

T&E COMMITTEE #2  
November 10, 2016

**Discussion**

**M E M O R A N D U M**

November 8, 2016

TO: Transportation, Infrastructure, Energy and Environment Committee  
FROM: <sup>KL</sup> Keith Levchenko, Senior Legislative Analyst  
SUBJECT: **Discussion:** Installation of Solar Photovoltaic (PV) Systems at County Agency Facilities

Executive Branch Staff Participants Include:

- David Dise, Director, Department of General Services (DGS)
- Greg Ossont, Deputy Director, DGS
- Eric Coffman, Chief, Office of Energy and Sustainability, DGS
- Michael Yambrach, Office of Energy and Sustainability, DGS
- Hamid Omidvar, Chief, Division of Building Design and Construction, DGS
- Mark Etheridge, Manager, Water Resources Plan Review, Department of Permitting Services

Agency Representatives Attending Include:

- Sean Gallagher, Assistant Director, Department of Facilities Management, Montgomery County Public Schools (MCPS)
- Shela Plank, Energy Program Manager, MCPS
- Seth Adams, Director, Division of Construction, MCPS
- Rob Taylor, Energy Manager, Washington Suburban Sanitary Commission (WSSC)
- Mike Whitcomb, Energy Manager, Montgomery College
- Maria Manfre, Utility Analyst, Montgomery College
- James Poore, Division Chief, Facilities Management Division, Maryland-National Capital Park and Planning Commission (M-NCPPC)
- Amanda Aparicio, Environmental Sustainability Coordinator, Facilities Management Division, M-NCPPC
- Richard Anderson, Energy Coordinator, CQI Associates (on behalf of M-NCPPC)

Councilmember Hucker requested that the T&E Committee discuss solar photovoltaic (PV) installations at County agency facilities and the efforts agencies are currently making to move forward with more installations.

Council Staff distributed a list of questions to each of the agency's energy managers. Their responses are attached to this memorandum. Some summary information is provided below.

For the T&E Committee discussion, Council Staff suggests that the Committee hear briefly from each agency on their current and planned installations and the opportunities and challenges going forward (both common and unique to each agency).

### **Bill 8-14 “Buildings - County Buildings - Clean Energy Renewable Technology”**

On June 10, 2014, the Council enacted Bill 8-14, which requires the County Executive to establish a County Clean Energy Plan and Clean Energy Portfolio target (through regulation) and to coordinate with County agencies on deploying solar in their facilities.

DGS intends to utilize the experience it is gaining from its current roll-out of solar installations through its current PPA agreement (discussed later) to develop a formal clean energy plan. Further information regarding DGS’ work to date related to Bill 8-14 is provided on ©1-2.

### **Power Purchase Agreements**

In most cases, County agencies are pursuing solar installations through power purchase agreements (PPAs). Under a PPA, a third party designs, finances, builds, maintains, and owns the solar project for a defined time period (typically 20 to 25 years). The property owner purchases the electricity generated by the system. PPAs have a number of advantages, including:

- Savings from federal tax credits (which are available to the third party but not to government agencies) can be passed through in the form of lower kWh costs to the host.
- Upfront costs are the responsibility of the third party, eliminating the need for these projects to compete for resources in the CIP or Operating Budget.
- Ongoing system performance is managed by the third party (and the host pays based on the actual system generation)
- The host locks in energy rates, which provides cost savings in the form of lower costs per kWh over a long period of time and further cost avoidance if energy costs rise during that period.

### **Current and Planned Inventory by Agency**

DGS has 16 existing or planned solar PV installations (see ©6-7). Thirteen of these are part of a current PPA initiative begun in FY16. Most of these are rooftop mounts, although there is one canopy over parking system (Holiday Park Senior Center) and two planned ground mount systems (Montgomery County Correctional Facility and Oaks Landfill), both of which will be many times larger in size than the rooftop systems. Based on current contracts, the County expects to construct nearly 11 megawatts of solar on County facilities by the end of FY18.

MCPS has 12 existing solar PV installations and five planned installations (see ©11), all through a PPA model. All of the existing systems are rooftop mounted systems on schools. One of the planned systems (Boyd’s Farm) will be a ground mount system (and will be much larger than the rooftop systems). The five planned systems are part of a current PPA with Sun Edison. This PPA is on hold because Sun Edison filed for bankruptcy in April 2016.

WSSC currently has two large ground mount systems in operation (both via PPAs): a two megawatt system at the Seneca Wastewater Treatment Plant (WWTP) in Germantown and a two megawatt system at the Western Branch WWTP in Upper Marlboro (8,500 panels at each site). WSSC

is planning a second solar PV project at the Seneca WWTP and is considering a microgrid project (which would include solar PV) at the Potomac Water Filtration Plant.

Montgomery College has eight existing solar PV installations owned by the college. Three more are under construction (also to be owned by the college). Montgomery College is currently doing a system-wide study to determine additional solar PV opportunities through PPAs.

M-NCPPC Montgomery County (Department of Planning and Department of Parks) currently does not have any solar PV installations, other than some individual assets such as call boxes, access controls, and remote communications locations. It also has three sites utilizing solar tube collectors used for water heating. M-NCPPC has two solar PV ground mount projects in development (South Germantown Regional Park and Rock Creek Regional Park) through a PPA originally with Sun Edison. However, with Sun Edison's bankruptcy, the PPA was transferred to Standard Solar and negotiations for final contract terms are underway. A parking canopy solar PV system also at the South Germantown Regional Park has been identified for future consideration.

### **Site by Site Issues**

As noted in the attached Q&A, each agency has gone through evaluations of their facilities to identify potential candidate sites for solar PV installations. A site evaluation for solar panels involves a number of factors, including:

- available space for panels (rooftop space, ground area, and/or space for canopy installations over parking areas) and competing uses for space (*see stormwater management discussion below*)
- sufficient sun exposure for the site
- roof age, condition, configuration, and structural capability for solar installations
- future facility disposition
- potential system size and resulting energy cost savings/avoidance over a set time period.

