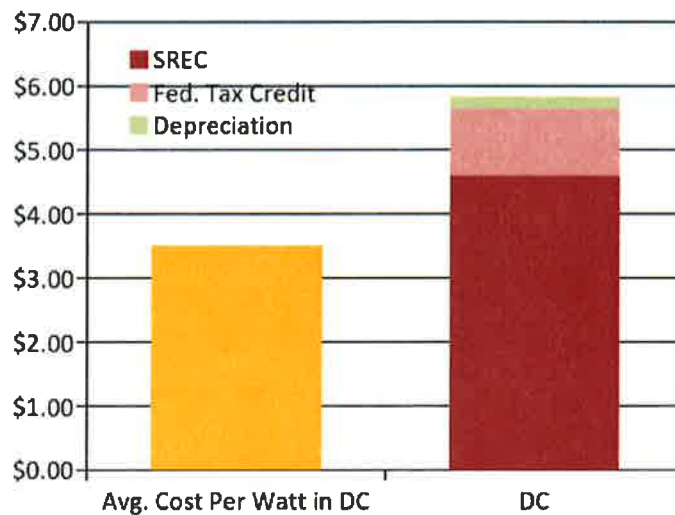
### Solar Financial Incentives in the District

Due to high SREC prices, the District has the country's highest financial incentives for installing solar energy. Current incentives cover more than one and a half times the cost of a typical solar PV system (see Figure 4).<sup>2</sup>

<sup>1</sup> Daily settlement price, Flett Exchange, January 10, 2017 (<http://markets.flettexchange.com/washington-dc-srec/>).

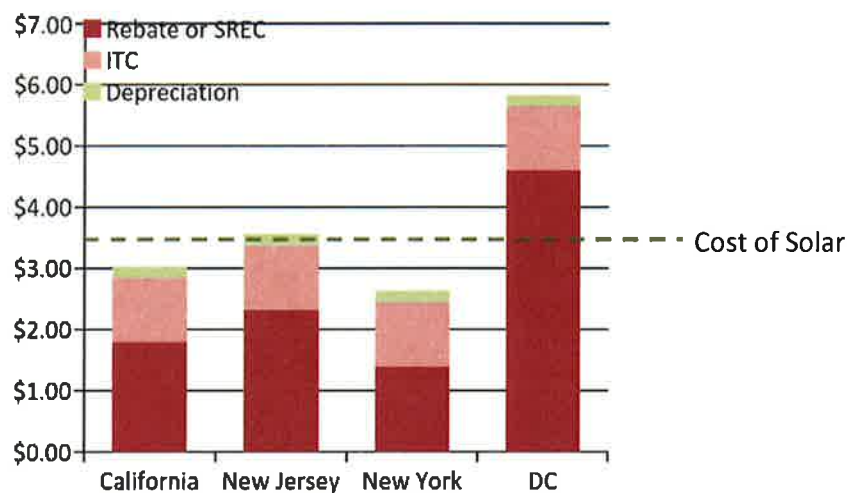
<sup>2</sup> See Appendix A - Calculations for Figure 4 - Financial Incentives in the District.

**Figure 4. Financial Incentives in the District**



To put this in perspective, incentives in New York and New Jersey (other leading states) cover 75% and 100% of the total system cost, respectively (see Figure 5).<sup>3</sup>

**Figure 5. State Comparison of Solar Incentives**



## Market Volatility

While the solar market is highly promising, it is also markedly volatile and proves to be difficult for many investors. This volatility is driven by three principal dynamics:

1. **Imbalances in basic supply and demand.** Over the past few years, solar installations have benefited from relatively high SREC prices, and the industry has struggled to keep

<sup>3</sup> <http://www.seia.org/state-solar-policy/new-york>; <https://cleantechnica.com/2016/03/31/rooftop-solar-cost-california/>; <http://www.seia.org/state-solar-policy/New-Jersey>;

up with the demand created by RPS requirements. When supply reaches the level of demand, SREC values drop significantly. For instance, after an unprecedented influx of solar installations in New Jersey, SREC prices fell sharply in 2012 as supply overshot demand.<sup>4</sup>

2. **Fluctuation of energy prices.** Since solar competes with gas and coal for generating electricity, price fluctuation affects the stability and predictability of the solar market.
3. **No guaranteed minimums.** There are currently no mechanisms to provide investors and solar developments with a price floor (guaranteed minimum value) for SRECs in the District. This lack of a guarantee decreases the long-term predictability of the District's SREC market.

## PROGRAM CHALLENGES

The Department, the Task Force, and RFI respondents identified the following key challenge areas that could significantly impact the feasibility of Solar for All as it is currently written:

- The number of eligible low-income households;
- Real estate barriers;
- Grid capacity; and
- Customer education and acquisition.

The following sections address each of these challenge areas in detail.

### NUMBER OF ELIGIBLE LOW-INCOME HOUSEHOLDS

Section 3(b) of the Act requires the Department to reduce the “electric bills of at least 100,000 of the District’s low-income households with high energy burdens.”<sup>5</sup> The Act defines low-income as “a household income equal to, or less than, 80% of the area median income.” Under this definition, the District has approximately 114,455 eligible low-income households.<sup>6</sup>

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<sup>4</sup> 2014 Report “Solar Market Development Volatility in New Jersey,” prepared for the Rutgers University Center for Energy, Economic & Environmental Policy (<http://nj.gov/bpu/pdf/announcements/2014/solar-market-volatility.pdf>).

<sup>5</sup> Section 3(b) of the Renewable Portfolio Standard Expansion Amendment Act of 2016, effective October 8, 2016, (D.C. Law 21-154; 63 DCR 12926).

<sup>6</sup> U.S. Department of Housing and Urban Development’s (HUD) Comprehensive Housing Affordability Strategy data (<https://www.huduser.gov/portal/datasets/cp.html>).

**Finding: There are fewer than 100,000 District low-income households that receive electric bills.**

Based on available data, the Department believes there are fewer than 100,000 low-income households that receive electric bills. Further, electric bills can be either tenant-paid or owner-paid. Although the District does not currently track the number of low-income electric accounts, the Department can report the following data:

- In FY16, a total of 22,322 District households received Low-Income Home Energy Assistance Program (LIHEAP) benefits from the Department;
- Of those households, 17,669 were enrolled in the Residential Aid Discount (RAD) program (only RAD recipients are certain to have an electric account);<sup>7</sup>
- At least 23,000 low-income District households reside in master-metered buildings and do not receive electric bills<sup>8</sup>; and
- None of the 8,360 District of Columbia Housing Authority (DCHA) public housing units pay electric bills. These bills are paid by DCHA.

***Table 1. Number of low-income households that receive electric bills.***

Total number of low-income households in the District	114,455
Minus low-income District households who reside in master-metered buildings and do not receive electric bills	— 23,000
Subtotal of low-income households that may receive electric bills	= <b>91,455</b>

<sup>7</sup> LIHEAP provides benefits for electric, gas, and home heating oil accounts; therefore not every LIHEAP recipient may have provided an electric account number for enrollment in RAD.

<sup>8</sup> This estimate is based on the District's 5,872 multifamily buildings, (apartment buildings, housing cooperatives, and condominiums), containing 167,961 units (DC Office of Tax and Revenue). Across the Washington, DC metro area, about 32% of multifamily households are in buildings that are master-metered for electricity (U.S. Census American Housing Survey). Therefore, DOEE estimates that there are at least 54,118 housing units, each generally containing one household that are in buildings that are master-metered for electricity. Since low-income households are 42.8% of the total households in the District, DOEE estimates that at least 23,163 low-income households in buildings that are master-metered for electricity and do not receive an electric bill.

Excluding low-income households that do not receive an electric bill means there are only 91,455 households that are potentially eligible to participate in Solar for All, 8,545 fewer households than the Act's requirement.

### **Recommendation**

The Department recommends amending the Act to make low-income households that do not receive an electric bill eligible for Solar for All.

### **Finding: The Act does not define the term “high energy burdens” and requires that electricity bills be reduced by at least 50%.**

The Act requires the Department to address households with “high energy burdens;” however, it does not define this term.<sup>9</sup> According to the Applied Public Policy Research Institute for Study and Evaluation, “high total residential energy burden” (including electric, gas, or home heating oil sources) is defined as an “energy burden greater than or equal to 10.9 percent of household income.”<sup>10</sup> Adhering to this definition would further reduce the number of District low-income households that could be eligible to participate in Solar for All.

The Act does not define the calculation for determining “50% of electric bills.” Requiring the Department to reduce the actual bill for each eligible household would increase the administrative burdens and costs of Solar for All, and households without electric bills would be difficult to include under this requirement. In addition, this phrase would make it difficult to project the amount of solar generation needed to serve the households because the consumption target will change with each utility bill cycle.

### **Recommendation**

The Department recommends amending the Act to remove the phrase “high energy burdens” and “50% of electric bills” to make all District low-income households eligible for Solar for All.

## **REAL ESTATE BARRIERS**

The Department estimates Solar for All implementation will require the installation of 240 to 300 megawatts (MWs) of solar power in the District, requiring approximately 1,000 acres of available surface area (e.g., unobstructed roof space or unused land) equivalent to more than three National Malls.<sup>11</sup>

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<sup>9</sup> Section 3(b) of the Renewable Portfolio Standard Expansion Amendment Act of 2016, effective October 8, 2016, (D.C. Law 21-154; 63 DCR 10138).

<sup>10</sup> Applied Public Policy Research Institute for Study and Evaluation prepared for the U.S. Department of Health and Human Services (July, 2005) ([www.acf.hhs.gov/sites/default/files/ocs/study\\_july\\_05.doc](http://www.acf.hhs.gov/sites/default/files/ocs/study_july_05.doc)).

<sup>11</sup> This estimate is based on the average monthly electric consumption of a typical low-income household (660 kwh) and the size of the rooftop PV system that would be needed to supply 50% of the household's electricity use (3 kW, according to the National Renewable Energy Laboratory's PV calculator). The low estimate takes into account an optimistic 20% overall size reduction due to energy efficiency measures and solar panel efficiency improvements.

**Finding: The District may lack the real estate necessary for solar generation.**

The District is densely populated and has limited open space, making it difficult to secure real estate for solar installations. Preliminary mapping indicates there are potentially 2,752 acres of rooftop available in the District.<sup>12</sup> However, not all of these roofs can accommodate solar PV systems due to a range of variables including building age, roof suitability, amount of shading, zoning and height restrictions, or competing uses like amenities or equipment.

**Recommendation**

The Department recommends assessing the real estate in the District and will conduct a detailed analysis of the commercial, institutional, and residential rooftops identified in its preliminary mapping to better assess the scope of available surface area.

**Finding: For most building owners in the District, the costs and complexity of investing in solar appear to outweigh the benefits.**

The District's lucrative solar incentives should motivate every owner with potential rooftop space to install solar PV systems. However, the underperformance of the District's solar market illustrates this has not been the case. Based on research and stakeholder input, the Department has found that (1) building owners are motivated in different ways based on the specific business model and building type (e.g., commercial or multifamily buildings, single-family homes) and (2) identifying the owners and decision-makers of large buildings can be challenging.

