

# STEP ONE: SITE VISITS

EXPANDING SOLAR PORTFOLIO



Site Visits were conducted in November and December 2015

Each visit was documented the following:

Height/No. of floors

Roof Age and Condition

Roof Size

Electricity Consumption and Main Electrical Panel Location

Roof Access and Any Roof Obstructions

1707 L Street NW, Washington, D.C.  
Roof Survey 11-2-15



- 10 Floors plus Penthouse on Roof
- Roof Age: 2000
- Roof Type: IRMA
- Roof Size: 10,500 SF
- 2014 Electricity Consumption: 1,400,222 kWh
- No Guard Rails on Lower Roof Level so tours would be an issue
- Lower roof solar installation would be difficult due to window washing tie-off access
- Solar install on penthouse roof would work but no visibility
- Main Electric Meter on P1 level



# STEP TWO: SOLAR COMPANY INITIAL RESEARCH

EXPANDING SOLAR PORTFOLIO



Initial industry research centered around finding area solar companies:

Which companies excel at large vs. small projects

Companies that provide integrated installation and warranty support

Companies that offer direct purchasing and/or other ownership arrangements

Allows TTC tax credit and financial incentive maximization



# STEP THREE: SOLAR COMPANY INTERVIEWS

EXPANDING SOLAR PORTFOLIO



Following Initial Research, project review meetings, solar company recommendations are based on how well each individual matches up with each project.

Prospect Solar ideal for The Blair House solar project:

- New subsidiary of a company that has history with TTC
- Prospect Solar has roots in commercial building construction
- Perfect for The Blair House as window washing anchors need to be installed without impact solar panel footprint, all work accomplished under one contract

