# Helping to Meet NJ's 2050 Energy Goals

## A&WMA-NCNJ Webinar
## March 11, 2021

Air & Waste Management Association

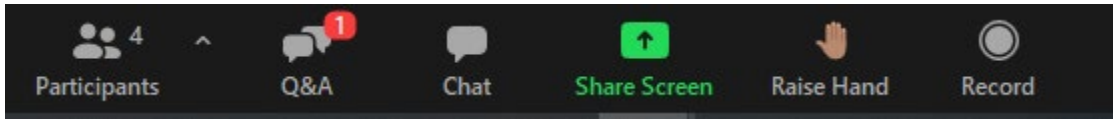
Northern and Central New Jersey Chapter

# Logistics

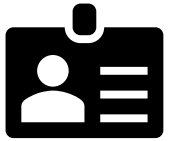
Air & Waste Management Association
Northern and Central New Jersey Chapter

- Keep your audio and video off

- Use question feature to type in your question




- Add your name (if needed) when typing the question



- We will try to get as many questions as we can after each speaker and also at the end if time allows.

# A little bit about A&WMA…..

Air & Waste Management Association
Northern and Central New Jersey Chapter

- Mission of A&WMA:
  To promote global environmental responsibility, and to assist in the professional development and critical environmental decision-making of our members to benefit society.

- Join Today: https://www.awma.org/join

- NJDEP Regulatory Conference in November (NJDEP & A&WMA-NCNJ joint venture)
  - Opportunity for regulated community to hear directly from NJDEP senior staff on the latest Department initiatives in environmental regulations
  - 2020 Conference was held on November 20th in a virtual format
  - 2021 Conference tentatively scheduled for Friday, November 19th

- Student Poster Competition & Career Panel in Spring (co-hosted with Rutgers Graduate Student Association)
  - Opportunity to be a judge and panelist
  - Virtual career panel this year – tentatively schedule for April 22nd

- Webinars

# A&WMA-NCNJ and Rutgers Poster Competition and Career Panel

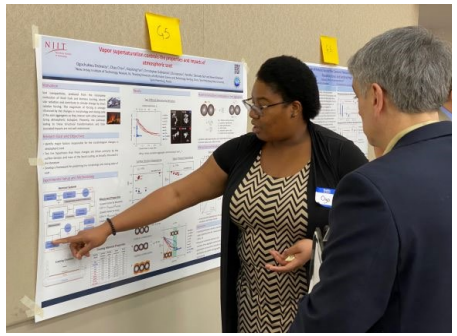
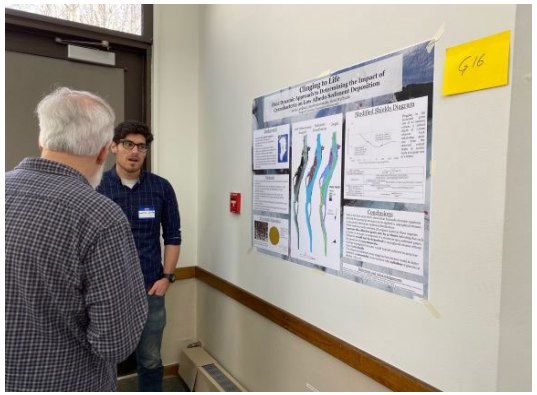
*March 4, 2020*

Air & Waste Management Association

Northern and Central New Jersey Chapter





# A&WMA- NCNJ Leadership Team

Air & Waste Management Association
Northern and Central New Jersey Chapter

**Chapter Chair**
**Michael Schaffer**
ERM

**Past Chair**
**Joann Held**
SRPLB

**Director**
**Mary (Hewitt) Daly**
Surrey Environmental Consulting

**Secretary**
**Gabi Carrasco**
Haley & Aldrich, Inc.

**Treasurer**
**Fran Lindsley-Matthews**
Buckeye Partners

**Program Chair**
**Sunila Gupta**
Haley & Aldrich, Inc.

**Program Committee**

**Ron Poustchi**
NJDEP

**Paul Eisen**
Proactive Environmental Solutions, LLC.

**Website Coordinator**
**Chris Whitehead**
AECOM

**Student Liaison Committee**
**Jyoti Agarwal,** Covanta
**Gabi Carrasco,** Haley & Aldrich, Inc.

# NJ's Energy Master Plan

Air & Waste Management Association
Northern and Central New Jersey Chapter

- On January 27, 2020, Governor Murphy unveiled the state's Energy Master Plan, which outlines key strategies to reach the Administration's goal of 100 percent clean energy by 2050.
- Plan addresses NJ's energy system, including electricity generation, transportation, and buildings, and their associated greenhouse gas emissions and related air pollutants.
- The Energy Master Plan defines "100 percent clean energy by 2050" as 100 percent carbon-neutral electricity generation and maximum electrification of the transportation and building sectors, which are the greatest carbon emission producing sectors in the state.
- Seven key strategies are outlined, including an implementation plan that lays out next steps and timelines.
- Energy Master Plan | About the Energy Master Plan (nj.gov)

# Presenters

Air & Waste Management Association
Northern and Central New Jersey Chapter

Janice Fuller
Anbaric Development Partners
President, Mid-Atlantic

**Janice Fuller is President, Mid-Atlantic of Anbaric Development Partners** where she leads efforts to develop offshore wind transmission infrastructure. Prior to joining Anbaric, Ms. Fuller served as Chief of Staff to Congressman and House Energy and Commerce Committee Chair Frank Pallone (NJ-06), where she oversaw staff executing legislation ranging from telecom to environmental issues. She has also held roles as Director of Cabinet Affairs in the administration of Governor Jon Corzine where she oversaw the operations of several state departments and as the Executive Director of a state political party. Ms. Fuller graduated with honors from Boston University. She is an elected member of the Board of Education in her hometown of Ocean, New Jersey, as well as serving as a board member of the Boys & Girls Club of Monmouth County.

Peter Protopappas
AEP OnSite Partners
Director of Business Development

**Peter Protopappas is Director of Business Development with AEP OnSite Partners** and is responsible for project development, acquisitions and strategy for AEP's customer-centric, distributed energy asset business. Prior to joining AEP, he was with Navigant Consulting and the US Department of Energy conducting policy strategy and engineering analysis for various energy efficiency and renewable energy programs at the federal and state level. Peter has authored federal energy rule makings and research, and his project experience spans the energy efficiency and lighting, solar, fuel cell, and energy storage. He began his career with Black and Decker as a product development engineer designing power tool batteries for Dewalt cordless power tools. Peter is a Certified Energy Manager (CEM) and holds a Bachelor of Science degree in Mechanical Engineering and an MBA with a focus in strategy, both from the University of Maryland, College Park.

ANBARIC
Scaling Renewable Energy

# Helping to Meet New Jersey's 2050 Energy Goals

**Janice Fuller, President Mid-Atlantic**

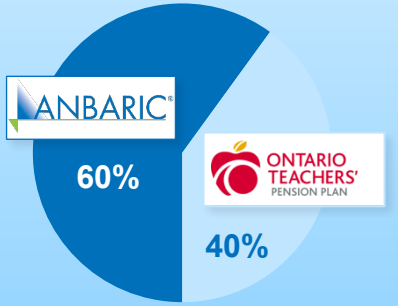
# Offshore Wind and Meeting New Jersey's Energy Goals

- Why Transmission Matters
- Transmission Options
- Offshore Wind in New Jersey
- The latest from Europe

# Who We Are

## Team of experienced transmission developers

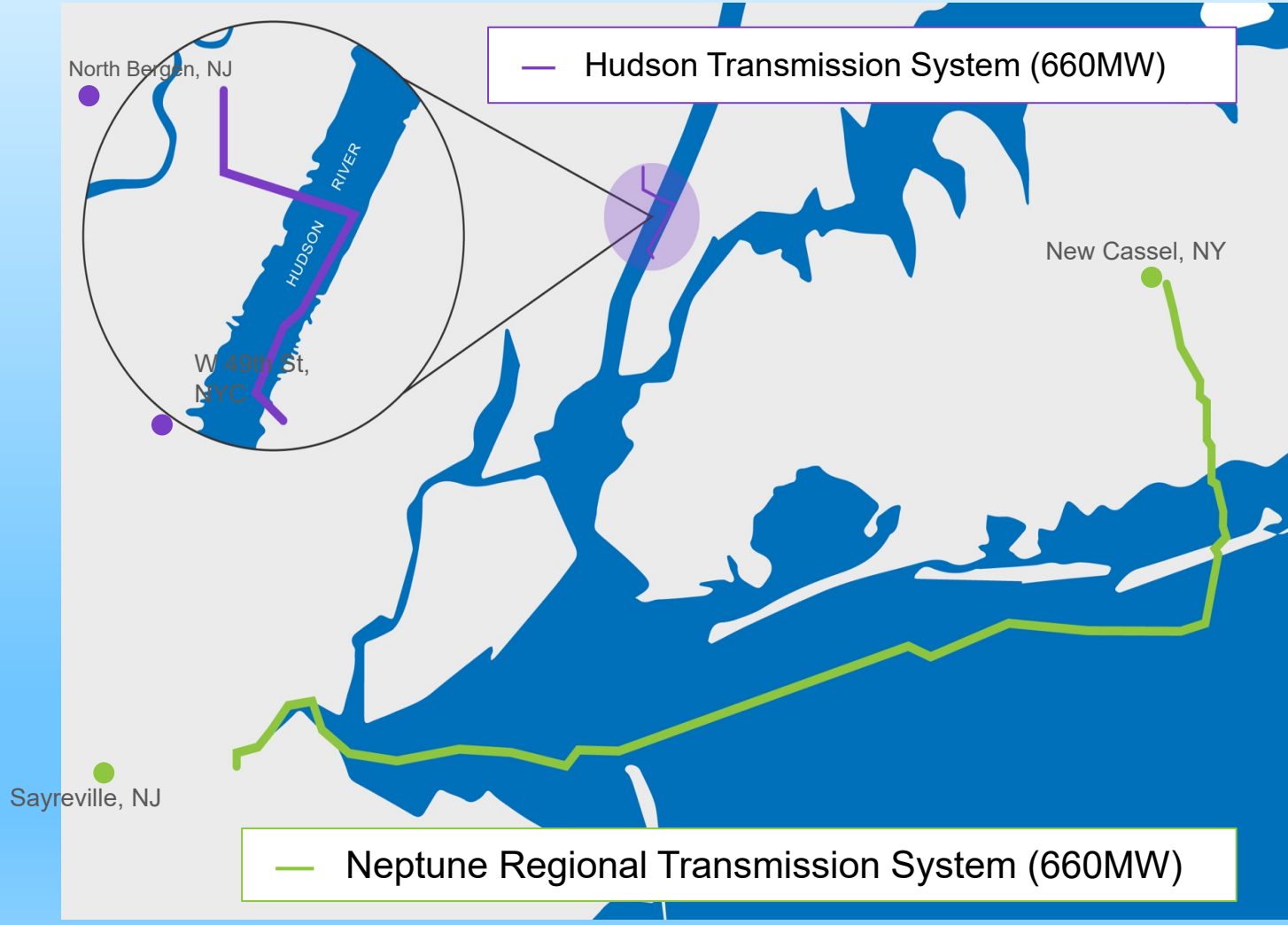
- Majority employee owned company
- Major pension fund investor
- Headquartered outside Boston




### Record of Success

- ✔ Large undersea & underground transmission projects
- ✔ On-time
- ✔ On-budget

**A+**



# Benefits of Planned Transmission

## Recent studies* confirm benefits of planned transmission systems with significant impacts:

**Lower costs.** Planning and procuring transmission separately from generation increases competition and can reduce transmission costs 20–30%.

