S. 3460

10 Million Solar Roofs Act of 2010

Policy Analysis & Program Design

Final Report, Fall 2010

Workshop in Applied
Earth Systems Management

Columbia University
School of International and Public Affairs
Master of Public Administration in Environmental Science and Policy

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This report is the result of the two-semester Workshop in Applied Earth Systems Management, an integral component of the Environmental Science and Policy Program at Columbia University. The authors were tasked with completing an in-depth environmental and political analysis of Senate Bill 3460, The Ten Million Solar Roofs Act of 2010. At this time, the legislation is still awaiting passage in Congress. This report summarizes the scientific findings and details the components of an implementation plan.

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Acronyms and Abbreviations

2010 Solar Act	Senate Bill 3460: 10 Million Solar Roofs Act of 2010
AC	Alternating Current
CO_2	Carbon dioxide
DC	Direct Current
DOE	Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
GHG	Greenhouse Gas
KPI	Key Performance Indicator
kWh	kilowatt-hour
MW	megawatt (1 MW = 1000 kW)
NREL	National Renewable Energy Laboratory
PV	Photovoltaic
RFP	Request for Proposal
SPM	Solar Portfolio Manager
SWD	Solar Web Dashboard

Executive Summary

Globally, the United States is the second largest consumer of electricity, a majority of which is supplied through traditional fossil fuel generation. While this provides relatively cheap electricity to consumers, scientists are beginning to bring to light the high environmental and health costs to society. Exacerbating the problem are the inherent inefficiencies of the aging transmission infrastructure that Americans rely on to deliver their electricity.

In response, researchers have developed technologies capable of producing electricity from clean and renewable sources, such as the Sun. Solar photovoltaic panels capture the Sun's solar radiation and convert it to useable electricity for consumers. Solar water heating systems harness the power of the Sun to heat water for commercial and residential use. However, though each of these technologies is widely available, they require a high initial investment and are not cost-competitive with electricity generated from fossil fuels. Therefore, while the benefits of solar electricity are clear, the systems required are an infeasible alternative for a majority of Americans.

As a way of addressing this barrier, Senate Bill 3460, the 10 Million Solar Roofs Act of 2010 (hereto referred to as "the 2010 Solar Act"), would establish a competitive grant program to assist in establishing solar energy programs across the country with the goal of reducing the financial costs of a solar energy system. States, local governments, and Indian tribes will develop programs and compete for funding so that they may offer their constituents financial incentives towards the purchase of solar energy systems. By creating a competitive grant program, the 2010 Solar Act fosters innovation among participants in order to maximize the deployment of solar energy systems.

By increasing solar energy capacity, the 2010 Solar Act will not only reduce the harmful environmental impacts of traditional electricity generation, but will also help develop economies of scale within the solar technologies market. Over time, this will make solar energy systems more affordable and diminish the need for government incentives. This report examines the policy solution offered in the 2010 Solar Act and proposes a first-year implementation plan that includes an organizational structure, staffing plan, budget, master calendar and performance management system. All components of the implementation plan have been chosen to ensure the policy meets its legislative goals of maximizing deployment and leverage of funds while ensuring grant recipients represent a diversity of populations and geographical locations.

Introduction

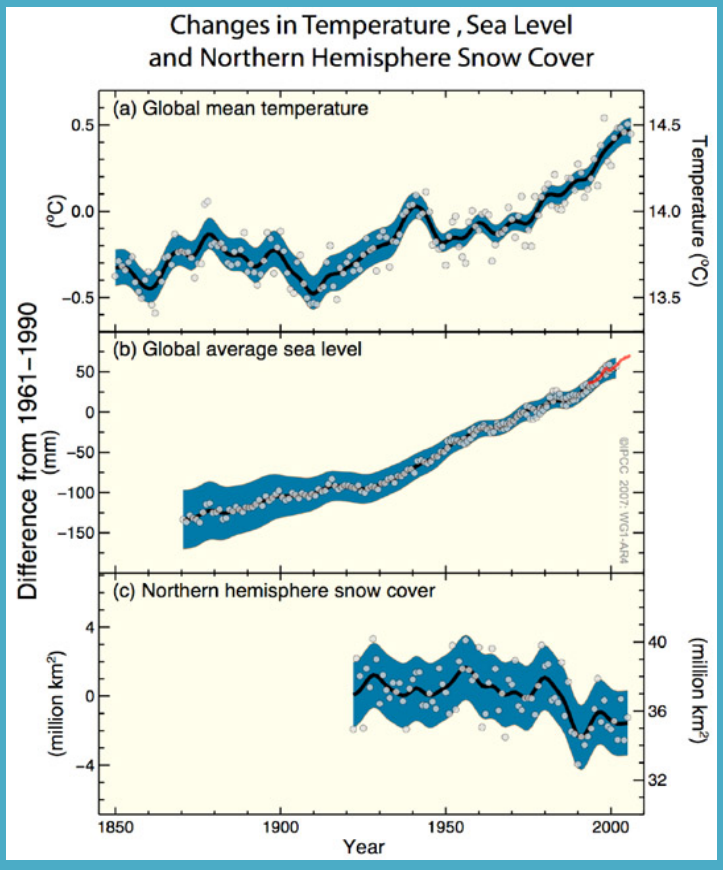
During the 111th session of Congress in 2010, Senator Bernie Sanders (I, VT) introduced Senate Bill 3460, the 10 Million Solar Roofs Act of 2010. At the time of publication, this serves as the most current iteration of a bill with a long legislative history, drawing inspiration from former President Bill Clinton's Million Solar Roofs Initiative of June 1997. The goal of the 2010 Solar Act is to facilitate the installation of new solar energy systems on 10 million properties in the United States by December 31, 2021. The bill will help the Department of Energy reach their goal of making solar electric technologies cost-competitive by 2015 (Springer, 2010).

If passed, the 2010 Solar Act will increase the capacity of solar electricity across the United States by providing competitive grants to fund regional programs that will incentivize the purchase and installation of solar energy systems. The bill authorizes $250 million for the initial year of 2012, with continued authorization of funding for the amounts deemed necessary for years 2013-2021. Funding for the program will be appropriated on an annual basis, and successful implementation could result in increased funding in subsequent years. Eligible grant recipients include states, Indian tribes and local governments. Solar energy systems include rooftop and ground-mounted options, both solar photovoltaic and solar water heating systems.

Solar energy systems have many economic and environmental benefits that accrue over time, but they require a high initial capital investment to purchase and install. The 2010 Solar Act assists with overcoming the upfront financial barriers to solar energy systems for homeowners, businesses, educational agencies, and other potential solar system owners, both lowering the total cost of the initial investment and effectively reducing their environmental impact and carbon footprint. This analytical team's previous report, Ten Million Solar Roofs and Ten Million Gallons of Solar Water Heating Act of 2010: Final Report of the Scientific Analysis of S. 2993, examined the scientific problems that the legislation seeks to address, as well as the environmental impacts it aims to achieve. Building upon that foundation, this report will explore program design options for the 2010 Solar Act and lay out recommendations for an effective structure and implementation process.

Environmental Problems of Electricity Generation

As one of the most pressing issues of the 21st century, global climate change refers to long-term changes in global climatic patterns that are directly attributed to human activities. Scientists around the world concur that the emissions of various gases, which are primarily byproducts of human processes, are causing the global climate and atmosphere to undergo significant alterations. These emissions, known as greenhouse gases (GHGs), absorb solar radiation, trapping it in Earth's lower atmosphere, causing increases in global temperatures. They include carbon dioxide, sulfur dioxide, and nitrous oxide, all of which are major byproducts of fossil fuel combustion. Carbon dioxide is the most significant GHG, and from 1750 to 2005, atmospheric concentrations of carbon dioxide increased by 36%, with more than half of this rise occurring in the past three decades (EPA, 2010). Within this time period, the Earth has experienced increased average global temperature and sea level, as well as reductions in Northern Hemisphere snow cover and ice caps, as seen in Figure 1.



Fossil fuels are a major source of GHG emissions, and combustion of fossil fuels generated 69% of electricity in the United States in 2009 (EIA, 2009). The United States is one of the biggest producers of GHG emissions globally, and in 2008, electricity generation from fossil fuels in the US accounted for 42%, or 2,363.5 million metric tons, of the total carbon dioxide emitted by

Figure 1. Global Effects of GHG Emissions

Changes in global average temperature (degrees Celsius), sea level (mm), and snow cover (million sq km) from average levels measured over the period 1961-1990.

Source: IPCC 4th Assessment Report, 2007.

the US (EPA, 2010). The problems created by fossil fuel combustion are exacerbated by the fact that only 1/3 of the energy available in fossil fuels ends up as usable electricity for the final consumer, due to inefficiencies through the production, combustion and transmission processes (DOE, 2010). In addition, fossil fuel combustion releases sulfur dioxide and nitrous oxide into the atmosphere, which lead to the creation of acid rain and photochemical smog. Conversely, solar power systems create electricity by taking advantage of the Sun's limitless resource, solar radiation. These technologies generate electricity without releasing harmful GHG emissions, thus minimizing negative environmental impacts and minimizing the effects of global climate change.

Centralized versus Distributed Power Generation

The United States electric grid is composed of a complex network of both publicly and privately owned and operated power plants and transmission lines that work under a centralized power generation structure. Large power facilities produce electricity that is then transmitted to end-users via the national grid system. Figure 2 shows the high voltage transmission lines that carry electricity long distances via antiquated and often over-loaded power lines. On average, coal-fired power plants, which account for 45% of national electricity generation, convert roughly 40% of the potential energy into electricity (EPA, 2010; DOE, 2010). This electricity is then distributed through the grid to end-users, a process during which an estimated 10% of the electricity generated is lost in transmission due to the resistance of wires and equipment that the electricity passes through. Combining these inefficiencies, the current method of centralized electricity generation and transmission for coal-fired power plants converts only 30% of the potential energy into useable electricity, leading to substantial waste of fuel resources, high levels of extraneous GHG emissions and higher production costs for generators.

Figure 2. Map of high voltage transmission lines that exist to distribute power generated at centralized power facilities.

Source: Platts POWERmap

In comparison, solar photovoltaic and solar thermal systems, which have much smaller capacities than large-scale generating facilities, deliver electricity to consumers through a process known as distributed generation, or on-site generation (see the right side of Figure 2). The electricity is produced close to the location of the end-user; for example, a solar panel installation that supplies electricity to a residential house or office building from the rooftop. This mitigates the inefficiency of transmission by eliminating the need to transport the electricity over far distances. Additionally, although solar energy systems are less efficient (average efficiency of 7%-17%) than traditional fossil fuel generators, the fuel source (the Sun) is renewable, free and does have negative environmental effects (EERE, 2008). Ideally, to handle the intermittent nature of solar electricity, homeowners can rely on small power stations located nearby to supply electricity when the output from the solar energy system is too low to meet the demand.