**Recommendation**

To deploy solar in the District efficiently, the Department recommends targeted engagement with building owners to better understand how to streamline services and tailor programs for commercial, multifamily, and residential building sectors.

**Finding: Roof upgrades increase solar installation costs.**

Costs to repair or replace roofs can vary significantly depending on the type of building and the overall scope of work. For example, a typical residential roof replacement might cost \$7 to \$9 per square foot, while large commercial roof replacements could cost anywhere from \$15 to \$30 per square foot. These variances can increase overall installation costs.

**Recommendation**

The Department recommends covering appropriate roof repair costs through the Solar for All Innovation and Expansion Projects. The Department's solar installation projects will include additional funding to account for costs associated with roof upgrades.

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<sup>12</sup> See the statistics at Mapdwell: <https://www.mapdwell.com/en/solar/dc>

## GRID CAPACITY

When individual solar systems generate more energy than needed, the excess power is fed into the electrical grid and redistributed. A grid is an interconnected network that delivers electricity from suppliers to consumers; it was designed to deliver power from large fossil power plants to cities. It was not intended to receive and redistribute energy generated by multiple sources (e.g., residential rooftop solar PV systems). Exceeding a grid's capacity could harm its ability to operate reliably, jeopardizing the ability to interconnect solar energy systems.

### **Finding: The District's grid lacks the modernization required to implement Solar for All.**

The District's electrical grid has limited capacity. Without modernization (a modern grid is defined by new technologies, services, and rate structures), meeting the Act's goal may not be feasible.

### **Recommendation**

The District of Columbia Public Service Commission (PSC) has opened Formal Case 1130, an investigatory proceeding for modernizing the grid. The Department supports this proceeding and the District's transition to a modern grid that can accommodate and manage large amounts of solar energy from multiple sources.

## CUSTOMER EDUCATION AND ACQUISITION

The Department has found that despite the significant financial and environmental benefits of using solar power, including zero-cost installation, not all low-income customers take advantage of the opportunity to install solar systems.

### **Finding: Some low-income customers are hesitant to install solar.**

Contrary to expectations, the Department has found that some low-income customers are hesitant to install solar PV systems on their rooftops. This reluctance could be based on general misperceptions about solar energy or the result of past negative experiences with energy marketers or government programs.

### **Recommendation**

The Department recommends identifying effective strategies to engage low-income customers and communicate the process and benefits of the Solar for All Program. The Department's Solar for All Innovation and Expansion Projects discussed in the next section will fund projects that focus on addressing low-income customer acquisition challenges while installing new solar systems.

## **SOLAR FOR ALL IMPLEMENTATION**

The overall cost to fully implement Solar For All depends on two critical variables: the total capacity that needs to be installed (240–300 MW), and the average cost to install that capacity (\$2.68–\$3.50 per watt).<sup>13</sup> Based on these ranges, the total cost could vary from a low of \$640 million to a high of \$1.05 billion. These estimates do not take into account capturing or reinvesting any of the financial benefits generated from the installation of these solar systems (e.g., the value associated with SRECs and the federal solar income tax credit).

The Department believes establishing a District Green Bank and other forms of profit-sharing would help reduce the implementation costs over the next 15 years.

### **PHASED APPROACH**

The Department will implement Solar for All in five three-year phases to ensure the program is sufficiently flexible to adapt to market changes and overcome barriers.

#### **Initial Phase (FY17–FY19)**

The Department projects the initial implementation phase will develop 30 to 60 MW of solar capacity. This phase will also focus on researching and developing the solutions necessary to execute large-scale projects in subsequent implementation phases.<sup>14</sup>

While funding levels for Solar for All are unpredictable, the Department estimates it will receive \$20 to \$45 million annually during the initial phase. However, the actual amount could be lower if electricity suppliers extend their grandfathered contracts in an attempt to avoid paying the higher Alternative Compliance Payment.

In the initial phase, the Department will continue to explore more predictable financing mechanisms, including using prepaid solar power purchase agreements (PPAs), an SREC price guarantee model, and a green bank.

#### **Subsequent Phases (FY20–FY32)**

In FY20, the Department will begin to implement the medium- and long-term solutions developed during the initial implementation phase and will use lessons learned from Solar for All Projects and stakeholder input to adjust targets and actions to achieve program goals over the course of subsequent phases.

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<sup>13</sup> See Footnote 10.

<sup>14</sup> For a market-driven program like Solar for All, the rate of deployment will likely resemble an “S” curve. This curve describes the performance of an entity or product in the market, with a slower rate of adoption initially, and then an increased rate as adoption becomes streamlined, followed by a cooling period once the market is saturated.



## INITIAL PHASE ACTIONS

The Department will implement the following activities for the initial implementation phase:

1. Issue funding for Solar for All Projects
2. Develop strategic partnerships
3. Improve zoning and building codes
4. Map and analyze available real estate for long-term planning
5. Conduct strategic public engagement & education
6. Begin coordinating LIHEAP and Community Solar Project enrollment
7. Establish a District Green Bank

Each of these activities is described in detail in following sections.

### Solar for All Projects

In FY17 the Department will make funding available for Solar for All Projects that will install additional solar capacity, provide benefits to low-income residents, small businesses, non-profits, and seniors, and develop solutions to Solar for All Program challenges. On December 12, 2016, the Department issued a Request for Information, *Solar for All DC Innovation and Proliferation*, to seek public input on this approach. This RFI closed on December 28, 2016, and a total of seven responses were received.

Based on the responses received, the Department anticipates making \$13 million available for multiple Solar for All projects.

**Table 2. FY17 Solar for All Projects**

Available Funding	Agency	Name
\$8 million	DOEE	Solar for All Innovation and Expansion Projects - Multifamily, Commercial, Institutional Buildings and Non-Residential Spaces
\$5 million	DOEE	Solar for All Innovation and Expansion Projects - Low-Income Single Family Homes, Small Businesses and Non-Profits

Solar for All Projects will have four purposes: (1) to expand solar energy in the District; (2) to provide benefits to low-income residents; (3) to develop solutions to program challenges; and (4) and to identify solutions that the Department can use to establish the most effective, predictable, and stable medium-term program.

## Strategic Partnerships

The Department is developing the following strategic partnerships to help increase the rate of solar deployment on public land and buildings throughout the District:

**Table 3. Strategic Partnerships Currently in Development**

Funding	Agency	Reason	Description
\$0.95M	DOEE DOES	Solar Workforce Development grant	3-year solar installation training grant
\$0.75M	DOEE	Weatherization Assistance Program (WAP) Plus Solar Projects	DOEE solar projects for WAP-assessed or WAP-eligible buildings
\$3.5M	DOEE DGS	MOU with the Department of General Services (using FY16 funds)	Community Solar facility on a remediated site
\$1.0M	DOEE DCPL	MOU with the District of Columbia Public Library (DCPL)	Funding for a solar and battery project for Southwest Branch, a new public library
\$TBD	DOEE DCHA	MOU with the District of Columbia Housing Authority	TBD
\$TBD	DOEE DHCD	MOU with the Department of Housing and Community Development (DHCD)	TBD
\$TBD	DOEE UDC	MOU with the University of the District of Columbia (UDC)	TBD
\$TBD	DOEE DCSEU	Existing Contract with the DC Sustainable Energy Utility (DCSEU)	TBD

### **a. Department of Employment Services (DOES) - \$950,000**

In December 2016, the Department, in partnership with DOES, released a \$950,000 RFA to establish Solar Works DC, a three-year solar installation and job training program in the District. This grant is expected to result in 60–100 solar PV system installations on low-income homes and job training for approximately 60–75 District residents (three cohorts of 20–25 participants). Two of these cohorts will be open to adults 18 years and older. The final cohort will be limited to participants 18–24 years old to align with the Department’s Green Zone Environmental Program, a part of the District’s Marion Barry Summer Youth Employment Program.

### **b. Weatherization Assistance Program (WAP) + Solar - \$750,000**

The Department will award approximately \$750,000 in FY17 for solar projects on single-family or multifamily buildings that have completed or will complete energy efficiency and health and safety installations through WAP. To increase the likelihood of success, the Department examined best practices and interviewed staff from the Colorado Energy

Office, who managed installations of solar energy systems under WAP. The Department also visited four affordable multifamily properties in January 2017 and will assess these properties as potential project sites.

**c. Department of General Services (DGS) - \$3.5 Million**

In FY16, the Department and DGS began to explore methods to install solar energy systems on underused District Government property to serve LIHEAP beneficiaries. DGS has identified a small number of sites that may be suitable for community renewable energy facilities. The Department has allocated \$3.5 million to develop at least 1 MW of solar PV capacity. A Request for Proposals to implement the project is planned for FY17. The Department and DGS are continuing to examine other sites for similar opportunities.

**d. District of Columbia Public Library - \$1 Million**

The Department will provide up to \$1 million for solar energy and battery storage for the new Southwest Branch Public Library, with the potential to deploy additional funds for solar development at other District libraries. The Southwest Branch Public Library aims to achieve the highest energy efficiency possible, and the Department's funding will increase resilience for the building and its surrounding neighborhood.

**e. District of Columbia Housing Authority (DCHA)**

DCHA has identified several properties within its portfolio that would be ideal for near-term solar deployment. Many of these properties have either received or are seeking WAP services from the Department. In FY17, the Department and DCHA are partnering to assess these properties for rooftop solar potential and will begin to make investments in roof and electrical upgrades to enable solar installations.

In FY18, DCHA and the Department plan to roll out a larger strategy that will include solar deployment across the DCHA portfolio and will examine the feasibility of resilience strategies, including energy storage. The Department is also identifying opportunities to collaborate with DCHA's Housing Choice Voucher Program and other housing assistance programs to identify low-income households that may subscribe to community solar or benefit from an on-site solar installation.<sup>15</sup>

**f. Department of Housing and Community Development (DHCD)**

In FY17, the Department and DHCD will assess ways to coordinate Solar for All with DHCD's Single Family Residential Rehabilitation Program, the Department's WAP, and District of Columbia Sustainable Energy Utility (DCSEU) programs. The Department will also continue to collaborate with DHCD's Development Finance Division and

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<sup>15</sup> See Appendix B - Chart: Number of Potentially Eligible Public Assistance Recipients.

Property Acquisition and Disposition Division to explore how best to require or incentivize solar deployment across the affordable housing and community facilities that receive gap financing from the District. In addition to providing funding and leveraging private capital to deploy solar, the Department will provide the affordable housing community with the necessary technical assistance on these solar projects.

**g. University of the District of Columbia (UDC)**

In FY 17, the Department is working with UDC to assess the potential to install rooftop solar PV systems with battery storage on UDC campus buildings. These systems may be used to provide solar job training to students. UDC will also explore its ability to direct a portion of revenues (generated by the solar energy systems) to low-income students who are District residents.

