COMMONWEALTH of VIRGINIA

OFFICE OF TRANSPORTATION PUBLIC-PRIVATE PARTNERSHIPS
600 EAST MAIN STREET, SUITE 2120
RICHMOND, VIRGINIA 23219

J. Douglas Koelemay
Director

June 27, 2014

Mr. Charlie A. Kilpatrick, P.E.
Commissioner of Highways
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

RE: High-level screening recommendation for the Solar Energy Development Project

Dear Commissioner Kilpatrick:

The Office of Transportation Public-Private Partnerships ("OTP3") has completed a high-level screening on the suitability of procuring the Solar Energy Development Project through a public-private partnership ("P3").

The attached high-level screening report evaluated the project concept against P3 criteria to determine whether procurement via a P3 delivery method offers additional efficiencies that cannot be achieved through traditional procurement, including accelerating project development, ability to transfer risk and ability to raise capital.

The OTP3 recommends proceeding with the detail-level screening for the Solar Energy Development Project as a candidate project. The detail-level screening analysis will allow the OTP3, in coordination with the Virginia Department of Transportation's resources, to provide you with a recommendation as to whether the project remains a good candidate P3 project and the level of priority for the Commonwealth to advance into the project development phase.

Should you have any questions regarding our recommendation or wish to discuss please contact me at 786-0456 or Dusty Holcombe at 786-3173.

Sincerely,

J. Douglas Koelemay

Cc: Quinton Elliot, Chief Deputy Commissioner
Garrett Moore, Chief Engineer
Dusty Holcombe
Alexandra Lauzon

Solar Energy Development
High-Level Project Screening Report

This report and recommendation are part of a high-level screening process used by the Office of Transportation Public-Private Partnerships ("OTP3") to assess the suitability of delivering a project as a public-private partnership ("P3").

PROJECT BACKGROUND

Date:	June 27, 2014
Project Name:	Solar Energy Development
Sponsoring Agency:	VDOT (can also apply to other agencies: Aviation, DMV, DRPT and VPA)
Project Concept Source:	Solicited

OTP3 Recommendation

Proceed with detail-level screening process? ☒ Yes ☐ No

Executive Summary recommendations from OTP3:

One possible way the Virginia Department of Transportation ("VDOT") or other agencies, as appropriate, can respond to the growing challenge of environmental sustainability and stewardship is through a Solar Energy Development Project (the "Project"). While VDOT is known for the roadways of Virginia, the agency also owns property across the state. Since the 1980's, Europe has been incorporating solar technologies within highway ROW and state property to take advantage of underutilized space. This trend is emerging in the U.S. as state departments of transportation ("DOTs") look for innovative ways to employ underutilized land and increase revenues. At the same time, more innovations in renewable energy technology, especially solar energy technology, are also emerging in the U.S. market.

Thus, OTP3 recommends VDOT explore whether solar energy development at, around, and/or atop state property and/or buildings would make business sense, be feasible, address state priorities, and benefit the public. The Project would transform underutilized state property and/or buildings into energy generating sites by installing solar array systems, which convert sunlight into usable energy.

OTP3 recommends the Project be advanced to a detail-level screening. The detail-level screening will consider elements of a business case for the project with the goal of maximizing value and public benefits. The detail-level screening will:

- assess the opportunities of interest based on market dynamics and the viability of solar energy development on underutilized state property administered by VDOT;

- identify the potential uses while meeting local and state land use needs/requirements;
- evaluate financial options and optimal business models; *and*
- continue policy analysis on state property management and renewable energy regulations.

Once the detailed-level review is complete, the OTP3 will provide a recommendation as to whether the project is a good candidate P3 project and the level of priority for the Commonwealth to advance into the procurement phase.

Concur:

7/18/14

Signature Date

Charlie A. Kilpatrick, Commissioner of Highways
Virginia Department of Transportation

PRELIMINARY SCHEDULE

Activity	Completion Date
Detail-level screening kickoff	Summer 2014
Data collection / site feasibility analysis	Fall 2014
Business case development	Fall 2014
Develop pro forma analysis	Winter 2014
Complete detail-level screening	Winter 2014

PURPOSE AND NEED STATEMENT

Description:

VDOT currently confronts the growing challenge of environmental sustainability and stewardship. Thus, not only must VDOT fulfill its mission "to plan, deliver, operate and maintain a transportation system that is safe, enables easy movement of people and goods, enhances the economy and improves our quality of life," but must also do so by meeting certain sustainability objectives and targets. At the same time, VDOT must fulfill its mission with increasingly constrained financial resources, due in a large part to declining tax revenue. VDOT has an opportunity to respond to these challenges and transition into the future. One possible way VDOT can respond and move forward is through a Solar Energy Development Project.