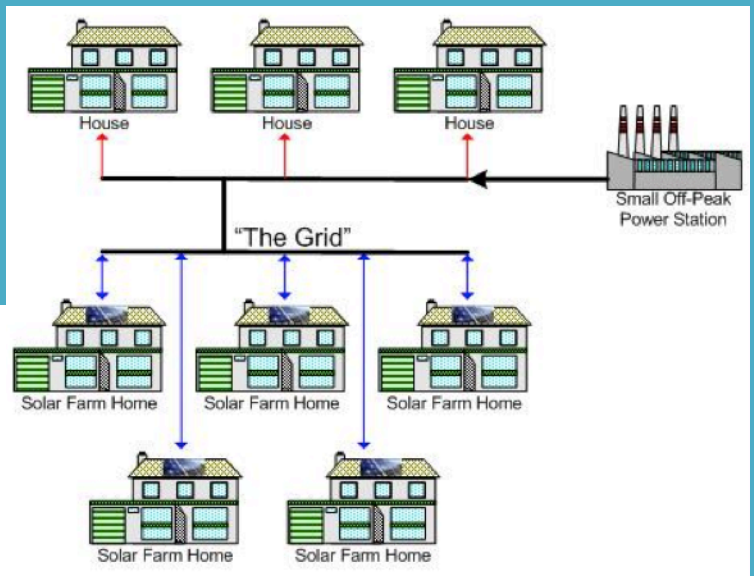
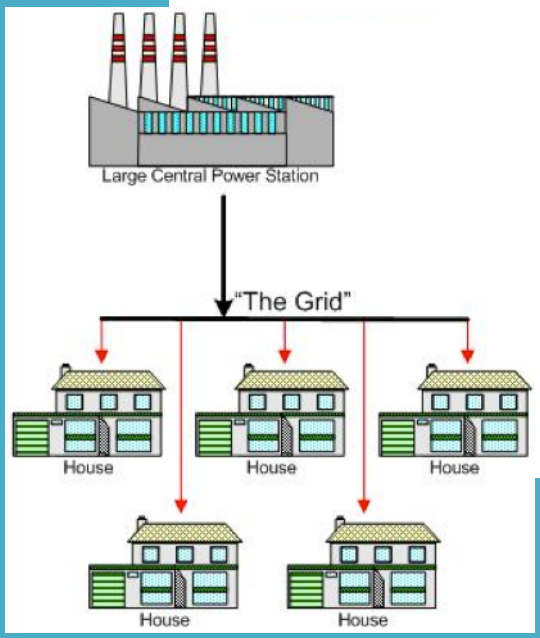


Figure 3. Centralized power generation (bottom left) versus distributed power generation (top right).

In a centralized power generation system, a large central power station produces electricity that is delivered to end-users via the national grid system. In a distributed power generation system, electricity is generated at the point of use. This is represented in the diagram by rooftop solar panels located at homes. Excess electricity from these systems can be fed back into the grid, while the consumers can draw electricity from the grid when solar electricity output drops. Ideally, the grid electricity would be supplied from a small power station located nearby to reduce the distance of transmission.



Promoting Solar Electricity

Taking into account the problems and inherent inefficiencies of traditional electricity production in the United States, the 2010 Solar Act is a legislative solution that facilitates the purchase and installation of solar energy systems, thereby increasing the national production and capacity of solar electricity. A major barrier to the deployment of solar energy technologies is high initial installation costs. Unlike electricity from centralized power generating facilities, for which consumers pay a retail rate based on consumption (average retail rate of 9.91 cents/kWh for 2010), solar energy requires that the consumers pay the total capital cost for the system upfront (EIA, 2010). The benefits of the systems accumulate over time since the energy source for the system is free and renewable, but due to the fact that the initial costs are high, the calculated average cost per kWh of the solar electricity over the lifetime of the system is significantly more expensive (please refer to the inset on the following page for more information on the price of solar energy systems). By offering financial incentives to lower the installation costs, the 2010 Solar Act can boost the market for solar energy technologies. This will help to create economies of scale that will eventually lower the cost of solar energy systems, making them an affordable alternative to traditional, grid-supplied fossil fuel electricity.

Increasing the installed capacity of solar energy will also mitigate many of the environmental problems that arise from traditional electricity generation and transmission. Solar energy systems convert solar radiation from the Sun, a free and renewable resource, into useable electricity for the consumer. This means that there are no GHG emissions that result from production of solar electricity. Additionally, the solar photovoltaic and thermal energy systems promoted by the 2010 Solar Act rely on distributed generation, meaning the electricity is produced close to where it will be used. This avoids transmission losses that occur when the electricity must travel long distances through expensive and inefficient transmission lines. Also, no new transmission lines need to be constructed in order to convey this electricity, a factor that is especially important for rural areas and growing communities. Finally, small solar energy systems can easily be installed on rooftops, requiring no additional space, an important consideration in space-limited urban areas. In just one hour, the Earth receives more potential energy from the Sun than the whole world uses during an entire year and solar energy systems serve as a tool to help capture and transform a greater amount of this limitless resource (Solar Power, 2009).

The Cost of Solar Electricity

Unlike traditional fossil fuel electricity for which consumers pay a per kWh rate, solar electricity requires an initial capital investment. This investment goes to cover the cost of the solar panels, as well as any equipment required to distribute the electricity and connect the system to the grid. According to the Open PV Project, a collaborative effort between the government, solar industry and the public to create a comprehensive database on solar photovoltaic installations, the average cost per watt of a solar PV system in the United States is $7.15 (NREL, 2010). In the United States, typical residential solar PV systems range from 2-4 kW, although approximately 10% of the total output is lost in the conversion from alternating current (AC) to direct current (DC) (Avacos, 2009). Based on the cost and size of the system, as well as the average sunlight hours per day, it is possible to calculate the approximate cost of solar electricity for the typical lifetime of a system (20 years). The following page includes calculations to show a range of solar electricity prices in varying cities across the United States (these do not take into account current financial incentives for solar electricity which vary by state). The variance in price is due to the fact that the average sunlight hours per day differs by region; this can be seen in figure 5, a map that shows the average solar photovoltaic resource for the United States. Figure 4 explains the assumptions that were made for the calculations. Phoenix, AZ has one of the highest amounts of sunlight hours per day (6.6 hours/day) resulting in a lower cost of solar electricity, approximately 16.9 ¢/kWh (all data on sunlight hours per day found at www.longtermsolar.com). Seattle, WA falls at the other end of the spectrum with only 3.8 sunlight hours per day, resulting in an average electricity cost of 29.3 ¢/kWh. By lowering the initial investment through financial incentives, the 2010 Solar Act will reduce the average cost of solar electricity across the United States. The act also aims to increase the purchase of systems, creating economies of scale, which will drive down the market price of solar energy systems.

Assumptions	
Average Cost per Watt	$7.15/watt
System Capacity	3 kW
Panel Efficiency (AC to DC conversion loss)	10%
Average System Cost, excluding incentives (3 kW) x ($7.15/watt) x (1000 watt/1 kW)	$21,450
Total Lifetime of System	20 years
Average System Capacity (3 kW) x (0.9)	2.7 kW

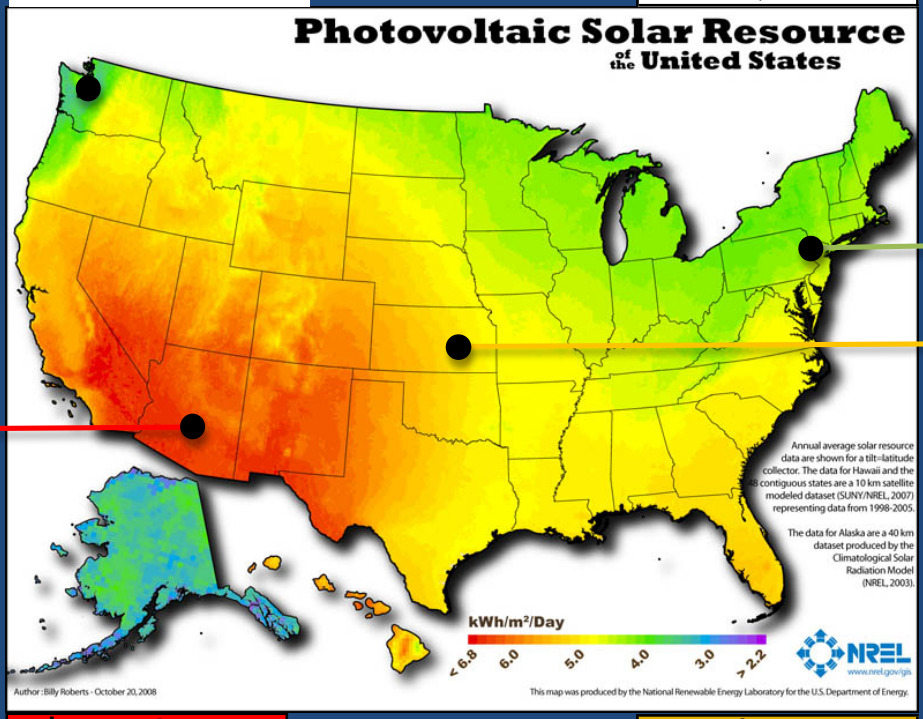
Figure 4. Calculation assumptions. Average cost per watt data from Open PV Project. Panel Efficiency data from EERE website. 20-year project life is industry standard.

Seattle, WA	
2.7 kWh x 3.8 sunlight hours per day	10.26 kWh/day
10.26 kWh/day x 30 days/month	307.8 kWh/month
10.26 kWh/day x 365 days/year	3744.9 kWh/year
3755.9 kWh/year x 20 years	75118 kWh total
$21,450/75118 kWh total output	28.6 ¢/kWh

Figure 5. Photovoltaic solar resources in the United States.

Source: NREL, 2010

Newark , NJ 4.4 sun hours/day
11.88 kWh/day
356.4 kWh/month
4336.2 kWh/year
86720 kWh total
25 ¢/kWh



Phoenix, AZ 6.6 sun hours/day
17.82 kWh/day
534.6 kWh/month
6504.3 kWh/year
130086 kWh total
16.5 ¢/kWh

Wichita, KS 5.2 sun hours/day
14.04 kWh/day
421.2 kWh/month
5124.6 kWh/year
102492 kWh total
20.9 ¢/kWh

Solar Policy Development in the United States

Million Solar Roofs Initiative, 1997

Enacted by President Bill Clinton

→First major solar initiative; served as legislative design template for later programs, including the California Solar Initiative and The Million Solar Roofs Act of 2008

→DOE awarded $16 million in competitive grants to 971 award recipients that installed 377,000 solar systems (Strahs, 2006)

S. 3224, 10 Million Solar Roofs Act of 2008

Introduced July 7, 2008, 110th Congress (referred to Senate Energy and Natural Resources Committee)

→First iteration uses California Solar Initiative as legislative design template (Springer, 2010)

S. 2993, 10 Million Solar Roofs and 10 Million Gallons of Solar Water Heating Act of 2008

Reintroduced on February 4, 2010, 111th Congress (referred to Senate Energy and Natural Resources Committee)

→Mandates federal rebate program

S. 3460, 10 Million Solar Roofs Act of 2010

Reintroduced June 7, 2010, 111th Congress (reported by the Senate Energy and Natural Resources Committee on August 5, 2010—recommended for a vote)

- Passed in Committee on Unanimous party line vote

→Amendments changed bill to a competitive grant program that would allow a variety of funding mechanisms and minimized overhead administrative costs

Current State of Debate

PRIMARY POINTS OF SUPPORT:

- Competitive grant system encourages the leverage of federal funds
- Minimal administration costs
- Open to various financing mechanisms which helps ensure wide distribution of funds

PRIMARY POINTS OF OPPOSITION (Springer, 2010):

- Costs inherent in funding any new legislation

Program Design Elements

Allocation of Funds

As stipulated in the 2010 Solar Act, the Secretary of Energy (the "Secretary") has primary responsibility for program design and implementation. The Secretary will allocate competitive grants to states, local governments and at least 2% of the funds to Indian tribes for the expansion of solar energy systems on properties across the United States.