**h. DC Sustainable Energy Utility (DCSEU)**

In FY17, the DC Sustainable Energy Utility (DCSEU), which administers energy efficiency and renewable energy programs on behalf of the District, under a performance-based contract to DOEE, plans to install approximately 1 MW of solar capacity. DCSEU has identified several multifamily, commercial, government, and institutional projects that have already been reviewed for technical and financial viability. DCSEU also plans to launch a new Solar Technical and Financial Support Service Initiative for multifamily, commercial and institutional customers, to address financing concerns, provide information on available tax credits, review contractor quotes, and provide technical and financial support to help project developers and owners overcome obstacles.

## **Zoning and Building Code Improvements**

To facilitate the broad adoption of rooftop PV, the Department will continue to work closely with the Department of Consumer and Regulatory Affairs (DCRA) and the Office of Planning (OP) to evaluate and propose necessary changes to the regulatory framework and permitting process for solar panels on both residential and commercial properties.

Amending zoning regulations and streamlining the permitting process would simplify system design, reduce soft costs, and facilitate an increase in the installations of rooftop solar PV. For example, zoning regulations currently define a “solar energy system” as mechanical equipment. This definition imposes limiting setback and height restrictions. A change to distinguish “solar energy systems” from “mechanical systems” will result in greater rooftop square footage for solar installations.

## **Mapping Real Estate for Long-Term Planning**

While a number of studies currently map the potential of rooftop PV in the District, they do not sufficiently address factors like zoning or roof structure assessment. As such, these studies cannot adequately inform the implementation of Solar for All. To address this issue, the Department plans to conduct a detailed analysis of the commercial, institutional, and residential rooftops in the District to assess the scope of available surface area viable for installing solar. This activity will complement the Office of the People's Counsel's (OPC's) current efforts to produce a study assessing the solar rooftop potential available within the District's low-income housing stock.

## **Public Engagement and Education**

As discussed earlier, one of the goals of the Solar for All Projects is to identify effective strategies for acquiring and engaging low-income customers and effectively communicating the benefits of solar. In addition to the engagement strategies that are developed, the Department will continue to coordinate with stakeholders, sister agencies, OPC, and community-based organizations to identify and implement strategies to increase the effectiveness of its outreach and education activities. This approach includes holding roundtable discussions with District property owners to identify effective methods to encourage participation in solar projects.

## **Coordinated LIHEAP and Community Solar Enrollment**

The Department administers the Low-Income Home Energy Assistance Program, which provides low-income households ("low-income" is defined as below 60% of State Median Income) with assistance to pay their utility bills including electric, gas and heating oil. The Department also works with the Department of Human Services (DHS) to provide additional assistance through the District's Heat and Eat Program for households receiving DHS's Supplemental Nutritional Assistance Program benefits. The Department will develop a coordinated enrollment process for LIHEAP and Heat and Eat Program participants as beneficiaries of Solar for All.

## **District Green Bank**

Green banks are innovative policy tools used to create green jobs, expand solar power, lower energy costs, reduce greenhouse gas emissions, and meet sustainability goals. As quasi-government entities, green banks finance the deployment of renewable energy, energy efficiency, and other clean energy and green infrastructure projects in partnership with private lenders.

Green banks are capitalized with public funds, which are then used to offer loans, leases, credit enhancements, and other financing services to close funding gaps for clean energy projects. The goal of a green bank is to increase investment and accelerate the deployment of clean energy by removing the upfront cost of adoption, leveraging private investment, and increasing the efficiency of public dollars.

## **Benefits of the DC Green Bank**

The Department recommends enacting legislation to establish the DC District Green Bank to help fulfill the \$2.3 billion investment needed to meet the District's Renewable Portfolio Standard, Clean Energy DC, and Sustainable DC Goals in a cost-effective manner. Specifically, the DC Green Bank could

- Attract private capital at a ratio of five private dollars to every one dollar of public investment;
- Use bonding authority to increase capacity, accelerate lending, and recapitalize funds;
- Accept funding from foundations, such as the \$3 million awarded to the Connecticut Green Bank by Kresge; and
- Qualify to receive funding from the recently introduced federal Green Bank Legislation.<sup>16</sup>

## **Funding the DC Green Bank**

The Department recommends an initial capitalization of \$7 million per year for five years through a transfer of existing and future REDF. Clean energy projects and programs financed by the DC Green Bank with REDF will include support to create new solar energy sources in the District. Other allowable sources of funding include philanthropic donations and grants, private investment capital, and other public funds.

The Department's proposal is based in part on a feasibility report conducted by the Coalition for Green Capital for the Department to determine how a green bank can help the District meet its climate goals. In addition, one of the Solar for All recommendations included a central financing program, which could manage and reinvest the financial benefits that accrue from installation of solar energy systems (see Appendix C, Finance Subgroup Recommendation).

## **DC Green Bank Lending**

Green banks offer loans, leases, credit enhancements, and other financing services to close funding gaps for clean energy projects. The goal of the DC Green Bank is to accelerate the deployment of clean energy technology by leveraging private investment, removing upfront costs, and increasing the efficiency of public dollars. Green banks typically establish lending programs based on the needs of the local jurisdiction, country, or state. This approach can include financing to expand solar deployment, complex energy efficiency retrofits of large buildings, and new clean energy infrastructure such as micro-grids and anaerobic digesters. Once established, the DC Green Bank's board of directors and staff would work with local stakeholders and investors to establish the initial programs.

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<sup>16</sup> <https://www.congress.gov/bill/114th-congress/house-bill/5802>

## **MEDIUM- AND LONG-TERM STRATEGIES**

In FY20, the Department will begin to implement medium- and long-term solutions that build on lessons learned in the initial phase. The long-term programs will balance the need to establish a stable market for the local solar industry with the District's desire to assist low-income households and residents. The Department is considering three initial options: power purchase agreements, SREC risk management, and public-private partnerships.

### **Power Purchase Agreement**

A Power Purchase Agreement (PPA) can be designed to assist low-income energy consumers and solar developers to lower the cost of solar energy projects by leveraging the creditworthiness of the energy buyer. A modified version of a traditional PPA could allow a solar developer to receive an upfront payment for the generation of solar energy for a period of time. This upfront payment lowers the cost of energy that a buyer pays on behalf of low-income households.

#### **Consultant's Report: Power Purchase Agreement**

In May 2016, the Department commissioned New City Energy, LLC to develop financing strategies for solar in the District. The Department received the report in August 2016 and shared it with the Solar for All Task Force. The report recommends the development of community solar access or PPAs.

To obtain additional stakeholder input on the consultant's report, the Department issued a Request for Information (RFI) on October 25, 2016, and requested public input on the concept of a PPA. This RFI closed on November 18, 2016, and a total of eight responses were received.

### **Market Stability & SREC Risk Management**

Market stability is critical to the success of Solar for All. As the primary financial incentive for solar projects in the District, a stable SREC market reduces risk and attracts private capital. The Act, which maintains the rate of Alternative Compliance Payments at \$500 per megawatt hour, sets the ceiling price (maximum possible value) for SRECs. The Act does not, however, provide a floor price (guaranteed minimum) for SRECs. This creates the potential for an oversupply of solar generation to cause a sharp decline in SREC prices. In other words, if the Department and solar developers are too successful removing barriers and developing solar projects, SREC values will fall. This uncertainty could result in a decrease in the number of willing lenders, making projects harder to finance.

To address issues of market stability, the District could investigate using REDF to establish a floor price for SRECs for Solar for All projects. This would allow developers to use future SREC revenue as a source of upfront financing. This solution could be implemented in coordination with the establishment a green bank.

## **Public-Private Partnerships**

The Department is interested in considering a public-private partnership model to leverage REDF. The Department would work with the Office of Public Private Partnerships to solicit and enter into a long-term agreement (10–15 years) with a partner who would receive an annual availability payment for delivering new solar installations; these agreements would include specific performance measures which could include a requirement to hire local subcontractors, or train and employ District residents for the project(s).



**Appendix A**  
**Calculations for Figure 4:**  
**Financial Incentives in the District**

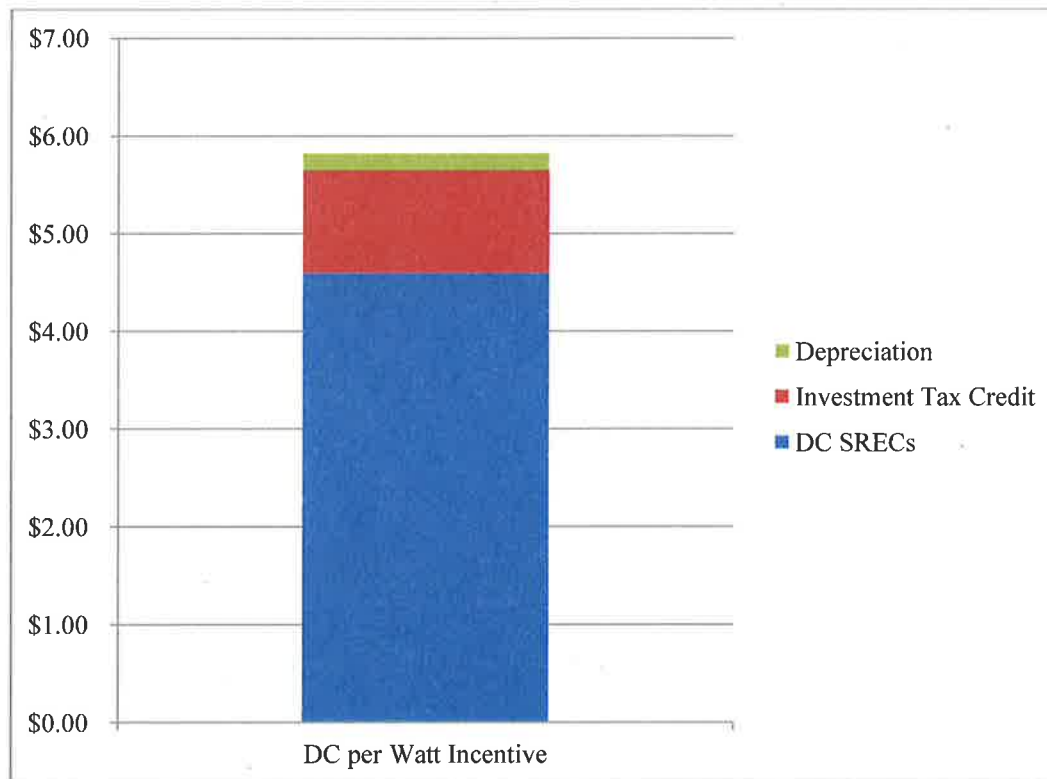
**Figure 4. Financial Incentives in the District**