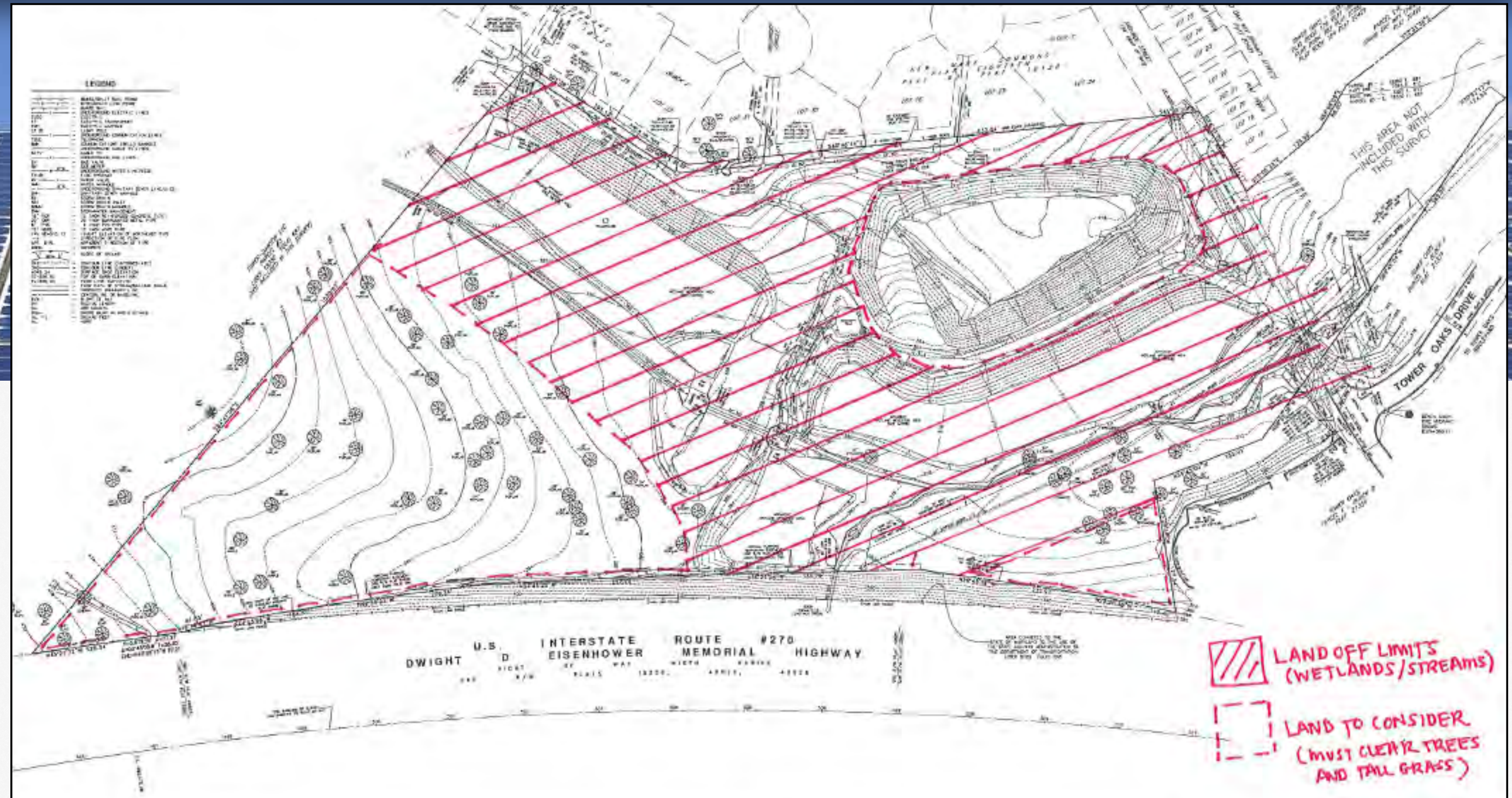


# STEP THREE: SOLAR COMPANY/PROJECT SELECTION

EXPANDING SOLAR PORTFOLIO



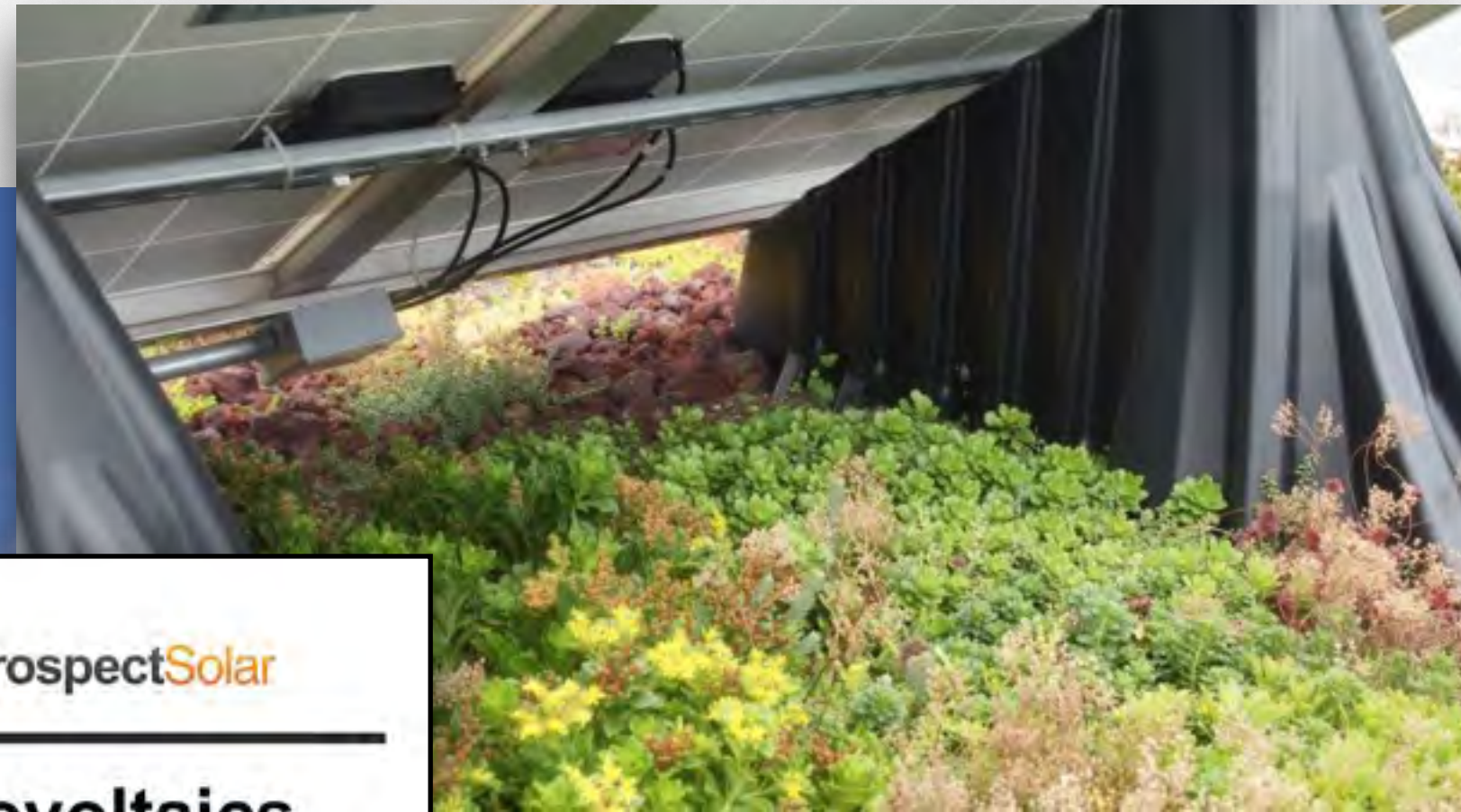
Traditional Solar, prefer larger projects  
 Large Field owned by TTC  
 Direct Purchase Solar System  
 Project on-hold until clearance obtained  
 from company partnerships





