

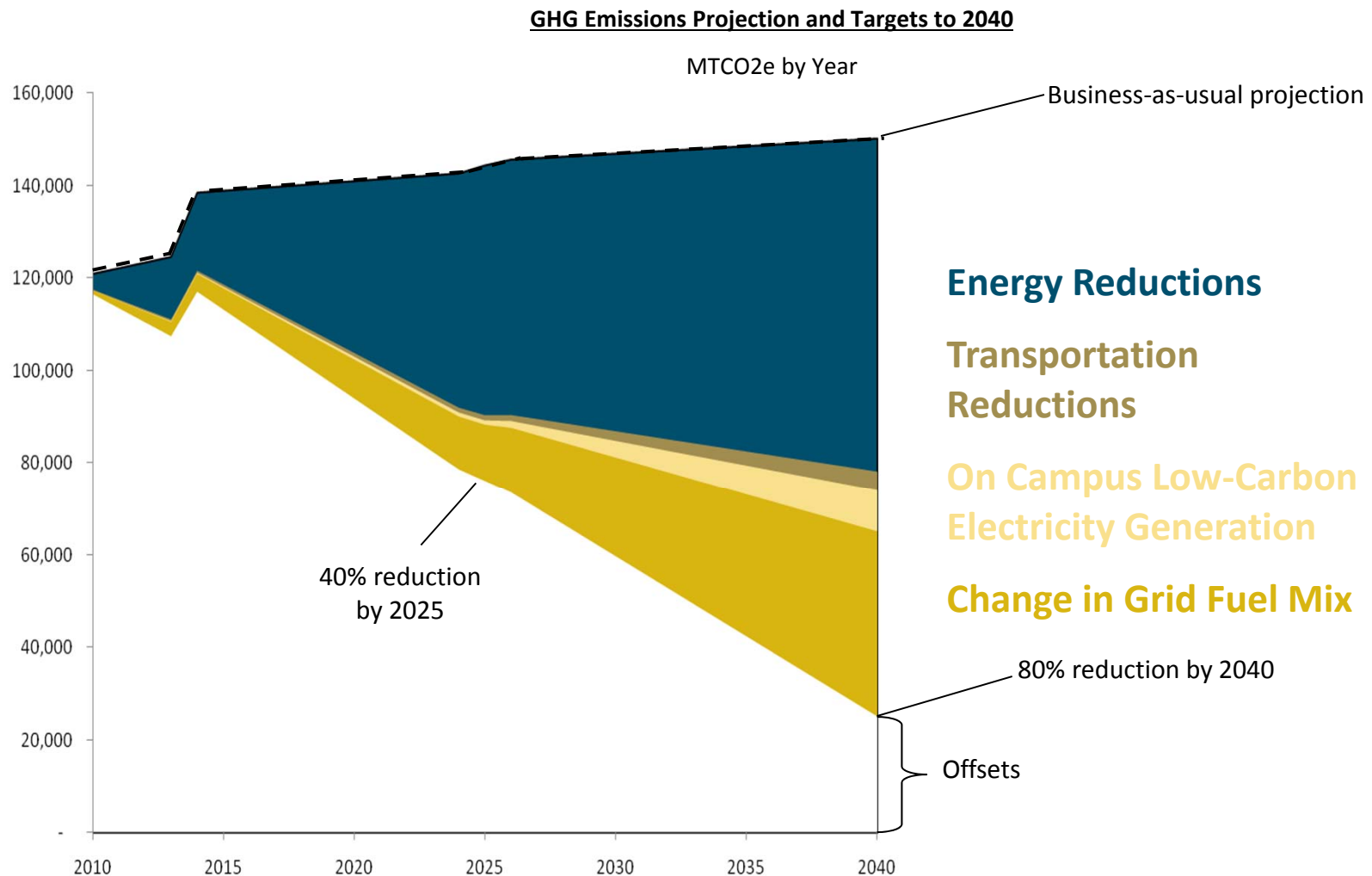
# Procuring Offsite Solar Power to Meet Climate Action Plan Goals at The George Washington University

Doug Spengel  
February 12, 2015

# Agenda

- Climate Action Plan (CAP) Goals
  - Electric Sources
  - Renewable Energy Deal Structures
- Power Purchase Agreement (PPA) Project Overview
  - PJM Interconnection
  - Desired Outcome, RFP, and Solar Solution Value
  - Project Participants
  - First Site Photos and Production Data
- Key Challenges and Barriers
- Conclusions and Recommendations