Installed  
Cost: \$3.50

DC per Watt  
Incentive

Incentive Type	Installed Cost	Incentive Amount	% of Total Cost	Source
DC SRECs	\$3.50	\$4.60	131%	DC SREC Incentive Model (see below chart)
Investment Tax Credit	\$0.00	\$1.05	30%	<a href="http://programs.dsireusa.org/system/program/detail/658">http://programs.dsireusa.org/system/program/detail/658</a>
Depreciation	\$0.00	\$0.18	5%	<a href="http://programs.dsireusa.org/system/program/detail/676">http://programs.dsireusa.org/system/program/detail/676</a>
MW Block	\$0.00	\$1.00	29%	Proposal
Customer management	\$0.00	\$0.50	14%	Proposal

Cost after  
incentive (\$2.32) -66%



# Chart: DC SREC Incentive Model

DC      Array size (kW): 1      Installed cost: \$3,500

	ITC	Depreciation	Tax incentive sum	Remainder after tax incentives
	\$1,050	\$175.00	\$1,225.00	\$2,275.00
	30%	5%		
	\$3500* .3	\$3,500 *.05		

Annual production  
(PVWatts)\*:

1.29 MWh/YR

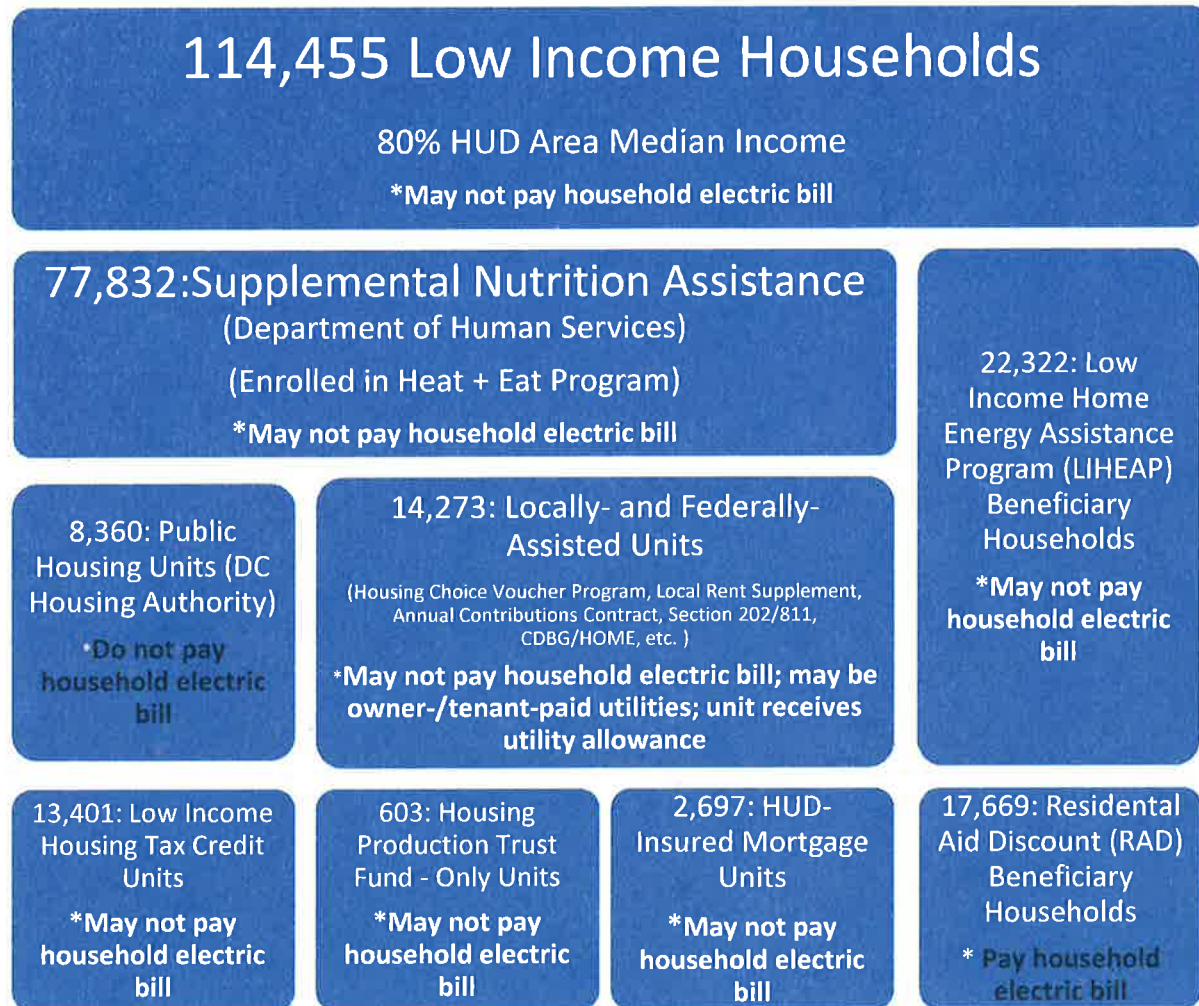
Year Number	ITC	Depreciation	SREC value/YR	Energy value/YR	Remaining debt	Annual Revenue	%	Profit
Install					\$3,500.00	\$0.00	0%	
Post-tax incentives	\$1,050.00	\$175.00	\$0.00	\$0.00	\$2,275.00	\$1,225.00	35%	-\$2,275.00
YR1	\$0.00	\$0.00	\$387.00	\$167.70	\$1,720.30	\$554.70	16%	-\$1,720.30
YR2	\$0.00	\$0.00	\$387.00	\$169.38	\$1,163.92	\$556.38	16%	-\$1,163.92
YR3	\$0.00	\$0.00	\$387.00	\$171.07	\$605.85	\$558.07	16%	-\$605.85
YR4	\$0.00	\$0.00	\$387.00	\$172.78	\$46.07	\$559.78	16%	-\$46.07
YR5	\$0.00	\$0.00	\$387.00	\$174.51	-\$515.44	\$561.51	16%	\$515.44
YR6	\$0.00	\$0.00	\$387.00	\$176.25	-\$1,078.69	\$563.25	16%	\$1,078.69
YR7	\$0.00	\$0.00	\$387.00	\$178.02	-\$1,643.71	\$565.02	16%	\$1,643.71
YR8	\$0.00	\$0.00	\$387.00	\$179.80	-\$2,210.51	\$566.80	16%	\$2,210.51
YR9	\$0.00	\$0.00	\$387.00	\$181.60	-\$2,779.10	\$568.60	16%	\$2,779.10
YR10	\$0.00	\$0.00	\$309.60	\$183.41	-\$3,272.11	\$493.01	14%	\$3,272.11
YR11	\$0.00	\$0.00	\$247.68	\$185.25	-\$3,705.04	\$432.93	12%	\$3,705.04
YR12	\$0.00	\$0.00	\$198.66	\$187.10	-\$4,050.81	\$385.76	11%	\$4,050.81
YR13	\$0.00	\$0.00	\$158.67	\$188.97	-\$4,366.19	\$347.64	10%	\$4,366.19
YR14	\$0.00	\$0.00	\$126.42	\$190.86	-\$4,628.39	\$317.28	9%	\$4,628.39
YR15	\$0.00	\$0.00	\$71.34	\$192.77	-\$4,892.49	\$264.10	8%	\$4,892.49
			\$4,595.37					

\*Azimuth: 180 Tilt: 20 System losses: 14%

## **Appendix B**

### **Chart: Number of Potentially Eligible Public Assistance Recipients**

## Chart: Number of Potentially Eligible Public Assistance Recipients



Data from DC 2016-2020 Consolidated Plan, page 34; 85. For more information see:  
<http://dhcd.dc.gov/sites/default/files/dc/sites/dhcd/publication/attachments/FY16%20-%20FY20%20Consolidated%20Plan%20for%20the%20District%20of%20Columbia.pdf>

Note: There are 40,088 subsidized units in the District per the DC 2016-2020 Consolidated Plan. Additionally, though there may be overlap, there are 22,322 Low Income Home Energy Assistance Program beneficiary households in the District.

**Appendix C**  
**Solar for All Task Force**  
**Recommendations**

# **Solar for All Task Force Recommendations**

## **Submitted to the Department of Energy and Environment**

December 2016

The Renewable Portfolio Standard Expansion Amendment Act of 2016, effective October 8, 2016, (D.C. Law 21-154; 63 DCR 10138) (the Act) establishes the District of Columbia's Solar for All Program (Solar for All). Funded by the Renewable Energy Development Fund (REDF), the Act is intended to expand solar capacity in the District and to provide the benefits of locally generated solar energy to the District's low-income households, small businesses, nonprofits, and seniors. Specifically, Section 3(b) of the Act requires the Department of Energy and Environment (the Department)—through Solar for All—to “reduce by at least 50% the electric bills of at least 100,000 of the District's low-income households with high energy burdens by December 31, 2032.”

Designated with the responsibility of administering Solar for All, the Department is required to submit a Solar for All implementation plan to the Council of the District of Columbia by February 1, 2017.

To assist in the plan's development, the Department established the Solar for All Task Force (Task Force) to provide recommendations on ways to effectively design and implement Solar for All. The Task Force comprised 13 solar professionals in the private and non-profit sectors, including solar development, affordable housing, District agencies, and green jobs.

The Task Force formed subgroups focused on five key topics: (1) Real Estate, (2) Customer Acquisition, (3) Customer Education, (4) Finance, and (5) Workforce. The Task Force and the subgroups met from September to November 2016.

The Task Force provided these final recommendations, arranged by subgroup, to the Department in December 2016.

## **Real Estate Subgroup**

### Rationale Statement

With the passage of the Renewable Portfolio Standard Expansion Amendment Act of 2016, D.C. has one of the most progressive solar energy policies in the country, joining the ranks of other leadership states such as California, New York, and Oregon. The newly enacted legislation requires the District to procure 5% of its electricity – or over 300MW – from solar energy by 2032. This means that 750 acres to 1,500 acres could potentially be covered with solar in the District's 68 square mile radius.

As D.C. looks to implement strategies to help meet its new renewable energy targets and expand solar energy for low income residents, DOEE should create programs that open new opportunities for solar deployment within the District's borders. The real estate sub-committee recommends that DOEE incorporate the following suggestions to ensure that D.C. is well-positioned to meet its new RPS and serve low income customers through the Solar for All program.

### Objectives

1. Utilize existing resources to assess opportunities for growth of solar in D.C. on available rooftops, land, brownfields, and canopy space.

DOEE should consider analysis conducted by the Office of People's Counsel, who is evaluating the solar potential of all available real estate in D.C. as part of its value of solar study. D.C. Department of General Services has already done a survey of potential brownfield sites. These efforts, along with resources such as Project Sunroof, will aid in assessing available solar resource in each real estate category (residential, commercial, greenfield/brownfield, and canopies). Building age, building owner, roof condition, and meter(s) type should also be considered.

Sample properties may include commercial buildings, affordable housing, public housing, federally assisted housing, federally ensured housing, D.C. government subsidized housing (i.e. Department of Housing and Community Development, DC Housing Finance Agency, etc.), and LIHTC properties.