While VDOT is known for the roadways of Virginia, the agency also administers property across the state, which is not considered highway right-of-way ("ROW"). This property includes, but is not limited to: central headquarters, district offices and facilities, regional offices and facilities, operations and maintenance facilities, land, and Park and Ride sites. One similarity highway ROW and state property share is they both have at least some portion of underutilized space. On highway ROW, the underutilized space can be airspace, sound barrier walls or bridge structures. On a facility or parking lot, the underutilized space can be empty roof tops, parking garage structures or airspace.

Since the 1980's, countries in Europe have been incorporating solar technologies within highway ROW and state property. One common example is a solar energy system mounted on noise barrier walls in the highway ROW (see Figure 1). The trend to incorporate solar energy technology within highway ROW and state property is emerging in the U.S. as state DOTs look for innovative ways to transform underutilized space into productive space and increase revenues. At the same time, more innovations in renewable energy technology, especially solar energy technology, are also emerging in the U.S. market. Thus, OTP3 recommends VDOT explore whether solar energy development at, around, and/or atop state property would make business sense, be feasible, address state priorities, and benefit the public.

The Project would transform underutilized state property into energy generating sites. This can be accomplished by installing solar energy technology on the underutilized space. Solar energy technology

converts sunlight into usable energy, the amount of which produced depends on how much of the sun's energy, solar radiation, reaches the solar collectors. The main technology used to convert solar radiation into electricity is a photovoltaic ("PV") panel, which can be connected with other panels to form a solar array. An example of employing underutilized space with a solar array is a solar parking lot, which consists of a solar array canopy of photovoltaic panels installed above the parking spaces (see Figure 2).

Energy produced from renewable sources, such as a solar array, has two revenue generating outputs: the renewable energy and the renewable energy certificates ("RECs") (see Figure 3). RECs are non-tangible energy commodities, representing the environmental attributes of the energy generated from renewable sources. One mWh of renewable energy is equivalent to one REC. RECs can be "unbundled" from the energy generated and sold into the open market as a commodity. While the RECs can be sold, they cannot be double counted. Thus, the user of the electricity can only claim to be using renewable electricity if the user also keeps the associated RECs and does not sell them into the open market.

In the U.S., RECs can be sold into two different markets: compliance and voluntary markets. Compliance markets exist in 29 states that have a mandatory Renewable Portfolio Standard ("RPS"), which requires retail power suppliers to meet a certain percentage goal of renewable energy. Voluntary markets exist in states that have a voluntary RPS, which does not mandate a renewable energy goal but still allows public and private entities to purchase RECs. The Commonwealth of Virginia (the "Commonwealth") has a voluntary RPS, which specifies certain renewable energy goals and gives retail power suppliers incentives for reaching these goals. The Commonwealth's voluntary market is likely to be one of the main reasons solar energy uptake has been slower in the Commonwealth as compared to other states across the U.S. (see Figure 4).

Another possible reason for the slower uptake in the Commonwealth is the lack of state incentives for renewable energy projects. The federal government offers private developers tax incentives on renewable energy projects, including the Business Energy Investment Tax Credits ("ITCs") and the Modified Accelerated Cost Recovery System. The ITCs are most commonly used for solar projects, are equal to 30% of project expenditures, and apply to eligible systems placed into service before January 1, 2017. Some states, such as Maryland, North Carolina and New Jersey, have additional state incentives, which promote solar development projects. While the upfront installation price of photovoltaic panels has decreased in recent years, both the federal and state tax incentives are important because the installation price is not yet low enough for systems to pay for themselves without the incentives. Since the Commonwealth has no additional state incentives, the state renewable energy market is not as attractive to solar developers and makes the federal tax incentives essential for the Project.

Finally, the state regulatory environment regarding renewable energy, especially concerning third-party Power Purchase Agreements ("PPAs") is one more reason solar energy uptake would be trailing in the Commonwealth. A PPA is a financing agreement between a private solar developer and a host customer. Under a PPA, the private solar developer owns, operates and maintains an energy system while a host customer agrees to site the system and purchase energy output from the system. Since government agencies cannot take advantage of private tax credits, PPAs are a commonly utilized structure because

they allow the private solar developer to monetize the tax credits and use the proceeds to help fund the solar project.