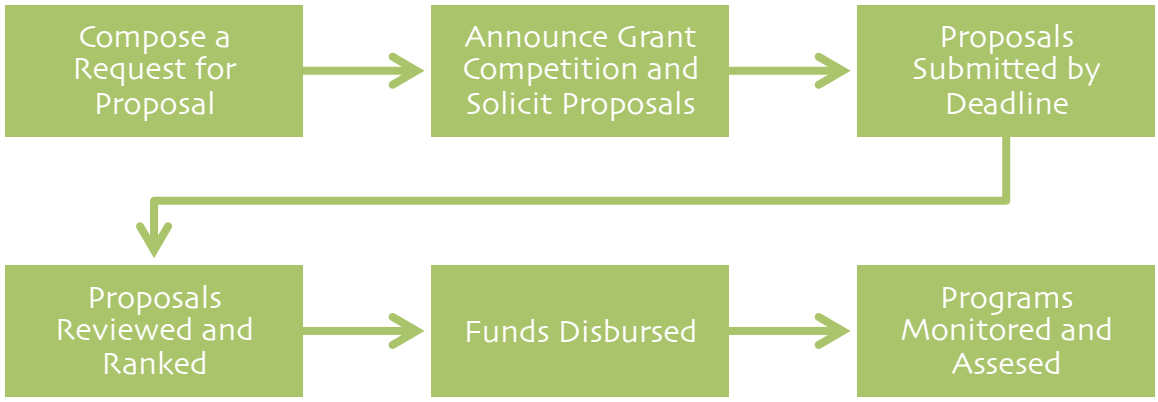
- Maximizes leverage of federal funds
- Ensures distribution of funds to diverse locations and population sizes
- Maximizes solar energy deployment
- Favors programs with net-metering and grid connection capabilities, or

The allocation of grants must be done in a manner that:

Mandated Program Structure: Competitive Grant Process

The Department of Energy (DOE), under the guidance of the Secretary, will develop the rules and parameters for the competitive grant process. The implementing office within the DOE will be responsible for publishing a Request for Proposals (RFP) in order to solicit applications from potential grant recipients. Applicants must meet the requirements stipulated within the RFP. After the solicitation period, the implementing office will review and score all grant proposals. Scoring guidelines will be formulated by the DOE and will be explicitly stated within the RFP. The DOE will then select and notify selected grant recipients and disburse funds.

The implementing office must also establish performance management and monitoring standards. Recipients of federal grant funds will enter into a performance-monitoring contract and will be required to submit quarterly and annual progress reports to the DOE certifying that the expenditures of funds are in accordance with the grant requirements. Reports must detail the program's implementation plan, including the number of eligible participants receiving funds, and to what degree the program is expected to increase the number of participants. The diagram below illustrates the steps within the competitive grant process that must be undertaken by the implementing office at the DOE.



Financial Considerations

There are several caveats to the financial breakdown and funds allocation pertaining to both the grant recipients and the DOE:

Department of Energy

- The DOE cannot use more than 5% of the total funds allocated in this bill for administrative expenses of implementing the act. The entities receiving the grants may use 10%, or $75,000 (whichever value is greater), of the funds to pay for administrative expenses. This minimizes administrative costs ensuring maximum funding goes towards the deployment of solar energy systems.
- The Secretary must coordinate and consult with governors of participating states to ensure that any new incentives from this act are integrated into existing solar initiatives. It is not intended that programs approved through this legislation take the place of any existing programs.

Grant Recipients

- The grant recipients must match at least 20% of the funds provided by the government for this new solar initiative. This ensures that the funds provided through this legislation are leveraged to increase the deployment of solar energy systems.
- The grant recipients must show that a maximum of 50% of the cost to the purchaser of the solar energy system can be covered by grants, rebates and tax credits. This ensures that the bill achieves its underlying purpose which is to lower the upfront cost of the purchase and installation of a solar energy system while still maintaining that system owners are responsible for an equitable share of the cost.
- Any grant recipient that receives funds through this act is no longer eligible for the rebates outlined in Section 206(e) of the Energy Policy Act of 2005.

Solar System Owners

The 2010 Solar Act will incentivize the purchase of solar energy systems for homeowners, businesses, local educational agencies, or any other entities deemed eligible by the Secretary. If the Secretary so decides, this funding could be apportioned to other entities that are not explicitly defined in the bill. Allowing discretion in selecting eligible projects may enable a greater deployment of solar energy systems (Springer, 2010). These entities could include:

- Government office buildings
- Multi-family homes
- Condominium cooperatives
- Multi-unit housing
- Moveable dwellings (trailer homes, RVs, houseboats)

Community solar garden located in Carbondale, Colorado

Solar photovoltaic installation on top of the Denver Museum of Nature & Science

Solar photovoltaic panels used to power a recreation vehicle (RV)

How Solar Energy Systems Work

Photon energy from the Sun strikes the solar photovoltaic panel, which frees some of the electrons present in the panel's material. The freed electrons form a direct current that is fed into a converter where it is changed into usable alternating current. The usable alternating current is then sent from the home's electrical panel into the home to power appliances and lighting. If the photovoltaic panel is producing more power than the home needs, the excess energy is sent out to the electrical grid for general use in the community.

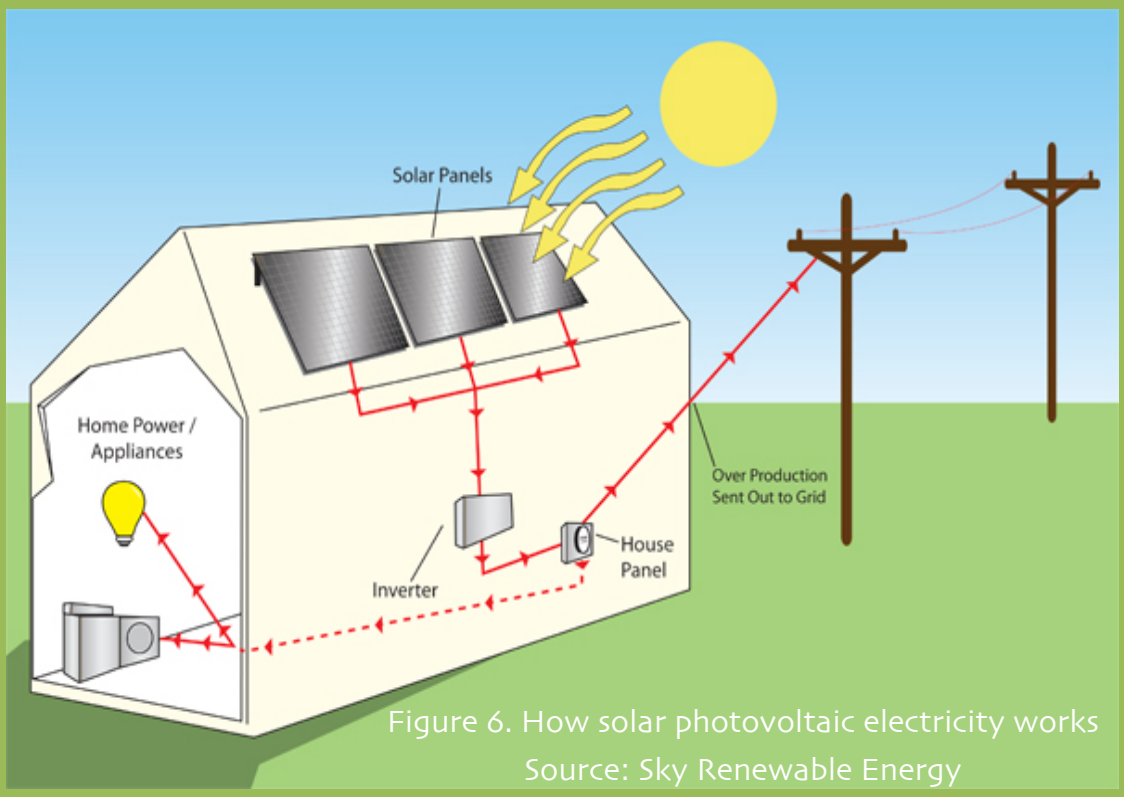


Figure 6. How solar photovoltaic electricity works
Source: Sky Renewable Energy

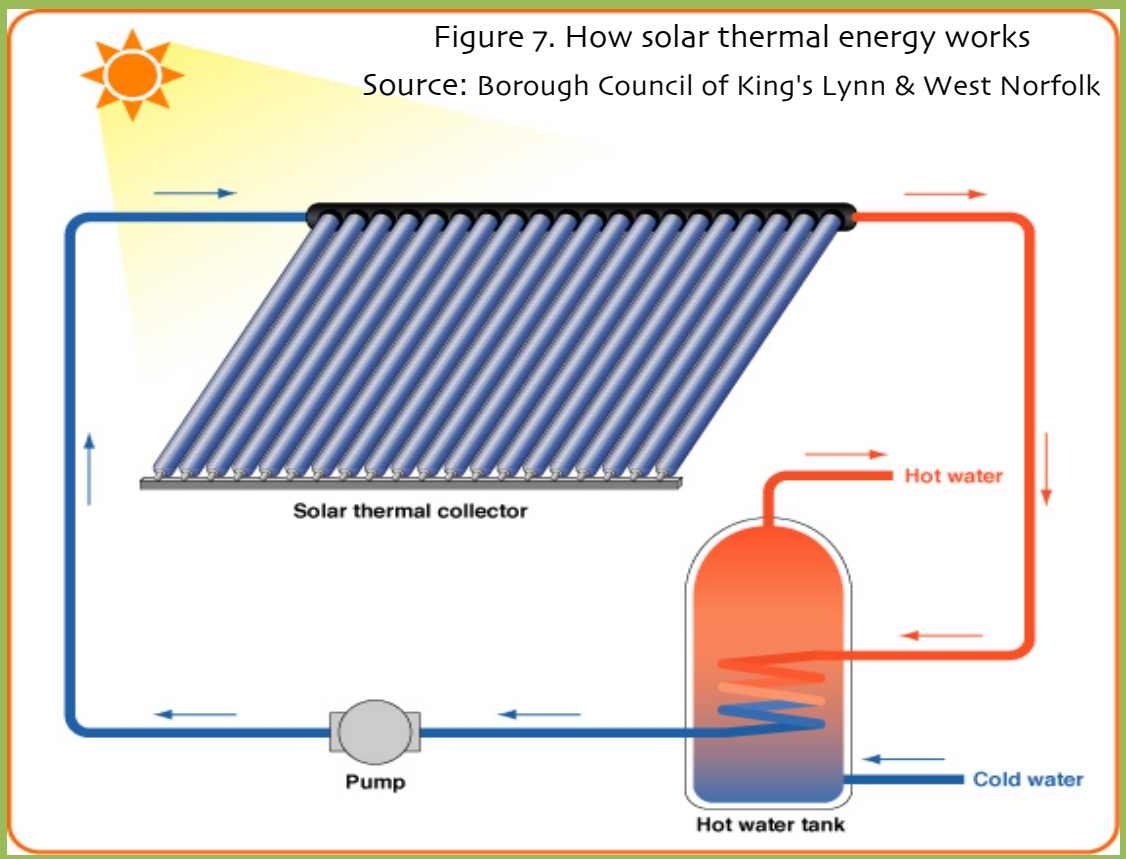


Figure 7. How solar thermal energy works
Source: Borough Council of King's Lynn & West Norfolk

Solar hot water heating systems utilize the Sun's thermal energy to heat water that is stored inside tubes in the water-heating panel. Periodically the heated water is fed down into the home's hot water tank where it is distributed for use in the home. As the hot water leaves the solar panel, fresh cold water is pumped into the panel and the process repeats.