**Reduced Impact on Fisheries & Marine ecosystems.** In NY, a planned transmission approach would reduce cabling by almost 60%, preventing 660 miles of seabed disturbance. In New England, planning transmission for the next 3,600 MW would reduce cabling by about 50%.

**Fewer onshore grid upgrades.** In New England, a planned transmission approach would result in $500M in savings. This is critical for cost impacts and avoiding difficult to permit overland projects that can take years to move to construction.

**Makes sure states can meet goals.** Limited points of interconnection and substations reduces the number of cables that can interconnect to shore. Underutilizing these pathways will result in more expensive set of transmission upgrades in the long run.

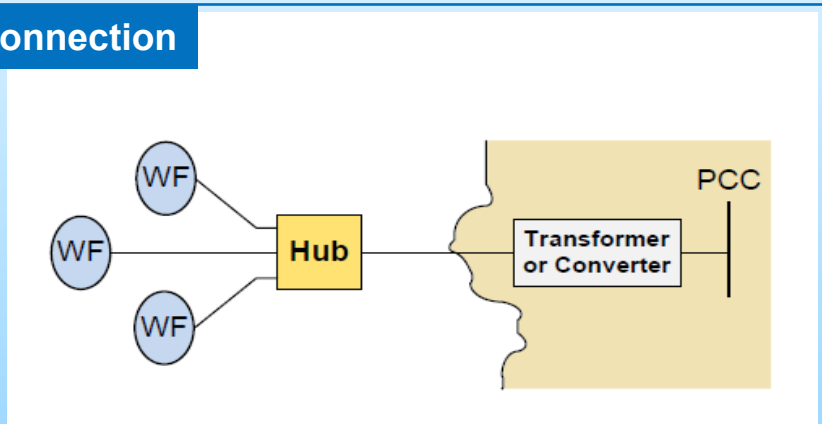
**Far reduced curtailments vs. radials.** With a planned system that delivers to load rather than shortest route, more wind can be used over time. New England study found $300m/yr in savings from reduced curtailments.

**Maximizes competition between wind generators.** Planned transmission has led to subsidy-free wind generation auctions in Europe.

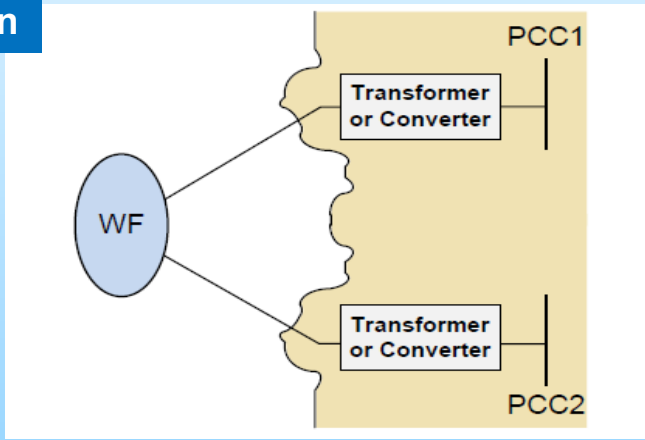
- The Brattle Group, *Offshore Transmission in New England: The Benefits of A Better-Planned Grid*
- The Brattle Group, *Offshore Wind Transmission: An Analysis of Options for New York*
- The Brattle Group, *Cost Savings Offered by Competition in Electric Transmission: Experience to Date and the Potential for Additional Customer Value*

# Types of Offshore Transmission Connections and Infrastructure

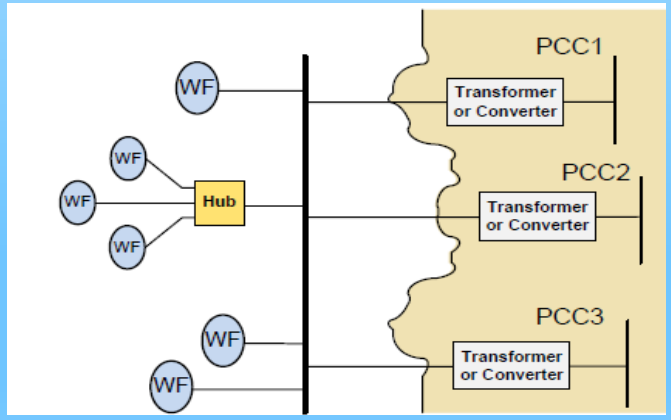
## Radial Connection




## Split Connection




## Backbone Connection




## Grid Connection

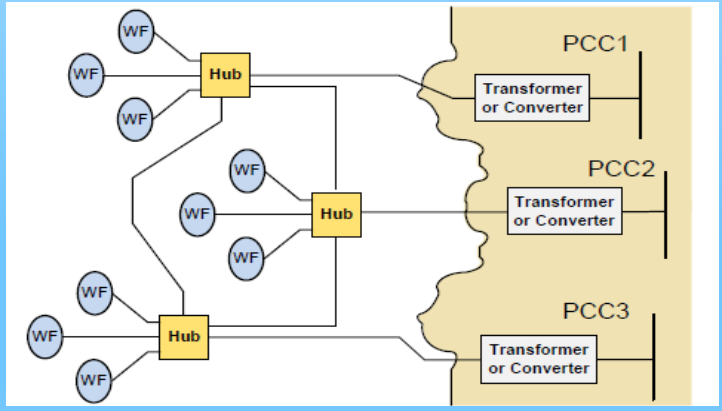
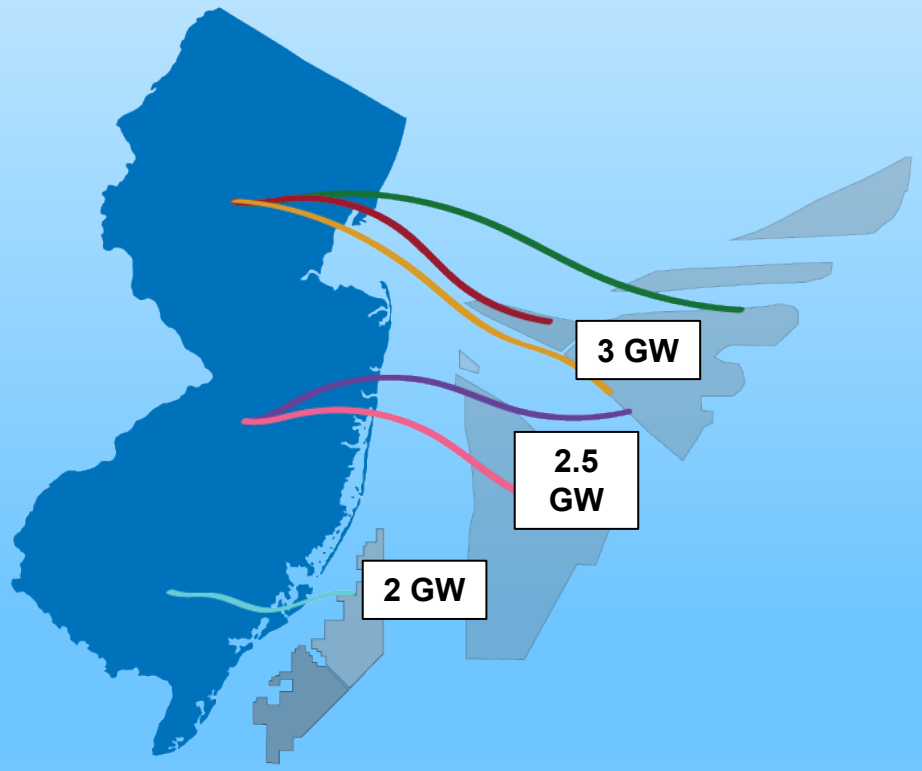



*Figure ES-10. Offshore wind farm delivery system options.*

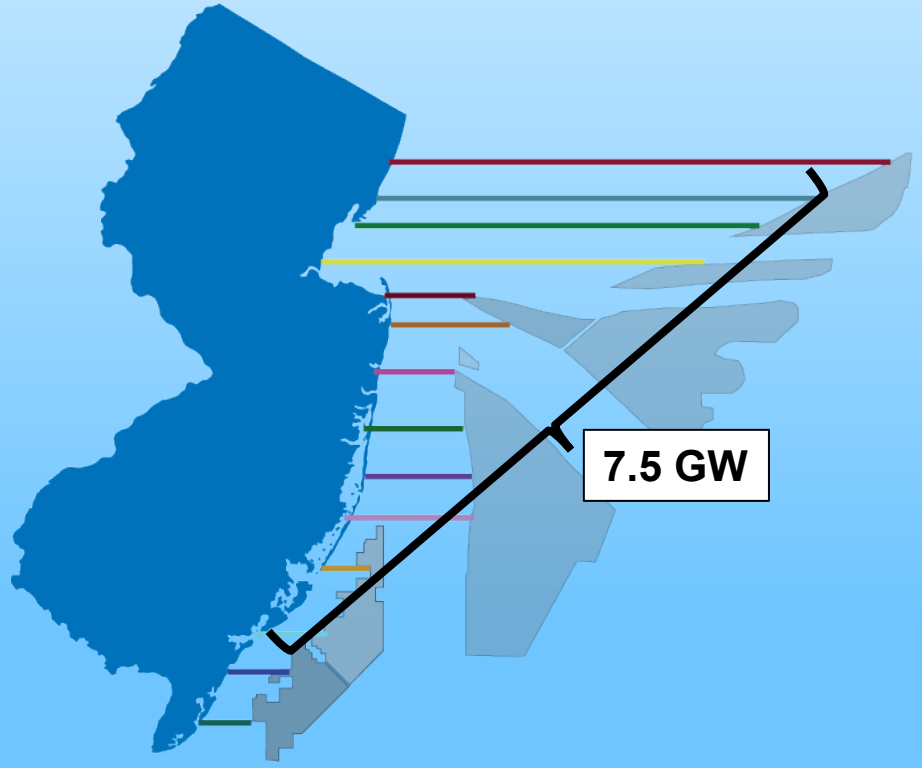
*Fig ES-10: National Offshore Wind Energy Grid Interconnection Study, ABB, Inc.*