Developing the "business model" for a solar energy project is unique for the project based upon the host customer's desired values and requires innovative thinking. The four basic business models used to date for solar energy projects are:

- DOT purchases the renewable energy generated through a PPA
- DOT collects lease revenue through a Land Lease Agreement ("LLA")
- DOT acquires RECs for the renewable energy generated and either keeps or monetizes them
- DOT owns and operates the renewable energy facility

In addition to these four basic business models, OTP3 would also like to explore the possibility of revenue sharing on profits made by the private solar developer through a LLA. These business models can be used together or separate by utilizing a P3 delivery method. Depending on the business model of the Project, which will be explored more in the detail-level screening, a P3 could net revenues to VDOT to be used in funding other transportation projects in the region or elsewhere in the state. Additionally, knowledge and experience gained from this project would aid in the development of a model for future solar energy projects and can potentially be utilized by other state agencies.

Several state DOTs, including Oregon, California, Massachusetts and Ohio, are pursuing solar energy projects via P3 delivery methods. The first project to be completed in the U.S. by a DOT on ROW was developed in 2008 by Oregon DOT ("ODOT") and is called "Oregon's Solar Highway Demonstration Project" (see Figure 5). This project is a ground-mounted solar array system, consisting of 594 photovoltaic panels and producing 104 kW Hours. This system supplies approximately one-third of the needed energy to illuminate the interchange at Interstate 5 and Interstate 205. ODOT structured the project so that the DOT pays the same rate as conventional power from the grid in order to realize two tangible benefits: a revenue stream in the form of an annual license payment and a dedicated percentage of the RECs generated by the project. ODOT keeps the RECs to count against its carbon footprint, offsetting its nonrenewable-energy electrical usage.

To give a sense of the potential size and impact this Project could have in the Commonwealth, Park and Ride sites serve as an example. The Commonwealth's daily rate of solar radiation is from 4.5-5.5 $kWh/m^2/day$ (see Figures 6). If VDOT data on Park and Ride sites is used to determine the number of parking spaces and a minimum parking space size of 8' by 16' for regular spaces and 13' by 16' for handicapped spaces is assumed, then there is a total area of approximately 10 million square feet (1 million square meters). Over this area, the Commonwealth receives about 1.8 billion kWh of annual solar radiation, which can be converted at a solar efficiency of 11% into 193 million kWh of annual solar energy output. If you equate this energy to the average retail price of electricity from the grid, which is 7.97 cents/kWh for commercial and transportation sectors as of March 2014, then the price of this electricity is approximately $15 million (see Figure 7).

Thus, the potential breadth and impact of this Project on the Commonwealth is impressive. The Project could not only supply VDOT with additional funds to deliver needed transportation projects, but could

also help VDOT join the growing trend of incorporating renewable energy into transportation infrastructure and take on a national leadership role in sustainable development.

HIGH-LEVEL SCREENING CRITERIA

Satisfies Public Need and Derives Public Benefit

☒ Yes ☐ No ☐ TBD

While the Project does not satisfy public needs in a direct sense like a new highway or additional lane of roadway capacity, it has many indirect benefits satisfying public needs. The most tangible and common of these benefits would be the act of producing renewable energy using innovative green technology to support a sustainable environment. In the U.S., 28% of the greenhouse gas ("GHG") emissions are produced by the transportation sector. Thus, this Project would contribute to lowering GHG emissions and, in turn, contribute to a cleaner environment and higher quality of life for the public. This Project also promotes energy security by helping to diversify the means of energy generation and reducing the amount of conventional grid energy, which offers protection from future energy rate increases.

In the solar parking lot example, the canopy over the parking lot gives the vehicles below a shading device, which can protect them from the elements and in turn reduce vehicular maintenance costs for the owners. Furthermore, the canopy can reduce VDOT's maintenance costs of the parking facility by protecting the surface below. This would be especially useful in snow storms because the solar array would account for most of the snow and thus only the aisles would need to be plowed. A solar parking lot also provides the possibility to have solar charging stations, which supports the movement towards electric and hybrid vehicles.

A broader return on the investment is enhancing the economic growth, competiveness and viability of the nation's renewable energy industry. The Solar Foundation's National Solar Jobs Census 2013 finds solar jobs in the U.S. increased nearly 20% since the fall of 2012 to more than 140,000 solar workers. Thus, the Project would support new sustainable businesses and foster jobs growth through the creation of a local green job market.