Solar Incentive and Funding Mechanisms

Each year, the Secretary will assess and update the list of authorized uses of funds. The Secretary has the authority to determine, for the grant recipients, which type of program will be employed as well as the type and capacity of solar energy systems for which the funds can be used. Included is a sampling of potential funding mechanisms that are either explicitly stated in the legislation or could be included at the discretion of the Secretary.

Loans

Lending institutions provide funds on the condition that they shall be repaid, with interest and administrative costs

Advantages:	Disadvantages:
Allows consumers to make payments over time; money can be recovered and reinvested	Risk of default; higher administration costs due to program complexity

Rebates

System owners receive a return on part of a payment, typically as a refund of money or a tax credit

Advantages:	Disadvantages:
Lowers the total amount of upfront cost to consumer	High program costs and lacks mechanism to recover funds

Performance-based Programs

System owner paid based on the amount of electricity that is fed back into the grid system

Advantages:	Disadvantages:
Proven successful in other programs; incentive for installation of efficient systems	Requires net-metering capabilities and grid access which vary by state

Solar Leasing

System owner leases solar energy system from a contractor, requiring payments on the lease over a set time period

Advantages:	Disadvantages:
Mitigates issue of upfront costs and maintenance to system owner	Additional costs still associated if participant chooses to purchase the system at the end of the lease term

Solar Gardens

Participants buy into a community-owned solar energy system

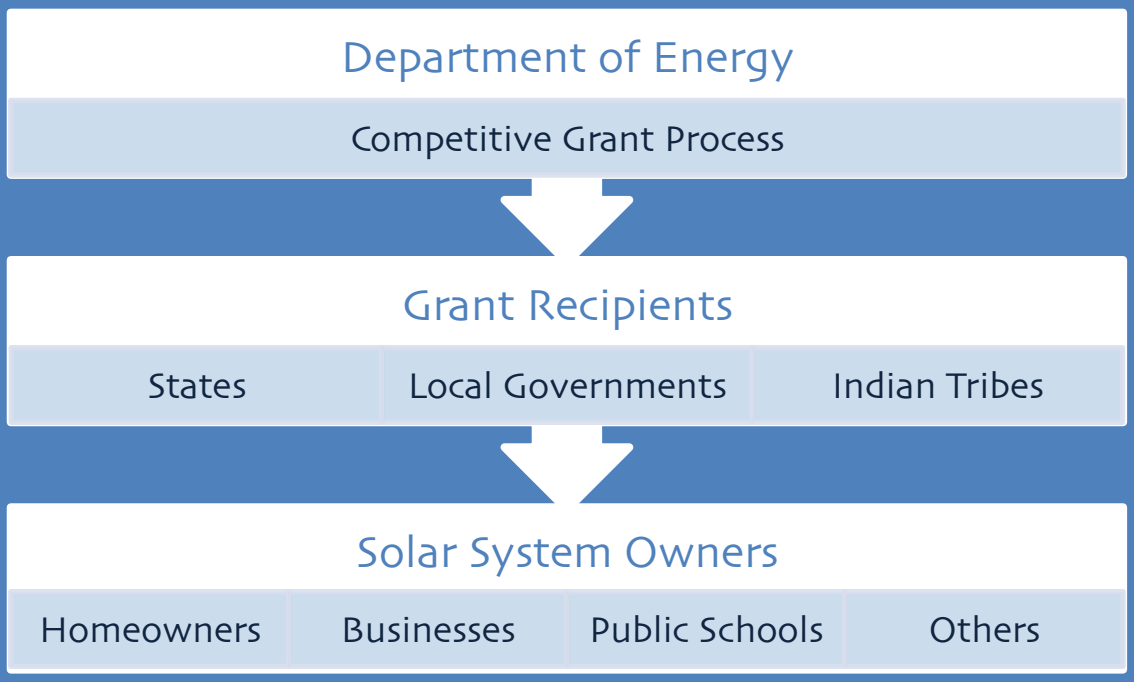
Advantages:	Disadvantages:
Includes participants who previously would not be able to support a system	Use of urban property for solar power production; difficult to ensure adequate management

Design of the Competitive Grant Program

The following components represent the optimal program design that best fulfills the requirements stipulated within the 2010 Solar Act. As with any program, there are tradeoffs that must be considered in choosing the most viable design options. This program design was selected based on its ability to maximize the leverage of funds and the deployment of solar energy systems, while simultaneously promoting equitable distribution of funds across a range of geographical locations and population sizes.

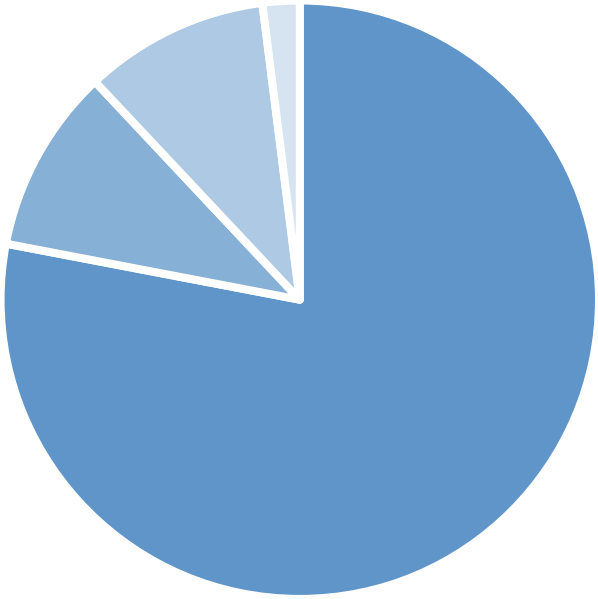
Centralized Competitive Grant Program

The DOE will be responsible for the administration of the competitive grant process. All grant proposals will be sent to the DOE for review, after which the agency will score and rank the proposals, designate grant recipients, distribute funds, and monitor the progress and performance of the programs. A centralized program will minimize administrative costs; the bill allocates no more than 5% of the total funds for federal administrative costs. This will leave more funds available to be dispersed among grant recipients, which will ultimately increase the deployment of solar energy systems.



Population Based Category System

This system creates three categories under which proposals will initially be reviewed: states, local governments and Indian tribes. In each category, the most competitive grant proposal would receive funding. While this system will reduce competition, which could affect the deployment of solar energy systems and the leveraging of funds, it ensures that funds will be disbursed to recipients representing a full range of populations. Small local governments representing rural populations will have an opportunity to competitively apply for funds along side larger local and state governments. This recommendation is more politically amenable than a system that would consider all proposals in a single grouping.



Percentage of funds allocated for:

- = Open Competition (78%)
- = States (10%)
- = Local Governments (10%)
- = Indian Tribes (2%)

Minimum Allocation Model

As shown in the graph to the left, grant applicants representing states and local governments will each receive 10% of the total funding, while Indian tribes will receive 2%. Once these minimum allocation caps have been satisfied, the remaining proposals will be merged into a single grouping, and the residual 78% of funds will be dispersed to the highest ranking proposals. This model ensures the funds will be dispersed among grant recipients that represent a diverse range of population groups and allows for increased competition for a majority of funds being disbursed. Greater competition among the proposals will maximize the deployment of solar energy systems and the leveraging of federal funds.

Point System for Proposal Ranking

In order to solicit proposals from potential grant recipients, the DOE will develop a Request for Proposals and an accompanying point system under which submitted proposals will be scored and ranked. The point system will provide a transparent and objective method by which the DOE can disburse funds to grant recipients. Within the point system, the DOE can develop criteria that ensures the legislative requirements will be met by the winning programs. It is recommended that the following criteria be integrated into the final point-system:

Program Approach	Environmental Impacts	Budget	Past Performance (if applicable)
• Leveraging of funds • Solar Deployment • Net metering or grid connection	• Expected GHG emission reductions • Outcomes, outputs and performance measures	• Clear and reasonable plans for the use of funds requested • Ability to match 50% of funds recieved	• Performance of any current solar programs • Experience of management and staff

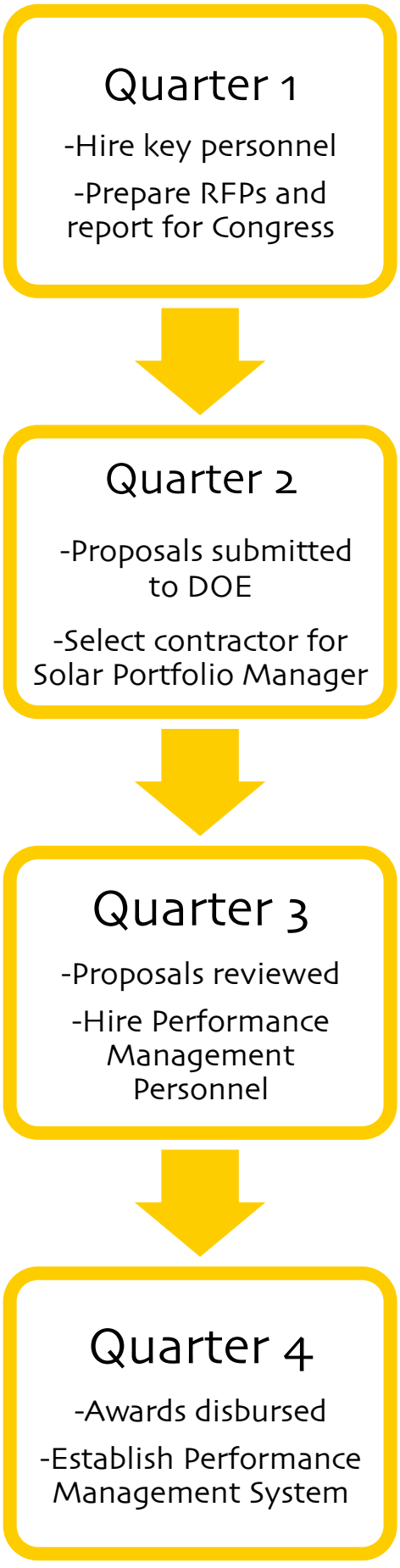
What is a Request for Proposals?

A Request for Proposals, or RFP, is a document used to solicit proposals from potential program participants. An RFP clearly outlines the eligibility requirements, program process and scoring criteria. It is imperative that the RFP disclose all program details to the entities that will be drafting proposals for review. When an RFP is made public, it is accompanied by a press release announcing the start and duration of the solicitation period.

Summary of Program Design Components

1. Competitive grant process that is administered by the DOE, which is open to a variety of funding mechanisms
2. Proposals grouped based on the population size represented by the potential grant recipient
3. A minimum allocation cap will be set for each group: 10% to local governments, 10% to states, and 2% to Indian Tribes
4. Proposal scoring will take into account the proposed approach, expected environmental impacts, budget plan and past performance

Year One: Implementation Plan



By establishing a centralized competitive grant process, the 2010 Solar Act will require extensive administrative work from the DOE during the initial implementation year. This work will lay the foundation for subsequent years of the program. Performance during this year is critical because future funding will be allocated based on past performance. The primary objectives of the first year include hiring key personnel, establishing a performance management system and completing the proposal solicitation process so that funds can be distributed before the close of the fourth quarter of year one.

The first objective, hiring key personnel, will begin prior to the start of Quarter 1. The DOE will post job announcements for a full-time Program Manager and part-time Program Assistant through the Office of Personnel Management. These positions will be filled at the start of Quarter 1. The DOE will also hire five Grant Managers, positions that will be filled by the middle of Quarter 2. Detailed job descriptions can be found in appendix A.