# A Potential Vision for a Planned Offshore Transmission

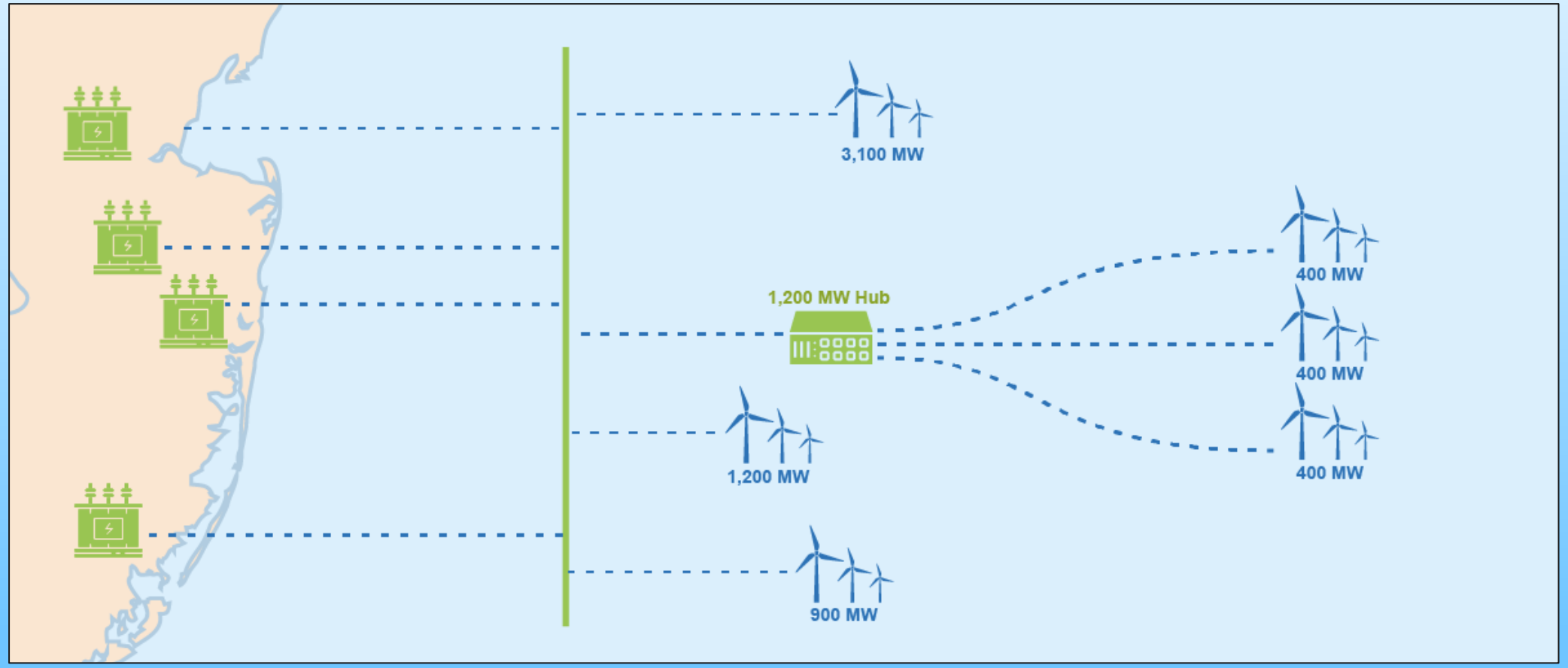
## Planned




## Unplanned



# Added Resiliency & Reduced Curtailments with Planned Transmission




The final design should be driven by the overall long-term economics of the system, reliability, contingency events, technology, location of points of interconnection, licensing & permitting, environmental impact, location of new WEA's.

# The 2020 Energy Master Plan stated:

*"Further, planned transmission to accommodate the state's offshore wind goals provides the opportunity to decrease ratepayer costs and optimize the delivery of offshore wind generation into the state's transmission system. This planning may include strengthening the onshore portions of the transmission system and extending the existing grid into the ocean. Although the transmission component of the Ocean Wind 1,100 MW project, which was bundled with the generation component, has its benefits,* ***this model would likely not lead to efficient growth of the offshore wind industry into the future****. Transmission planning is important in order to reach the state's long-term offshore wind goals. Coordinating transmission from multiple projects may lead to considerable ratepayer savings, better environmental outcomes, better grid stability, and may significantly reduce permitting risk."*

# The 2nd Solicitation also discusses the need for transmission planning and requires that all bids demonstrate:

*"Ability for the Project to work synergistically with any future offshore transmission grid, including willingness to make its interconnection facilities available to future integrated offshore wind transmission solutions"*

# New Jersey BPU Historic PJM SAA Announcement

**In November 2020, the NJBPU asked PJM to include offshore wind in its transmission planning process**

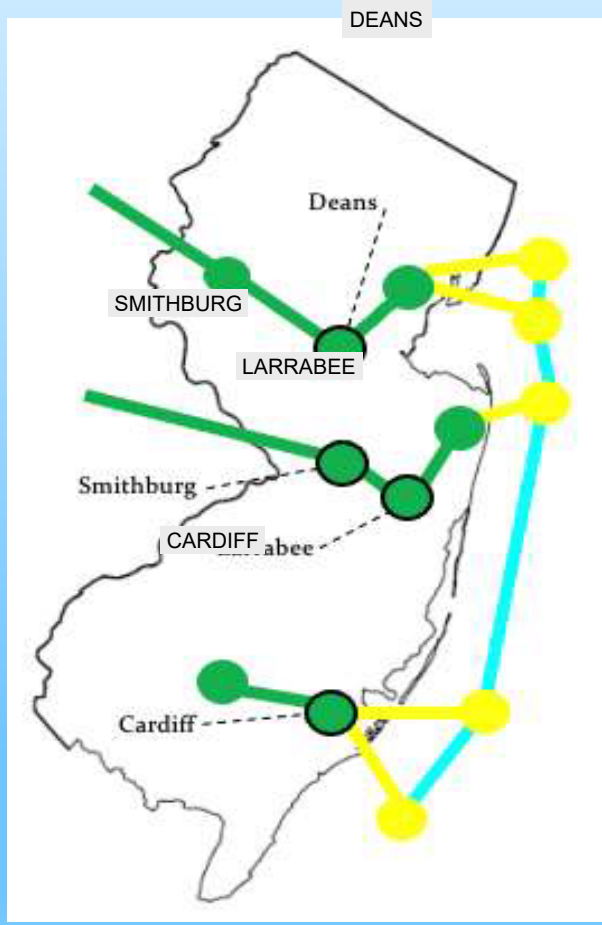
- **First state to utilize the State Agreement Approach**
- **Goal lower cost, reduced risks of permitting/construction delay, protect environment**

## Three inter-related components

- Grid to On-Shore Substations
- On-Shore Substations to Offshore Platforms
- Offshore Transmission "Backbone"

## BPU detailed POIs where OSW delivered

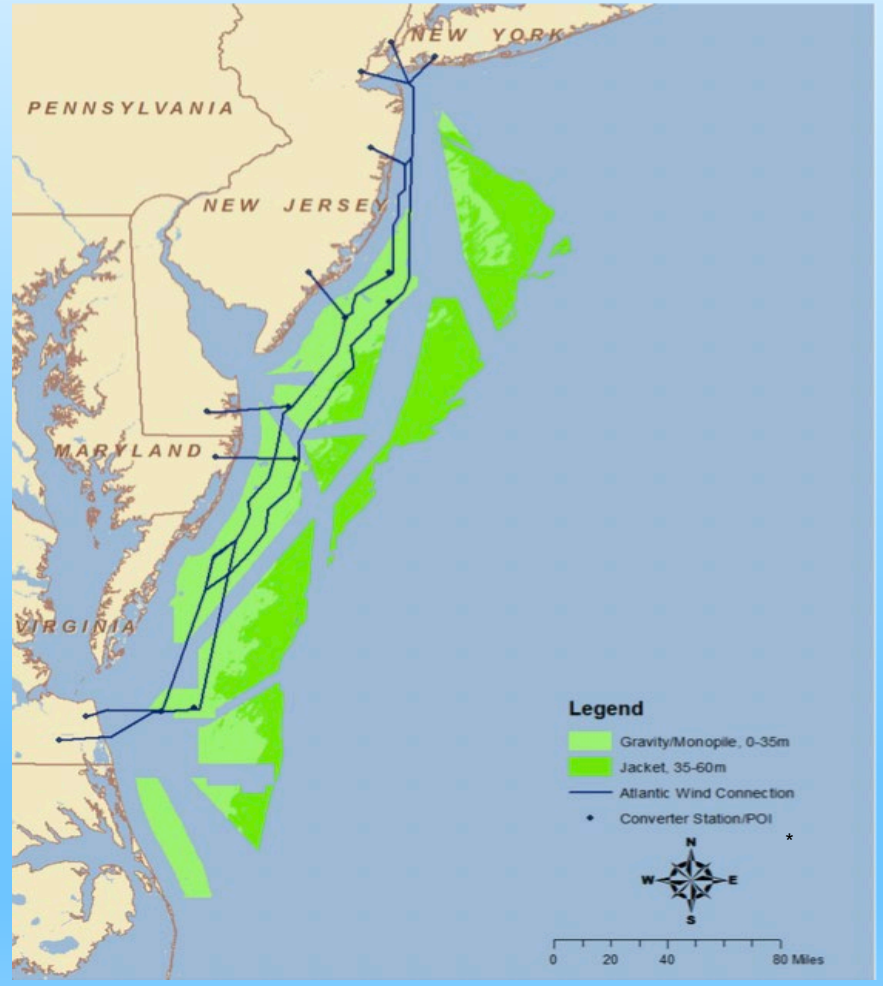
| | |
|---|---|
| **Cardiff** | 900 MW |
| **Larrabee** | 1200 MW |
| **Smithburg** | 1200 MW |
| **Deans** | 3100 MW |



# Northeast States are Setting the Pace with Offshore Wind Goals

| STATE | OSW TARGET | AWARDED TO DATE |
|---|---|---|
| Massachusetts | 3200 | 1600 |
| Rhode Island | 430 | 430 |
| Connecticut | 2300 | 1100 |
| New York | 9000 | 4200 |
| New Jersey | 7500 | 1100 |
| Maryland | 1200 | 368 |
| Virginia | 2652 | 2652 |
| TOTAL | 26,282 MW | 9076 MW |