### **Stormwater Management**

Another factor that MCPS has noted it takes into consideration is whether rooftop or ground space may be required for future stormwater management improvements. Current stormwater management requirements (which kick in for new construction and major reconstruction projects) involve utilizing environmental site design (ESD) type facilities to the maximum extent practical (MEP). On constrained sites, the most feasible way to meet these stormwater management requirements may be with vegetative roofs (which could preclude or reduce solar PV opportunities).

Mark Etheridge, Manager, Water Resources Plan Review, Department of Permitting Services (DPS) will be available at the meeting in case the Committee wishes to discuss stormwater management requirements in further detail and the potential space impacts of these requirements on facility sites and rooftops.

## Current Economic Conditions

In addition to potential site-specific limitations, there are two major economic factors that are complicating agency efforts to move forward with additional installations via PPAs:

- Solar Renewable Energy Credit<sup>1</sup> (SREC) Prices have dropped precipitously over the past year. DGS has noted that SRECs were priced at \$150 per megawatt in November 2015 but have since dropped to less than \$18 as of this month.
- Electricity prices remain relatively low and may even be dropping again after marginal increases in recent years.

Both of the above factors make new power purchase agreements (PPAs) less financially attractive. Providers pass SREC savings on to hosts in the form of lower costs per kWh. As those SREC values drop, the kWh prices offered go up. This problem is compounded by the fact that electricity prices remain low. Both factors combined have resulted in the long-term payback over time in PPAs becoming more marginal.

## Attachments

- Department of General Services Q&A (©1-7)
- Montgomery County Public Schools Q&A (©8-11)
- Washington Suburban Sanitary Commission (©12-13)
- Montgomery College Q&A (©14-17)
- Maryland-National Capital Park and Planning Commission Q&A (©18-22)

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<sup>1</sup> Solar Renewable Energy Credits (SRECs) are an officially designated representation of the production of 1,000 kilowatt hours (1 MWh) by a qualified solar panel system. SRECS can be bought and sold on the market. SRECs are often purchased by utilities that must meet a certain percentage of clean energy within their energy portfolio per State law. Maryland's renewable energy portfolio standard is 20% by 2020, with at least 2.0% from solar.

**T&E Committee Worksession on Solar PV Installations**

**Montgomery County Department of General Services**

**Response to Staff Packet Questions**

**11/10/2016**

Questions:

1. Let me know who will be attending from your agency (Each Agency)

David Dise, Director, Department of General Services

Greg Ossont, Deputy Director, Department of General Services

Eric R. Coffman, Chief, Department of General Services, Office of Energy and Sustainability

Michael Yambrach, Capital Energy Projects Manager, Department of General Services, Office of Energy and Sustainability

Hamid Omidvar, Chief, Division of Building Design and Construction, Department of General Services

2. Please summarize the requirements in Bill 8-14 (Eric)

Montgomery Council Bill 8-14 requires the County to establish a County Clean Energy Plan, a Clean Energy Portfolio target, to issue regulations to define the Plan and target, and to report on the progress of the Clean Energy Plan.

Specifically, the plan requires the County to develop policy goal defining the amount of clean energy to be installed on County facilities and properties. In addition, the plan must include a process for getting candidate facilities for clean energy installations as part of design, requirements for solar ready new facilities, criteria for the best placement of solar on facilities, funding and staff needs, and a process to coordinate with County agencies on deploying solar in their facilities.

3. What is the status of the Executive Regulation that will implement Bill 8-14? (Eric)

DGS has taken the following steps to implement the renewable energy plan:

- o Committed, as part of a White House Commitment, to develop 6 megawatts (MW) of solar energy on County facilities. Based on current contracts, the County anticipates constructing nearly 11 MW of solar on County facilities by the end of FY18.

- Participated in a technical assistance project with the National Renewable Energy Laboratory to assess the potential for solar on County facilities and develop criteria for when solar is appropriate.
- Initiated a design pilot on the Wheaton Recreation Center and Library to develop a solar ready facility with the potential of a future public private partnership (P3) between the County's facility Designer and its Public solar vendor.
- Cataloged lessons learned from its first 15 projects, lessons that will be essential to the development of a formal plan with specific design and financial criteria.
- Hired a Capital Energy Project Manager to focus on the development of solar and other advanced on-site energy systems across the County's portfolio.

The plan, which will define the elements of the regulation, will be formalized as part of an upcoming strategic energy management plan for County operations.

4. What is the status of the SREC market and its impact on the viability of power purchase agreements (PPAs) going forward? (Eric)

Solar Renewable Energy Credits (SRECs) are tradeable commodity with a market value created when a solar photovoltaic system generates electricity. Under the Maryland Renewable Portfolio Standard (RPS) energy suppliers must purchase a prescribed amount of credits from solar energy systems. The value of these credits is determined by the available supply relative to demand.

Due to the rapid adoption of solar energy in Maryland, the value of SRECs has dropped significantly over the last year from a high of approximately \$150 per megawatt in November 2015 to less than \$18 in November 2016.

The reduction in SREC value significant affects the cost-effectiveness of a project and increases the price per kilowatt-hour paid to a third party owner/operator.

5. Current and Planned Solar Installations (Each Agency)

- a. Please provide a list of your agency's solar installations (Please break out this information by existing systems, systems under construction, and systems planned for construction within the next two years). Please include the facility name and address (NOTE: a facility could be a building, a parking structure, a parking lot, and open space owned by the agency)

See attached table.

- b. Please note the type of system (rooftop, canopy, ground mount)

See attached table.

- c. Size of system (kW and number of panels)

See attached table.

- d. Date operational (or planned to be operational)

See attached table.

- e. Type of financial arrangement/ownership model used (or assumed at this time). Please be sure to note who owns the RECs related to the system.

See attached table.

- f. Savings/payback assumed (i.e. annual energy cost savings and/or breakeven date on upfront costs from energy savings and REC sale). Please note the cost per kW hour obtained in power purchase agreements and how this compares to your typical cost per kW you pay from energy suppliers.

See attached table for savings.

- g. Name of Contractor used (if applicable)

See attached table.