The second objective will be to select a contractor for the Solar Portfolio Manager, a key component of the performance management system (for more information, see page 27). The Program Manager will publish an RFP, review proposals and hire a contractor who will design the Solar Portfolio Manager. Proposals will be due at the beginning of the third quarter, and a contractor will be selected by the middle of the third quarter.

The final objective will be the completion of the proposal solicitation process for the competitive grant program. The deadline for proposal submission from potential grant recipients will fall at the end of the second quarter. During the third quarter, Grant Managers and Technical Experts from the National Renewable Energy Laboratory (NREL) will review and rank the proposals and funds will be disbursed to grant recipients during the fourth quarter.

For a more detailed calendar of events, please see appendix B.

Organizational and Staffing Plan

The organizational and staffing plan for implementing the 2010 Solar Act will utilize existing offices and personnel within the DOE, the specified implementing body. There will be three main levels of hierarchy in the DOE: the Office of the Secretary, Office of the Under Secretary and the Office of Energy Efficiency and Renewable Energy (DOE Organization, 2010).

Within the DOE, the Office of Energy Efficiency and Renewable Energy (EERE) currently exists with the expertise and capabilities of implementing the program specified in the 2010 Solar Act. Specifically, the purpose of the EERE is to provide financial assistance for research, development and market transformation of clean energy technologies (EERE Homepage, 2010). EERE personnel are equipped with expertise in solar energy systems and have experience in implementing competitive grant programs (EERE Financial Opportunities, 2010).

The Solar Energy Technologies Program Office (Solar Program Office) within the Office of Technology Development at the EERE will manage the program objectives. The Solar Program Office will have the primary responsibility for implementation and will coordinate the secondary responsibilities of the Golden Field Office, NREL and the Office of Field Performance Management.

Office of the Secretary

- Required to submit a report to Congress containing additional recommendations determined to be necessary to achieve the goals of the program no later than 270 days after the enactment of the 2010 Solar Act

Office of the Under Secretary

- Submit progress reports to the Office of the Secretary with performance data supplied by the EERE

Office of Energy Efficiency and Renewable Energy

- Responsibility for overseeing implementation—will assign program components to corresponding offices and report on progress

Solar Energy Technologies Program Office

- Coordinate between all offices at EERE
- Core Staff will be assigned to implement and coordinate the program

Golden Field Office

- EERE's primary field implementation office

National Renewable Energy Laboratory

- Provide technical expertise for EERE Solar Program

Field Performance Management

- Performance management and monitoring assistance

Organizational Chart Sources: DOE Organization, 2010; EERE Programs and Offices, 2010; EERE Solar Technologies Homepage, 2010

While existing EERE personnel have the skills and experience necessary to implement the program, the Solar Program Office will require additional personnel that will make up the core staff. The core staff will manage the implementation and coordination of the program through the Solar Program Office, with the support of personnel from the secondary implementation offices. The core staff will be comprised of a full-time Program Manager, five full-time Grant Managers and a part-time Assistant Program Manager. While it is estimated that five Grant Managers will suffice for the first year of implementation, the Program Manager may hire more in subsequent years as deemed necessary. The core staff will be located in the Solar Energy Technologies Program offices in Washington D.C. The EERE will post a job announcement for each position through the Office of Personnel Management and may hire external personnel or fill the positions through internal transfers. Included In appendix A are detailed job descriptions for each position, and a detailed organizational chart including offices and positions can be found in appendix C.

A majority of staffing requirements at the secondary implementation offices will not require addition personnel. Currently, existing personnel at the Golden Field Office, NREL and Office of Field Performance Management divide hours between multiple DOE programs. Therefore, required additional staff hours for implementing the 2010 Solar Act will be allocated between the existing staff within each secondary office. Specifically, the program will require part-time work from fifteen technical experts at the NREL and ten Contracting Officers from the Golden Field Office. The program will require one full-time IT specialist to manage the performance management systems at the Office of Field Performance Management; this position, though, will not be considered full-time until the middle of

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Program Manager	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Assistant Program Manager	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
Grant Managers (5)					20%	100%	100%	100%	100%	100%	100%	100%
Technical Experts (15)							25%	25%				
Contracting Officers (10)										50%	50%	50%
IT Specialist			10%		20%			100%	100%	100%	100%	100%

Table 1: Percentage of Time Personnel will devote to Program in Year 1. Grant Managers and Technical Experts are expected to spend a total of 2,700 hours and 1,350 hours reviewing applications, respectively.

Year One: Tasks for Implementation

Competitive Solicitations

Solar Program Office: core staff will develop RFP and post on all applicable DOE and government venues.	NREL: offer technical expertise in RFP development.

Proposal Review

Solar Program Office: two Grant Managers review each eligible proposal and notify applicants of approval status.	NREL: a Technical Expert reviews each proposal.

Financial Awards

Solar Program Office: submit awarded proposals and award amount to Golden Field Office.	Golden Field Office: Contracting Officers will draft award contracts for grant recipients and disburse funds.

Grant Management

Golden Field Office: manage awards through Project Management Center, a web-based portal where recipients will submit required documents. Review reports and ensure contract compliance.

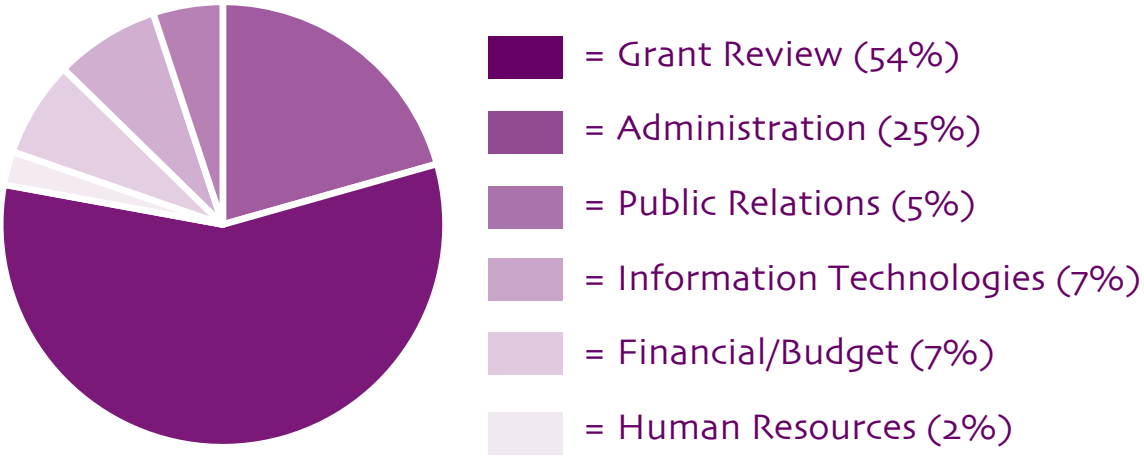
Performance Management System

Performance managment data will be collected by Golden Field Office and compiled by Office of Field Performance Management. The Program Manager will use performance data to report on the program to the Office of the Under Secretary.

Budget

The 2010 Solar Act authorizes a budget of $250 million for 2012, the first year of the program, of which no more than 5% can be used towards administrative expenses. Due to the nature of the program, however, it is expected that these expenses in the first year will be well below this limit. Specifically, the administrative expenses are estimated to require only 0.28% ($693,760.59) of the authorized money, of which approximately 90% ($626,760.59) will be used to secure the necessary personnel, while the remaining 10% ($67,000.00) will be used for supplies, travel expenses and office expenses. This leaves 99.72% of the program budget to be disbursed to grant recipients to fund solar energy programs across the United States. Low administrative costs ensure the maximum amount of funds goes to grant recipients. Grant recipients will be held accountable for efficiently managing awarded funds and reporting performance to the DOE. For a more detailed description of the program budget and assumptions, please refer to appendix D.

First Year Administrative Costs by Function



Future Budgetary Considerations

In the second year of implementation, the structure for the program will already be established but the number of applications will increase and more hours will need to be dedicated to reviewing grants. Additionally, other-than-personnel administrative costs will increase. It is expected that administrative costs will remain below the 5% cap at approximately 0.58%, assuming the program budget remains at $250 million. For fiscal years 2013-2021, the language is less clear concerning the total program budget; the bill authorizes "such sums as are necessary." Based on the ability for the program to meet legislative requirements, Congress will determine the total budget.

Performance Management and Monitoring

A key objective for the first year implementation of the 2010 Solar Act is the development of an effective and accountable performance management and monitoring system to track the progress of the program in meeting the legislative goals. The information compiled from the program's performance management system will be used to monitor the success of the program and the larger effects on the solar energy market. Reports will be relevant to multiple entities both within and outside of the DOE.

The requirements for performance monitoring data collection will be included in grant contracts with award recipients. The following parties will be responsible for various aspects of performance management and monitoring:

Grant Recipients

States, local governments or Indian tribes who receive direct funding through the competitive grant process will be responsible for program-wide data collection from solar system owners for reporting to the EERE.

EERE

The Office of Energy Efficiency and Renewable Energy will collect data from grant recipients on a quarterly basis. Quarterly and annual data reports will be drafted for the assessment of the program's success.

Solar System Owners

Homeowners, businesses, schools or other eligible entities funded by the solar energy programs established by the grant recipients will be responsible for solar system data collection for reporting to the grant recipient.

The EERE offices responsible for implementation of the performance management system will be the *Project Management* Center of the Golden Field Office and the Office of Field Performance Management (EERE Office of Field Operations, 2010). The Golden Field Office will collect performance data from grant recipients who will be required to upload performance data on a quarterly basis for ensuring compliance with grant contracts (EERE Golden Field Office, 2010). The *Project Management Center* will coordinate the Solar Web Dashboard, which is the online location where grant recipients will upload required quarterly performance data reports. The Office of Field Performance Management will compile data reports summarizing performance data statistics, which will be submitted to the Program Manager at the Solar Program Office.

The following Key Performance Indicators (KPIs) will be required to assess the program's progress towards meeting the primary legislative goals of the 2010 Solar Act. These KPIs will be divided into two categories, based on the timeframe of collection.

Environment and System Performance Indicators

Data Location: Solar Web Dashboard (SWD) and Solar Portfolio Manager (SPM)

Quarterly Solar Energy System Installations
- Tracks the total number of installed systems
- Data Location: SWD

Average Installed Capacity
- Tracks average installed capacity by solar system owner within selected criteria (recipient type, geographic location)
- Data Location: SWD and SPM

Total Installed Capacity
- Tracks the total capacity installed (MW for PV, gallons for solar thermal)
- Data Location: SWD and SPM

CO_2 Emissions Offsets
- Tracks CO_2 emissions reduced based on the comparison to conventional generation in the region
- Data Location: SWD, Energy Information Administration

Total Electricity Feedback to Grid
- Tracks electricity users feed back to grid
- Data Location: SPM

Demographic Indicators

Data Location: Solar Web Dashboard

Recipient Category
- Tracks the recipients of funds by solar system owners category (homeowners, businesses, etc.)

Geographic Diversity
- Tracks the geographic distribution of solar system owners

Population Diversity
- Tracks the size of the population represented by the Grant Recipients

Total Electricity Produced by Installed Systems
- Tracks the total energy generated by the system per month
- Data Location: SPM

Leverage of Funds
- Track how much the grant recipient contributes to the purchase and installation of a solar energy system compared to the non-program investment in that solar energy system
- Data Location: SWD

Data Collection

All grant recipients of federal funds through the solar program will require solar system owners to integrate performance data measurement equipment into all solar energy systems. Solar system owners will have to agree to report to grant recipients on environmental, electrical and demographic indicators. Grant recipients will be responsible for the compilation and submission of reports to the Solar Program Office.