From a monetary perspective, benefits include the potential reduction in energy usage from the grid for the Commonwealth, which could decrease VDOT's total price of electricity. The potential rent collection and revenue sharing from a LLA and the sale of RECs into the open market are two possible sources of revenue for the Project. Ultimately, combined these strategies allow more money to be spent on other projects to satisfy public transportation needs across the state.

Complexity of Effectively Leveraging Private Sector Innovation/Expertise

☒ Yes ☐ No ☐ TBD

While VDOT knows the business of transportation, it lacks subject expertise regarding photovoltaic panels and the challenges associated with developing and implementing solar energy projects. Therefore, innovative ideas and experienced professionals are needed to maximize the value of underutilized state property and navigate through complex zoning and regulatory concerns. Therefore, the Project could effectively leverage the private sector expertise in developing, designing, implementing, operating and maintaining solar array systems to maximize the annual energy output and add value to the Commonwealth.

Project Efficiencies through P3 Delivery

☒ Yes ☐ No ☐ TBD

Advancing the proposed Project via a P3 delivery method could drive efficiencies in the overall project execution. VDOT could realize these efficiencies by integrating project activities, such as design, construction, financing, operations, maintenance and decommissioning, into one long-term contract with a private partner either as a PPA or LLA. Efficiencies can also be gained through the single contracting of multiple sites across the Commonwealth. These Project efficiencies are very important for solar energy projects in the Commonwealth because the current federal tax incentives expire January 1, 2017 and no other state incentives currently exist. Moreover, the development of a model for future transactions with other state agencies, especially the Department of Aviation, Department of Motor Vehicles and Department of Rail and Public Transportation, could lead to future project efficiencies.

Accelerated Project Development

☒ Yes ☐ No ☐ TBD

The utilization of the federal tax incentives is a key benefit to solar energy projects and makes these projects feasible. Since these credits expire on January 1, 2017, no other state incentives currently exist, and VDOT currently has no funding allocated to explore solar energy development, accelerated project development is essential to make this Project financially feasible. Acceleration of project development and implementation can be delivered by utilizing a P3 delivery method, which allows for project efficiencies by using innovative ideas and business models. Therefore, VDOT could realize time savings by initiating a P3 for the work needed in developing and operating the Project. These time savings and the development of a model for future transactions could possibly allow other state agencies to take develop projects early enough to take advantage of the federal tax credits.

Ability to Transfer Risk

☒ Yes ☐ No ☐ TBD

The P3 procurement method could allow for risk transference to the private sector. Dependent upon the final scope and business model of the Project, the transferable risks could include risks associated with development, design, permitting, construction, regulatory issues/changes and schedule, as well as long term risks associated with financing, lifecycle costs, operations, maintenance and decommissioning.

Addresses State, Regional and/or Local Priorities

☒ Yes ☐ No ☐ TBD

The Commonwealth Energy Policy (§ 67-100) (the "Policy") is intended to provide guidance to all state agencies and directs them to act in a manner consistent with the policy when taking discretionary action with regard to energy issues.

The Policy details fourteen energy objectives (§ 67-101), three of which are:

- *minimizing the Commonwealth's long-term exposure to volatility and increases in world energy prices through greater energy independence;*
- *managing the rate of consumption of existing energy resources in relation to economic growth; and*
- *increasing Virginia's reliance on sources of energy that, compared to traditional energy resources, are less polluting of the Commonwealth's air and waters.*

Moreover, the Policy states twelve policies to achieve the objectives (§ 67-102), two of which are:

- *support research and development of, and promote the use of, renewable energy sources; and*
- *promote the generation of electricity through technologies that do not contribute to greenhouse gases and global warming.*

These objectives and policies show the importance of renewable energy to the Commonwealth and the role VDOT, as a state agency, is responsible to undertake with regard to energy issues.

In March 2013, the General Assembly approved Chapter 382 of the Virginia Acts of Assembly, which establishes a renewable energy pilot program. This pilot program allows for the sale of electricity from a private developer to an eligible customer under a PPA used to provide third-party financing. This pilot program shows the General Assembly's desire to explore solar energy development projects.

Additional renewable energy legislation has been introduced to the General Assembly but has not yet been approved. In the 2014 Session, the most notable bills in regards to the Project were introduced and establish state renewable energy property tax incentives or grants (House Bill 910 and Senate Bill 653). This shows the support from the General Assembly to pursue renewable energy development.