- 6. Has your agency done an inventory of all of your facilities to determine where solar installations would be feasible and cost-effective? Please provide a summary of this inventory. (Each Agency)

Montgomery County conducted a review of its buildings and facilities to determine those that were most suitable for the installation of solar photovoltaic panels. DGS reviewed the age, size, condition, use, orientation to develop a list of the most appropriate projects.

The County's solar contractor then conducts a detailed analysis of the facility to determine structural suitability and cost effectiveness.

In situations where structural or condition concerns are identified on a project that would otherwise be an excellent project; the County has an independent engineering firm review the facility to determine if it is suitable for solar. The firm also provides recommendations for repairs/adjustments that may make the facility suitable.

This process is repeated as new facilities are designed, acquired, re-roofed or renovated.

7. How does your agency make decisions regarding moving forward with solar installations at particular sites? (Each Agency)

The County moves forward with that are where solar photovoltaic systems will be effective and financially viable for the expected life of both the system and facility.

8. What options are there for building agency-owned solar arrays instead of using a PPA model (i.e. potential for financing outside of spending affordability that would be covered by future utility savings)

Power Purchase Agreements (PPAs) provide the County multiple advantages over other sources of finance. Under a PPA a third party designs, finances, builds, maintains and owns the solar project for a period of 20 to 25 years, the County purchases the electricity generated by the system. The PPA allows the County to benefit from federal tax credits that are available to private entities, reducing the cost per kWh paid by the County. Under a PPA, the third party owner of the system is responsible for maintenance of the system. Payment is based on the actual production ensuring the County only pays for the electricity delivered and incentivizing the vendor to ensure maximum generation. The PPA also shifts County electricity purchases from the utility to the PPA vendor, minimizing the impact to debt capacity.

DGS has evaluated options to purchase systems using capital funds, however the costs are likely to be more as we will not benefit from tax credits and using capital funds could impact County debt capacity.

9. (Each Agency) Do you design new facilities and major facility renovations to:  
a. include solar installations?

Yes, solar photovoltaic systems are considered as part of County projects. During the design process, DGS evaluates options to minimize the overall lifecycle cost of the facility. This review includes energy-efficiency and solar.

- b. be "solar ready" so that solar arrays could be easily added in the future?

The County is currently designing the Wheaton Community Recreation Center and Library to be "solar ready". The facility Designer and our Solar Power Purchase provider (SolarCity) have been coordinating on the design so when the facility is complete it will be ready to accommodate a solar project via PPA if cost-effective.

10. What are some recurring reasons why you have chosen not to pursue solar installations at particular facilities? (Each Agency)

DGS is installing solar on County facilities where appropriate and cost-effective. See criteria in question 7.

11. What are the challenges your agency faces when deciding if and where to plan future solar installations (i.e. vegetative roof potential and/or other swm requirements competing for rooftop/ground space, net-metering requirements, cost savings/payback, other)? (Each Agency)

The primary challenges for the County are the availability of appropriate facilities (see Question 7), decreasing solar incentives, and cost-effectiveness of potential projects. As projects get smaller, they become significantly less cost-effective.

The reduction in costs have been offset by other changes in the solar market. The largest impact has been the reduction in SREC value. financial investors in solar projects are requesting a larger return on investment on their funds which impacts the PPA rate the County receives.

12. What cost savings/payback criteria does your agency use to determine whether to move forward with a particular installation or a package of installations? (Each Agency)

The County typically moves forward with projects that are less costly per kWh using a power purchase agreement than the County's projected average per kWh rate from traditional energy suppliers are considered for installation. As part of the final decision, the County considers the risk to the facility (e.g., leaks from penetrations), funds needed to resolve existing issues that would prevent a solar installation, soft costs (third party engineering studies, and project management costs).

13. Please describe how the agencies are working together to make the decision-making process and the procurement of solar panels more streamlined and cost-effective. (Each Agency)

The agencies compare best practices via a committee of County Energy Managers, each agency can also ride the other public agency's contract.

**Montgomery County Department of General Services  
Solar PV Power Purchase Agreements**

Facility Name	Address	Vendor	PPA or County Owned	Operational date	Type	Number of Panels	Initial Capacity (KW-DC)	SREC Ownership	Current Annual Cost Avoidance
Shady Grove Transfer Station (Note 1)	16101 Frederick Road, Derwood, MD 20855	Sun Edison	PPA	FY08	Roof	1,248	280	County	Approximately \$20,000
Equipment Maintenance and Transit Operations Center (EMTOC) (Note 2)	16700 Crabbs Branch Wat, Rockville, MD 20855	Standard Solar - Subcontract	County Owned	FY13	Roof	Unknown	74	County	\$10,656
Montgomery County Circuit Court South Tower (Note 2)	50 Maryland Avenue	Standard Solar - Subcontract	County Owned	FY14	Roof	16	12	Vendor	\$1,728
New Liquor Warehouse	201 Edison Park, Gaithersburg, MD 20878	SolarCity	PPA	FY16	Roof	3672	1120	Vendor	\$83,997
Gaithersburg Library	18330 Montgomery Village Ave, Gaithersburg, MD 20879	SolarCity	PPA	FY16	Roof	720	220	Vendor	\$23,326
Rockville Library	21 Maryland Ave, Rockville, MD 20878	SolarCity	PPA	FY16	Roof	288	88	Vendor	\$7,926
Potomac Community Recreation Center	11315 Falls Road, Potomac, MD 20854	SolarCity	PPA	FY16	Roof	180	55	Vendor	\$3,553
UpCounty Regional Services Center	12900 Middlebrook Road, germantown, MD 20874	SolarCity	PPA	FY16	Roof	176	54	Vendor	\$3,559
Jane Lawton Community Recreation Center	4301 Willow Lane, Chevy Chase, MD 20815	SolarCity	PPA	FY16	Roof	134	41	Vendor	\$3,476
Silver Spring Civic Building	1 Veterans Plaza, Silver Spring, MD 20910	SolarCity	PPA	FY16	Roof	128	39	Vendor	\$3,095
KidStop Childcare Center	15910 Somersville Road, Rockville, MD 20855	SolarCity	PPA	FY16	Roof	TBD	31	Vendor	\$3,116
Montgomery County Correctional Facility	22880 Whelen Lane, Boyds, MD 20841	SolarCity	PPA	FY17	Ground and Roof	TBD	2083	Vendor	\$245,807