2. Increase the amount of eligible rooftop space available for solar.

GRID Alternatives estimates that only 2 out of 10 rooftops that they assess are suitable for solar. Rooftops are otherwise ineligible given poor roof quality, or because they are in need of electrical repairs. The economics related to solving these problems prohibit many District residents from pursuing solar. Given these challenges, DOEE should allow a solar incentive to be



used toward common roof repairs or electrical repairs to increase the number of eligible rooftops for solar. DOEE should look to San Francisco Solar Roof Retrofit Program as a best practice.

Solar development on commercial buildings is limited by rooftop obstructions such as HVAC systems, compressors, mechanical penthouses, mini splits, elevator shafts, and window washing anchors. DOEE should examine this problem closely and think creatively about ways to troubleshoot removing these obstructions. One idea would be a process whereby building owners with high solar potential can apply for grant funds to remove these obstructions or move them elsewhere. This will not only increase the District's solar potential on its biggest rooftops, but also in order to encourage building owners to pursue solar energy.

As part of this effort, DOEE should also analyze the green roof rebate in the context of available solar incentives to determine which is more attractive, and if the green roof rebate discourages building owners from installing solar or if the two can complement each other. Green roof integration, while important to the District's storm water management strategy, is another obstruction that prevents the installation of solar.

Additionally, DOEE should work with Homeowners Associations to ensure homeowners that want solar are able to pursue solar.

3. Make changes to the building code to ensure structures are "solar ready."

DOEE should work with appropriate agencies to make changes to building codes that will ensure that new commercial buildings and canopies will be structurally sound for solar. All new construction should be solar ready/solar enabling. Consider an interagency Memorandum of Understanding as it relates to new affordable housing development.

4. Educate building owners about REC ownership issues.

Confusion over REC ownership, or how to claim the environmental attributes associated with a solar energy system, are a barrier to solar development in the District. This is especially true for the federal government, who owns much of the available rooftop space in D.C., but generates little solar. Building owners like the federal government – as well as buildings trying to achieve LEED status - do not install solar and/or monetize their RECs because they are concerned that they cannot claim the green power.

Education must be done around environmental claims and REC swaps for federal buildings and with LEED. DOEE should also hold education sessions with federal GSA, the Architect of the Capitol, White House Council for Environmental Quality, and others on this topic.

5. Incentivize large real estate owners to install solar.

Electricity savings from solar energy are of very minimal financial importance to large real estate owners with large, sometimes national, portfolios of buildings. While electricity savings are such a small portion of their bottom line, the marketing benefits and brand equity built from installing solar may be another motivation. DOEE should consider marketing incentives for commercial buildings, such as a solar-specific award program (i.e. Solar Champion Awards), or window decals and/or signage that may be placed at the building's entrance to demonstrate that the building is powered by green energy. Another marketing incentive could be a dinner with the Mayor that recognizes these Solar Champions.

The incentives mentioned in pillar two - removing rooftop obstructions - will also accomplish this goal.

## **Finance Subgroup**

### Introduction

The financing sub-group conducted a thorough analysis of the programmatic needs to achieve the goals of the Solar for All Program. After extensive discussion, the group's analysis was narrowed to four primary approaches, for which financial models were developed. After reviewing their analysis the group arrived at a consensus recommendation on a path forward for the program. While there are considerable differences between the models examined, all arrived at the conclusion that the core solar development costs to DOEE over the length of the entire program would not exceed \$171 million dollars. Fundamentally, even considering the need to finance incentives to enable the program to address roof repair and replacement, subscription/client management, incentives to encourage roof owners to participate such as leases, public recognition and awards programs; the costs of workforce development; the costs of an extensive public education campaign; and monitoring and reporting on the program—the total program costs did not exceed \$256 million dollars.

### Program Assumptions

In all of the group's models, it was assumed that the District government (or a contracted designee) would consolidate and manage all subscribers into the program—participants would be recruited through LIHEAP first, and subsequently SNAP or other District public assistance programs (see recommendations of customer acquisition team). DC Council members could be given a roll recommending constituents including small businesses and community organizations into the program. We did not include long-term cost savings in the LIHEAP program in our financial analysis nor did we measure considerable community and program benefits beyond end of the program.

In addition, we assumed that all roofs, whether residential, commercial or other sites would be subscribed into DC's community solar program. Therefore, all kWh produced by the program could be flexibly allocated and re-allocated over time. We assumed that some percentage of the build out of the solar PV could be "allocated" by developers to building site owners as payment for use of the site. We calculated all installations participating in the program to have a minimum 10 year contract to provide energy to the program (however whenever possible longer lease lengths should be included in the program). Starting in year 11 the program will need to create an incentive for extending energy production contracts for additional five-year periods in order to encourage as many projects as possible to stay in the program. The costs of these extensions are included in the model.

We assumed that all installations in the program would be required to provide on-line monitoring, and transparent reporting in the program. We also assumed there would be standardized contract elements and communication materials for both subscribers and site hosts.

The detailed assumptions including rate of build out, kWh hours needed to be produced in order to meet program goals, per unit costs for different building classes SREC market projections, and costs of solar estimates are contained within our financial model and are delineated in the attached spreadsheet.

### A Phased Approach

The team has concluded that there are great opportunities to highly leverage DOEE Funds to lower program costs and increase the impact and public benefit of the program. Most important many of these interventions are additive but do not need to be phased in all at once. The key is to start immediately and send clear market signals that companies should be making a long-term investment in participating in the Solar-for-All program. As such, we recommend that the program begin with the simplest model and begin exploring additional interventions and adaptive management over time.

**Phase I Block:** The working group recommends that the implementation of the financing portion of the Solar for All Program should utilize a 25 MW Phase I Block that will likely cover the build out from 2017 through at least 2019,. The Phase I Block will continue until it is exhausted. During 2017 DOEE should begin to, develop additional options including subsequent blocks, and additional enhancements, and additional program elements that can be implemented starting in 2019. This will provide stability and security to the market participants and result in a good start for the program. The Phase I Block program and it's accompanying program management would utilize a majority of the REDF funds that are currently available and a majority of those available in 2018 and 2019.

The PV solar energy systems built under the Phase 1 Block would commit to provide to DOEE all of the output for a period of at least 10 years. DOEE would then allocate the power at no cost to program subscribers. The payment for this would be made upfront when the system is placed in service using the mechanism of a prepaid PPA to simplify the transaction and procurement.

The key to success of this model is to build a steady pipeline of projects with a quick start and a steady build up. This model prioritizes steady market growth over other potential benefits. In this model (based on successful elements of the California CSI program and NY SUN program), blocks of installed capacity have incentive structures that are made available to developers at a set rate until each block is "used up". The Phase 1 Block is constructed to have a base rate and each block will also include adders to promote more expensive construction such as residential LMI households, roofs that need repair etc. To be clear, the Blocks are available until the block is built they do not expire at a specific time-frame.

Once DOEE has purchased the output from a system it would, through a program administrator, provide billing credits for qualifying energy customers through the Community Solar mechanism. In other words, DOEE would not use the power it purchases, but would assign the CREF credits to qualifying residents identified by the administrator. CREA would be the

mechanism to allow the credits to appear on the household electric bill at the CREF credit rate for residential customers. For example, DOEE could purchase power at, for example, 4 cents per kilowatt hour and assign the billing credits to individual District of Columbia residents at the CREF credit rate of approximately 12 cents per kilowatt hour.

For ease in administration of the program, the Block size would be expressed as megawatts of capacity. However, the commitment would be to purchase a certain amount of megawatt-hours per year for each MW of capacity. Thus, using the NREL standard, it would be to purchase approximately 1200 megawatt-hours per year per megawatt of capacity. These expected outputs are expressed in the attached spreadsheet and allow us to accurately predict how many households will be helped by the program each year.

The purchase price and payment terms, would be set at the opening of each block of the program. The committee recommends that a reservation system such as that used in California be used so that private development can know ahead of time the level of advance power purchase contract it can expect for each system. Once reservations adding up to that block of power have been accepted, other system owners can make reservations for the next block. Each new block provides an opportunity to assess program costs, and impact and to adaptively adjust the program to provide the most effective and least cost incentive possible.

This Phase I Block program relies on each system to be owned by a third party owner/ developer and does not involve DOEE in any system ownership, finance, or maintenance. DOEE has a contract to purchase all of the output of these systems and the upfront payment to the system owner is intended to assist the system owner secure financing by providing a credit off-taker of power, removing that risk, and providing the equivalent of an up-front payment to act as a layer of the capital stack that the owner uses to purchase and install the system. The system owner will retain all of the SRECs that the system produces, and will use the revenues from the sale of these to amortize debt, pay expenses, and pay the owner an economic return.

The overall financial modeling of the program envisions five blocks capturing the entire 300 MW over the life of the program. Although the payment mechanism will be made at cents/kwh basis, the equivalent \$/KW installed were modeled and are provided here as a point of comparison. Although we envision a number of different adders to achieve specific program goals and allow the economics to work for a wider variety of real estate—for the sake of simplicity we modeled an average adder of 75 cents.

**BLOCK 1: 20 MW Total Size**

Base Rate      \$1.00/Watt

Note: adders to incentivize additional types of buildings. Such as low income residential households in need of roof repair, specific locations, electrical upgrades, buildings over three

stories, or buildings with complex roofing structures can be built into the program. The adders would range from 15 cents to \$1.00/Watt

**Advantages:** This model incorporates roof repair and electrical upgrades. The model allows you to create different incentives for different roof types. This is a crude tool but easy to administer. Risk is pushed onto the private sector. The model allows for flexibility and adaptive management in subsequent blocks if there are unforeseen circumstances over time. This program can be adjusted over time. If, for example, the cost of solar drops more quickly than modeled, subsequent blocks can lower the incentive more quickly. The program will build market momentum and business certainty—it creates stability in the market. The program will also mesh well with other efforts to bring value to the program like a centralized customer acquisition pool, a centralized site donation effort, education effort and standardized contracts and monitoring requirements.

**Disadvantages:** If prices are not set right there will be uneven development among different types of building classes. For example—there may be a lot of development in the commercial sector or very little in LMI residential. Doesn't create economy of scale or aggregation programs for roof acquisition or financing. It is not highly market sensitive and may under or over incentivize the work. It does not provide a hedge against potentially highly fluctuating SREC values.

## Phase II: Program Enhancements

The Financing team expects that there will be program costs, and market evolutions that are not anticipated in this initial analysis. Thus, for example, as the program evolves the program may need to provide a “bonus incentive” for a particular type of roof or location that provides a large potential for the program but is more challenging to implement. However, the flexibility of the Block program would allow DOEE to effectively push out a robust program with a reasonable budget.

In addition, there may be significant additional financing and program interventions that could be explored that would provide significant opportunities to provide greater economic leverage or economies of scale in delivering the program. Several of these Phase II enhancements are discussed below.