# STEP THREE: SOLAR COMPANY INTERVIEWS

EXPANDING SOLAR PORTFOLIO



## Green Roof

**Advantages of Green Roofs**

- Reduced building heat envelopes mitigating Urban "Heat Island" Effect
- Green roofs reduce HVAC bills and allows for solar to increase energy offset
- Vegetative roofs can retain 50-95% of rainfall avoiding storm water runoff
- Reduces the amount of impervious surfaces in a city
- As natural biofiltration devices, green roofs remove airborne toxins and re-oxygenate air; water retention allows for filtration of pollutants
- Green roofs can reduce the noise levels of a facility by as much as 40%
- Extended roof life can be possible due to moderation of temperature swings

**Green Roof Construction**

Green roofs are typically installed on an Inverted Roof Membrane Assembly (IRMA) roofing system. Sometimes referred to as a Protected Roofing Membrane Assembly, this system places the waterproof membrane directly on the roof substrate (decking), and then uses a protective foam layer above it to prevent puncture of the waterproofing layer. Once the IRMA

## GRIPV Integrated

GRIPV systems combine the advantages of Green Roofs and Solar with additional symbiotic benefits:

- Warmth from solar panels provides plants a longer growing season
- GRIPV systems can increase solar production by as much as 10%
- LEED Points are awarded for both energy efficiency systems

The solar modules are physically connected to the green roof through ballasted mounting systems such as the SunRoof system from Green Roof Technologies.

With this setup, the weight of the growing medium and plants provide the weight needed to secure the solar array to the roof.