Holiday Park Senior Center	3950 Ferrara Drive, Wheaton, MD 20906	SolarCity	PPA	FY17	Canopy over Parking	-	351	Vendor	\$35,264
Fire Station #31	12100 Darnestown Rd, Gaiterhsburg, MD	SolarCity	PPA	FY17	Roof	120	41	Vendor	\$3,649
Council Office Building	101 Monroe Avenue, Rockville, MD 20850	SolarCity	PPA	FY17	Roof	102	42	Vendor	\$1,040
Oaks Landfill	6001 Olney Laytonsville Road, Laytonsville, MD 20882	SolarCity	PPA	FY17/FY18	Ground and Roof	TBD	5,000	County Starting Year 3	\$386,910

Notes:

1. SunEdison filed for bankruptcy protection in April 2016 and continues to operate under Chapter 11.
2. Montgomery County Circuit Court South Tower and EMTOC savings does not include the cost of debt financing embedded in the project.

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T&E Committee Worksession on Solar PV Installations  
November 10, 2016  
MCPS Response to Staff Packet Questions

Questions

1. Let me know who will be attending from your agency (Each Agency)

*Sean Gallagher, assistant director, Facilities Management; Shela Plank, energy program manager*

2. Please summarize the requirements in Bill 8-14 (Eric)
3. What is the status of the Executive Regulation that will implement Bill 8-14? (Eric)
4. What is the status of the SREC market and its impact on the viability of power purchase agreements (PPAs) going forward? (Eric)
5. Current and Planned Solar Installations (Each Agency) – *see attached table*
  - a. Please provide a list of your agency's solar installations (Please break out this information by existing systems, systems under construction, and systems planned for construction within the next two years). Please include the facility name and address (NOTE: a facility could be a building, a parking structure, a parking lot, and open space owned by the agency)
  - b. Please note the type of system (rooftop, canopy, ground mount)
  - c. Size of system (kW's and number of panels)
  - d. Date operational (or planned to be operational)
  - e. Type of financial arrangement/ownership model used (or assumed at this time). Please be sure to note who owns the RECs related to the system.
  - f. Savings/payback assumed (i.e. annual energy cost savings and/or breakeven date on upfront costs from energy savings and REC sale). Please note the cost per kW hour obtained in power purchase agreements and how this compares to your typical cost per kW you pay from energy suppliers.
  - g. Name of Contractor used (if applicable)
6. Has your agency done an inventory of all of your facilities to determine where solar installations would be feasible and cost-effective? Please provide a summary of this inventory. (Each Agency)

*MCPS develops a listing of the facilities/sites which meet the criteria as appropriate candidates for solar power purchase agreement (PPA) installations for inclusion in RFP solicitations. The PPA providers can elect to offer pricing proposals on various combinations of facilities/sites. After contract award, the PPA provider conducts a detailed evaluation to verify the feasibility of the proposed projects.*

7. How does your agency make decisions regarding moving forward with solar installations at particular sites? (Each Agency)

*Solar PV PPA solicitations have been developed when there are financial conditions that appear to make for successful projects. If the solicitation results in attractive proposals, a*

*selection is made and recommended to the Superintendent. Recommendations for contract award are reviewed and submitted by the Superintendent and approved by the Board of Education.*

8. What options are there for building agency-owned solar arrays instead of using a PPA model (i.e. potential for financing outside of spending affordability that would be covered by future utility savings)

*Because the PPA model has proven to have the potential to deliver successful projects, this has been the only project delivery model that MCPS has used for production-scale projects. There are significant greater up-front costs and staff requirements for other delivery models that have kept MCPS from attempting to use these other methods. The other options would involve agency owned and operated installations.*

9. (Each Agency) Do you design new facilities and major facility renovations to:
- a. include solar installations?
  - b. be "solar ready" so that solar arrays could be easily added in the future?

*Yes, Hallie Wells MS was identified as a new school that was suitable for a solar PV PPA installation. Building features primarily involving interior electric conduits were incorporated into the project to remove some of the exterior electrical runs that would otherwise been needed.*

*New construction projects are designed with the necessary structural design elements to support either solar PV arrays or vegetative roof systems. Chases are also incorporated in anticipation of the need for electrical circuit runs from the roof through the building.*

10. What are some recurring reasons why you have chosen not to pursue solar installations at particular facilities? (Each Agency)

*The factors that reduce the suitability of solar installations include:*

- *roof age*
- *roof configurations with incompatible features or equipment*
  - ♦ *vegetative roofs*
  - *extensive roof top equipment*
  - ♦ *architectural designs that create too much shading*
- *insufficient cost avoidance to offset the risk exposures that can make these projects financial liabilities*
- *uncertainty that a building will remain in use and in its current configuration for the next 20 years.*

11. What are the challenges your agency faces when deciding if and where to plan future solar installations (i.e. vegetative roof potential and/or other swm requirements competing for rooftop/ground space, net-metering requirements, cost savings/payback, other)? (Each Agency)

*Challenges include:*

- *suitable buildings and land*
- *majority of open roof space not encumbered with equipment or shading*
- *vegetative roofing systems*
- *roof age*
- *PPA rates and terms to produce enough cost avoidance to offset the risk that could result in making the project a liability.*

12. What cost savings/payback criteria does your agency use to determine whether to move forward with a particular installation or a package of installations? (Each Agency)

*PPA rates and terms to produce cost avoidance that will offset the risk that could result in making the project a liability.*

13. Please describe how the agencies are working together to make the decision-making process and the procurement of solar panels more streamlined and cost-effective. (Each Agency)

*The County agencies periodically meet to share information on the ongoing solar PV procurements and project implementations. This has allowed for each agency to learn from each other's experiences as well as the ability to ride the various procurement vehicles as appropriate.*