Offshore Wind Potential off PJM territory - 70 GW



# The Brattle Report – Concrete Findings on the Benefits of Planned Transmission

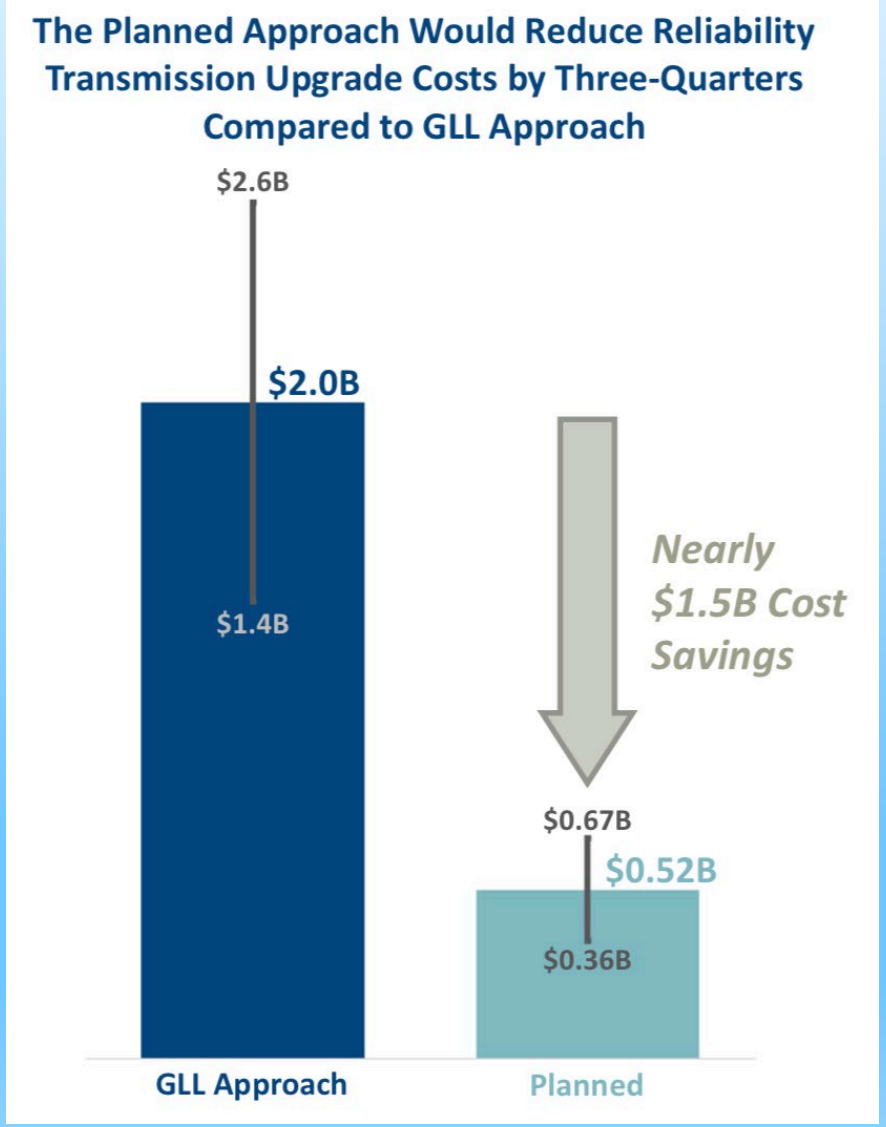
brattle.com | 2

**1. Cost Differential Analysis:** Planned approach estimated to reduce total transmission costs by at least $500 million, not counting additional competitive benefits

**2. Utilization of Points Of Interconnection (POI):** Planned transmission maximizes OSW integration with efficient utilization of POIs, while the GLL approach risks limiting ability to meet clean energy standards cost-effectively

**3. Environmental Impact:** Planned transmission significantly reduces the impact on the fishing industry, coastal communities, and marine environments

**4. Curtailments:** This transmission planning effort identifies curtailment challenges that need to be addressed to reduce developer risk from future projects (though further planning is needed)



# A European Perspective From Hard-Earned Experience

- Policymakers need to recognize that the ocean, if it's to serve as a dominant energy source, **must have its own planned, independent, offshore grid**. In other words, governments should think beyond early procurements and insist on infrastructure that can support long-term growth.

WILFRIED BREUER
FORMER MANAGING DIRECTOR OF TENNET

**In Europe, this approach to planned open access offshore transmission has helped lead to zero-subsidy bids by wind generators, with The Netherlands and Germany leading the way**

NETHERLANDS

2017

## NETHERLANDS' FIRST ZERO-SUBSIDY OFFSHORE AUCTION

First zero-subsidy OSW farm to be built in Netherlands by 2022.

GERMANY

2017

## ZERO-SUBSIDY BIDS AWARDED IN GERMAN AUCTION

- OWP West (240 MW) and Borkum Riffgrund West 2 (240 MW).
- He Dreiht OSW farm (900 MW).

# Countries That Started With Radials Are Moving To Planned Systems

- The United Kingdom is a best cast for radial transmission development for offshore wind given it extensive coastline. But even here, Ofgem has determined that the nation will move to a planned “meshed” grid approach going forward.

> **We do not consider that individual radial offshore transmission links for this amount of offshore generation are likely to be economical, sensible or acceptable for consumers and local communities.***

ofgem
Making a positive difference for energy consumers

- Working with government and industry, Ofgem will assess how a more "coordinated" offshore transmission system could reduce financial and environmental costs, the regulator said.

**ForwardWorkProgramme**
consultation 2020-2022

* https://www.reutersevents.com/renewables/wind-energy-update/windy-december-lifts-orsted-2019-profit-uk-develop-new-offshore-grid-networks

ANBARIC
Scaling Renewable Energy

# THANK YOU

Janice Fuller
President, Mid-Atlantic
jfuller@anbaric.com

AEP ENERGY
An AEP Company

# Overview & Benefits of Solar Energy in NJ

## AWMA-NCNJ Webinar: (Renewable Energy) Helping to Meet NJ's 2050 Energy Goals

March 11, 2021

# PRESENTATION OVERVIEW

TYPES OF SOLAR

NJ TODAY

SREC's & TRECs

MARKET DRIVERS

OWNERSHIP OPTIONS

SITING SOLAR

SOLAR SIZING

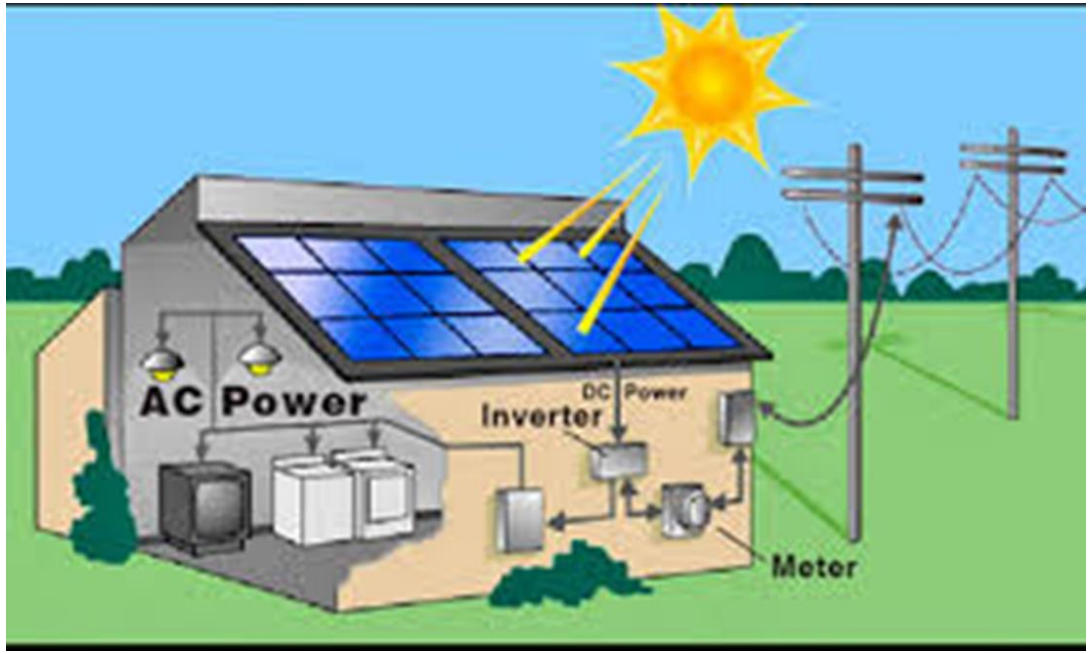
Delran School, NJ = 2.0 MW

# TYPES OF SOLAR (Primary)

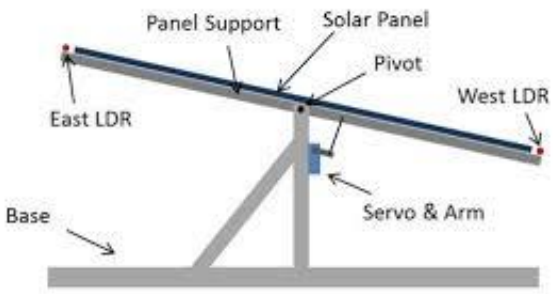
- Fixed Tracking
  - Rooftop
  - Carport/Canopy
  - Ground Mount
- Single Axis Tracking
  - Ground Mount