## Photovoltaics

**Advantages of Solar Energy Systems**

- Reduces your building's monthly energy costs (lowers overhead for businesses)
- Increases the property value of your home or business
- Solar energy system equipment & installation qualifies for a 30% Federal Tax Credit
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- Insulates against rising energy costs over the next 25 years
- Solar's environmental contribution mitigates the effects of carbon dioxide, nitrous oxide, and harmful airborne particulates
- Solar energy provides a clean and renewable resource
- Businesses can take advantage of green-branding and positive community image

**Example of Solar Energy's Environmental Contribution**

A 100kW Solar Energy System, over the next 25 years would offset the equivalent of:

- 6,826,813 lbs. of Carbon Dioxide (Greenhouse Gas)
- 21,907 lbs. of Nitrous Oxide (Smog)

Prospect Solar also recommended for The Pearl  
 Unique integration of Green Roof and Solar Panels  
 Special Stormwater Permit variance required from Montgomery County  
 Most green roof interference must be 7 feet away



# THE PEARL: PROJECT DETAILS

THE TOWER COMPANIES: 2016 SOLAR PROJECTS



- System Size: 3.4 kW
- Panels: 327 W, Sun Root Integration
- Solar Generation: 4,562 kWh, 0.6%



- Hard Cost: \$14,280
- Soft Cost (Permit Variance): \$5000
- Total Cost: \$19,280



- Federal Tax Credit: \$5,784
- Payback: ~8 Years with DC SRECs
- Payback: 14 Years with MD SRECs



# EXAMPLE PRO FORMA: BREAKDOWN

THE TOWER COMPANIES: 2016 SOLAR PROJECTS

Initial Capital Investment		Energy Consumption & Generation		Assumptions		Return on Investment Analysis			
Approx. System Size (kW) using 280 W SUNIVA Panels	3.4	Estimated Annual Energy Consumption (kWh): The estimated annual consumption is 3,578,310 kWh. The energy rate in the Energy model by Integral was \$0.1499 / kWh, so \$536,388 annual electricity billing. The approximate common area usage is 736,000 kWh, so 20.5% / \$110,326. (Reference LEED Online)	736,000	Electricity Cost (Fully Loaded)	\$ 0.124	Simple Payback (after tax)	8 years	assuming \$5,000 soft costs	
Total Hard Costs (Paid to Solar Company)	\$ 14,280.00			Electricity Rate Inflation	3%	IRR after 20 years	6.59%	assuming \$5,000 soft costs	
Total Soft Costs for County Approvals	\$ 5,000.00			Annual Solar Degredation	0.7%				
Total Project Cost	\$ 19,280.00			Annual Solar Array Energy Production (kWh) (system size x 3.5hrs x 365 days/year or system size x site factor)	4,562	Tax Rate	42%		
Approx. Cost per W	\$ 4.25			% Energy Offset by Solar	0.6%				

Year No.	Year	Project Cost	Annual Electricity Generation (kwh)	Electricity Rate
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Electricity Savings (Avoided Cost) - Assume \$0.1240/kWh w/ 3% inflation	DC SACP (Penalty) Schedule (per MWh) Assume \$50 from 2023 and beyond	DC SREC Sales - Assume 3 (\$350)-7(\$75) Year Combo from Sol Systems (1 SREC = 1 MWh)	Total Avoided Electricity Costs & SREC Revenue	Cost of Revenue (SREC processing, 2% of Sales)	O&M Expenses	Total Expenses	Net Earnings/Savings Before Taxes & Depreciation
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Accelerated Depreciation (up to 85% over 6 years)	Net Earnings Before Taxes	Tax Savings/Deficit (from net earnings before taxes)	Investment Tax Credit (30%)	Annual Savings (Includes Electricity Avoidance and Tax Savings/Deficit)	Cummulative Cash Flow	Payback (Cummulative % Return)
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# EXAMPLE PRO FORMA: THE PEARL