**Montgomery County Public Schools  
Solar PV Power Purchase Agreements**

Facility Name	Address	Operational date	Number of Panels	Initial Capacity (KW-DC)	Current Annual Cost Avoidance	Current energy supply rate	Contract Escalation factor	Notes
Clarksburg HS	22500 Wims Rd Clarksburg, MD 20871	2009	1,421	277	\$3,218	0.115	3%	Rooftop
Lakelands Park MS	1200 Main St Gaithersburg, MD 20878	2008	615	111	\$2,148	0.114	3%	Rooftop
College Gardens ES	1700 Yale Place Rockville, MD 20850	2009	405	77	\$1,249	0.116	3%	Rooftop
Richard Montgomery HS	250 Richard Montgomery Dr. Rockville, MD 20852	2009	567	109	\$2,433	0.112	3%	Rooftop
Francis Scott Key MS	910 Schindler Dr Silver Spring, MD 20903	2009	528	92	\$1,671	0.113	3%	Rooftop
Quince Orchard HS	15800 Quince Orchard Rd. Gaithersburg, MD 20878	2009	1,360	238	\$5,572	0.113	3%	Rooftop
Sargent Shriver ES	12518 Greenly Dr Silver Spring 20906	2009	528	93	\$1,436	0.112	3%	Rooftop
Parkland MS	4610 West Frankfort Dr Rockville, MD 20853	2009	864	151	\$2,167	0.113	3%	Rooftop
Watkins Mill HS	10301 Apple Ridge Road Gaithersburg MD 20879	2016	1,080	351	\$30,121	0.060	1%	Rooftop
Redland MS	6505 Muncaster Mill Road Gaithersburg, MD 20855	2015	1,170	380	\$32,578	0.060	1%	Rooftop
Sligo MS	1401 Dennis Avenue Silver Spring, MD 20902	2016	838	272	\$22,939	0.060	1%	Rooftop
Sherwood HS	300 Olney-Sandy Spring Road Sandy Springs, MD 20860	2016	1,851	601	\$57,382	0.060	1%	Rooftop
	<i>Subtotal - Completed Projects</i>		11,227	2,752	\$162,914			
Hallie Wells MS	11701 Little Seneca Parkway Clarksburg, MD 20871	Under contract		249		0.063	1%	Rooftop new school 2016
Roberto Clemente MS	18808 Waring Station Road Germantown, MD 20874	Under contract		312		0.063	1%	Rooftop
Fields Road ES	One School Drive Gaithersburg, MD 20878	Under contract		212		0.063	1%	Rooftop
Walt Whitman, HS	7100 Whittier Boulevard Bethesda, MD 20817	Under contract		300		0.063	1%	Rooftop
Boysd Farm	Croom Rd. Upper Marlboro, MD 20772	Under contract		2,670		0.052	1%	Ground mount
				<b>TOTAL</b>	<b>6,495</b>			

**Notes:**

1. All projects are owned by SunEdison or their assignees. Contracts are in the form of PPAs and the RECs are owned by SunEdison or their assignees.
2. SunEdison filed for bankruptcy protection in April 2016 and continues to operate under Chapter 11.
3. Electric supply rate is in the \$0.060 - \$0.065 range with a combined rate including LDC, taxes and surcharges of ~ \$0.120

T&E Committee Worksession on Solar PV Installations  
Washington Suburban Sanitary Commission  
Response to Staff Packet Questions  
11/10/2016

**Questions**

1. Let me know who will be attending from your agency (Each Agency)  
Rob Taylor will be attending the T&E Committee Meeting on November 10.
  
5. Current and Planned Solar Installations (Each Agency)
  - a. Please provide a list of your agency's solar installations (Please break out this information by existing systems, systems under construction, and systems planned for construction within the next two years). Please include the facility name and address (NOTE: a facility could be a building, a parking structure, a parking lot, and open space owned by the agency)
  - b. Please note the type of system (rooftop, canopy, ground mount)
  - c. Size of system (kW's and number of panels)
  - d. Date operational (or planned to be operational)
  - e. Type of financial arrangement/ownership model used (or assumed at this time). Please be sure to note who owns the RECs related to the system.
  - f. Savings/payback assumed (i.e. annual energy cost savings and/or breakeven date on upfront costs from energy savings and REC sale). Please note the cost per kW hour obtained in power purchase agreements and how this compares to your typical cost per kW you pay from energy suppliers.
  - g. Name of Contractor used (if applicable)

2 MWac ground mounted at Seneca WWTP (Gaithersburg), 2 MWac ground mounted at Western Branch WWTP (Upper Marlboro), both installed in Nov. 2013 by Standard Solar under a 20 year PPA. Owner is WGES. Total of 8500 modules at each site. Cost of solar power \$.075/kWh, escalated at 3%/yr. All components are "Buy American"

6. Has your agency done an inventory of all of your facilities to determine where solar installations would be feasible and cost-effective? Please provide a summary of this inventory. (Each Agency)

Yes. WSSC has inventoried all sites to determine feasibility of ground and/or roof mounted solar applications. The only sites with potential are Seneca WWTP (that is included in a planned new project), and Potomac WFP (that will be included with the Microgrid project once the Consent Decree project recommendation is approved by MDE).

7. How does your agency make decisions regarding moving forward with solar installations at particular sites? (Each Agency)

WSSC analyzes the REC market potential applicable to a PPA arrangement and also the available ground space (minimum of 10 acres or 1 MW). WSSC does not own a significant inventory of buildings that would be amenable to roof mounted solar installations.

8. What options are there for building agency-owned solar arrays instead of using a PPA model (i.e. potential for financing outside of spending affordability that would be covered by future utility savings)

There are significant options outside of a PPA; however WSSC would have to take responsibility for the ownership, maintenance and operation of the solar facilities which would increase the risk. The risks could be mitigated by subcontracting these functions.

9. (Each Agency) Do you design new facilities and major facility renovations to:  
a. include solar installations? b. be "solar ready" so that solar arrays could be easily added in the future?

No. Most of our new facilities are treatment plants or pumping stations.

10. What are some recurring reasons why you have chosen not to pursue solar installations at particular facilities? (Each Agency)

We are pursuing a new 6 MW solar project (Phase II) that was to be awarded last spring (2016) but has been temporarily put on hold due to the weakening of the REC market.