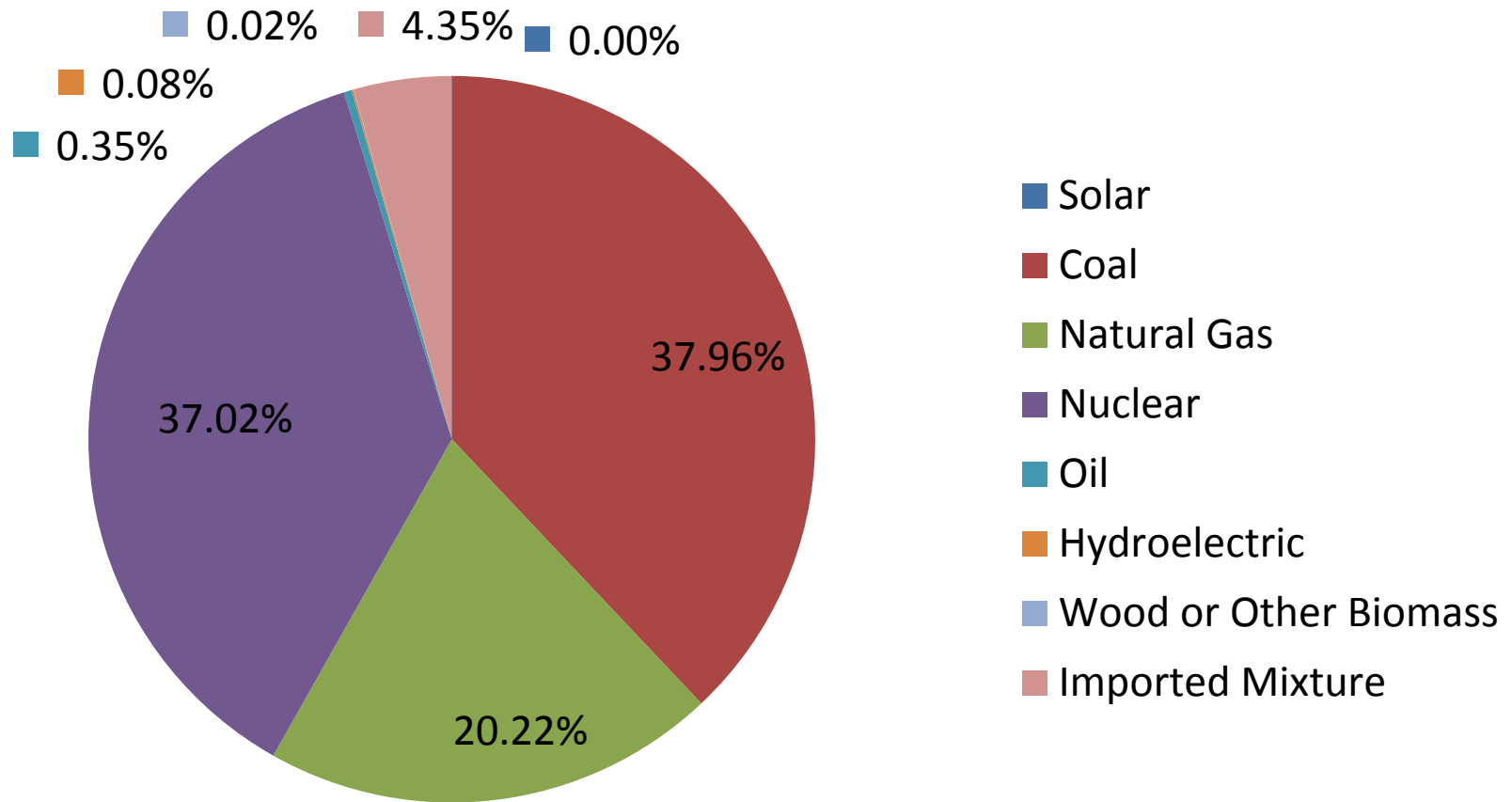
# Climate Action Plan Goals



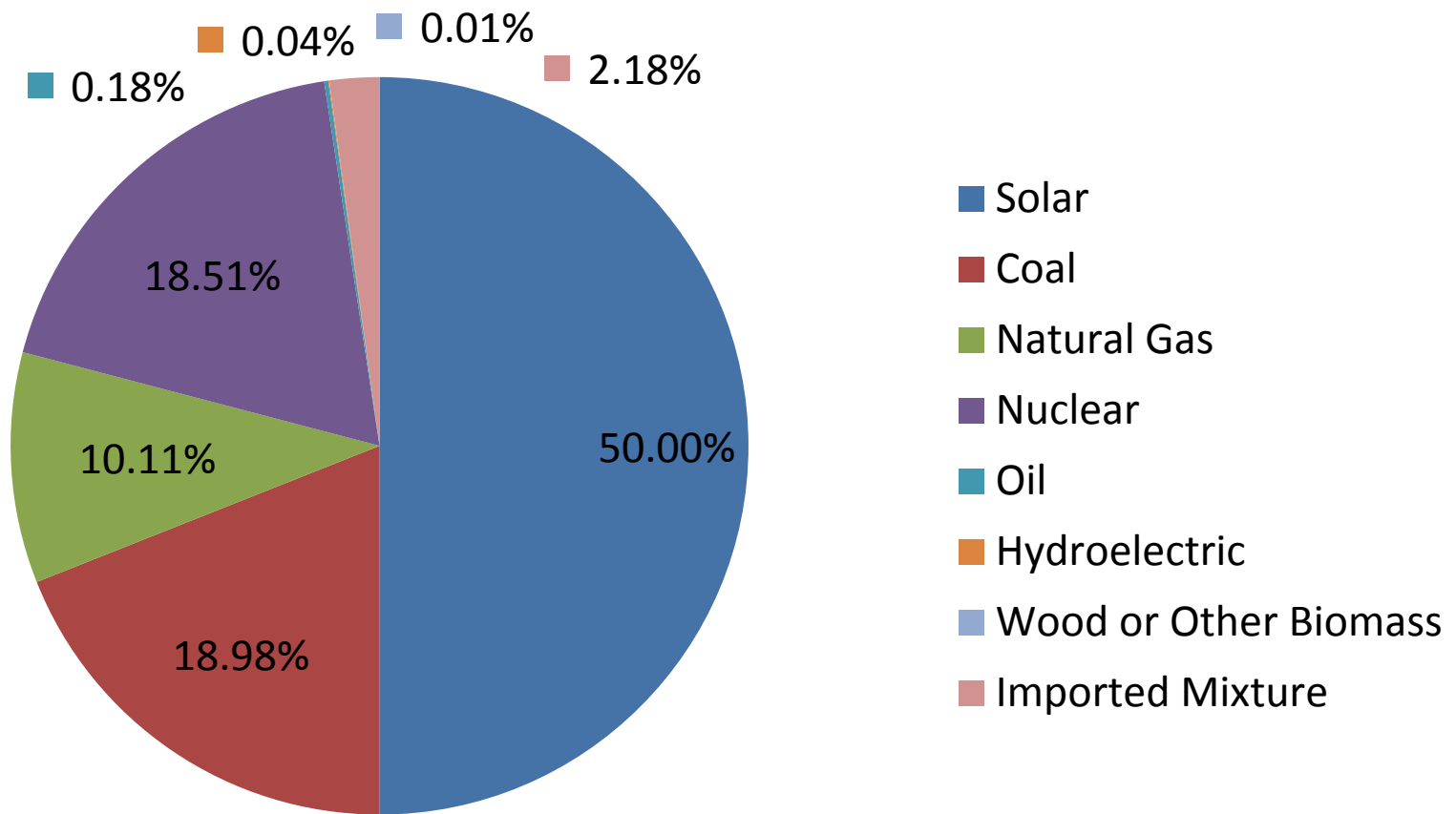
# Climate Action Plan Goals

	<i>MTCO<sub>2</sub>e</i>	<i>Percentage of 2025 Reduction</i>	<i>Percentage Reduced from Baseline Emissions</i>
2008 Baseline Emissions	128,300		
Total Emissions 2025	144,300		
Energy Reduction and Conservation*	(54,000)	78%	38%
Utility Supplier Fuel Mix Changes	(12,500)	18%	1.5%
Transportation Reduction	(1,000)	2%	.5%
On Site Renewables	(1,000)	2%	
<b>Totals</b>	<b>75,800 (remaining)</b>	<b>100%</b>	<b>40%</b>