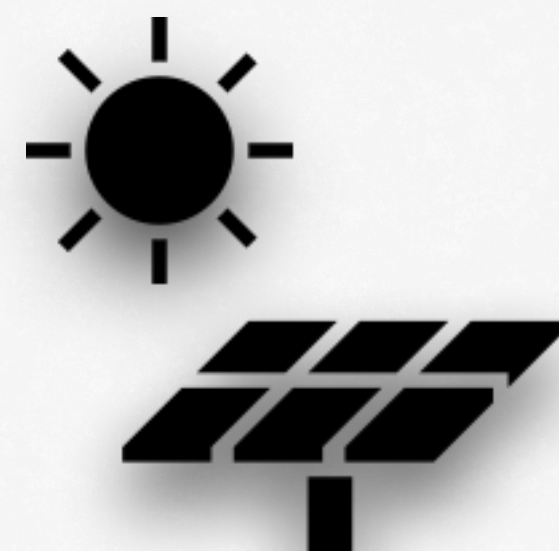
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0	2016	\$ (19,280.00)															(\$19,078.40)	(\$19,078.40)	
1	2017		4,562.21	0.124	\$566	\$500	\$1,597	\$2,162	(\$32)	included	(\$32)	\$2,131	(\$9,833)	(\$7,702)	\$3,235	\$5,784	\$11,149	(\$7,929)	58%
2	2018		4,530.27	0.128	\$579	\$350	\$1,586	\$2,164	(\$33)	included	(\$33)	\$2,131	(\$2,622)	(\$491)	\$206		\$2,337	(\$5,592)	71%
3	2019		4,498.56	0.132	\$592	\$300	\$1,574	\$2,166	(\$34)	included	(\$34)	\$2,132	(\$1,573)	\$559	(\$235)		\$1,897	(\$3,694)	81%
4	2020		4,467.07	0.135	\$605	\$200	\$335	\$940	(\$35)	included	(\$35)	\$905	(\$944)	(\$39)	\$16		\$921	(\$2,773)	85%
5	2021		4,435.80	0.140	\$619	\$200	\$333	\$952	(\$37)	included	(\$37)	\$915	(\$944)	(\$29)	\$12		\$927	(\$1,846)	90%
6	2022		4,404.75	0.144	\$633	\$150	\$330	\$964	(\$38)	included	(\$38)	\$926	(\$472)	\$454	(\$191)		\$735	(\$1,111)	94%
7	2023		4,373.92	0.148	\$648	\$150	\$328	\$976	(\$39)	included	(\$39)	\$936	\$0	\$936	(\$393)		\$543	(\$567)	97%
8	2024		4,343.30	0.153	\$662	\$50	\$326	\$988	(\$41)	included	(\$41)	\$947	\$0	\$947	(\$398)		\$550	(\$18)	100%
9	2025		4,312.90	0.157	\$677	\$50	\$323	\$1,001	(\$42)	included	(\$42)	\$959	\$0	\$959	(\$403)		\$556	\$538	103%
10	2026		4,282.71	0.162	\$693	\$50	\$321	\$1,014	(\$44)	included	(\$44)	\$971	\$0	\$971	(\$408)		\$563	\$1,101	106%
11	2027		4,252.73	0.167	\$709	\$50	\$106	\$815	(\$45)	included	(\$45)	\$770	\$0	\$770	(\$323)		\$447	\$1,548	108%
12	2028		4,222.96	0.172	\$725	\$50	\$106	\$830	(\$47)	included	(\$47)	\$784	\$0	\$784	(\$329)		\$455	\$2,002	110%
13	2029		4,193.40	0.177	\$741	\$50	\$105	\$846	(\$48)	included	(\$48)	\$798	\$0	\$798	(\$335)		\$463	\$2,465	113%
14	2030		4,164.04	0.182	\$758	\$50	\$104	\$862	(\$50)	included	(\$50)	\$812	\$0	\$812	(\$341)		\$471	\$2,936	115%
15	2031		4,134.90	0.188	\$776	\$50	\$103	\$879	(\$52)	included	(\$52)	\$827	\$0	\$827	(\$347)		\$480	\$3,416	118%
16	2032		4,105.95	0.193	\$793	\$50	\$103	\$896	(\$54)	included	(\$54)	\$842	\$0	\$842	(\$354)		\$489	\$3,905	120%
17	2033		4,077.21	0.199	\$811	\$50	\$102	\$913	(\$55)	included	(\$55)	\$858	\$0	\$858	(\$360)		\$498	\$4,402	123%
18	2034		4,048.67	0.205	\$830	\$50	\$101	\$931	(\$57)	included	(\$57)	\$874	\$0	\$874	(\$367)		\$507	\$4,909	126%
19	2035		4,020.33	0.211	\$849	\$50	\$101	\$949	(\$59)	included	(\$59)	\$890	\$0	\$890	(\$374)		\$516	\$5,425	128%
20	2036		3,992.19	0.217	\$868	\$50	\$100	\$968	(\$61)	included	(\$61)	\$906	\$0	\$906	(\$381)		\$526	\$5,951	131%
Totals		(\$19,280.00)	\$ 85,423.85		\$14,134		\$8,084	\$22,217	(\$903)	included	(\$903)	\$21,314	(\$16,388)	\$4,926	(\$2,069)	\$5,784	\$25,029		