Data collection will be facilitated by two online interfaces: the Solar Portfolio Manager and the Solar Web Dashboard. These programs will be used by the solar system owners and the

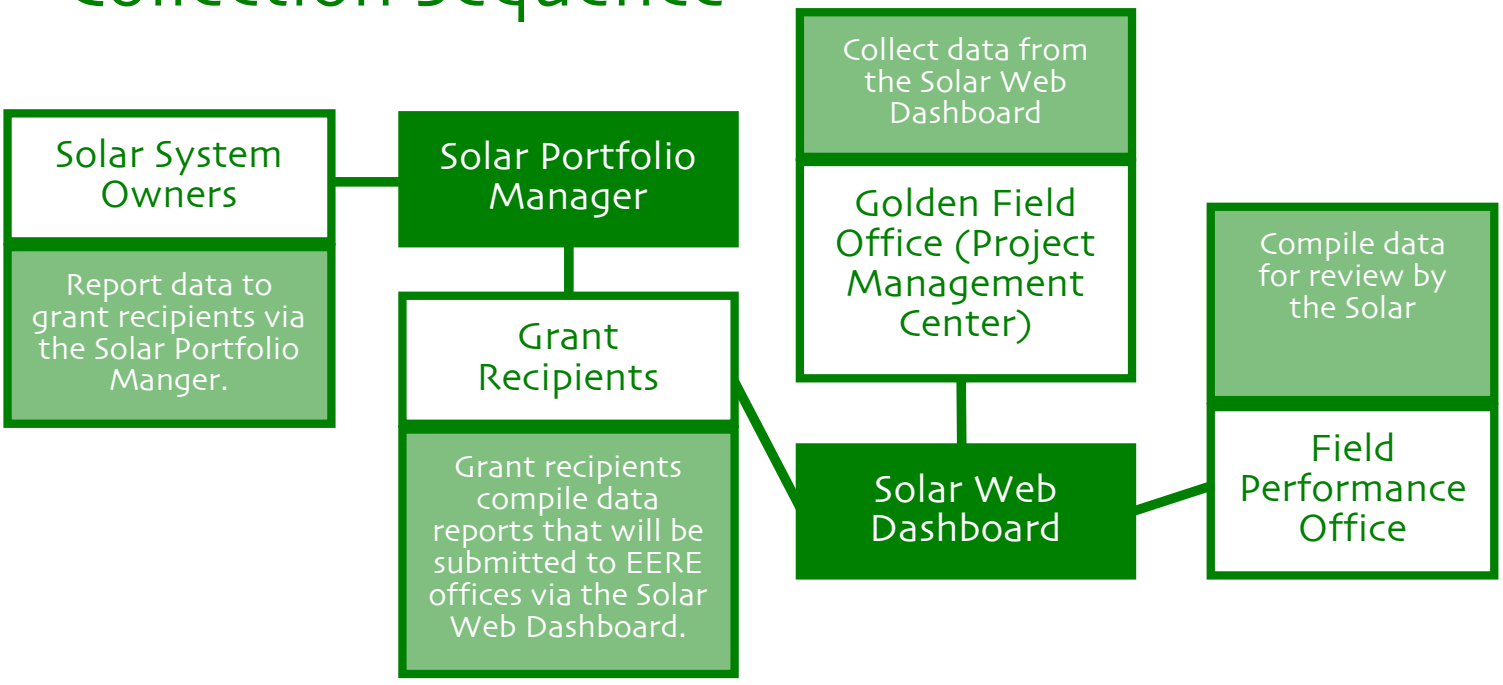
What is the Solar Web Dashboard?

An online program that will interface data collection between the grant recipients and the Project Management Center at the Golden Field Office. The program will track reports compiled by the grant recipients based on the performance data from the solar system owners.

What is the Solar Portfolio Manager?

An online program that will interface data collection from the solar system owners to the correlating grant recipients. The system will incorporate measurements from devices tracking energy generation and energy fed back into the grid. The system also provides benchmarking measures for users to track their energy consumption rates.

Collection Sequence



The Project Management Center in the Golden Field Office will maintain data stored on the Solar Web Dashboard. The Office of Field Performance Management will use the data to generate reports measuring the Key Performance Indicators required by the Solar Program Office. Four primary reports will be generated: quarterly grant reports, annual grant reports, annual program summary report and on-demand reports (EERE Office of Field Operations, 2010).

Key Performance Reports

Annual Grant Report:

Each grant recipient will generate an annual report one month after the end of the year summarizing key accomplishments of the program.

Quarterly Grant Reports:

Grant recipients will generate quarterly reports one month after then end of the quarter and submit them to the Program Manager, as well as interested grant recipients.

Annual Program Summary Report:

The Program Manager will generate an annual report one month after the end of the year and publish it online, as well as submit it to the Secretary of Energy.

On-Demand Reports:

The Solar Web Dashboard will have an on-demand reporting feature that gives it the ability to generate reports for internal (DOE) and external (grant recipients) users. These reports can include comparisons of performance data between states, geographic location and types of systems installed.

The information compiled from the performance management system will be used to assess how well the program has performed in terms of the goals stated within the legislation, as well as its larger effects on the solar energy market. Therefore, performance management data and reports will be relevant to multiple entities within and outside of the DOE:

- DOE, Office of the Under Secretary and Secretary
- EERE, Solar Program Office
- Congress and sponsors of the act
- Grant recipients
- General public
- Non-governmental environmental groups

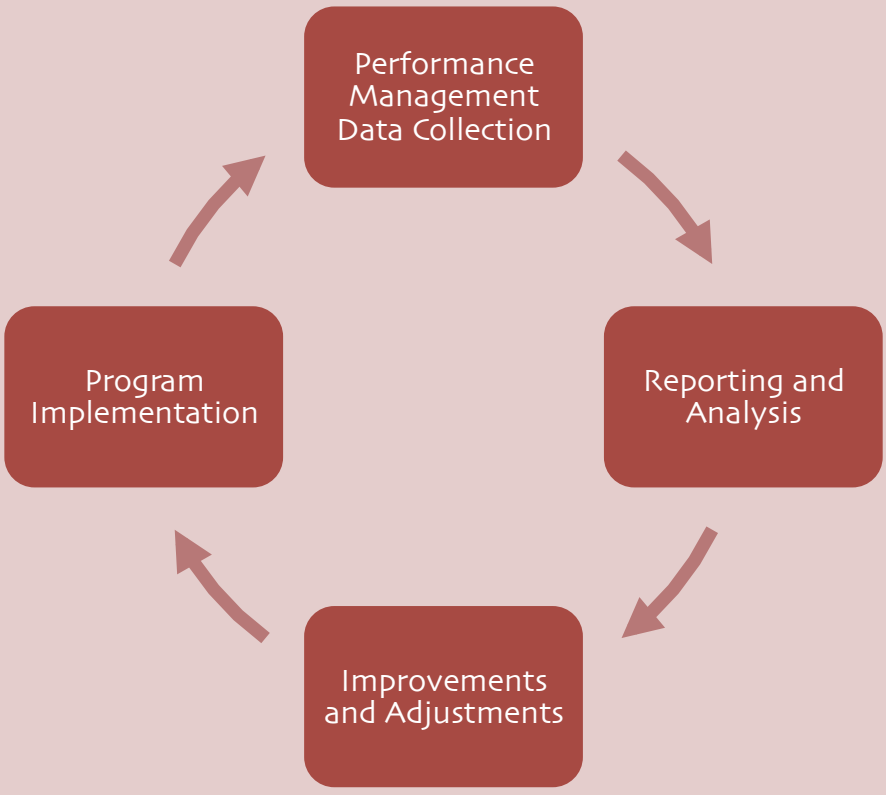
Beyond Year One

The first year of implementation for the 2010 Solar Act will serve as a preparatory phase whereby the DOE will establish the program parameters and the administrative structure. The processes undertaken throughout the year are integral, as they will lay the foundation for subsequent years of the program. Once funds have been disbursed during Quarter 4, grant recipients will then work with potential solar system owners in year two (and beyond) to deploy solar energy systems. By the end of year two, it is expected that all grant recipients will be actively providing incentives for the installation of solar energy systems across a diverse representation of communities and geographic locations.

The competitive grant program will proceed on an annual cycle. The Program Manager, along with the core staff, will use the performance management and monitoring data and reports to continually assess the program, making improvements and adjustments in subsequent years. Each year, DOE may modify the RFP and both grant recipients and any new applicants may reapply for funding. Congress will determine the funding allocation for the program on an annual basis, depending on proven ability to meet the legislative requirements. If the program proves to be a success, Congress may allocate more than the $250 million as stipulated in the 2010 Solar Act.

Feedback Cycle

The program is designed in a manner that integrates performance management data from previous years into the program design of following year. This allows for continual improvement in order to ensure that the legislative goals of the 2010 Solar Act are met. This is important to demonstrate performance to enhance the program's chance of sustained or increased funding.



Conclusion

The current structure of electricity generation and transmission in the United States is highly centralized and relies on fossil fuels that release GHG emissions into the atmosphere through combustion. As a result, fossil fuels are one of the primary contributors to the pressing issue of global climate change. GHG emissions also lead to the creation of acid rain and photochemical smog, both of which produce harmful human and environmental impacts. Exacerbating these problems is the transmission loss of generated electricity over the nation's sizable network of publicly and privately owned transmission lines.

The 2010 Solar Act aims to both reduce the country's reliance on centralized energy production and decrease its dependence on fossil fuels by facilitating the installation of solar energy systems on at least 10 million properties by 2021. These decentralized solar energy systems would generate electricity without releasing harmful greenhouse gas emissions and avoiding substantial transmission losses. Through solar leasing, loans, rebates, and other innovative financial incentives, this bill seeks to overcome the initial high capital cost of solar energy systems for prospective owners. This report has analyzed the components of the legislation and proposed an effective and efficient implementation strategy that addresses important budgetary, staffing, and performance management considerations. A successful first year implementation is imperative in order to receive maximum benefit from the funds that will be allocated to this bill upon its passage in Congress.

The 2010 Solar Act seeks to establish economies of scale in the solar industry in order to increase the renewable energy share of the United States energy portfolio. While this act alone cannot advance solar energy to the point of rivaling traditional fossil fuel generation, it does represent a step in the right direction for developing cleaner, more sustainable energy production. Passing this bill and introducing more solar energy systems into society may spark a brighter future for the role of solar energy in the United States.

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Appendix

Appendix A Job Descriptions

Appendix B Master Calendar

Appendix C Organizational Chart

Appendix D First Year Program Budget

Appendix E Glossary of Terms

Appendix A: Job Descriptions

Program Manager

Pay Grade: GS-15

Location City: Washington, D.C.

Annual Salary: $123,578 – $155,500

Position Description: The Program Manager serves as the primary authority responsible for developing and managing a government solar program that facilitates the installation of solar energy systems by providing financial assistance through competitive grants.

Job Functions:

- Develop a program plan with measurable objectives and milestones
- Serve as primary drafter of the Request for Proposals document
- Encourage and maintain high standards for projects to help ensure effective and successful completion
- Strategize and plan program tasks and budget needs
- Oversee the drafting of the initial grant cycle's RFP and all subsequent changes to the RFP for future grant cycles
- Oversee performance management system and Golden Office's contracting for the creation of *Solar Web Dashboard* and *Solar Star Portfolio Manager* software
- Responsible for reporting program's status to the DOE Office of the Under Secretary and drafting required program progress

Assistant Program Manager

Pay Grade: GS-12

Location City: Washington, D.C.