## SREC Escrow

There is a strong consensus with the team that this intervention could be highly complementary to the Phase 1 Block program described above, and could provide significant additional leverage to the Phase 1 Block Program. The SREC Escrow could be implemented in year two or three. In this model, DOEE or a designated third party would take REDF funds and put them into an escrow account. The account would hold funds based on the amount of MW built. It would act as a backstop to SREC payments to guarantee a floor on prices if they dropped below said floor. Solar developers contributing to the Solar for All Program would therefore have a guaranteed

minimum price for their SRECs over time. This would allow them to use future SREC revenue (which is considerable) as a source of upfront financing for the program.

The team believes that this program would make projects much easier to finance, requiring less developer risk capital and making a greater pool of lenders available. As a result, this would allow the government to potentially reduce subsequent Block incentives for a net decrease in program costs and a higher leverage of private sector investment at better terms without slowing the pipeline. If SREC prices are steady the costs of this program could be negligible. After the Phase 1 Block program is established, it should be possible to determine a SREC backstop price that provides certainty of revenue while staying below the maximum SREC prices that may be obtainable. For example, providing a constant backstop price of \$300 per SREC for 10 years may be below the average price in the market's range of SREC values. Such a price could "cost" DOE very little. Yet it could have great value in getting financing while still allowing project owners to keep the SRECs from the projects and sell them on the market for higher amounts if available.

The committee envisions that the payments to the escrow reserve for a pool would be made based on the next 12 months' SREC payment needed. DOE would replenish the backstop reserve at the beginning of the next year, if it has been used and depending on how much is needed for the next year. If the backstop reserve is used in any year the reserve would have a first call on any excess SREC revenue from the projects in future years until the amount used from the reserve is repaid.

**Advantages:** This intervention would significantly decrease costs to developers that currently must take significant discounts between expected revenue from SRECs and the amount of money they can borrow against future SRECs revenue. This intervention works similarly to a loan loss reserve because it de-risks SREC revenue - one of the most significant value streams in the DC Solar market. This may be the most effective market mechanism of those analyzed by the team in terms of costs to program compared to MW produced. Assuming SRECs stay close to projected values, the approach would create significant opportunities to reinvest into the program. Each year's unused allocation could be carried over, to decrease the quantity of new funds needed in the subsequent year. The program is open to multiple developers and investors. DOE/DC Government's interest would be aligned to have a strong SREC market, decreasing the risks to the Solar for All Program overall. The program could integrate seamlessly with a Block program.

**Disadvantages:** Would probably require a third party such as a CDFI or Green Bank to manage the program. Establishing such an entity would take time. On its own, doesn't include or differentiate costs for roof repairs, types of real estate or locations. May include significant program administration costs. May add complexity to the program and require more extensive communications, outreach and monitoring. The cost of program overall is difficult to predict at this time as it could vary considerably depending on the strength of the market..

## The Central Financing Model

While the team was unable to reach a consensus on this model we have provided it here for your consideration. The government or designated third party such as a Green Bank entity would coordinate tax equity and debt financing for developers to install solar in addition to the SREC Escrow intervention described above. This entity would also become the owner of solar projects at the end of a seven-year financing period, and would be responsible for coordinating maintenance, insurance, and other operational responsibilities. The same entity could potentially pass along assets to a community-controlled entity, possibly a cooperative, to continue operating projects over the long term.

The model assumes an annual procurement process to identify tax equity investors and debt providers. The size of the investment pools for a block or annual allocation is significant, so Solar for All would be able to attract the lowest-cost tax equity investors and lenders. It may be possible for a central third party entity – a large bank, for example – to coordinate all debt for the pool, allowing lenders of many sizes to participate in Solar for All. Preliminary analysis of this model (attached) shows total costs for 15 years of this model are \$144 million. Our model shows an additional \$283 million of SREC revenue not required for debt service is also generated. The ownership of this \$283 million is unclear as it is generated in the first seven years of project operations, primarily under legal ownership of tax equity investors, who would flip ownership to another legal entity after five years.

**Advantages:** Uniform PPA for all participants and single point of responsibility for long-term operation, maintenance and monitoring of solar energy systems. Allows significantly greater aggregation for tax equity investors and debt providers, which could result in significant cost reductions due to greater economies of scale. Allows much greater reinvestment of SREC revenue and provides a clear path to long-term community ownership of solar projects for the entire life span of the solar panels and potentially beyond. Allows small local solar installation companies that do not have access to financing to participate in the marketing. Central financing entity could learn from innovations occurring in the private sector in DC and other locations and innovate financing as it evolves.

**Disadvantages:** Directly competes with private sector solar developers and small investors in the financial sector, allowing fewer finance players for Solar for All. Requires government administration of financing and asset management currently offered in the private sector, which may pose significant legal and contracting questions. Will have higher overhead costs to provide the same services as other private sector PPA companies.

## PROGRAM ADMINISTRATION AND OTHER NON-INSTALLATION COSTS

The finance team has taken a very preliminary look at the program administration costs in order to model the total costs of the program. It is assumed that once the other Solar for All sub-groups have completed their recommendations this section may have to be significantly revised.



A. Subscription/Client Management: Our assumption is that the DC Government will manage this. They will house this function within the LIHEAP office and/or other programs serving low and moderate-income households. The assumption is there maybe a large investment in the first year to set up the CRM to track program participants and work out intake policies within the existing program-- but after that a relatively skeletal staff can handle checking income status, entering people into the program and managing customer complaints and questions. 300k/year? (See customer acquisition recommendations) upfront costs and annual costs to be broken out.

B. Education: This is a rather large task that will include outreach to building owners, potential subscribers in the program, solar developers/installers and rate-payers. It will require extensive coordination with government, utility, non-profit and private sector plays. Outputs will include designing and implementing a marketing plan for the program, website, development of FAQs, and other on-going efforts. see education sub-committee recommendations) 250k/year?

C. Monitoring Program and Reporting: This task will require getting real production data and real client data from program participants, Program monitor will need to set up data protocols with program participants, analyze data and prepare an independent annual report to be shared and disseminated with the public that includes program impact and lessons learned and recommendations for program changes including incentive changes or adaption's to program design. Our assumption is that this should be a third party contract \$150k/year.

D. Marketing: Even though each solar developer would be responsible for finding and negotiating terms at all of their building sites, We assume that a centralized marketing program available to all developers and program participants to recognize, recruit and support site donations to the program can greatly increase the efficiency of the program. This third party entity would work with commercial, government, residential and non-profit sites. They would explain and trouble shoot for potential site donors. They would create a recognition or awards program for site donors. They would develop a marketing program to reward and encourage site donation. \$250k/year

E. Workforce Development: Our assumption is that local job training will be an essential element of success. \$1.3 million average annual costs. (see workforce development subgroup)

#### Solar for All | Financial Model Narrative

The financial model consists of 2 main components; total solar cost and additional program costs. The solar cost (main sheet) is the cost of providing solar to 100,000 households to cut their electricity cost by 50% by 2032. The additional costs are those necessary costs to achieve these energy saving targets including workforce development, customer acquisition and management, roof and electrical upgrades to older properties, and program management and O&M fees.

#### SOLAR COSTS

Assumptions were made by the Finance sub-group to calculate the cost needed to achieve the program goals. These assumptions are listed on top of the sheet, including average electricity consumption by LMI household, consumption reduction overtime due to energy efficiency, base utility rate, rate increase overtime, base solar cost/Watt, cost reduction overtime, SREC base rate, and SREC rate decline over time. These assumptions are soft-coded in the model to be adjusted, changed, or used in what/if analysis.

### Target Market

This segment of the model calculates the annual electricity consumption, annual utility rate, and total electricity cost for the total LMI target market (100,000 households) based on the assumptions created.

### Saving Goals

This segment calculates the annual cost-saving sub-goal leading up to 50% saving in 2032; starting with 0.5% in year one and ramping up gradually to 50% in year 16. Annual electricity saving (KWh) and annual cost saving are calculated based on the ramp-up goals and the assumptions listed above.

### Solar PV Installed

The annual amount of solar energy installed in MW is calculated based on the desired annual electricity saving goals in KWh taking into consideration the regional efficiency rate of 1,200 KWh/KW installed. Then the cost of this annual solar PV target installed is calculated based on the assumptions of base cost/Watt and cost decline overtime due to technical and business efficiencies.

The program targets and costs are divided into 5 phases with each phase running for 3 years, the objective of this phased approach is to provide continuity and program stability to developers and participants beyond the traditional tactical 1-year programs.

### ITC & SREC Rebates

The solar installation costs calculated above are gross costs. A number of rebates are available to developers to reduce the installation costs including ITC & SRECs.

ITC is calculated based on the current Federal laws e.g. 30% in years 2017-2019, 26% in 2020, 22% in 2021-2023, and 10% thereafter. A factor of 1.1 is applied to these rates to allow of depreciation and other concurrent Federal incentives.

The SREC values are calculated over the 16-year length of the program. For the purpose of this model, a conservative base rate of \$300 was assumed for 10 years with annual 20% rate decline thereafter.

## Rebate Needed

The ITC and SREC's alone won't cover the solar installation cost. Therefore, an additional funding source is needed to fill the gap. This funding gap is requested in a form of rebate, the way this rebate is calculated in the model is based on a simple formula: gross solar cost - ITC - SREC's. However, the mechanism this rebate is recommended to be paid by the District government is in a form of pre-paid PPA of \$0.05/KWh or 10-15 years, which equates to the funding gap identified above.

The annual rebate varies based on a number of factors; for phase 1 it is estimated at \$1.75, which will go down in subsequent phases as SREC values decrease and system sizes increase.

## ADDITIONAL COSTS

Additional program costs are calculated in separate sheets/models and aggregated at the bottom of the solar sheet. The assumptions and calculations of these additional costs are detailed in their prospective sheets.

### Workforce

The number of new jobs was calculated based on the man/year resources needed to deliver 1 MW of solar. The cost of training solar resources is estimated based on a combination of course study and hands-on training on actual solar installation projects, based on GRID model.

### Customer Management

The model includes cost assumptions for client acquisition, subscription management, education, and support. These costs are estimated per household and then aggregated annually based on annual goals.

### Upgrades

Roofs and electrical upgrades are calculated based on the assumption that 50% of the solar installed would be on LMI single family and multifamily buildings, the other 50% are commercial buildings and community solar. Another assumption is 50% of these LMI buildings need upgrades.

### Other Costs

Other program costs such as Operations and Maintenance (O&M) and program administration fees are estimated based on a percentage of total solar cost

All additional costs allow for setup/startup cost, which needs to be added to Year 1 of the program.