Consistent with State, Regional and/or Local Regulations

☐ Yes ☐ No ☒ TBD

For a solar energy project using a PPA business model on the campus of Washington and Lee University, Dominion issued cease and desist letters because the project was deemed to violate the Code of Virginia (§ 56-577 (A) (5) (a)). By using a PPA for the project and not qualifying as an exemption because the project did not supply the University 100% of its energy demand, Dominion believed the project violated its monopoly on power sales within its designated territory. This prompted the approval of Chapter 382 of the Virginia Acts of Assembly, which establishes a renewable energy pilot program. The pilot program allows for third-party PPAs, however, has limitations on the amount of energy that can be covered under the program, which is 50 mW. This pilot program could possibly determine the maximum scale of the Project. A change in the Code of Virginia may need to occur to make this Project feasible at the optimal size to achieve the most value for the Commonwealth.

Furthermore, special attention will need to be paid to zoning and local land use ordinances when choosing site locations because these ordinances were not written with this type of project in mind. These regulations can become a challenge to change and will be explored further in the detail-level screening.

Consistent with Federal Priorities and Requirements

☐ Yes ☐ No ☒ TBD

In October 2009, the President made an executive order (Executive Order 13514) which made reduction of greenhouse gas emissions a priority for federal agencies. In December 2013, the President established new renewable energy goals for all federal agencies, directing agencies to nearly double their current renewable energy consumption by 2020. The current goal is a 20% reduction in the total amount of energy consumed by each agency by October 2019. These goals show how important promoting energy dependence and greenhouse gas reduction is nationally.

In order to further promote renewable energy initiatives, the federal government offers private developers tax incentives on renewable energy projects. In addition to tax incentives, the Moving Ahead for Progress in the 21st Century ("MAP-21"), signed into law in 2012, establishes environmental sustainability as a national transportation goal. Thus, the Project is compatible with both current national and U.S. DOT priorities and goals.

As for federal requirements, if the Project is located on state property administered by VDOT, then federal requirements will not be applicable. Otherwise, the use of real property acquired as a part of a transportation project in which federal funds participated for public or private highway and non-

highway purposes is granted to the state DOTs in 23 CFR Part 710 on Real Property Management. This grant is contingent upon ensuring the continued safety and integrity of the federally funded facility and adhering to the federal requirements for design, safety, security, operation and maintenance. The right to use this area by public or private parties for interim non-highway uses may be granted in airspace leases. Moreover, the state DOT may receive fair market income from real property leases and use it for Title 23 (transportation) eligible projects (23 CFR 710.403 (e)). While specific sites for the project have not been determined, the rights to real property are important because many state transportation projects in Virginia include some form of federal funding.

Moreover, the need for environmental assessments and identification of applicable permits are not known at this point and will depend on the site locations. This will be further studied in the detail-level screening.

Funding Requirement

☐ Yes ☐ No ☒ TBD

Public funding and procurement funding for the Project are not known at this stage and are dependent on the type of business model identified in the detail-level screening.

Ability to Raise Capital

☐ Yes ☐ No ☒ TBD

The financing market for large renewable energy projects is highly dependent on a small and sophisticated set of investors called "tax equity investors." These investors have the ability and experience to monetize the associated tax benefits and are comprised of 20 to 25 large financial institutions (e.g., investment banks, commercial banks, large corporations, and insurance companies) seeking to offset some portion of their expected tax liability. While the upfront installation price of photovoltaic panels has decreased in recent years, monetizing both the federal and state tax incentives remains an important investment tool because the installation price is not yet low enough for systems to pay for themselves without the incentives. Since the Commonwealth has no additional state incentives, the renewable energy market is not as attractive to solar developers and makes monetizing the federal tax incentives essential for the Project.

In recent years, there has been an emergence of energy developers who pool funds provided by tax equity investors to provide financing options for large renewable energy projects, which they manage within a portfolio of projects. In 2013, U.S. renewable energy developers raised $6.5 billion, which was an increase from $5.3 billion in 2012. This investment growth is a response to the growing demand for renewable energy, especially in unbundled REC markets. While the demand for unbundled RECs has

increased in recent years, new renewable energy output in compliance markets has outgrown that of voluntary markets. Thus, a market opportunity for energy developers exists to supply the growing demand of unbundled voluntary RECs through the development of new renewable energy projects in states with voluntary markets, such as the Commonwealth.