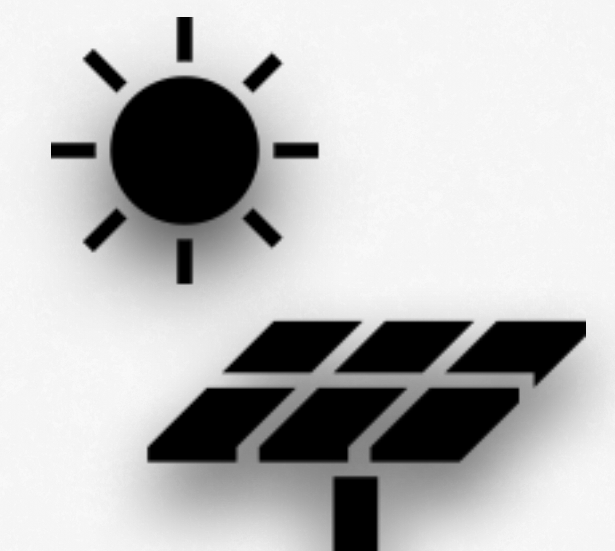


# STEP FOUR: SOLAR CO. SELECTION & INSTALLATION

EXPANDING SOLAR PORTFOLIO



Projected Start Dates:  
The Pearl: Summer/Fall 2016  
The Blair House: Q4 2016 (proposed status)  
The Tower I Field: 2017 (proposed status)





A black sun icon with rays, positioned above a grey rectangular box containing the word "QUESTIONS?".

**QUESTIONS?**

**THE TOWER COMPANIES: SOLAR POWER PORTFOLIO EXPANSION**





# THE BLAIR HOUSE: PROJECT DETAILS

THE TOWER COMPANIES: 2016 SOLAR PROJECTS



- System Size: 103 kW with 5 degree tilt
- Panels: 327 W, Ballasted
- Solar Generation: 124,156 kWh, 6.5%



- Cost: \$340,000
- Required Roof Anchor Installation:
- Anchor Design: \$3,225
  - Installation: \$45,000
  - Roof Repair: \$35,000
  - Total Cost = \$80,000



- MEA Grant: \$6,000
- Federal Tax Credit: \$101,953
- Annual Energy Savings: \$15,000
- Total SREC Sales: \$132,378
- Total Depreciation: \$84,324
- Payback: ~ 6 Years with DC SRECs



# TOWER 1 FIELD: PROJECT DETAILS

THE TOWER COMPANIES: 2016 SOLAR PROJECTS



- System Size: 4 kW
- Panels: 327 W, Sun Root Integration
- Solar Generation: 5,290 kWh, 0.2%



- Cost: \$19,239
- Permit Variance: \$5000



- MEA Grant: \$240
- Federal Tax Credit: \$5,772
- Annual Energy Savings: \$650
- Total SREC Sales: \$2500
- Total Depreciation: \$5306
- Payback: < 11 Years with DC SRECs