## **Customer Acquisition Subgroup**

The following organizations participated in the Customer Acquisition Subgroup of the Solar for All Task Force:

- Office of the People's Counsel
- Community Power Network/DC Solar United Neighborhoods
- Grid Alternatives Mid-Atlantic
- Interfaith Power & Light (DC/MD/VA)
- DC Fiscal Policy Institute
- Pepco
- Coalition for Nonprofit Housing and Economic Development (CNHED)
- Groundswell
- DOEE staff

The following sections summarize the Customer Acquisition subgroup's final comments and recommendations for identifying the universe of customers who can benefit from the Solar for All program and proposing ways to facilitate and maintain customer participation in the program. We incorporate by reference information about LIHEAP and WAP

### **DEFINITIONS**

- "Monthly Electricity Bills": We note DOEE Staff's November 1 memo which maintained that for purposes of implementation of the Solar for All program, this metric should literally be based on "electric bills." The Customer Acquisition subgroup remains concerned that limiting the program to customers who receive monthly bills from Pepco would prevent many low-income residents living in master-metered buildings and others from being able to benefit from solar. Given that a significant number of residents live in master-metered buildings, our subgroup recommends the following compromise on this definition:
  - o For those who receive monthly bills, the goal will still be achieving a 50% reduction in the monthly bill. For those who do not receive a monthly electricity bill, the goals will be to achieve a 50% reduction in their energy consumption.
- "Households": We are pleased that DOEE agrees with our interpretation of this term.

- o “to include single-family homes, individually-metered residences, and master-metered multifamily buildings. All affordable housing complex/building construction projects are included. The term includes owned unit and rental unit.
- “Small local business”: We are pleased that DOEE agrees with the spirit of the definition we originally proposed. The Customer Acquisition subgroup would like to offer the following amended definition:
  - o “Private, worker, community or cooperative ownership; at least 50% locally owned with a maximum of 500 employees (a metric set forth by the U.S. Small Business Administration); Decision-making authority is vested in the local owners and not subject to conditions dictated remotely; the business has a limited geographic range. The term includes CBEs and minority-owned businesses.”
- “Nonprofits”: We are pleased that DOEE agrees with our interpretation of this term.
  - o “Any 501c3 entity operating in the District of Columbia. Term should be interpreted broadly. However, priority should be given to organization serving low-income populations.”
- “Seniors”: We are pleased that DOEE agrees with our interpretation of this term.
  - o “Individual senior citizens (persons 65 or older), as well as commercial or non-profit senior-serving entities.

## COMMUNITY SOLAR

- One more assumption that our and other subgroups would like to add is that all participants in Solar for All would become participants in community solar. In essence, Solar for All would effectively be a community solar initiative.

## ACQUIRING CUSTOMERS

- LIHEAP should be a primary intake mechanism for placing low-income customers in the queue for the Solar for All program
  - o Similar to the way that the Weatherization Assistance Program acquires customers, there could be a simple box to check on the initial LIHEAP application indicating interest in participation in Solar for All.
  - o The box on the application would be accompanied by a concise, clear and “encouraging” description of Solar for All and ability to reduce their energy burden
  - o DOEE or a Third Party Contractor would immediately follow up with the LIHEAP/Solar for All applicants with solar education programs and materials.

- o Additionally, their buildings/properties with applicants reside would be immediately be placed in a solar readiness queue (for community solar)
- o While LIHEAP would be the primary intake process, other programs such as RAD and SNAP should be utilized for informing residents about Solar for All.
- For those District consumers who may not be eligible for these programs but fall within the 80% AMI Solar for All eligibility requirement, information about the program can be distributed to various categories of community organizations and institutions such as churches, schools, ANCs, civic associations etc. A robust marketing plan should be developed to reach these consumers.
- Establish partnerships with DC government agencies (e.g., OPC, Office of Tenant Advocate, DCRA etc.) and non-profit organizations (Salvation Army, Habitat for Humanity DC, YMCA/YWCA etc.) for dissemination of information to consumers about SFA.
  - o DC government agencies would be responsible for regularly distributing information to their constituents about Solar for All.

## CUSTOMER MANAGEMENT

The Customer Acquisition subgroup reiterates our concern that it is critical that the SFA Program should run 12 months continually throughout every month of each year. We believe it is absolutely essential that Solar for All be managed by one central entity that would be the “go to” organization for customer education, customer care and program administration. Centralizing Solar for All program management will reduce the potential for customer confusion, will facilitate standardized information and will likely keep program administration costs low – making for more efficient implementation of the program. We recommend that there be a cost assessment of Solar for All customer acquisition and management.

(Note: Grid Alternatives estimates that the cost will be \$.50/Watt which will likely decrease as the program grows. However, we welcome any analysis that the Finance Subgroup has done on this issue)

## SOLAR FOR ALL PROGRAM MONITORING

The Customer Acquisition subgroup further believes that it is imperative that independent, external, third-party contractor monitoring of the performance of the Solar for All initiative be arranged sooner rather than later.

## **Consumer Education Subgroup**

This sections contains the Solar for All Consumer Education Subgroup's:

- Recommended Education Program Objectives;
- Program recommendations;
- Additional questions for DOEE's consideration; and
- Recommended list of Frequently Asked Questions.

### Education Program Objectives

1. Inform target groups how to participate in the program;
2. Encourage transparency and accountability of the program;
3. Help the general public to understand why the District Government is investing resources in the program, including: energy democracy, increased equity, and addressing climate change;
4. Motivate individuals to take action beyond the scope of the program; and
5. Successfully engage the target populations.

### Program Recommendations

1. Provide an overall explanation and the legislative authority for the Solar for All program

Recommended language: The Renewable Energy Portfolio Standard Act of 2004 ("The Act") requires the District of Columbia to generate energy from renewable sources to decrease its overall carbon footprint. The Act was recently amended in 2016 to include a Solar for All Program within the DOEE "to increase the access of seniors, small local businesses, nonprofits, and low-income households to the benefits of solar power. The Program shall reduce by at least 50% the electric bills of at least 100,000 of the District's low-income households with high energy burdens by December 31, 2032."

2. Establish a holistic approach.

The Customer Education Subgroup recommends that DOEE adopt a holistic approach in both acquiring and managing consumers, as well as monitoring program results that includes education and follow up.

3. Provide a definition of solar energy and explanation of how it works.

Solar power is energy from the sun that is converted into thermal or electrical energy. Solar energy is the cleanest and most abundant renewable energy source available, and the U.S. has some of the richest solar resources in the world.

4. Explain the various ownership options.

- Purchase
- Lease
- Solar Garden Subscriptions

5. Establish and Demonstrate the Interconnection Timeframe.

Ensure consumers are aware that the interconnection process takes approximately 12 weeks. Include a graphic of the timeline that is easily understood.

6. Clarify Third Party Verifier Responsibilities.

- Serve as the go-to or “one-stop” entity that provides standardized education to the consumer at or before the point of sale.
- Explain who does what – DCRA/Pepco/PSC.
- Provide a definition of Net Metering, along with an easily understood flowchart of the net metering process.
- Explain pricing and consumer choice.
- Provide initial and follow-up consultations at 60 – 90 days and 9 months.
  - Site visit
  - Savings realized
  - Problem resolution
  - Billing issues/questions

7. Explain the impact of solar on the environment, emissions, and employment.

8. Ensure that the Solar for All education efforts dovetail with DOE's existing Energy Efficiency and Weatherization efforts and leverages District agencies and other organizations to disseminate information about the programs.

9. Monitor and Communicate Program Results

Monitoring and consistent dissemination of program results and accomplishments is an essential element for program success. Metrics to report on include the following:

- Dollars saved
- KWh produced (what does a kWh translate to?)
- kWh saved
- Reductions in CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>2</sub>
- Annual reporting on number of LIHEAP disconnects per year
- Energy consumption reduced



- Solar jobs filled and job trainees brought online
- Movement toward achieving 5% program goal (annual percentage reporting)
- Number of households impacted
- LIHEAP – Number of persons applying and number of disconnections

10. Ensure all elements contain consumer friendly language.

11. Education, Monitoring and Communication efforts need dedicated staff and funding.

12. Create a standalone website that would allow consumers to learn about the Solar for All program, facilitate the online intake process, and allow consumers to provide feedback and ask questions of DOEE.

13. Engage representative groups

Representative groups include: small and local business associations, non-profits, senior citizen representatives (i.e., Office on Aging) and other civic organizations to participate in and collaborate on the program, to include DOEE's service intake services.

14. The group recommends that Consumer Education Plan be a flexible or living document that accommodates change as necessary and reflects the concerns of the different target groups.

#### Additional Questions for DOEE's Consideration

1. Will the task force limit its outreach to printed materials or be inclusive of other channels?

There needs to be an engagement strategy, which will coincide with customer acquisition efforts. Recommendations include:

- Pop-up display tables at District community events throughout the 8 Wards
- Hands-on consumer education sessions during the day, evenings, and weekends to accommodate various work schedules
- Collaboration/partnership with business organizations, Mayors Office of Community Relations and Services (MOCRS) and other District Government agencies,
- a stand-alone website,
- Social media (e.g., Twitter, Facebook),
- DOEE intake services, and
- Small business associations and community association meetings (e.g., Ward, ANC).  
These community groups should be able to further disseminate the information.

2. What does a well-educated constituency look like?

May overlap with acquisition group benchmarks.

3. How do we get to that target number (of 100,000)?

Recommendation – amendments that make the number more feasible. However, the message must be communicated regardless of the number.

4. Will recommendations about energy efficiency awareness and weatherization to be included?

The materials should contain specifics about energy efficiency literacy.

5. Should the task force efforts include job training?

The Consumer Education Subgroup recognizes that a workforce development subgroup has been created since the original recommendation.

6. Can a useful app be developed to disseminate program information or track District program milestones and homeowner metrics after installation?

7. What are the opportunities for embedded media? As a normal business practice, the community solar projects in play include ribbon cuttings, but it should be a part of the recommendations. This area may overlap with other groups.

8. What are the ideas and concerns about a standalone website?

- Having a standalone site is preferable to the content being included on an already crowded DOEE website. If on the DOEE website, there is no guarantee that content will receive priority placement to prevent consumers getting lost searching deep links to find the message/program.
- Dedicated staffing – who manages content and social media for effectiveness and efficiencies.
- A website can be useful for value and tracking purposes.
- How will the dedicated website be financed?

9. What is the universe of potential customers?

- SNAP, LIHEAP, RAD, and WAP
- How big are these lists?
- What overlap exists between the lists? A customer opportunity assessment would be useful to understand overlaps and what low-income consumer may be overlooked

10. Include a list of FAQ's in the consumer education program materials.

Recommended List of Frequently Asked Questions

#### OWNERSHIP

- What are the types of ownership?
- Who owns the electricity produced under the various types of ownership?
- What are the benefits of each type of ownership?
- What happens if I sell my home?

- When selling my home, should I seek a green appraiser who is knowledgeable about solar electric installation to obtain accurate valuations?
- Will the system increase the value of my home?
- Can a lien be placed on my home if I do not own the system?
- For a solar community garden, does it matter where the system is located?

## FEDERAL TAX CREDITS

- What federal tax credits are available?
- When am I eligible for the Federal Tax Credit (up to 30% of the cost of the system)?