11. What are the challenges your agency faces when deciding if and where to plan future solar installations (i.e. vegetative roof potential and/or other swm requirements competing for rooftop/ground space, net-metering requirements, cost savings/payback, other)? (Each Agency)

The major challenges are the amount of ground space available (WSSC has a limited number of buildings in which to install roof mounted solar) and the fluctuations in the REC market.

12. What cost savings/payback criteria does your agency use to determine whether to move forward with a particular installation or a package of installations? (Each Agency)

WSSC will proceed with a typical solar project if the initial solar unit cost is equal to or less than the cost of conventional power.

13. Please describe how the agencies are working together to make the decision-making process and the procurement of solar panels more streamlined and cost-effective. (Each Agency)

Don't know of any collaborative effort as yet. Each individual installation is unique; don't think that there can be a universal contract that any agency could use.

14. Please provide any other information you think would be helpful for this T&E discussion.

WSSC plans to award our Solar Phase II (6 MWac) project next spring (2017) once the REC market recovers. This project will consist of an additional 2 MW at the Seneca WWTP and 4 MW at two leased sites in Prince George's County.

T&E Committee Worksession on Solar PV Installations  
Montgomery College  
Response to Staff Packet Questions  
11/10/2016

**Questions**

1. Let me know who will be attending from your agency (Each Agency)  
MW: Mike Whitcomb, Energy Manager and Maria Manfre, Utility Analyst
  
5. Current and Planned Solar Installations (Each Agency)
  - a. Please provide a list of your agency's solar installations (Please break out this information by existing systems, systems under construction, and systems planned for construction within the next two years). Please include the facility name and address (NOTE: a facility could be a building, a parking structure, a parking lot, and open space owned by the agency)
  - b. Please note the type of system (rooftop, canopy, ground mount)
  - c. Size of system (kW's and number of panels)
  - d. Date operational (or planned to be operational)
  - e. Type of financial arrangement/ownership model used (or assumed at this time). Please be sure to note who owns the RECs related to the system.
  - f. Savings/payback assumed (i.e. annual energy cost savings and/or breakeven date on upfront costs from energy savings and REC sale). Please note the cost per kW hour obtained in power purchase agreements and how this compares to your typical cost per kW you pay from energy suppliers.
  - g. Name of Contractor used (if applicable)  
MW: Please see attached summary table.
  
6. Has your agency done an inventory of all of your facilities to determine where solar installations would be feasible and cost-effective? Please provide a summary of this inventory. (Each Agency)  
MW: As part of the Utility Master Planning effort the College is currently discussing College-wide opportunities for solar PPAs with Solar City.
  
7. How does your agency make decisions regarding moving forward with solar installations at particular sites? (Each Agency)  
MW: The College generally evaluates solar for each building during the design phase and as part of the USGBC LEED Certification process. Depending upon the building budget and rooftop area available, solar is incorporated into the building's construction. At a minimum, a building's structure and electrical systems are designed to accept solar arrays in the future. As part of the Facility Master Planning and Utility Master Planning effort the College is currently discussing College-wide opportunities for solar PPAs with Solar City, see response to Question No. 6.
  
8. What options are there for building agency-owned solar arrays instead of using a PPA model (i.e. potential for financing outside of spending affordability that would be covered by future utility savings)

MW: The College owns and operates all of its solar arrays which are financed as part of a buildings construction budget.

9. (Each Agency) Do you design new facilities and major facility renovations to:

a. include solar installations?

MW: Yes, all new facilities are evaluated for solar as part of the USGBC LEED Certification process. Depending upon the building budget and rooftop area available, solar is incorporated into the building's construction.

b. be "solar ready" so that solar arrays could be easily added in the future?

MW: Yes, all new facilities are designed to at least be "solar ready"

10. What are some recurring reasons why you have chosen not to pursue solar installations at particular facilities? (Each Agency)

MW: Building construction budget is the primary reason for not installing solar on a particular building. In discussing the PPA options on a particular building with vendors, single rooftop arrays are not large enough to support a PPA project. This is why the College is now looking at the Facility Master Plans and Utility Master Plans and inviting input from Solar City to determine solar PPA potential College-wide.

11. What are the challenges your agency faces when deciding if and where to plan future solar installations (i.e. vegetative roof potential and/or other swm requirements competing for rooftop/ground space, net-metering requirements, cost savings/payback, other)? (Each Agency)

MW: The primary challenge faced by the College when deciding if and where to plan for future solar installation is competing requirements for roof-top and ground space. Roof-top real estate is limited because the College designs buildings with a reduced footprint. This limited roof-top real estate must then be shared with storm water management features(vegetative green roofs) and roof-top air handling units, thus limiting the available footprint for a solar array. Existing roof-top real estate on long span structures such as Physical Education facilities have limited structural strength to support the additional weight of a solar array and must be evaluated by a structural engineer. The age and condition of the roof are also factors that must be considered when evaluating placement of a solar array. Ground space in open areas(ground mounts) or parking lots(canopy mounts) also competes for limited real estate and must be coordinated with the Facilities Master Plans and Utilities Master Plans. As indicated in Question 6, the College is in discussions with Solar City to investigate the College-wide potential for PPA.

12. What cost savings/payback criteria does your agency use to determine whether to move forward with a particular installation or a package of installations? (Each Agency)

MW: The College generally evaluates solar potential during new and renovated building design and incorporates it into its design documents if the building budget will allow, otherwise it designs "solar ready" for future addition. The College incorporates PV into the building design in order to obtain credit for mandatory certification under the USGBC LEED rating system rather than evaluating based upon cost savings/payback.

13. Please describe how the agencies are working together to make the decision-making process and the procurement of solar panels more streamlined and cost-effective. (Each Agency)

MW: The College participates with other agency members on the Interagency Committee on Energy and Utility Management(ICEUM), sharing information and contracts. MCPS had a PPA contract with Sun Edison but it is in jeopardy due to Sun Edison's bankruptcy, while the Montgomery County Department of General Services(DGS) has a competitively bid contract with Solar City which the College tends to bridge should the Utility Master Plan evaluation prove that College-wide PPA projects are viable.

14. Please provide any other information you think would be helpful for this T&E discussion.  
MW: No additional information.