Annual Salary: $74,872 - $97,333

Position Description: The Assistant Program Manager works closely with the Program Manager in developing and managing a government solar program by coordinating between relevant program offices and by assisting core staff to effectively complete tasks.

Job Functions:

- Help develop and monitor an effective program implementation plan geared to accomplishing targeted goals in the specified timeframe
- Coordinate grant intake and processing
- Supervise/coordinate program staff and their activities to ensure the efficient and effective completion of program milestones
- Liaise between core staff and the Golden Field Office, the National Renewable Energy Laboratory, and the Field Performance Management Office

Grant Managers

Pay Grade: GS-11

Location City: Washington, D.C.

Annual Salary: $62,467 - $81,204

Position Description: Grant Managers oversee the grants review and selection processes, ensuring projects meet program objectives and adhere to their contractual obligations. Grant Managers will work directly with grant recipients once funds are disbursed. Grant Managers report to the Program Manager.

Job Functions:

- Responsible for reviewing proposals and awarding funding (with support from National Renewable Energy Laboratory personnel)
- Responsible for grant management and tracking grant compliance (with support from grant contractors in Golden Field Office)
- Responsible for analyzing performance management data received from Field Performance Management Office and determining recommendations for program changes

Contracting Officer

Pay Grade: GS-13

Location City: Golden, Colorado

Annual Salary: $87,815 - $114,158

Position Description: Contracting Officers provide relevant technical expertise for the development, implementation, management, and support of selected program projects.

Job Functions:

- Provide information and assist staff and administrators in budget preparation and implementation
- Perform complex budgeting and accounting functions to ensure appropriate use to federal funds
- Conduct financial, statistical, and analytical studies
- Prepare and assist in the preparation of financial reports

IT Specialist

Pay Grade: GS-9

Location City: Golden, Colorado

Annual Salary: $50,923 - $66,195

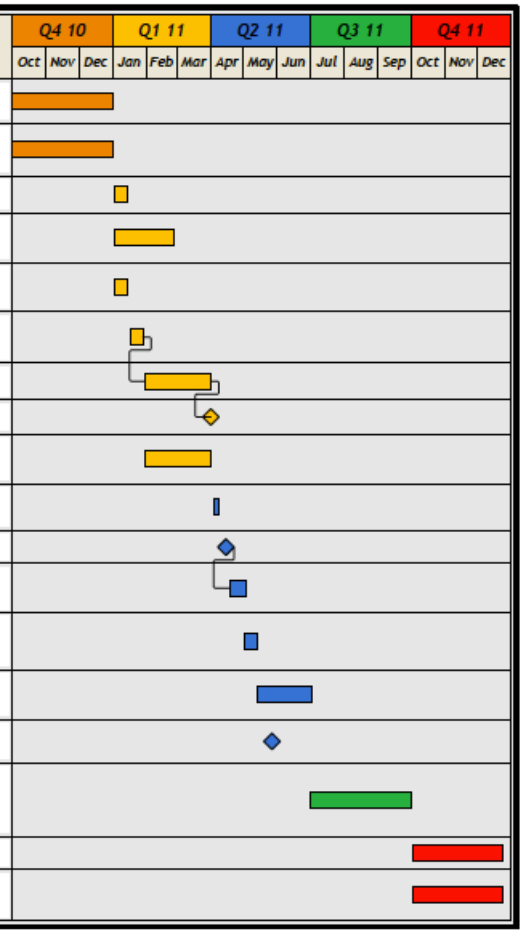
Position Description: IT Specialist will manage the performance management and monitoring programs, including the Solar Portfolio Manager and Solar Web Dashboard; this position will be based in the Office of Field Operations

Job Functions:

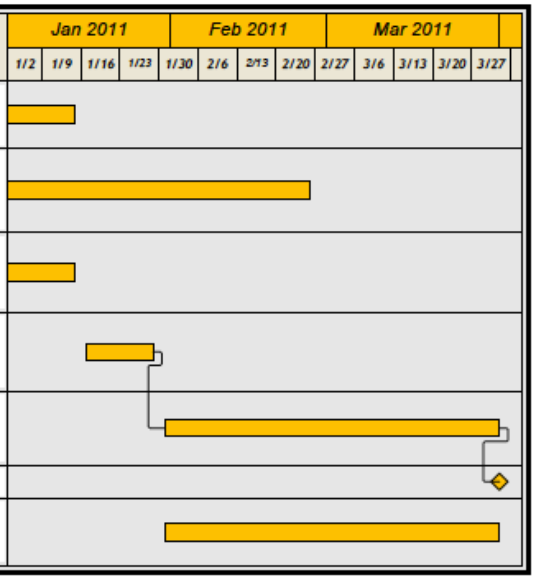
- Manage the implementation of the Solar Portfolio Manager and Solar Web Dashboard
- Interface with Grant Recipients to answer questions and solve system issues
- Ensure systems are operating effectively
- Assist Program Manager in data reporting, as necessary

Appendix B: Master Calendar

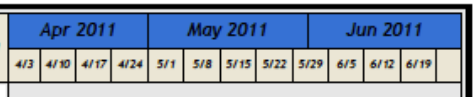
ID	Task Name	Start	Finish	Duration
1	Fill Project Manager position	10/1/2010	12/31/2010	13.2w
2	Post job announcement for Assistant Program Manager	10/1/2010	12/31/2010	13.2w
3	Program Manager training	1/3/2011	1/14/2011	2w
4	Program Manager interviews and selects Assistant Program Manager	1/3/2011	2/25/2011	8w
5	Draft and post request for proposal (RFP) for Solar Portfolio Manager	1/3/2011	1/14/2011	2w
6	Complete preliminary research for report to Congress and RFP	1/17/2011	1/28/2011	2w
7	Complete RFP and preliminary report	1/31/2011	3/31/2011	8.8w
8	Post Request for Proposal (RFP)	4/1/2011	4/1/2011	0w
9	Post job announcement and hire five Grant Managers	1/31/2011	3/31/2011	8.8w
10	Coordinate Technical Experts at the National Renewable Energy Laboratory	4/4/2011	4/8/2011	1w
11	Solar Portfolio Manager proposals due	4/15/2011	4/15/2011	0w
12	Review Solar Portfolio Manager proposals and select contractor	4/18/2011	5/2/2011	2.2w
13	Grant Managers begin preliminary training for grant proposal review process	5/2/2011	5/13/2011	2w
14	Grant Managers and Technical Experts begin grant review process	5/13/2011	7/1/2011	7.2w
15	Grant application deadline	5/27/2011	5/27/2011	0w
16	Grant Managers and Technical Experts complete grant review process and select grant recipients	7/1/2011	9/30/2011	13.2w
17	Award distribution	10/3/2011	12/23/2011	12w
18	End of year evaluation and agenda setting for 2012	10/3/2011	12/23/2011	12w



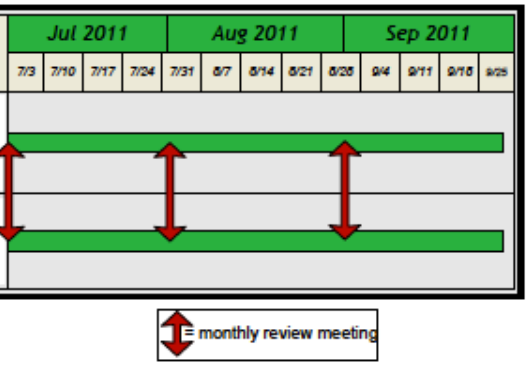
ID	Task Name	Start	Finish	Duration
1	Program Manager Training	1/3/2011	1/14/2011	2w
2	Program Manager interviews and selects Assistant Program Manager	1/3/2011	2/25/2011	8w
3	Draft and post request for proposal (RFP) for Solar Portfolio Manager	1/3/2011	1/14/2011	2w
4	Complete preliminary research for report to Congress and RFP	1/17/2011	1/28/2011	2w
5	Complete RFP and preliminary report	1/31/2011	3/31/2011	8.8w
6	Post Request for Proposal (RFP)	4/1/2011	4/1/2011	0w
7	Post job announcement and hire five Grant Managers	1/31/2011	3/31/2011	8.8w



ID	Task Name	Start	Finish	Duration
1	Coordinate Technical Experts at the National Renewable Energy Laboratory	4/4/2011	4/8/2011	1w
2	Solar Portfolio Manager proposals due	4/15/2011	4/15/2011	0w
3	Review Solar Portfolio Manager proposals and select contractor	4/18/2011	5/2/2011	2.2w
4	Grant Managers begin preliminary training for grant proposal review process	5/2/2011	5/13/2011	2w
5	Grant Managers and Technical Experts begin grant review process	5/13/2011	7/1/2011	7.2w
6	Grant application deadline	5/27/2011	5/27/2011	0w

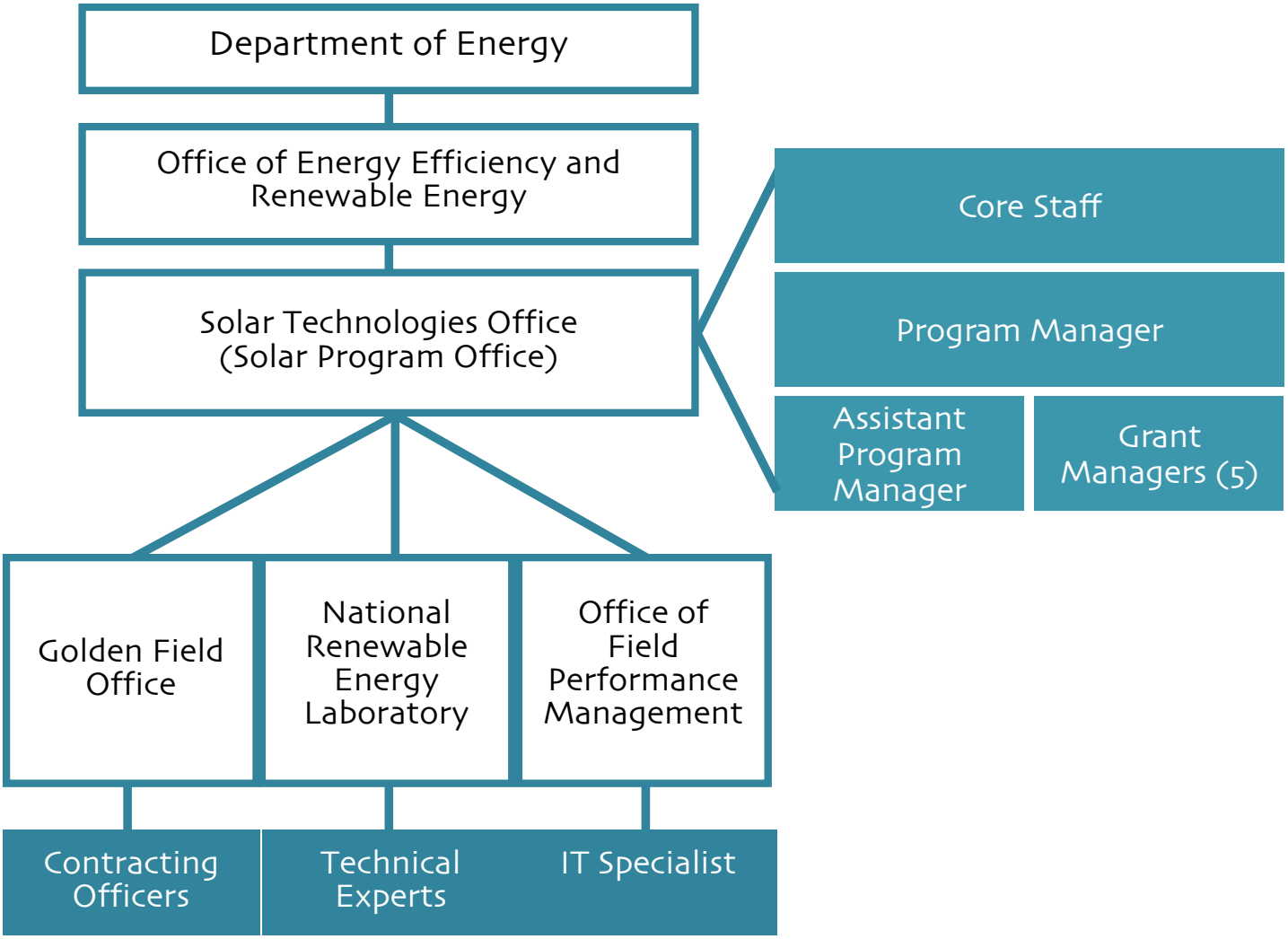


ID	Task Name	Start	Finish	Duration
1	Grant managers review proposals and select grant recipients	7/1/2011	9/28/2011	12.8w
2	Technical Experts review proposals and select grant recipients	7/1/2011	9/28/2011	12.8w