## SOLAR RENEWABLE ENERGY CERTIFICATES (SRECs)

- What are SRECs?
- Who owns the SRECs?
- How do I use the SRECs?
- Under what circumstances can ownership of the SRECs transfer?
- What is the process for transferring SREC ownership?
- Are there any associated fees for the SRECs ownership transfer?
- What are the terms/conditions for transfer?

## SYSTEM INSTALLATION AND MAINTENANCE

- How do you know if your system is working?
- What to do if your system is not working or your bill doesn't go down after the solar is installed.
- What safety practices and installations procedures must be followed?
- Who is responsible for all maintenance, monitoring and upkeep?
- Does the same company that installed the system provide the maintenance?

## ENERGY PRODUCTION AND SAVINGS

- How much money can I expect to save?
- How much energy should I expect my solar energy system to produce?

## CONTRACT PROVISIONS

- How is the projected annual solar output computed?
- Who calculates the projected annual solar output?
- How are the projected savings computed? [PVWATTS or KWH?]
- What type of warranty is included?
- Do I have to pay maintenance fees?
- Who bears the risk when the project experiences unexpected problems?
- What are the remedies if performance projections are not met?
- Is it the owner, subscriber or, finance company's responsibility to rectify the problems?
- Who actually owns the system on my premise?
- Who is responsible for all maintenance, monitoring and upkeep?

- Who is responsible for removal and replacement of the solar energy system in case the roof needs to be repaired or replaced?
- What is the period in which I may rescind my contract?
- Are my contract terms negotiable?
- Who do I contact for any follow up issues?
- What happens if my solar provider goes out of business?

## SYSTEM FINANCING

- Who finances the system under the various ownership options?
- What are the financing options?
- Are there any District of Columbia solar financing programs?
- What does the lease payment cover?
- Will the lease payments increase over time?
- Does my lease payment include interest charges? If so, how is the rate determined?

## ENVIRONMENT AND ECONOMIC DEVELOPMENT

- How does this program help reduce the District's carbon footprint?
- How will the program create sustainable jobs with living wages?
- What will be the frequency of communication about the program overall and its cumulative impacts? We recommend creating a dashboard for the program that includes updates in KW installed, and the CO2 impact. It should be available online.
- Should we provide a general statement on positive environmental impact (may be difficult to quantify, given that electricity is not generated within the District)?

## **Workforce Subgroup**

### Overview:

The Renewable Portfolio Standard Expansion Amendment Act (“RPSEAA”) recently approved in DC has goals to increase the city’s RPS to 50% and install 300MW for 100,000 low-income residents by 2032. In order to effectively reach the Solar for All goal of reaching 100,000 low-income households, creating a diverse workforce program with a scalable training model will assist the District in implementing the new law. The District’s laudable vision and intent for clean and efficient energy consumption and generation creates a sizeable market opportunity and offers the city the opportunity to achieve multiple sustainability goals: (a) effectively implement this legislation, along with other related sustainability mandates (energy efficiency and stormwater management, for example) (b) by engaging the sizeable number of DC residents needing access and success in opportunity pathways, such as Opportunity Youth and Returning Citizens.

The “RPSEAA” coincides with the Federal Government’s Workforce innovation and Opportunity Act, the most significant rewriting and reauthorization of Federal Workforce Legislation since the introduction of the Workforce Investment Act was introduced in 1998.

The Workforce subgroup suggests that DOEE work closely together with other DC agencies dedicated to creating opportunity pathways for all DC residents. In many ways, the task will be to see if this market initiative can integrate with the City’s requirements and workforce efforts. These efforts are being led directly by the Mayor through DMGEO, DMPED and Directors at \_\_\_\_\_. The work is being led by the Workforce Investment Council Staff in conjunction with a Board led by business interests reconstituted in July 2016. The major differentiators in the new workforce initiatives that make the integration of these two efforts potentially symbiotic are:

- Demand-driven workforce solutions
- Offer entry level opportunities for opportunity youth and other disenfranchised populations WITH an attainable career pathway (1)
- Encourage Innovation in workforce solutions

Through this collaborative effort, the City can design and incorporate a citywide workforce program that introduces sustainable solar careers and pathways, targets the communities that we’re impacting and utilizes partnerships with local job training organizations. Included below are recommendations for programming, target population, and possible barriers.

## Program Goal

To create a sustainable career for approximately 3,500 people in the workforce program in order to help achieve the installation requirements for the Solar for All program.

## Projections

Saving 50% of electricity cost for the 100,000 low to medium income households would equate to 300 MW of solar installed over the next 16 years. This target would need the resources of 10,000 person/year across multiple skill levels. Assuming an average career retention rate of 3 years per individual, the estimated jobs that need to be created are 3,344 over the length of the program, with 200 new jobs every year. Solar careers with high demand during this timeframe will include installation, sales, logistics and customer service. Please see the Solar for All Jobs Estimate and Solar for All Workforce Costs Estimate created by GRID Alternatives Mid-Atlantic in the appendix of this document.

Please note that these projections offer an initial perspective on the implementation of the plan, with a projected built timeframe. If these recommendations or approach is approved, we recommend that a more rigorous evaluation of DEMAND PROJECTIONS taking into account certain considerations (many of which already discussed by the group and raised / considered by the other subgroups). For example, evaluate the impact of important but competing mandates such as Storm Water Management.

## Objectives

The workforce subgroup suggests that the program should:

Target the communities being served

- The workforce program can be a pathway to foster economic development in the communities that we're serving by targeting subgroups within these communities to introduce solar as a viable career, train a workforce, and provide job placement and entrepreneurial support. Target demographics should include trainees with a range of skill sets including but not limited to at-risk youth, college students, returning citizens, and experienced solar professionals.

Establish partnerships with job training providers, local business and universities

- To achieve RPS goals, DOEE should utilize job training providers, local businesses and universities as professional resources to develop a solar mentorship program. DOEE should collect data on: best practices, barriers to employment, average training time length, assessment protocols, quality assurance, program costs per trainee and stipend amounts. Ninety percent of Mid-Atlantic solar employers say that it's either somewhat or very difficult to hire local employees. Focusing on quality assurance by strengthening

the quantity and quality of the workforce should be a continuous effort. These entities can provide valuable information needed to create an adequate and intentional workforce program that empowers job trainees while executing program goals.

#### Develop a training structure

- Based on information provided by partner entities to DOEE, we recommend that the solar mentorship program should use feedback to:
  - o Partner with local job training organizations to provide cross-training for target populations in solar and energy efficiency
  - o Incorporate the use of digital tools to ensure more optimal and scalable learning
  - o Incorporate other education and training concepts used widely in other levels of training and identified as far more important than skills learning for continued success, such as emotional intelligence, learning agility and mindfulness (which could be even more important in workforce populations exposed to trauma)
  - o Place trainees with local businesses and trained professionals to learn additional skills necessary to sustain a career in the solar industry.
  - o Provide trainees with skills certification and transferrable skills in order to progress in their careers
  - o Prepare trainees for NABCEP certification
  - o Mandate employers to hire a certain percentage of trainees from the program similar to the Single Family Affordable Solar Housing (SASH) program in California
  - o Decide on a tracking process similar to a case management system that will monitor trainees' progress, attendance, retention and provide support throughout the program
  - o Create an innovation hub to support entrepreneurship in solar and renewable energy
  - o Develop an assessment or survey for trainees and program partners to give feedback on the program
  - o Be scalable and adaptable so that it meets the Solar for All program requirements throughout the length of the program

## Solar for All Jobs Estimate

Solar for All															
Variable Assumptions															
Installers / MW	10	Outreach / MW		5	Administration / MW		4								
Technicians / MW	8	Logistics / MW		6	Management / MW		1								
Engineers / MW	2	Customer Support / MW		3	Training cost/job		7,000								
Project Mgmt / MW	3	Finance / MW		3	Career rotation (years)		3								
Target Market															
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
LMI Electricity consumption (MWh)	700,000	886,000	672,280	858,834	645,658	832,745	620,090	807,688	595,534	782,623	571,951	760,512	549,302	738,316	527,549
SFA Saving goals - Annual (%)	0%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
SFA Saving goals - Cumulative (%)	0%	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%	28%
Energy Saving goals - Annual (MWh)	3,500	13,720	13,446	13,177	12,902	12,627	12,352	12,077	11,802	11,527	11,252	10,977	10,702	10,427	10,152
Annual Solar PV Install (MW)	2.9	11.4	11.2	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0	8.8
Scope of Work (man/year)															
Installers	29	114	112	110	108	106	104	102	100	98	96	94	92	90	88
Technicians	12	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Engineers	6	23	22	22	21	20	19	18	17	16	15	14	13	12	11
Project Mgmt	9	34	34	33	32	31	30	29	28	27	26	25	24	23	22
Outreach	15	57	56	55	54	53	52	51	50	49	48	47	46	45	44
Logistics	18	69	67	66	65	64	63	62	61	60	59	58	57	56	55
Customer Support	9	34	34	33	32	31	30	29	28	27	26	25	24	23	22
Finance	9	34	34	33	32	31	30	29	28	27	26	25	24	23	22
Administration	12	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Management	3	11	11	11	10	10	9	9	8	8	7	7	6	6	5
Total SoW (man/year)	120	469	459	450	441	432	423	414	405	396	387	378	369	360	351
Unique Jobs Created															
Solar-specific jobs	31	122	120	117	115	113	111	109	107	105	103	101	99	97	95
Professional jobs	9	34	34	33	32	31	30	29	28	27	26	25	24	23	22
Total jobs	40	156	153	150	147	144	141	138	136	134	132	130	128	126	123
Annual Solar Training Cost (\$ million)	0.2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Setup cost (% of program cost)	0.9														

## Solar for All Workforce Costs Estimate

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1. Below is the full definition of a Career Pathway, taken from WIOA Sec. 3 (Def. 7)

**CAREER PATHWAY.**—The term “career pathway” means a combination of rigorous and high-quality education, training, and other services that—

(A) aligns with the skill needs of industries in the economy of the State or regional economy involved;



(B) prepares an individual to be successful in any of a full range of secondary or postsecondary education options, including apprenticeships registered under the Act of August 16, 1937 (commonly known as the “National Apprenticeship Act”; 50 Stat. 664, chapter 663; 29 U.S.C. 50 et seq.) (referred to individually in this Act as an “apprenticeship”, except in section 171);

(C) includes counseling to support an individual in achieving the individual’s education and career goals;

(D) includes, as appropriate, education offered concurrently with and in the same context as workforce preparation activities and training for a specific occupation or occupational cluster;

(E) organizes education, training, and other services to meet the particular needs of an individual in a manner that accelerates the educational and career advancement of the individual to the extent practicable;

(F) enables an individual to attain a secondary school diploma or its recognized equivalent, and at least 1 recognized postsecondary credential; and

(G) helps an individual enter or advance within a specific occupation or occupational cluster.