**Montgomery College  
Renewable Energy  
Site Generation Facilities  
November 2016**

Campus	Building	Year Installed	Solar Array Type	Location of System	Building Load	Status	Ownership	Name of Contractor	Initial Cost	Estimated Annual Electrical/ Energy Cost Savings	Payback	Comments
Germantown	Science and Applied Studies	1978	224 Flat Plate Thermal Panels	Roof Top	Thermal Source for WSHP & DHW	Decommissioned 1998	College	Unknown	Unknown	Unknown	Unknown	Constructed as part of the original building(Late 1970s-Early 1980s) and reached the end of useful life.
Germantown	Humanities & Social Sciences	1978	282 Flat Plate Thermal Panels	Roof Top	Thermal Source for WSHP, DHW, & Swimming Pool	Decommissioned 2000	College	Unknown	Unknown	Unknown	Unknown	Constructed as part of the original building(Late 1970s-Early 1980s) and reached the end of useful life
Germantown	Science and Applied Studies	1998/2016	26 kW Photovoltaic. Future Space for 100 kW	Roof Top	Building Electrical Grid	Decommissioned 2016 as part of the renovation of building. Structure for future.	College	Unknown	Approx. \$150,000	46,000 kWh /\$6516.00	23 years	The 1998 PV array replaced original thermal array but has reached the end of useful life. Renovated building has structure for future PV array.
Germantown	Humanities & Social Sciences	2000	24 kW Photovoltaic & 900 Evacuated Tube Thermal	Roof Top	Building Electrical Grid, Thermal Source for WSHP, DHW, & Swimming Pool	Decommissioned 2015, both arrays reached the end of useful life. Re-evaluating replacement options.	College	Unknown	\$130,000	50,000 kWh /\$6000.00	22 years	Replaced 3/4 of original thermal array with PV & converted remainder to evacuated tube in 2000. Currently evaluating installation of 70-100 kW of new PV.
Takoma Park /Silver Spring	Heath Sciences	2004	33 kW Photovoltaic	Roof Top	Building Electrical Grid	Operational	College	Unknown	TBD	64,000 kWh /\$8300.00	>15 years	Struck by lightning in 2008, replaced multiple PV panels and 3 Inverters.
Rockville	Science Center	2012	25 kW Photovoltaic	Roof Top	Building Electrical Grid	Operational	College	TBD	TBD	48,000 kWh /\$6,000.00	>10 years	LEED Gold Awarded. This is a Science, Engineering and Math Building. PV contributed to LEED rating and is part of Academic programs.
Rockville	Science East	2013	20 kW Photovoltaic	Roof Top	Building Electrical Grid	Operational	College	TBD	TBD	38,000 kWh /\$5,000.00	>10 years	LEED Gold Awarded. PV represents approximately 2% of the building electrical.
Germantown	Biosciences Education Center	2014	35 kW Potovoltaic & 6 kW Wind Turbines	Roof Top/Ground Mount	Building Electrical Grid	Operational	College/RECs or Future PPA	Solar City	TBD	67,000 kWh /\$9,000.00	>10 years	LEED Gold Awarded. Additional rack space available for system expansion. Potential for 200-400 kW ground mount expansion.
Rockville	Science West	2016	20 kW Photovoltaic	Roof Top	Building Electrical Grid	Building Under Construction, Spring 2017 Opening	College/RECs	TBD	TBD	38,000 kWh /\$5,000.00	>10 years	LEED Gold Application. PV represents approximately 2% of the building electrical.
Rockville	North Garage	2016	Future space for up to 100 kW	Canopy on Upper Deck	Building Electrical Grid	Building Under Construction	PPA	Solar City	TBD	TBD	TBD	LEED For Garages Application. Building Under Construction. Structure and electrical designed to accept future canopy array. PPA with Solar City under discussion.
Rockville	Student Services	2018	Future space for up to 100 kW	Roof Top	Building Electrical Grid	Building Under Construction	PPA	Solar City	TBD	TBD	TBD	LEED Building Out for Bid. Structure and electrical designed to accept future canopy array. PPA with Solar City under discussion.
College-wide	All	TBD	PV Array TBD	Roof Top, Ground Mount, Canopy or Off-site TBD	Building Electrical Grid	Utility Master Plan Update to determine College-wide solar opportunity using PPA	PPA	Solar City	TBD	TBD	TBD	As follow-up to the 2013-2023 Facilities Master Plan, the Utility Master Plan is examining potential for Solar PPA College-wide.

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Council Staff Questions  
Installation of Solar Systems for County Agency Facilities  
Agency Response to Questions

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M-NCPPC Montgomery County  
Department of Planning  
Department of Parks

T&E Committee Questions and Responses for the November 10 at 9:30 AM (7<sup>th</sup> Floor Hearing Room) to discuss the installation of solar panels at county agency facilities.

**1. Let me know who will be attending from your agency (Each Agency)**

M-NCPPC Attendees are: James Poore, Division Chief, Facilities Management Division; Amanda Aparicio, Environmental Sustainability Coordinator, Facilities Management Division; Richard Anderson, Energy Coordinator, CQI Associates

**5. Current and Planned Solar Installations (Each Agency)**

- a. Please provide a list of your agency's solar installations (Please break out this information by existing systems, systems under construction, and systems planned for construction within the next two years). Please include the facility name and address (NOTE: a facility could be a building, a parking structure, a parking lot, and open space owned by the agency)

Current Solar Installations (Each Agency): M-NCPPC currently has limited deployment of solar infrastructure consisting of evacuated solar tube collectors that are primarily used for water heating at three facilities. Solar PV technology is used to service individual assets such as call boxes, access controls and remote communications locations.

Planned Solar Installations (Each Agency): M-NCPPC conducted a formal solicitation to develop two solar systems on sites determined feasible based on the assessment conducted and addressed in the response to question 6. The locations proposed are:

South Germantown Regional Park  
18041 Central Park Circle, Boyds, MD 20841



Rock Creek Regional Park  
6700 Needwood Road, Derwood, MD 20855



A Power Purchase Agreement was signed for Maryland-National Capital Park and Planning Commission ("Purchaser") on September 28, 2015, with SunEdison Origination 1, LLC ("SunEdison").