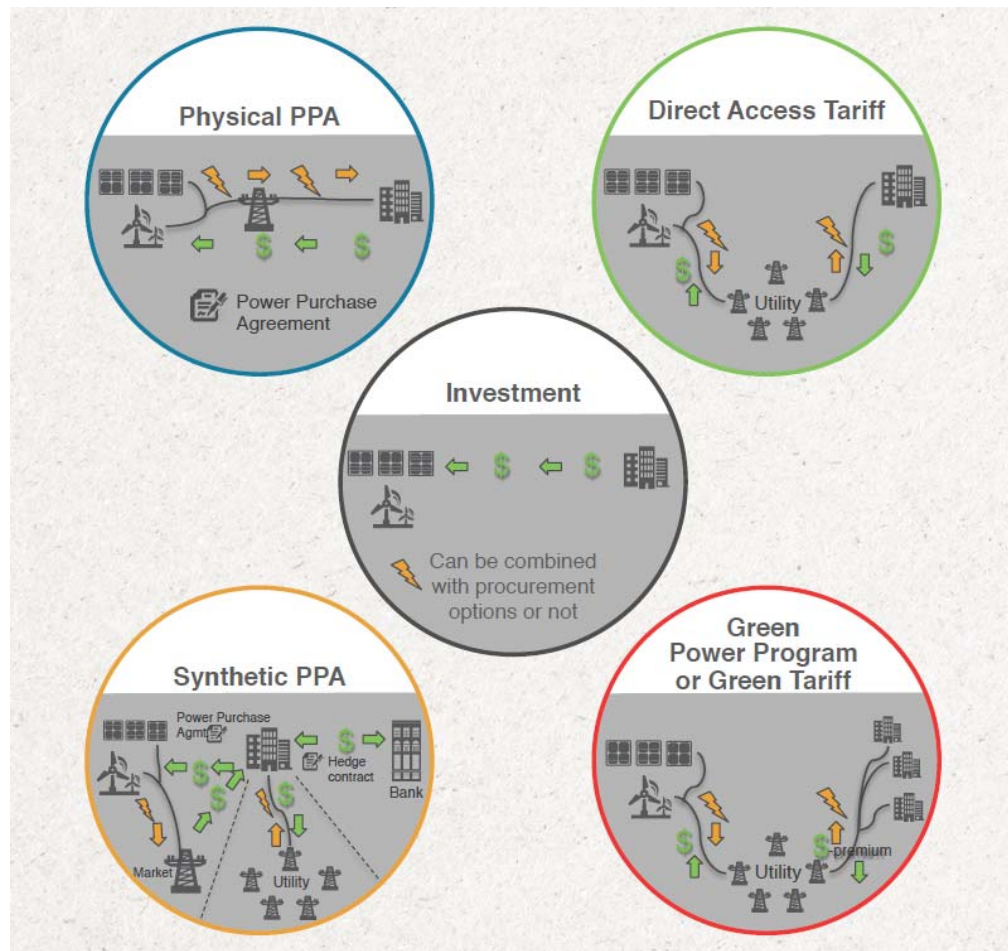
# Electric Sources – CY2012



# Planned Electric Sources – CY2016



# Renewable Energy Deal Structures



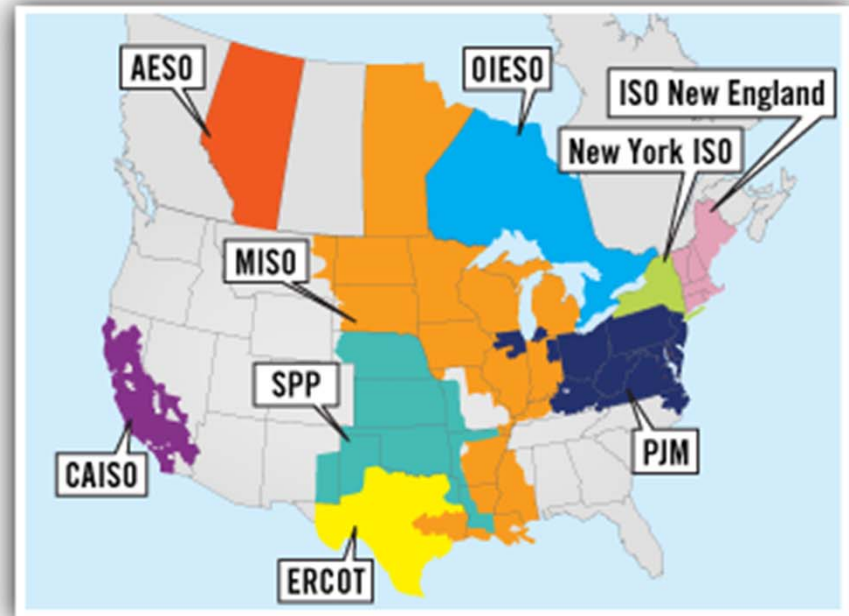
Source: Rocky Mountain Institute, Business Renewables Center, [www.rmi.org/business\\_renewables\\_center](http://www.rmi.org/business_renewables_center)

# Project Overview

Buyers	<ul style="list-style-type: none"><li>• GW University, American University, and GWU Hospital</li></ul>
Goals	<ul style="list-style-type: none"><li>• Meet sustainability commitments by establishing renewable energy (RE) solution to green the electric fuel mix and mitigate future price uncertainty</li></ul>
Starting point	<ul style="list-style-type: none"><li>• Urban footprint, ~260,000 MWh/year combined use</li><li>• Located in deregulated market</li></ul>
Expected impact	<ul style="list-style-type: none"><li>• Supply 50% of each customer's needs from new RE project to reduce electric-related GHG (30% for GWHU)</li><li>• Significant NPV cost savings relative to forecasted conventional power</li></ul>
Process steps and time	<ul style="list-style-type: none"><li>• 2-year process between initial strategy and PPA contract</li><li>• First phase online Dec 2014 and second phase Dec 2015</li></ul>
Organization involvement	<ul style="list-style-type: none"><li>• Cross-functional team from the start, including facilities, sustainability, finance, procurement, legal, and PR</li><li>• Presidents and CFOs decision makers with Board input</li></ul>



# PJM Interconnection



Acting as a neutral, independent party, PJM Interconnection operates a competitive wholesale electricity market and manages the high-voltage electricity grid to ensure reliability for more than 61 million people.