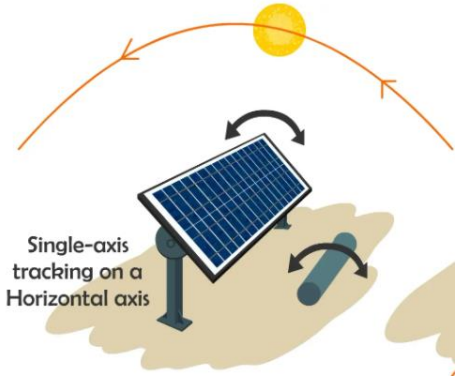
# BASIC SOLAR SYSTEM COMPONENTS

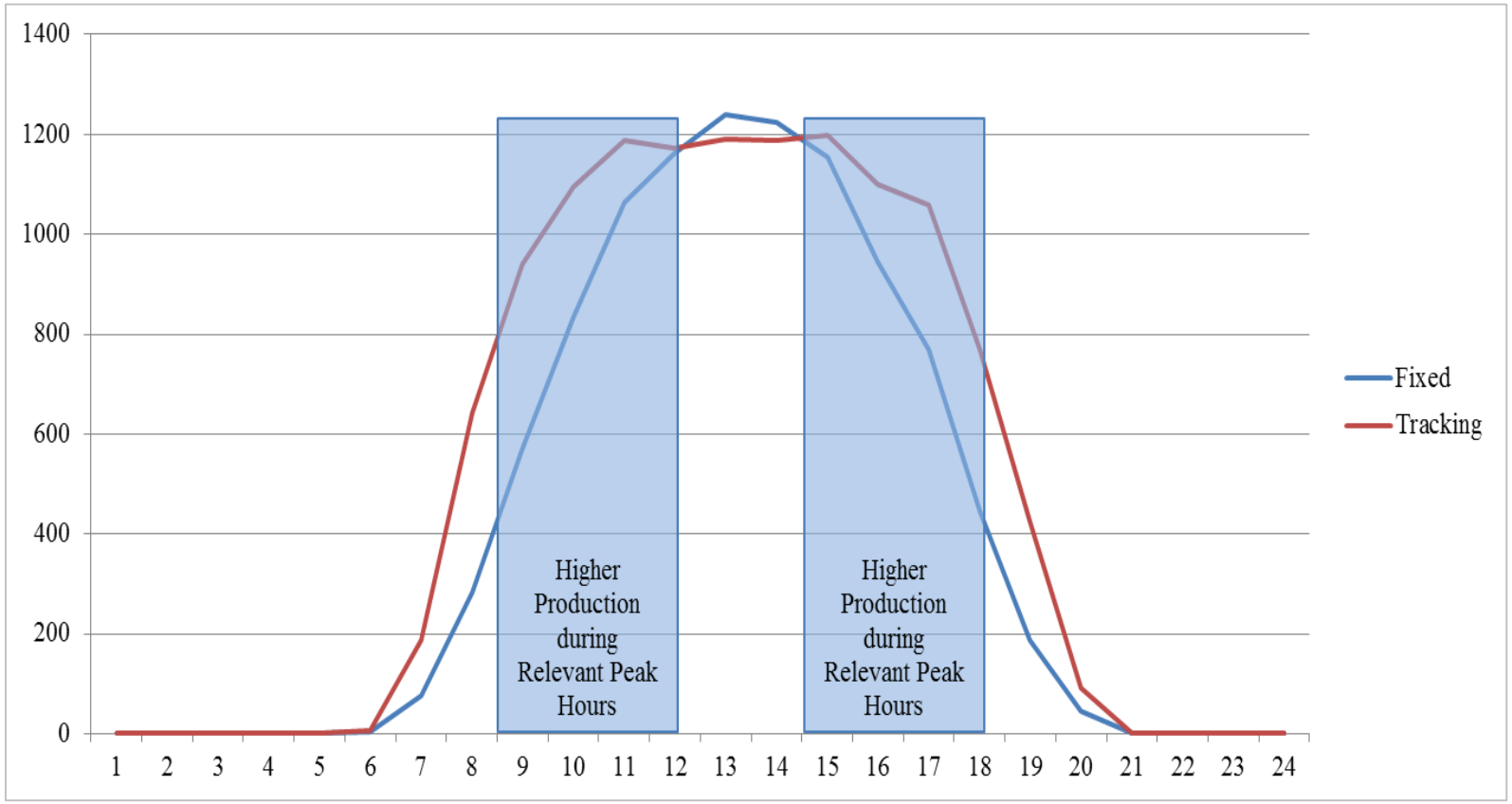
- Solar Module/Panel
- Inverter – DC to AC
- Transformer – 480V to Distribution Voltage
- Meter



# FIXED AXIS VS SINGLE AXISTRACKING



# NJ SOLAR TODAY

## State Solar Spotlight

SEIA Solar Energy Industries Association®

## New Jersey

### Key Figures

| Total Solar Installed | National Ranking | Solar Jobs[1] | Growth Projection |
|---|---|---|---|
| 3,471.55 MW | 7th | 6,225 | 1,879.78 MW over the next 5 years |
| 448.58 MW in 2019 | Ranks 9th in 2019 | Ranks 12th in 2019 | Ranks 16th |

Enough solar installed to power: **557,971 homes**

Percentage of state's electricity from solar:[2] **5.75%**

Price decline over the last five years: **45%**

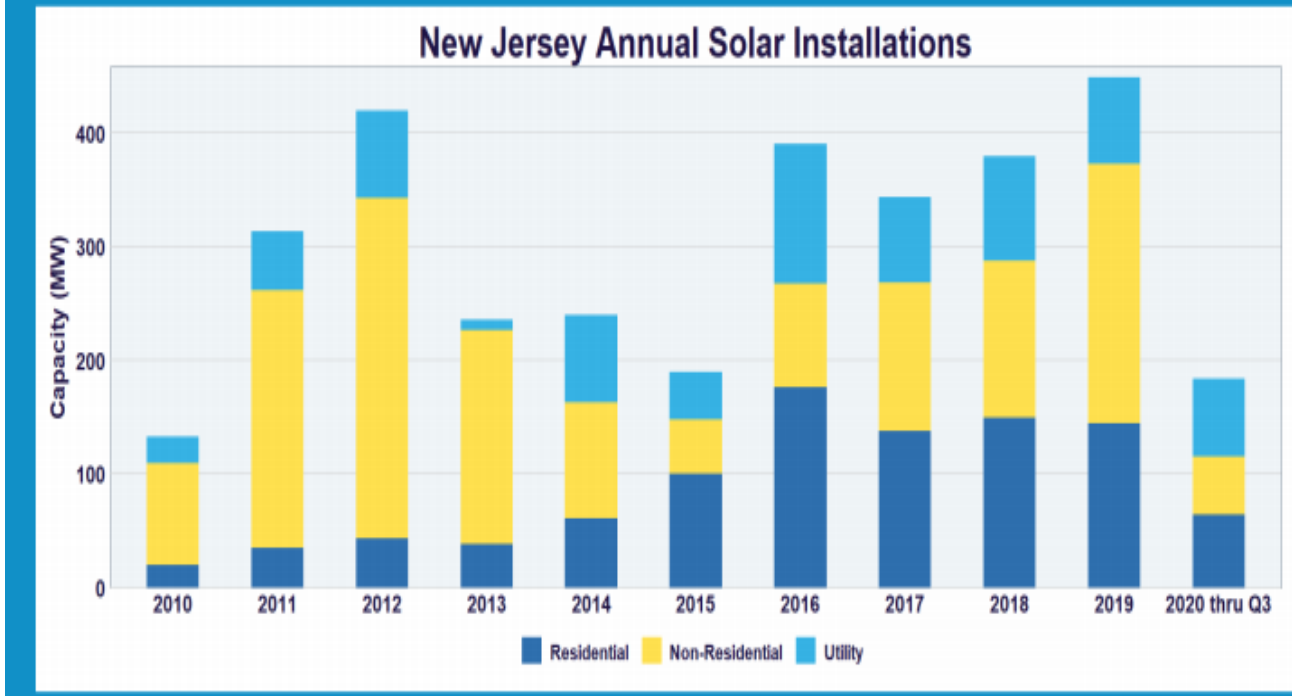
**There are 399 solar companies operating in New Jersey.[3]**

**65** Manufacturers

**245** Installers/ Developers

**89** Others

**The solar industry has invested $10,622.12 million in New Jersey, including $815.24 million in 2019**




Learn more at www.seia.org/states

December 15, 2020

# NJ ENERGY MASTER PLAN - 2050

## 100% CLEAN ENERGY BY 2050

**STRATEGY 1:** Reducing Energy Consumption and Emissions from the Transportation Sector

**STRATEGY 2:** Accelerating Deployment of Renewable Energy and Distributed Energy Resources

**STRATEGY 3:** Maximizing Energy Efficiency and Conservation, and Reducing Peak Demand

**STRATEGY 4:** Reducing Energy Consumption and Emissions from the Building Sector

**STRATEGY 5:** Decarbonizing and Modernizing New Jersey's Energy System

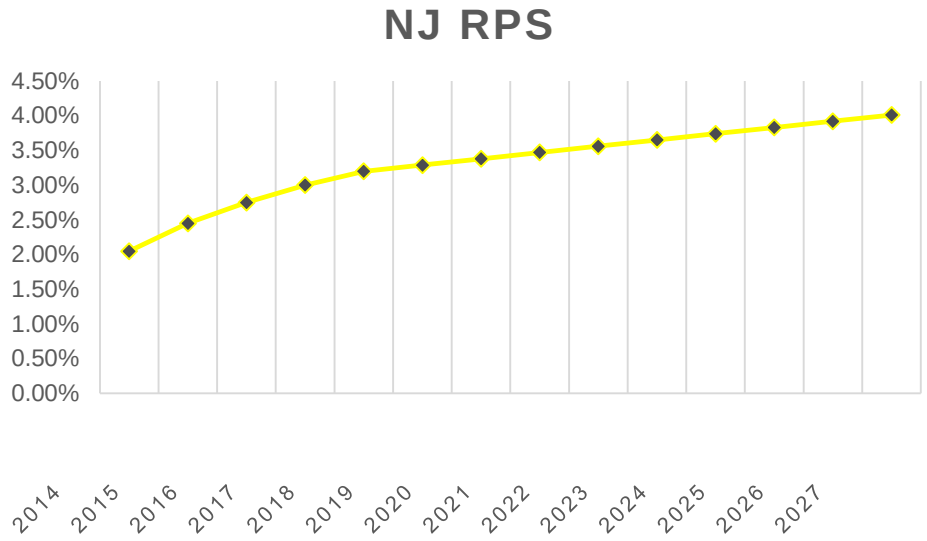
**STRATEGY 6:** Supporting Community Energy Planning and Action in Underserved Communities