The Agreement specified Sun Edison would contract with Standard Solar to develop, permit, engineer, construct, and operate the solar systems at the M-NCPPC sites and to provide electricity generated by a solar photovoltaic system.

The Agreement specified Sun Edison would provide financing and pay for the solar system development, engineering, construction, operation, and maintenance for 20 years. The solar developer would retain all of the project financial, tax, depreciation, and environmental benefits. The solar developer would have the rights to the Solar Renewal Energy Certificates.

Work began on the development project, led by Standard Solar, with the first project meetings held on September 28, 2015 for the Montgomery County Projects.

On November 20, 2015, the stock of Sun Edison went from \$33.45 to \$3.02 per share due to concerns by investors regarding the total outstanding debt based on recent acquisitions. Sun Edison declared bankruptcy. The Agreement was transferred to Standard Solar and negotiations for final contract terms and conditions are underway.

The goal is to finalize negotiations and commence construction in 2017 with commercial operation of the two systems by December 2017.

Park	Utility	System Type	Area Available Acres	Size kW	kWh Annual Production	Cost Benefit Year One
South Germantown Regional Park	Potomac Edison	Ground Mount	5.68	1,340	1,867,000	\$64,000
Rock Creek Regional Park	Potomac Edison	Ground Mount	5.02	1,160	1,619,000	\$55,000

<b>Annual Reduction Equivalent Data</b>				
<b>Park</b>	<b>Annual Greenhouse Gas Reduction Metric Tons</b>	<b>Passenger Vehicles</b>	<b>Homes</b>	<b>Acres of Forest</b>
<b>South Germantown Regional Park</b>	1,298	273	118	1,064
<b>Rock Creek Regional Park</b>	1,146	241	105	940

**6. Has your agency done an inventory of all of your facilities to determine where solar installations would be feasible and cost-effective? Please provide a summary of this inventory. (Each Agency)**

M-NCPPC conducted a comprehensive assessment of potential project locations to determine the feasibility of installing solar.

The Assessment was the culmination of a 10 month study involving:

- Park Planning and Stewardship
- Horticulture Forestry and Environmental Education
- Park Development
- Northern and Southern Region
- Facilities Management
- Department of Planning

Staff contacted current solar users from public and private sectors, conducted site visits, and worked closely with the commission’s energy consultant.

The assessment analyzed Park sites for the suitability to install solar systems as follows:

- 135 initial candidate Park Sites
- Geographic Information Systems Analysis using site selection criteria
- Short List of sites (35)
- Recommended list of sites (2)

The sites were field reviewed by Park Planners, Park Managers, and subject matter experts using an assessment process.

Each site was evaluated to determine which solar technology would be applicable to include roof mounted systems, parking canopy mounted systems, and ground mounted systems.

The list of site locations and the applicable solar technology recommended for initial development are:

Park	Utility	System Type	Area Available Acres	Size kW
South Germantown Regional Park	PEPCO	Ground Mount	5.68	1,340
Rock Creek Regional Park	PEPCO	Ground Mount	5.02	1,160

Parking canopy mounted systems are feasible at the South Germantown Regional Park and will be considered in the future for development:

Park	Utility	System Type	Area Available Acres	Size kW
<b>South Germantown Regional Park</b>				
Lot By Entrance/Washington Nationals Park	PEPCO	Parking Canopy	1.35	280
Lot by Picnic Area	PEPCO	Parking Canopy	1.07	220
Lot by Children's Playground	PEPCO	Parking Canopy	1.59	330
		<b>Total</b>	<b>4.01</b>	<b>830</b>

**7. How does your agency make decisions regarding moving forward with solar installations at particular sites? (Each Agency)**

M-NCPPC's assessment criteria were to effectively utilize solar technology to:

- reduce the Commission's energy cost
- reduce carbon footprint and associated environmental impacts
- aid in the development of local emerging solar industry
- protect agriculture land, forests, and stream beds

**8. What options are there for building agency-owned solar arrays instead of using a PPA model (i.e. potential for financing outside of spending affordability that would be covered by future utility savings?)**

The M-NCPPC options are limited for development of net meter solar systems based on agency financed and owned system. The PPA was determined to be the best option given the current Federal Tax and Depreciation incentives.

**9. (Each Agency) Do you design new facilities and major facility renovations to:**

- a. include solar installations?
- b. be "solar ready" so that solar arrays could be easily added in the future?

M-NCPPC reviews all options for renewable energy including solar for new facilities and major renovations. The typical size of the Parks projects has yet to identify a candidate for a solar installation.

**10. What are some recurring reasons why you have chosen not to pursue solar installations at particular facilities? (Each Agency)**

Land use restrictions - agricultural land, forests, and sensitive areas like stream and wetland buffers.

**11. What are the challenges your agency faces when deciding if and where to plan future solar installations (i.e. vegetative roof potential and/or other swm requirements competing for rooftop/ground space, net-metering requirements, cost savings/payback, other)? (Each Agency)**

Due to the typical size and environmental settings of the Parks facilities, roof top mounted technology has not been deemed financially viable. Viable ground round mounted and parking canopy solar system sites have been identified.

**12. What cost savings/payback criteria does your agency use to determine whether to move forward with a particular installation or a package of installations? (Each Agency)**

The proposed project should show a positive cash flow in year one given the potential cost pass thru of savings resulting from the current Federal Tax and Depreciation Incentives as a pass thru from a third party financier using a PPA Agreement.

**13. Please describe how the agencies are working together to make the decision-making process and the procurement of solar panels more streamlined and cost-effective. (Each Agency)**

The discussions at the quarterly Energy Managers meeting (ICEUM Committee Members) has promoted potential collaborative efforts.

**14. Please provide any other information you think would be helpful for this T&E discussion.**

The significant change in the value of Solar Renewable Energy Certificates has resulted in price adjustments for PPA Agreements which have slowed the development of projects. The value in December 2016 was \$128 per MW. The current value is \$23 per MW. The value would need to exceed \$50 per MW to permit projects to commence at PPA rates to be considered competitive.