# Solution Agreed to at Outset

Solution Element	Hypotheses
Location	<ul style="list-style-type: none"> <li>• Preferably within PJM or another interconnected region</li> <li>• Attractive long-term transmission access with manageable risks</li> <li>• Solid local community support for project</li> </ul>
Technology	<ul style="list-style-type: none"> <li>• Large-scale wind or solar with contemporary hardware</li> <li>• Preferably new development</li> </ul>
Scale	<ul style="list-style-type: none"> <li>• Sized to serve about one-half of current electric usage</li> <li>• Sufficient project size to capture economies of scale</li> <li>• Partner with others to achieve scale benefits</li> </ul>
Delivery	<ul style="list-style-type: none"> <li>• Direct delivery to buyer's facilities with RE supply complemented by firming resources</li> <li>• Buyers retain control over renewable energy certificates (RECs)</li> </ul>
Term	<ul style="list-style-type: none"> <li>• 20-year term with fixed price (flat or nominal escalation factor)</li> <li>• Understand trade-offs with shorter-term contract</li> </ul>
Ownership	<ul style="list-style-type: none"> <li>• Prefer PPA with experienced and financially-strong developer</li> </ul>
Value Capture	<ul style="list-style-type: none"> <li>• Project timing that allowed for full capture of PTC/ITC or other incentives</li> <li>• Well-informed process that equips buyers to secure best economics</li> </ul>

# RFP and Responses

- RFP issued in June 2013
- 28 Responses from wind and solar projects
- Responses were weighted and ranked on:
  - Total solution cost (i.e., energy, capacity, transmission)
  - Project characteristics and feasibility
  - Is it a new project (additive)?
  - Developer's financial strength and durability
  - Developer's renewable project experience and management capacity
  - PPA duration and specific terms and conditions

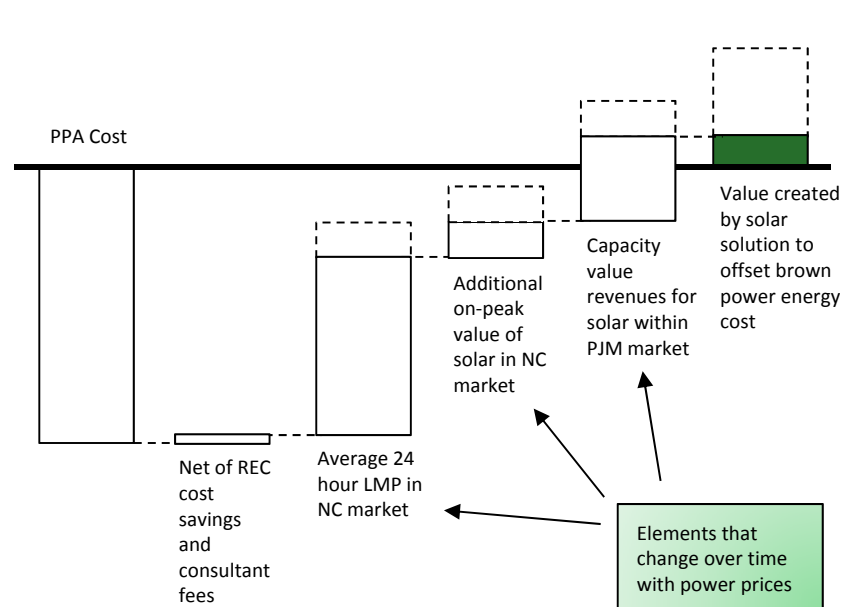
# Solar Solution Value

## Generation Portion of Electric Bill – 2016

\$/MWh

Cost Element	Brown Power	Solar Power
Energy price		
Basis		
Shaping (firming)		
Line losses		
Ancillaries + APP		
Capacity (Gen)		
NITS + TEAC		
RPS		
RES Margin		
RECs		
Consultant fee		
All-in price		

## Economics of Solar Solution in NC



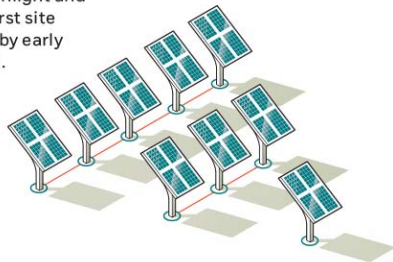
**Solar solution can save costs from Year 1**

**As power prices increase the offset grows, shielding buyers from higher costs for energy component of bill**

# Project Overview

1

**Three fields of photovoltaic panels** in North Carolina collect sunlight and convert it into power. The first site is expected to come online by early 2015; the two others in 2016.