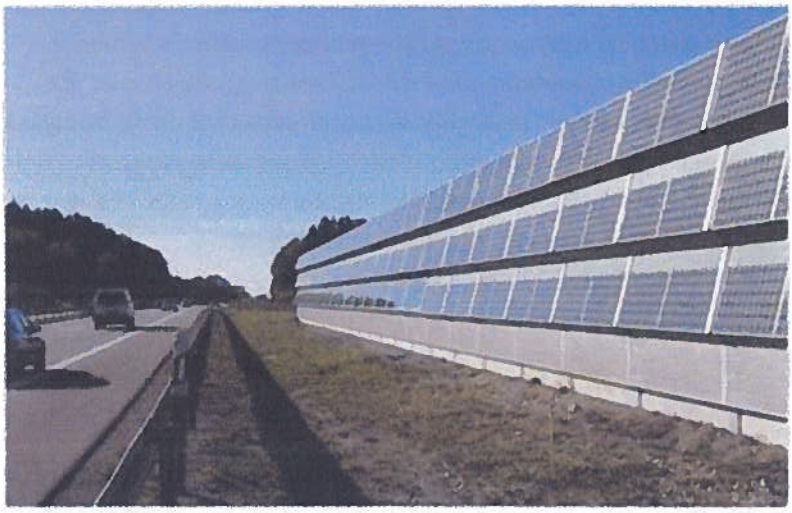
The Project has the ability via a P3 delivery method to allow for private energy developers to invest capital (e.g., equity, debt) and collect revenue from operating the Project. Revenue collection of the Project from VDOT's perspective could be in the form of lease collection and revenue sharing through a LLA and the sale of RECs. This revenue could be used to fund other state transportation projects. Furthermore, the discounted price of electricity would save money for the Commonwealth. These cost savings would in turn free up capital resources to fund more transportation projects.

LIST OF REFERENCES

1. http://www.virginiadot.org/about/missionandvalues.asp
2. http://www.nrel.gov/gis/solar.html
3. http://www.nrel.gov/docs/fy14osti/60210.pdf
4. http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a
5. http://pureenergies.com/us/how-solar-works/solar-panel-efficiency/
6. http://www.whitehouse.gov/the-press-office/2013/12/05/presidential-memorandum-federal-leadership-energy-management
7. http://environment.fhwa.dot.gov/strmlng/newsletters/dec11nl.pdf
8. http://www.fhwa.dot.gov/publications/publicroads/13novdec/04.cfm
9. http://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ghg_planning/ghg_planning.pdf
10. http://www.virginiadot.org/about/vdot_hgwy_sys.asp
11. http://www.seia.org/
12. http://www.epa.gov/greenpower/buygp/solarpower.htm
13. http://energy.gov/articles/progress-report-advancing-solar-energy-across-america