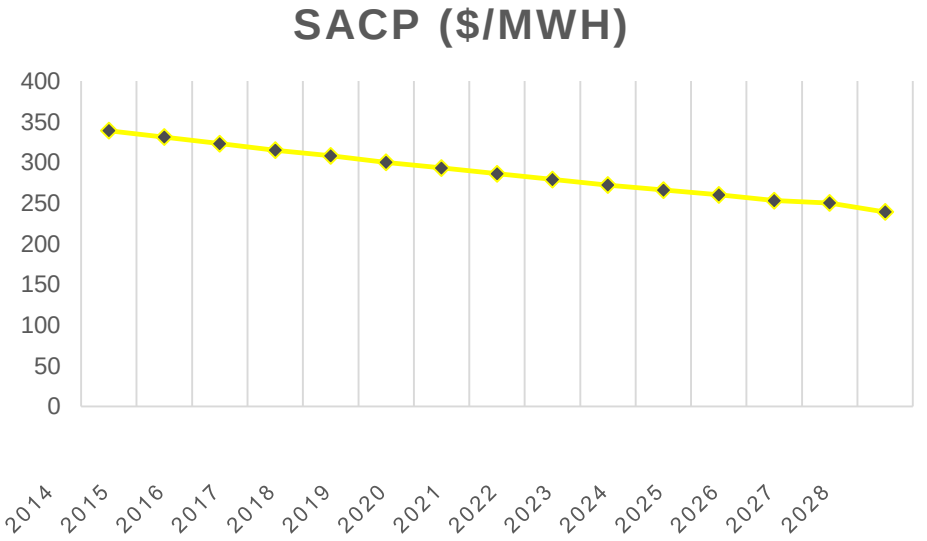
**STRATEGY 7:** Expand the Clean Energy Innovation Economy

https://www.nj.gov/governor/news/news/562020/approved/20200127a.shtml

# MARKET DRIVERS – SRECs & TRECs

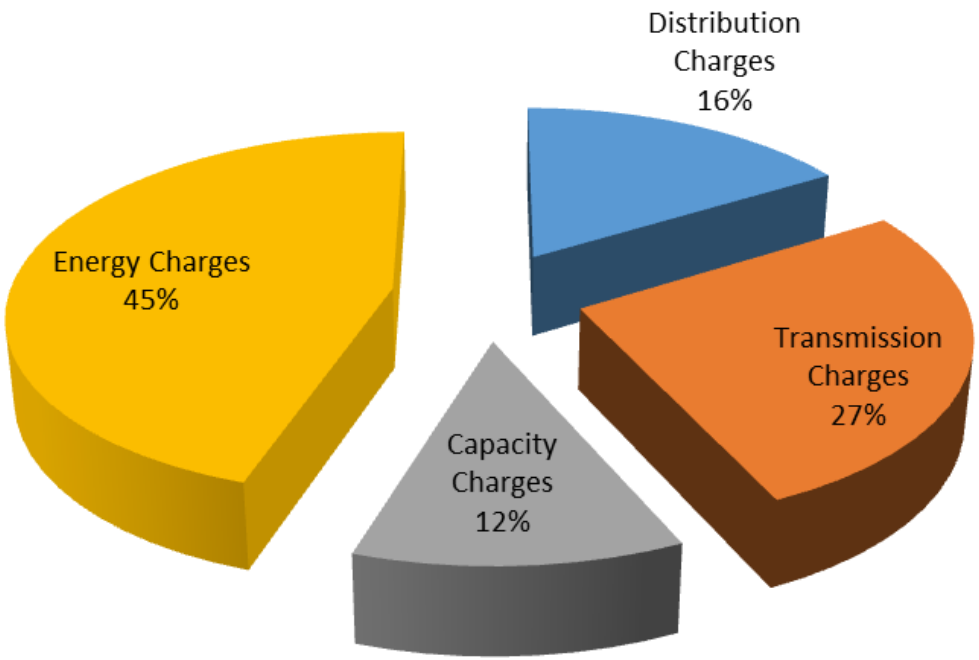
- **SREC – Solar Renewable Energy Credit**
  - 1 REC = 1 MWh
  - RECs Help Carbon Emitters Meet State RPS (Renewable Portfolio Standards) Requirements
  - SACP – Solar Alternative Compliance Payment
  - SREC Program will phase out
    - New Jersey Clean Energy Act of 2018 directed BPU (Board of Public Utilities) to close SREC Program when 5.1% of KWh sold in state are generated by solar
    - TREC program developed as successor program
- **TREC – Transition Renewable Energy Certificate**
  - Creates fixed price & 15 year certification term
  - TREC = $152/MWh
    - Factors Apply to Different Types
    - Payment = TREC (MWhs) Delivered x $152 * TREC Factor
    - Factors of 1 = $152.00, .85 = $129.20, and .6 = $91.20



# MARKET DRIVERS - SOLAR VALUE STACKING

| |
|---|
| RECS/Tax Credits |
| Energy savings |
| Distribution savings |
| Capacity peak shaving |
| Transmission peak shaving |




**Target each bill line item**

# MARKET DRIVERS – TAX CREDITS

Solar ITC Extended at Temporary Higher levels

| 2020 Extenders ITC | | |
|---|---|---|
| **Start of Construction** | **COD Deadline** | **ITC %** |
| 2019 | 2023 | 30% |
| 2020 | 2024 | 26% |
| 2021 | 2025 | 26% |
| 2022 | 2025 | 26% |
| 2023 | 2025 | 22% |
| Before 1/1/24 | After 1/1/26 | 10% |
| 2024 or after | Any | 10% |

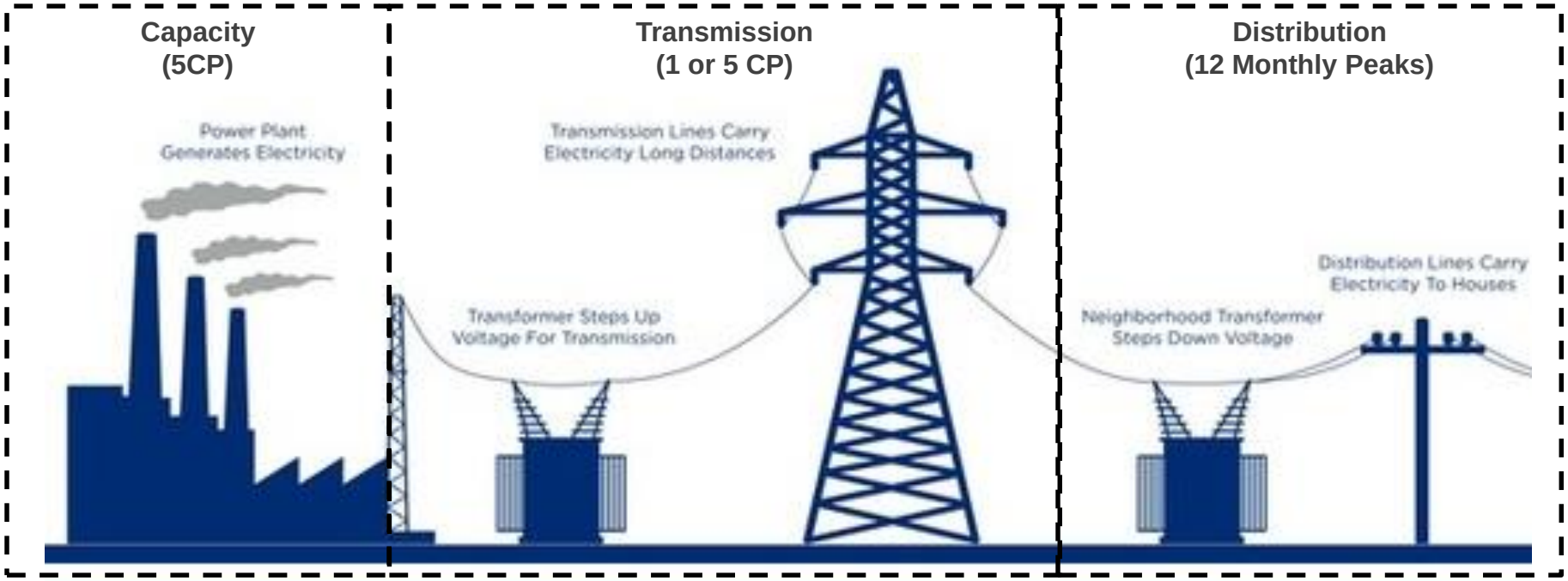
# MARKET DRIVERS – TRECs

| Project Type | TREC Factor |
|---|---|
| Subsection (t): landfill, brownfield, areas of historic fill | 1 |
| Grid Supply rooftop | 1 |
| Net Metered non-residential rooftop and carport | 1 |
| Community Solar | 0.85 |
| Grid Supply ground mount | 0.6 |
| Net Metered residential ground mount | 0.6 |
| Net Metered residential rooftop and canopy | 0.6 |
| Net Metered non-residential ground mount | 0.6 |
| Floating Solar panels | 0.6 |