**123**  
MILLION KILOWATT-HOURS

*The amount of power that will be generated in the first year, which will dip slightly over time as the solar panels naturally degrade*

**THAT AMOUNT OF POWER:**

*will prevent the release of around 60,000 metric tons of carbon dioxide per year*

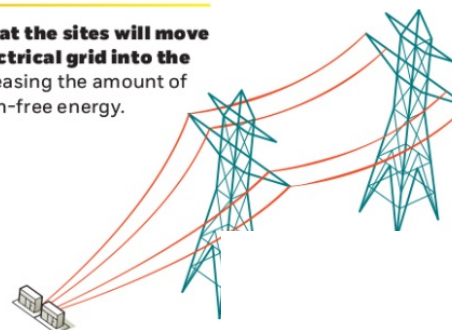
*... which is equivalent to taking around 12,500 cars off the road*

*... or equivalent to the carbon sequestered by 50,000 acres of forest*

*... and roughly the amount of electricity used by 8,200 U.S. homes*

2

**Solar power harvested at the sites will move through the state's electrical grid into the D.C. regional grid,** increasing the amount of local renewable, emission-free energy.



**50%**

*The portion of GW's electricity needs that will be covered by the solar deal. At the time of the signing, the university's share alone—1.65 million megawatt-hours—constituted the nation's largest non-utility solar power purchase agreement.*

**243,000**  
SOLAR PANELS

*on*

**450**  
ACRES

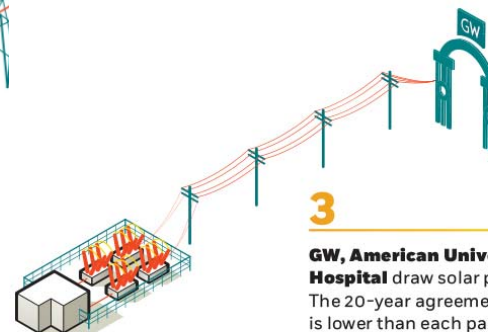
*generating*

**52**  
MEGAWATTS

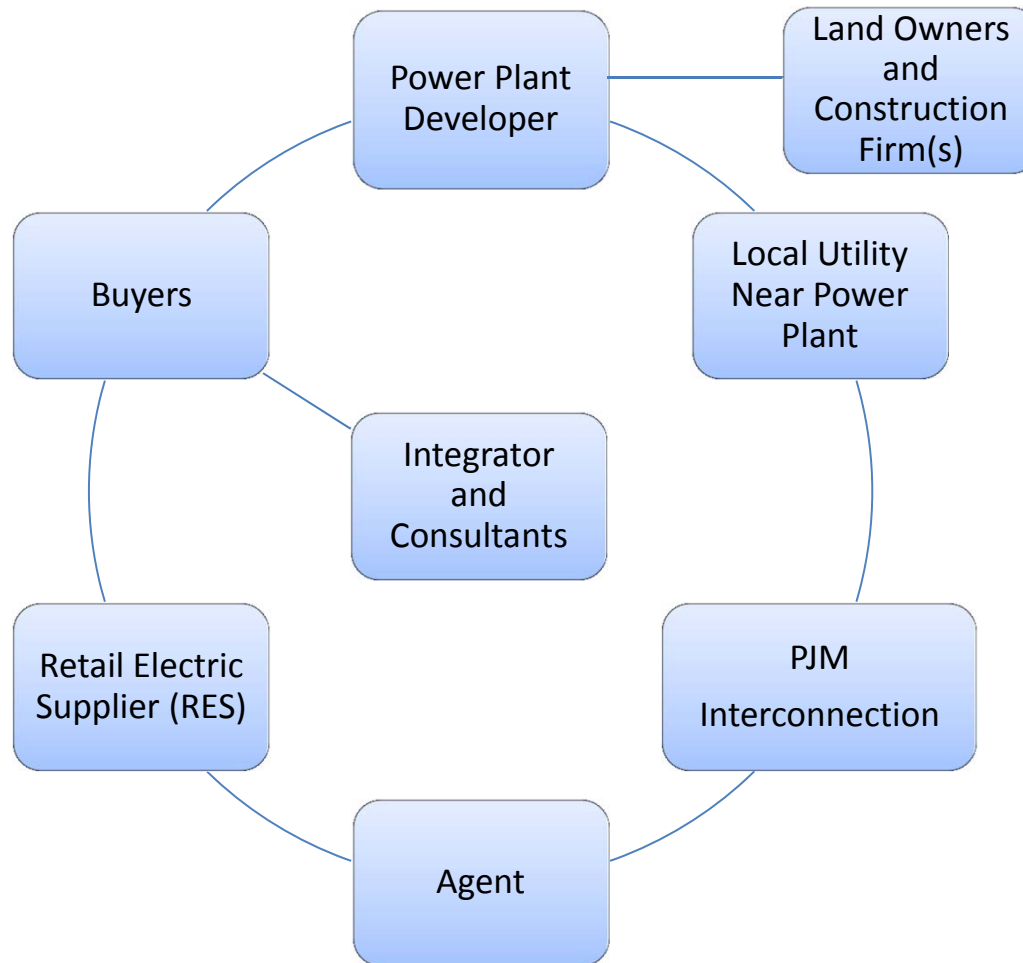
3

**GW, American University, and GW Hospital** draw solar power from the grid.

The 20-year agreement has a fixed rate that is lower than each partner's current rate and could result in millions of dollars in savings by avoiding potential rate increases.