FIGURES

FIGURE 1: PV SYSTEM MOUNTED ON A NOISE BARRIER IN EUROPE

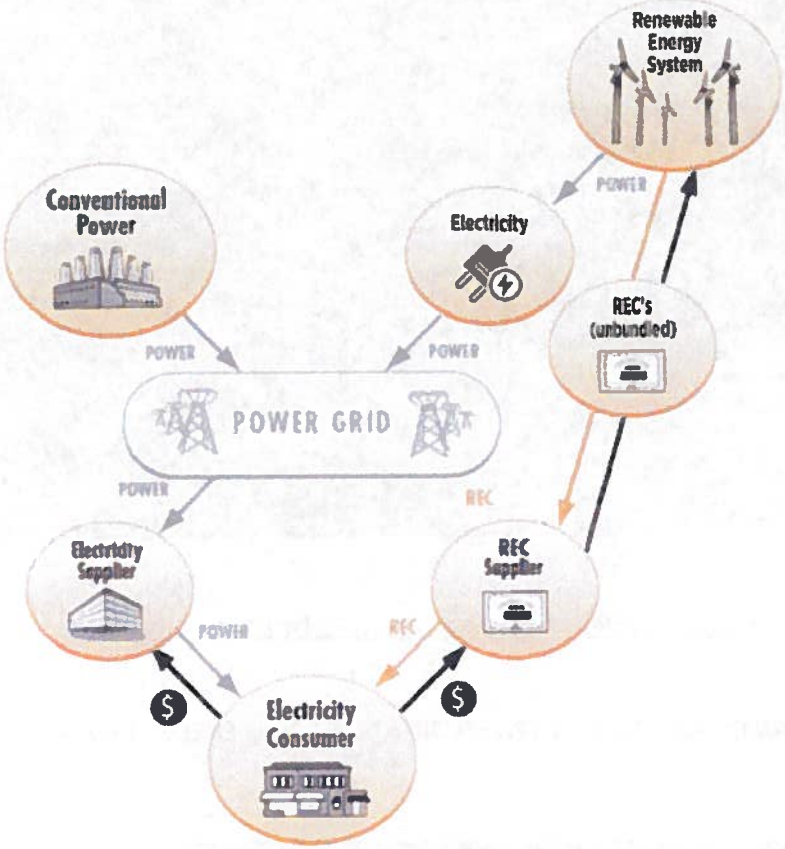


Source: www.photovoltaik.eu

FIGURE 2: SOLAR PARKING LOT EXAMPLE

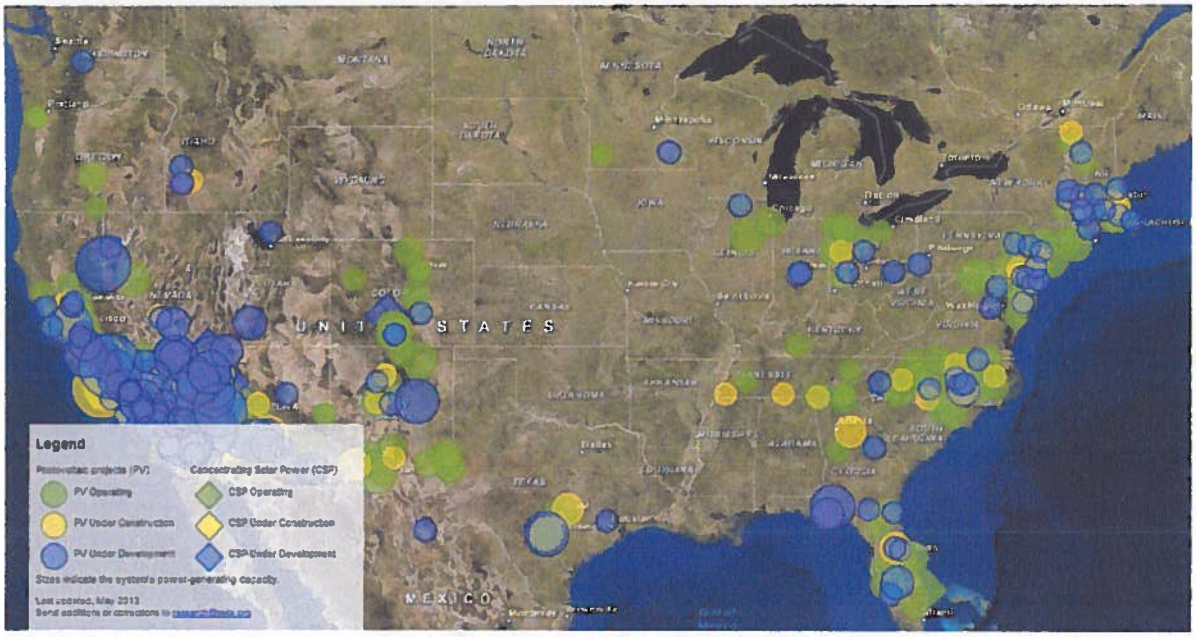
Source: http://us.sunpower.com/commercial/products-services/solar-parking/