ID	Task Name	Start	Finish	Duration
1	Awards distribution	10/3/2011	12/23/2011	12w
2	End of year evaluation and agenda setting for 2012	10/3/2011	12/23/2011	12w

Appendix C: Organizational



Appendix D: First Year Program Budget

2010 Solar Act Line Item Budget, Year One				
Items	*Number of Personnel Required*	*% Devoted to Program*	*Salary*	*Total for Year 1*
PERSONNEL SERVICES				
Program Manager (GS 15, DC)	1	100%	$123,758.00	$ 123,758.00
Assistant Program Manager (GS 8, DC)	1	75%	$ 46,745.00	$ 35,058.75
Grant Managers (GS 11, DC)	5	60%	$ 62,467.00	$ 187,401.00
NREL Technical Experts (GS 13, CO)	15	4%	$ 87,815.00	$ 52,689.00
Contracting Officers (GS 11, CO)	10	13%	$ 61,612.00	$ 80,095.60
IT Specialist (GS 9, CO)	1	44%	$ 50,923.00	$ 22,406.12
Total Fringe Benefits (25% of compensation)				$ 125,352.12
TOTAL Personnel Services				**$ 626,760.59**
OTHER THAN PERSONNEL SERVICES				
Supplies				$ 7,000.00
Travel				$ 10,000.00
Office Expenses				$ 50,000.00
TOTAL Other Than Personnel Services				**$ 67,000.00**
TOTAL OPERATIONAL COSTS				**$ 693,760.59**
TOTAL GRANTS				**$ 249,306,239.41**
TOTAL BUDGET				**$250,000,000.00**

Table D-1: 10 Million Solar Roofs Act of 2010 Line Item Budget, Year 1. Administrative expenses stay well below the limit of 5%, at an estimated 0.28% for Year 1. Salaries are taken from the 2010 Salary Tables that are published by the Office of Personnel Management.

Operational Budget, Breakdown by Function							
Items	*Administration*	*Grants, Contracts*	*Human Resources*	*Financial, Budget*	*Information Technology*	*Public Relations*	*Total for Year 1*
PERSONNEL SERVICES							
Program Manager (GS 15, DC)	$ 101,481.56	$ 3,712.74	$ 6,187.90	$ 8,663.06		$ 3,712.74	$ 123,758.00
Assistant Program Manager (GS 8, DC)	$ 7,011.75		$ 7,011.75	$ 5,258.81	$ 10,517.63	$ 5,258.81	$ 35,058.75
Grant Managers (GS 11, DC)		$ 187,401.00					$ 187,401.00
NREL Technical Experts (GS 13, CO)		$ 52,689.00					$ 52,689.00
Contracting Officers (GS 11, CO)		$ 56,066.92		$ 24,028.68			$ 80,095.60
IT Specialist (GS 9, CO)					$ 22,406.12		$ 22,406.12
Total Fringe Benefits (25% of compensation)	$ 27,123.69	$ 74,966.83	$ 3,300.52	$ 9,487.90	$ 8,230.62	$ 2,242.55	$ 125,352.12
TOTAL Personnel Services	**$ 135,617.00**	**$ 374,836.49**	**$ 16,500.17**	**$ 47,438.45**	**$ 41,154.37**	**$ 11,214.10**	**$ 626,760.59**
	21.638%	59.805%	2.633%	7.569%	6.566%	1.789%	100%
OTHER THAN PERSONNEL	$ 2,000.00	$ 5,000.00					$ 7,000.00
Supplies		$ 5,000.00				$ 5,000.00	$ 10,000.00
Travel	$ 2,000.00	$ 3,000.00			$ 30,000.00	$ 15,000.00	$ 50,000.00
Office Expenses	**$ 4,000.00**	**$ 13,000.00**			**$ 30,000.00**	**$20,000.00**	**$ 67,000.00**
TOTAL Other Than Personn	**$ 139,617.00**	**$ 387,836.49**	**$ 16,500.17**	**$ 47,438.45**	**$ 71,154.37**	**$ 31,214.10**	**$ 693,760.59**
	20%	56%	2%	7%	10%	4%	100%

Table D-2: 10 Million Solar Roofs Act of 2010 Program Budget, Year 1. This program budget breaks down costs by program function.

2010 Solar Act, Year 1 Line Budget				
Item	Number of Personnel Required	% Devoted to Program	Salary	Total for Year 1
PERSONNEL SERVICES				
Program Manager (GS 15, DC)	1	100%	$123,758.00	$ 123,758.00
Assistant Program Manager (GS 8, DC)	1	75%	$ 46,745.00	$ 35,058.75
Grant Managers (GS 11, DC)	5	60%	$ 62,467.00	$ 187,401.00
NREL Technical Experts (GS 13, CO)	15	4%	$ 87,815.00	$ 52,689.00
Contracting Officers (GS 11, CO)	10	13%	$ 61,612.00	$ 80,095.60
IT Specialist (GS 9, CO)	1	44%	$ 50,923.00	$ 22,406.12
Program Performance Analyst (GS 9, CO)				
Fringe Benefits (25% of Compensation)				$ 125,352.12
TOTAL Personnel Services				**$ 626,760.59**
OTHER THAN PERSONNEL SERVICES				
Supplies				$ 7,000.00
Travel				$ 10,000.00
Office Expenses				$ 50,000.00
Conference/Webinar				$ -
TOTAL Other Than Personnel Services				**$ 67,000.00**
TOTAL OPERATIONAL COSTS				**$ 693,760.59**
TOTAL GRANTS				**$ 249,306,239.41**
TOTAL BUDGET				**$ 250,000,000.00**
Total Operational Costs/Total Budget				0.28%
Grants/ Total Budget				99.72%

Table D-3: Line Item Budget for Year 1.

2010 Solar Act, Year 2 Line Item Budget				
Item	Number of Personnel Required	% Devoted to Program	Salary	**Total for Year 2**
PERSONNEL SERVICES				
Program Manager (GS 15, DC)	1	100%	$ 123,758.00	$ 123,758.00
Assistant Program Manager (GS 8, DC)	1	75%	$ 46,745.00	$ 35,058.75
Grant Managers (GS 11, DC)	10	80%	$ 62,467.00	$ 499,736.00
NREL Technical Experts (GS 13, CO)	15	4%	$ 87,815.00	$ 52,689.00
Contracting Officers (GS 11, CO)	10	26%	$ 56,857.00	$ 147,828.20
IT Specialist (GS 9, CO)	1	10%	$ 50,923.00	$ 5,092.30
Program Performance Analyst (GS 9, CO)	1	33%	$ 50,923.00	$ 16,804.59
Fringe Benefits (25% of Compensation)				$ 214,767.49
TOTAL Personnel Services				**$ 1,095,734.33**
OTHER THAN PERSONNEL SERVICES				
Supplies				$ 5,000.00
Travel				$ 40,000.00
Office Expenses				$ 50,000.00
Conference/Webinar				$ 100,000.00
TOTAL Other Than Personnel Services				**$ 195,000.00**
TOTAL OPERATIONAL COSTS				**$ 1,290,734.33**
TOTAL GRANTS				**$ 248,709,265.67**
TOTAL BUDGET				**$250,000,000.00**
Total Operational Costs/Total Budget				0.52%
Grants/ Total Budget				99.48%

Table D-4: Line Item Budget for Year 2. Year 2 shows increased costs due to more Grant Managers hired, additional work for Contracting Officers, the hire of a part-time program analyst, as well as increased travel expenses, and a best practices conference.

Appendix E: Glossary of Terms

Acid rain: a chemical and atmospheric occurrence that happens when sulfur and nitrogen are released into the atmosphere from the combustion of fossil fuels, then chemically converted into secondary pollutants like nitric and sulfuric acid, and deposited as acid rain, snow, or fog

Alternating current: the form of electricity that is delivered to businesses and homeowners; the movement of electric charge periodically reverses direction

Demographic indicators: measurements that will include data from grant recipients and solar system owners that will be required in quarterly reports; compilation of this information will be based on the unique conditions of each entity's program and entered into the Solar Web Dashboard by grant recipients

Direct current: the form of electricity that is used to power electronic devices; the electric charge is unidirectional

Distributed generation: the generation of electricity close to the point of use

Efficiency: this term has been used in several contexts throughout the report; in terms of combustion of fossil fuels, efficiency describes the amount of input energy required for the amount of output energy. In terms of solar panels, efficiency is the amount of sunlight collected that is converted into usable energy in the form of electricity

Environment and electricity indicators: measurements that include the initial grant statistical data that the Solar Energy Technologies Program will collect at the start and termination of grant cycles

Fossil fuel: a nonrenewable resource derived from the remains of organisms preserved within the Earth's crust (oil, coal, and natural gas)

Grant recipient: a state, local government, or Indian tribe

Greenhouse gas (GHG): a gas that absorbs out-going infrared radiation from the Earth's surface, trapping heat in the atmosphere; major greenhouse gases include carbon dioxide, methane, nitrous oxide, and ozone

Grid parity: the point when the price of an alternative energy source is equal in cost or cheaper than that of conventional sources of electricity on the power grid

Kilowatt-hour (kWh): a unit of energy that describes the amount of electricity needed to operate something over one hour

Net-metering: method that enables energy customers to use their own small-scale, grid-connected renewable energy generation to offset their electricity consumption and have less of an impact on the electric grid

Photochemical smog: air pollution caused by nitrous oxides reacting with sunlight to produce tropospheric ozone

Request for Proposal (RFP): document used by an organization to solicit proposals or bids from entities for a service or product

Solar energy system: rooftop or ground-mounted solar equipment that is used to generate electricity or heat water

Solar system owner: an owner of a home, a business entity, a local educational agency, and any other individual or entity that the Secretary of Energy determines is eligible to receive a financial incentive on a solar energy system

Solar Portfolio Manager: online program that will interface data collection from solar system owners to corresponding grant recipients

Solar Web Dashboard: online program that will interface data collection between grant recipients and the Project Management Center at the Golden Field Office

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