# Project Participants

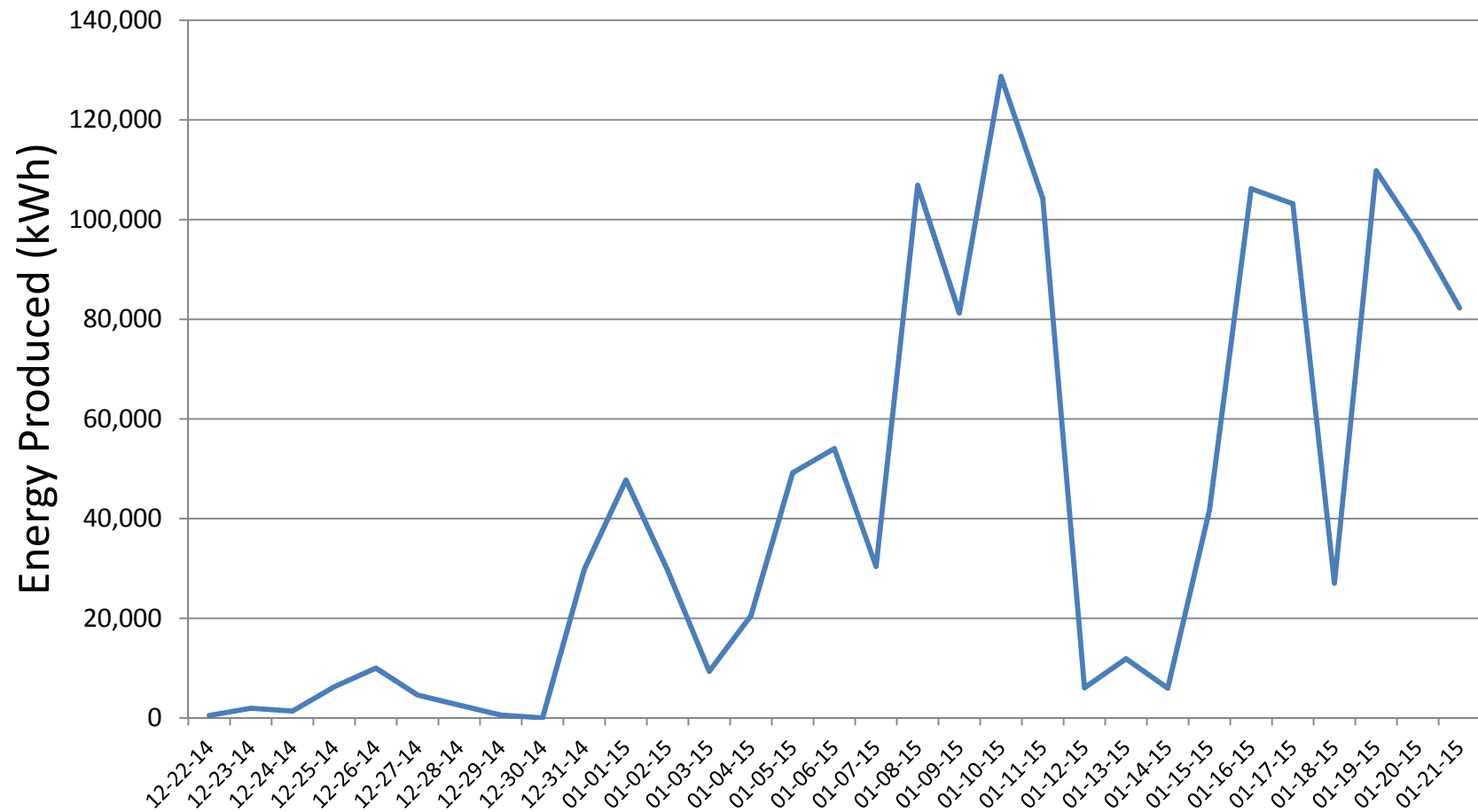




# First Site Photos

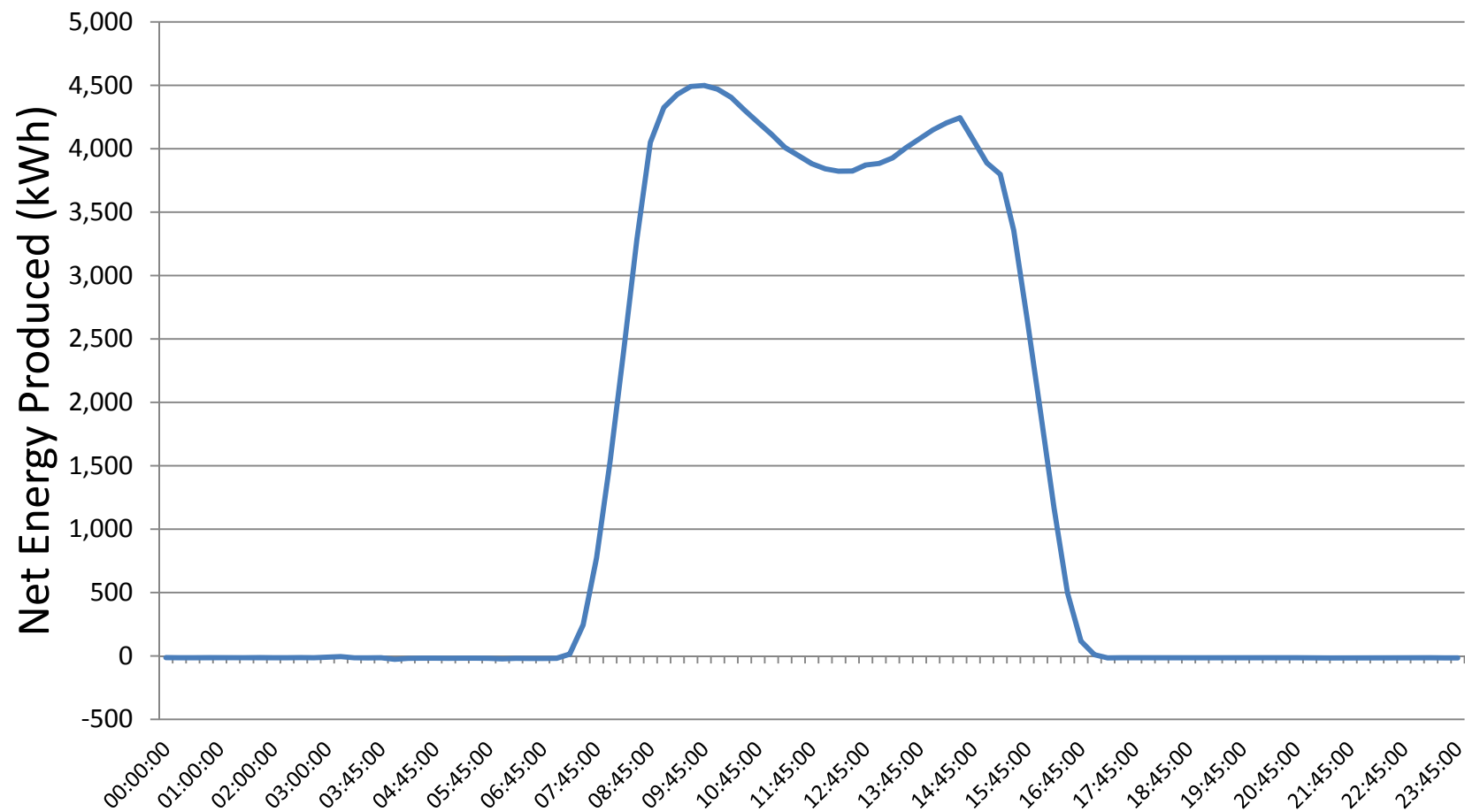


# Daily Production During First Month





# Hourly Production on 1<sup>st</sup> Peak Day



# Key Challenges and Barriers

- Aligning disparate views of what defined success within and across organizations
- Overcoming a lack of market transparency on renewable market prices
- Needing to understand all-in impact on buyer economics, not just project cost
- Building buyer understanding and confidence in novel solution that pushed the envelope
- Designing and negotiating innovative contract provisions that addressed buyer sensitivities
- Committing to a solution and long-term contract for energy unlike what had been done before at each purchasing institution
- Sustaining process momentum alongside short-term, day-to-day responsibilities of each institution's operations

# Conclusions

- We changed our electric source mix, which has built confidence toward achieving our future carbon-neutrality goals.
- Completing this project took long-term thinking, planning, and execution by a diverse cross-functional team including an external integrator and consultants.
- We have more work to do as two other sites come online by 2016 and two more buyers begin taking power from these sites.

# Recommendations for Others Interested in Replicating This

1. Establish a cross-functional team to own the process
2. Involve experienced, external support upfront to run the process
3. Leverage the benefits of partnership to build confidence to keep moving forward (i.e., “we are all in this together”)
4. Agree up-front on what defines success
5. Compete more than one technology to build confidence
6. Adapt process and timeline as new issues/challenges arise to problem-solve and eliminate “show-stoppers”
7. Recognize this is not a standard RFP/procurement process and adopt a new approach
8. Utilize an extremely objective, transparent, and fact-based process to guide top project selection and negotiations
9. Engage potential agents and/or retail electric suppliers periodically throughout the PPA procurement process

# Capital Partners Solar Project