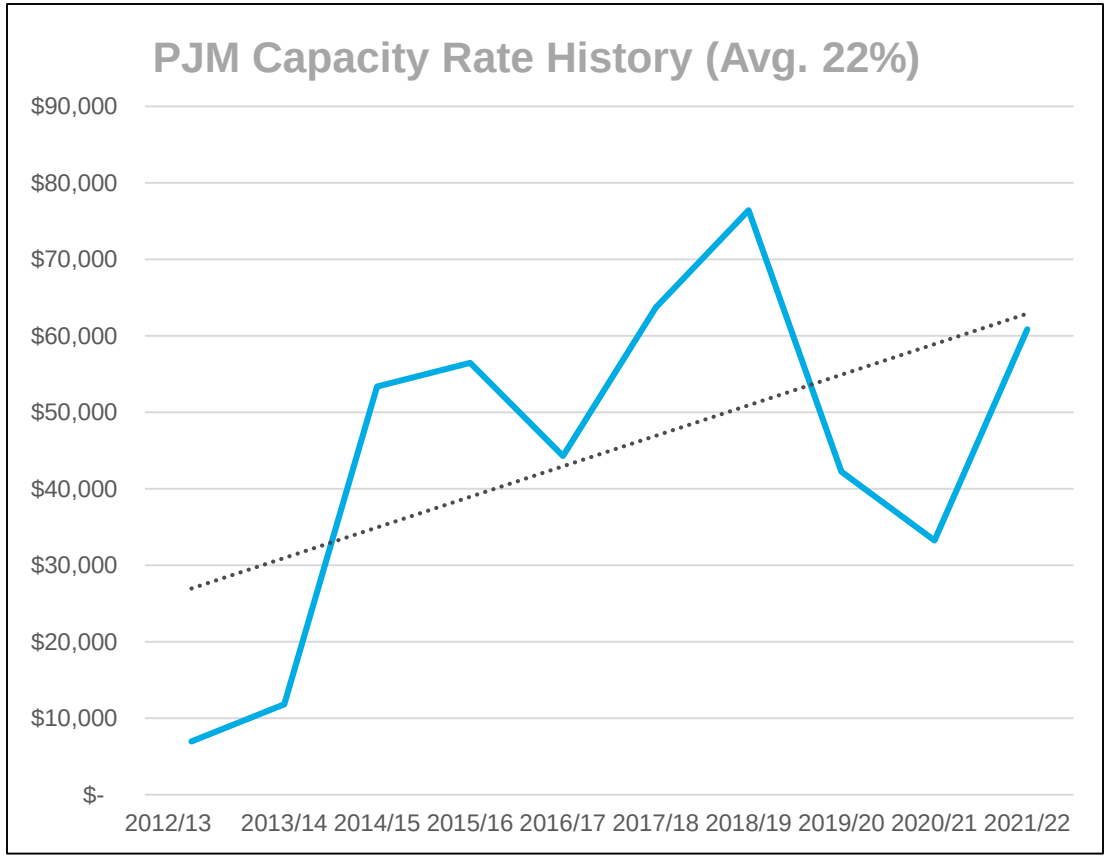
Delran School, NJ = 2.0 MW

# MARKET DRIVERS– DELIVERY CHARGES

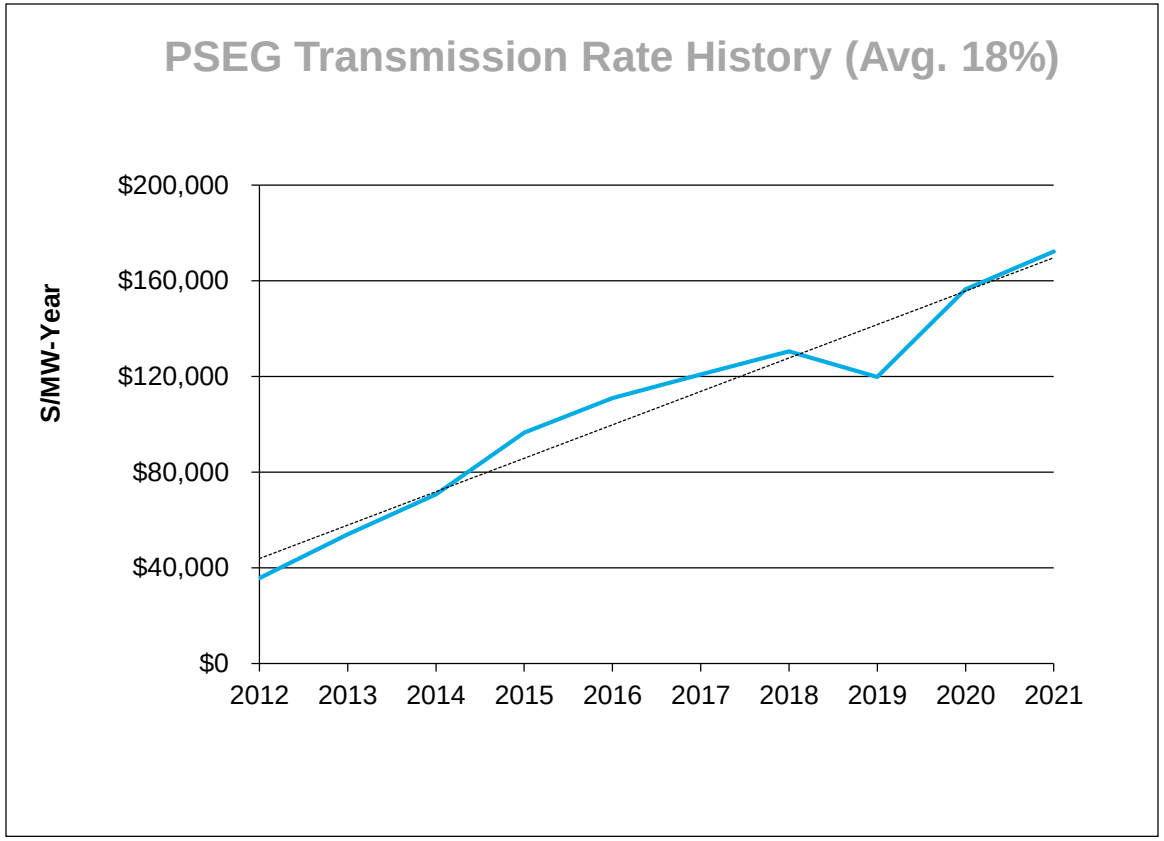
Utilities recover the entire fixed cost of power plants and transmission grid investments during the annual peak usage hours (either 5 Coincident Peaks (CP) or 1CP).



# MARKET DRIVERS - ENERGY PRICING TRENDS

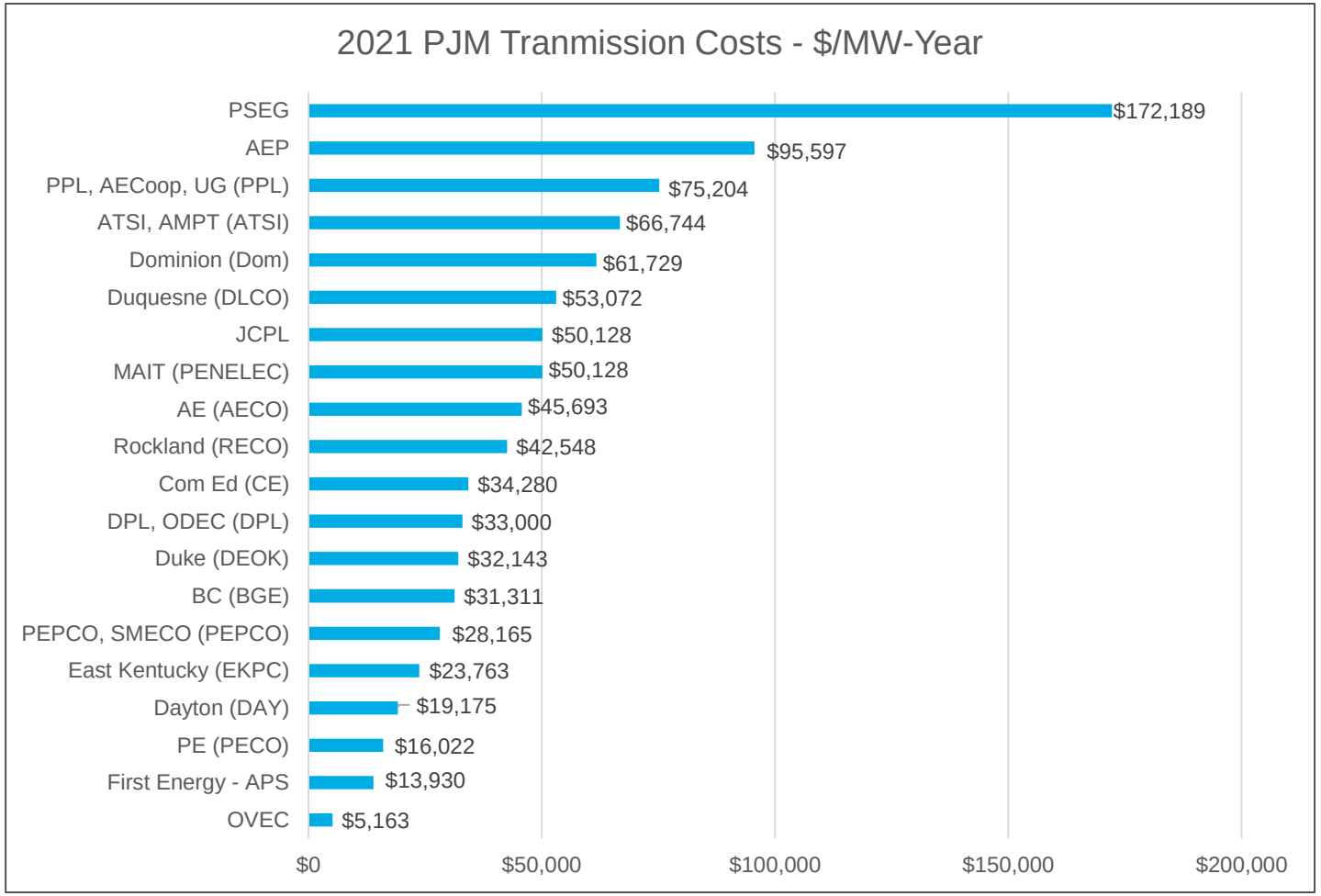



5CP (consistent across PJM)




1CP or 5CP
(dependent on transmission owner)

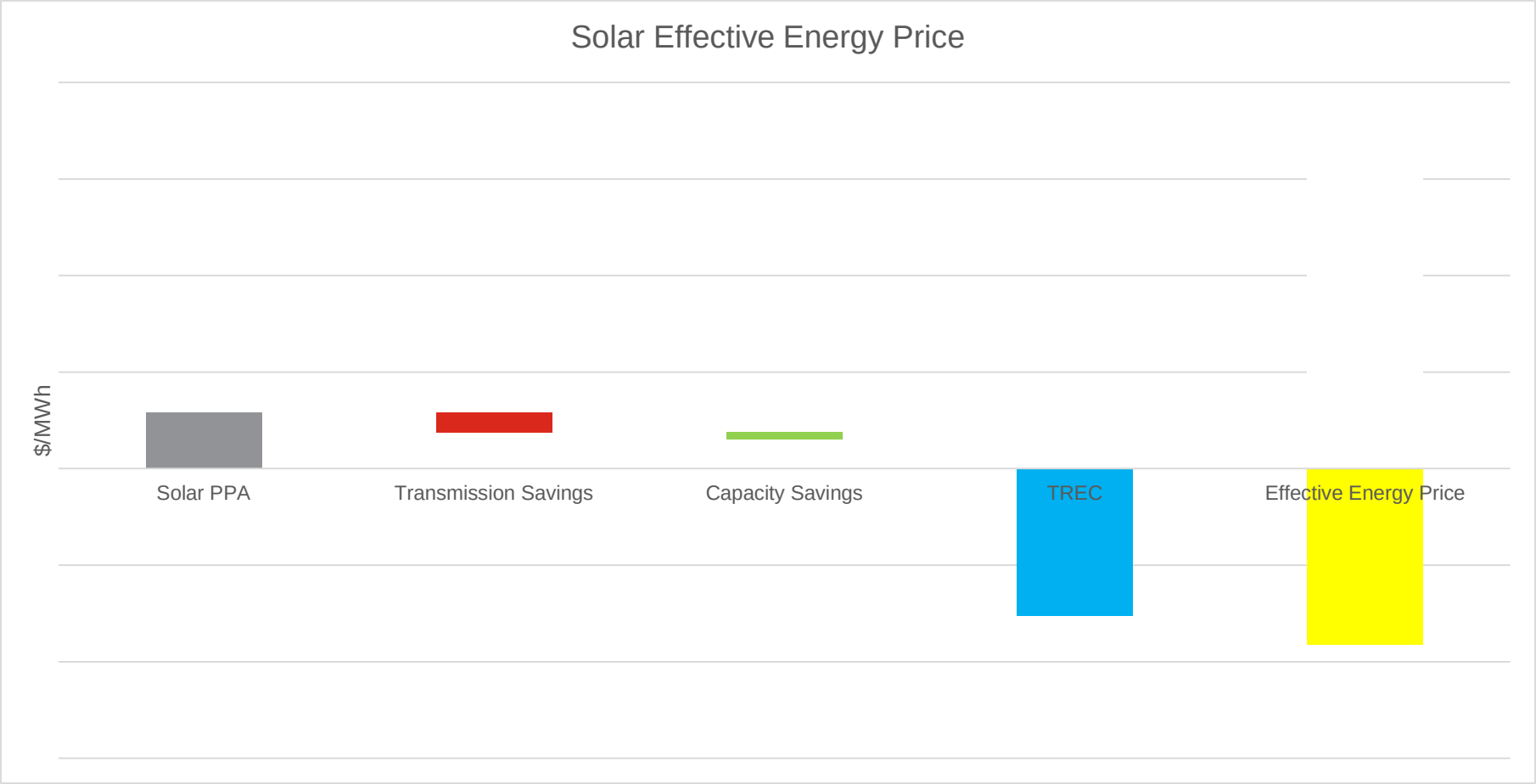
# MARKET DRIVERS - ENERGY PRICING TRENDS