FIGURE 3: VALUE FROM RENEWABLE ENERGY SALES: ELECTRICITY AND RENEWABLE ENERGY CERTIFICATES



Source: U.S. Department of Energy

FIGURE 4: SOLAR ENERGY INDUSTRIES ASSOCIATION MAJOR SOLAR PROJECTS LIST

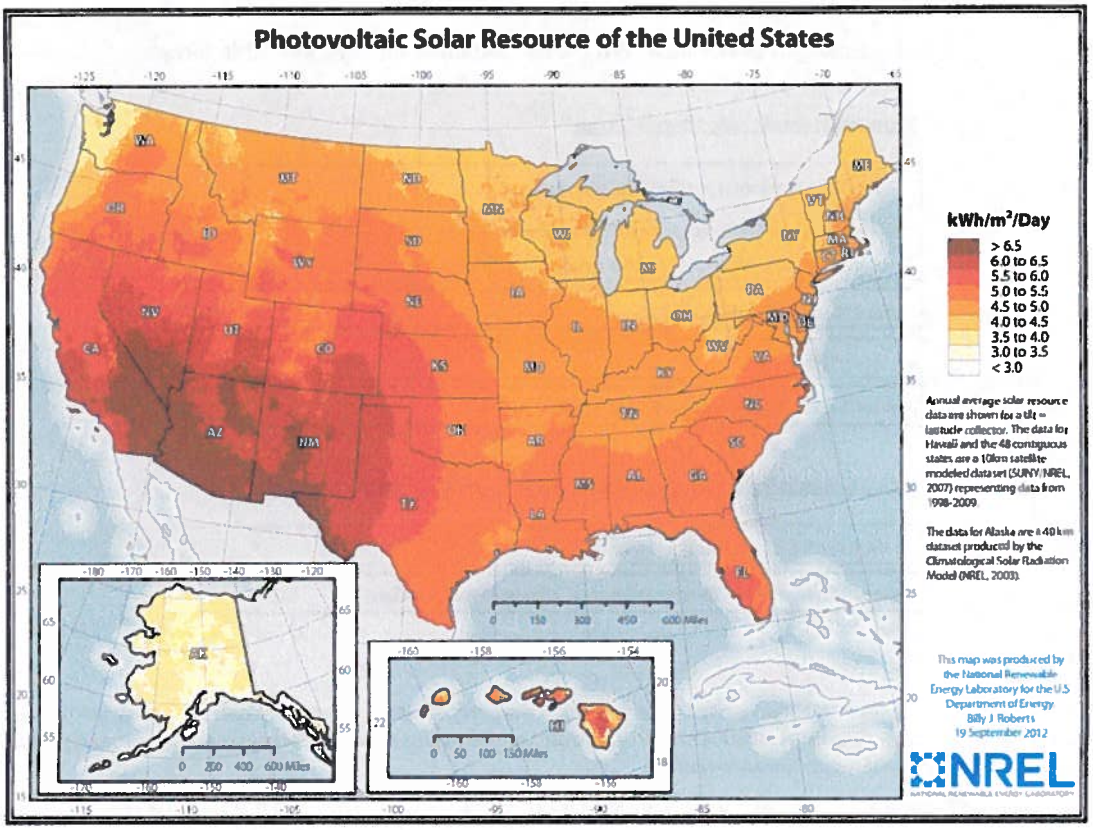


Source: http://www.seia.org/research-resources/major-solar-projects-list

FIGURE 5: OREGAN DEPARTMENT OF TRANSPORTATION SOLAR ENERGY DEMONSTRATION PROJECT IN PORTLAND

Source: http://energy.gov/articles/progress-report-advancing-solar-energy-across-america

FIGURE 6: NREL U.S. SOLAR RESOURCE MAP FOR PHOTOVOLTAICS (DATA 1998 TO 2009)



Source: http://www.nrel.gov/gis/solar.html

FIGURE 7: SOLAR ENERGY DEVELOPMENT ON PARK AND RIDES SITES

Solar Energy Development Pro Forma Summary on Park and Ride Sites[1]

Estimated Annual Solar Energy Output

Total Square Footage of Park & Ride Spaces[2]	10,349,622
Total Square Meterage of Park & Ride Spaces	961,861
Virginia's Daily Rate of Solar Radiation (kWh/m^2/Day)[3]	5
Annual Solar Radiation (kWh/year)[4]	1,755,395,925
Solar Efficiency[5]	11%
Annual Solar Energy Output (kWh/year)	**193,093,552**

Price of Annual Solar Energy Output if Obtained from the Grid

Virginia's Price of Electricity (cents/kWh)[6]	7.97
Price of Annual Solar Energy Output if Obtained from the Grid	**$15,389,556**

Notes:

[1]This Pro Forma Summary is meant to give a general understand of size of Park & Ride sites, amount of possible energy production and possible energy cost savings. The numbers included are approximate and do not reflect the exact conditions of a solar energy project, nor do they represent any proposal to the Commonwealth.

[2]Square footages of Park & Rides Spaces inlcudes the square footage of parking spaces located on 271 Park & Ride sites across Virginia. This is an approximate value and based upon conservative assumptions and the best available information.

[3]Solar radiation represents the solar resource available to a surface collector, such as a solar panel. The daily rate of solar radiation used was collected from the National Renewable Energy Laboratory's Solar Resource Map for Photovoltaics (Data 1998 to 2009) and is an average representing the range of 4.5 - 5.5 kWh/m2/Day in Virginia.

[4]Annual Solar Radiation (kWh/year) = Virginia's Average Insolatioon (kWh/m2/year) * Total Square Meterahe of Park & Ride Sites * 365 days/year.

[5]Solar Efficiency is the amount of solar radiation that can be captured and converted into usable electricity. Most solar panels are around 11-15% efficient. To be conservative, 11% is used in this analysis.

[6]Virginia's Price of Electricity is the average Virginia retail price of electricity for commercial and transportation sectors as reported in the U.S. Energy Information Administration's March 2014 Electric Power Monthly.