# OWNERSHIP OPTIONS

| | |
|---|---|
| • **Third Party/PPA**<br>Pros:<br>• No Up Front Cost<br>• Behind the Meter (BTM) Benefits<br>• Fixed Priced Energy<br>• Eliminate Operating Risk<br>• Eliminate Maintenance Risk<br>• Long Term Energy Partner<br>• 24/7 Monitoring<br>Cons:<br>• Savings realized over time | • **Direct Ownership**<br>Pros:<br>• Energy Savings<br>• Behind the Meter (BTM) Benefits<br>• Depreciation/Tax Incentives when possible<br>Cons:<br>• Up Front Cost<br>• Operating & Maintenance Risk<br>• Production Risk |

# SOLAR THIRD PARTY OWNERSHIP VALUE BTM



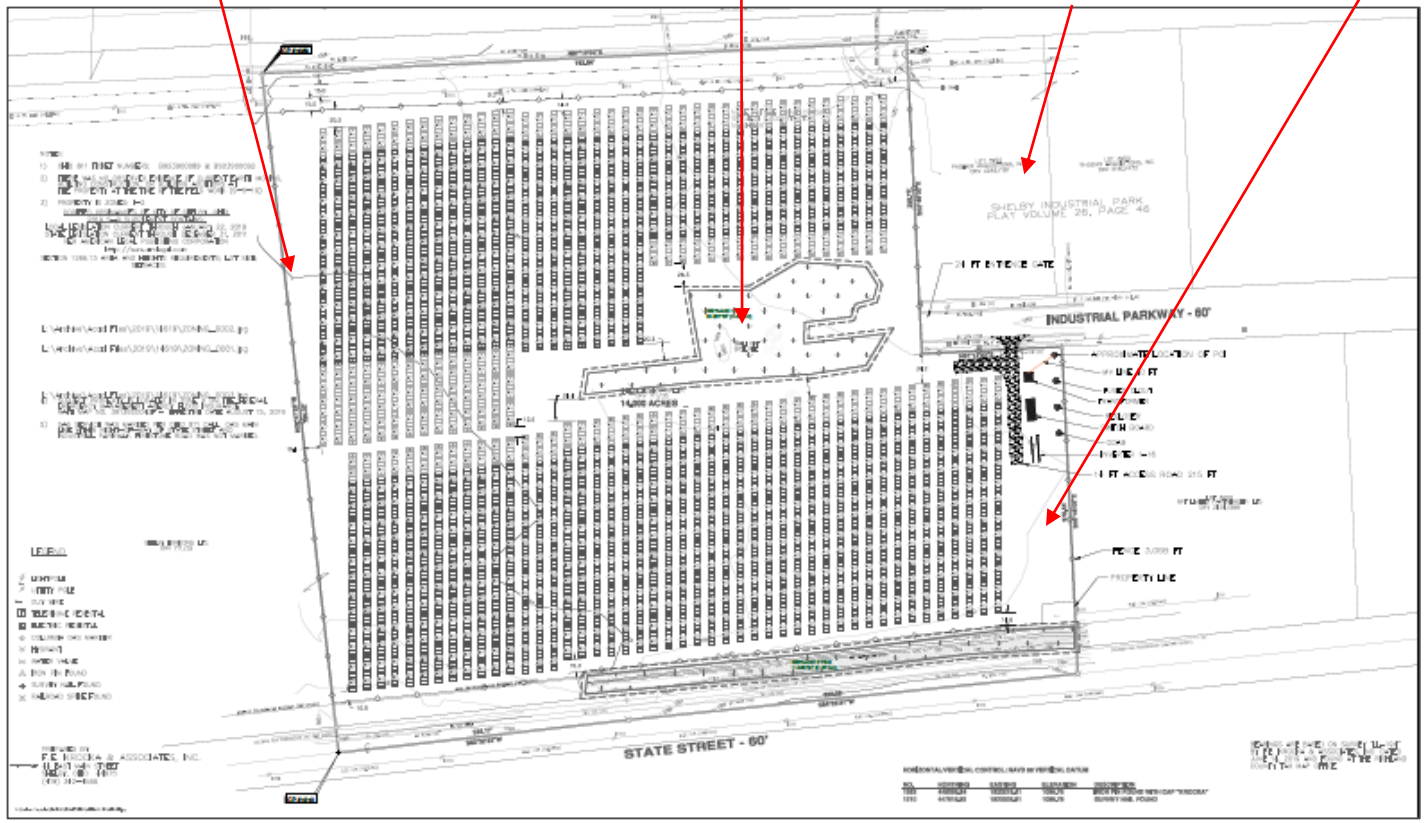
# SITING SOLAR

Surveyed Plot Line Adjusted Restricted Area

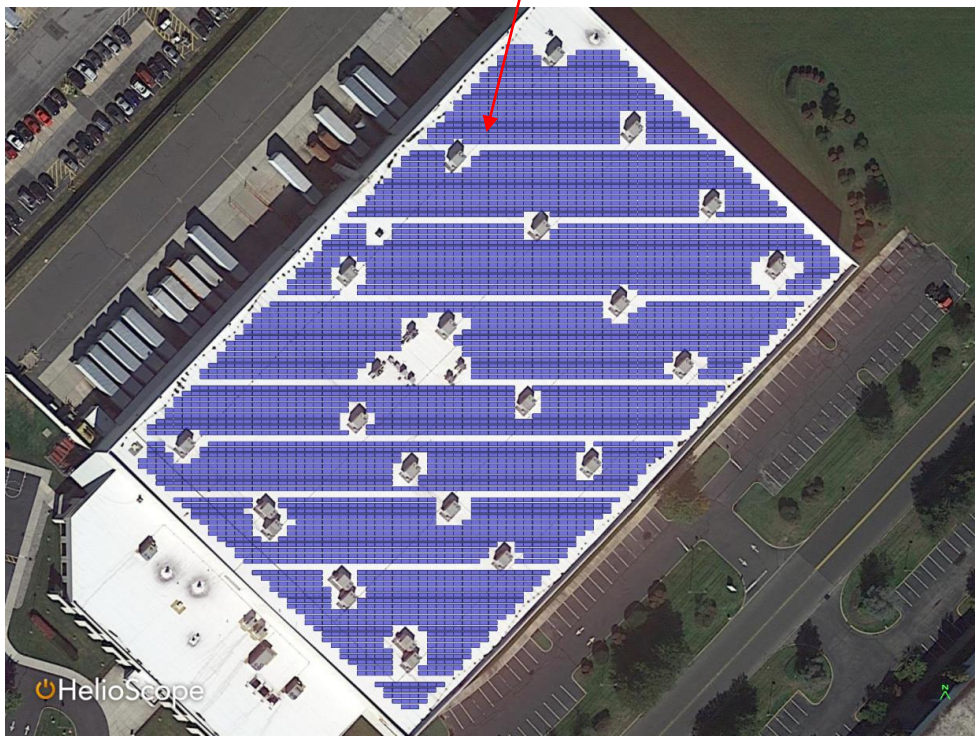
Wetland Area Discovered

Temp Laydown Area – Separate Lease

Reserve Space for Future Project

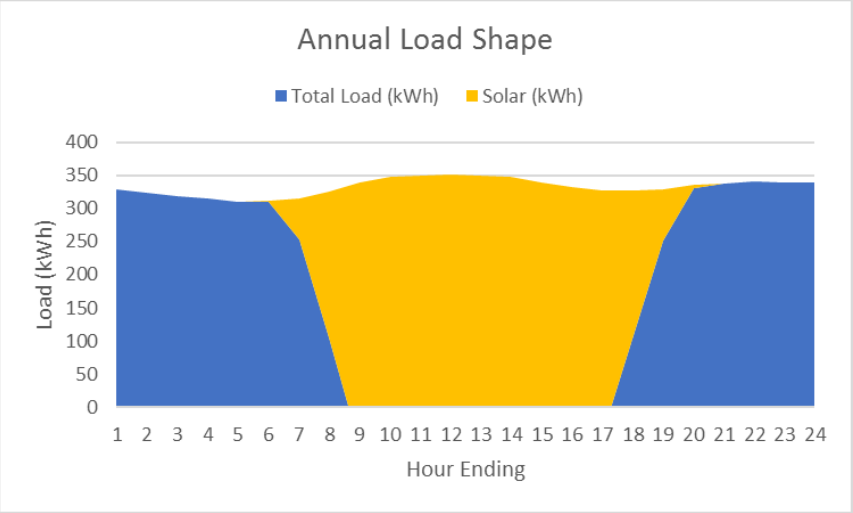


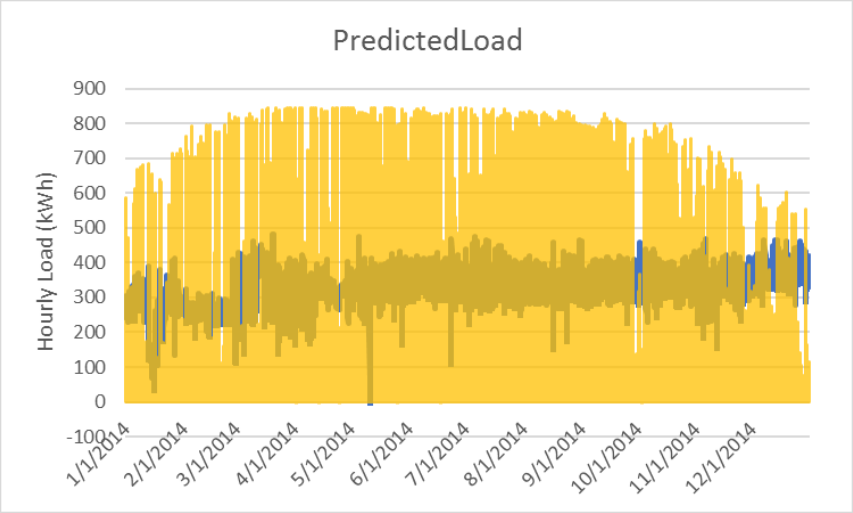

Roof Obstacles



# Case Study: Solar "Over" Sizing

## Municipal Load



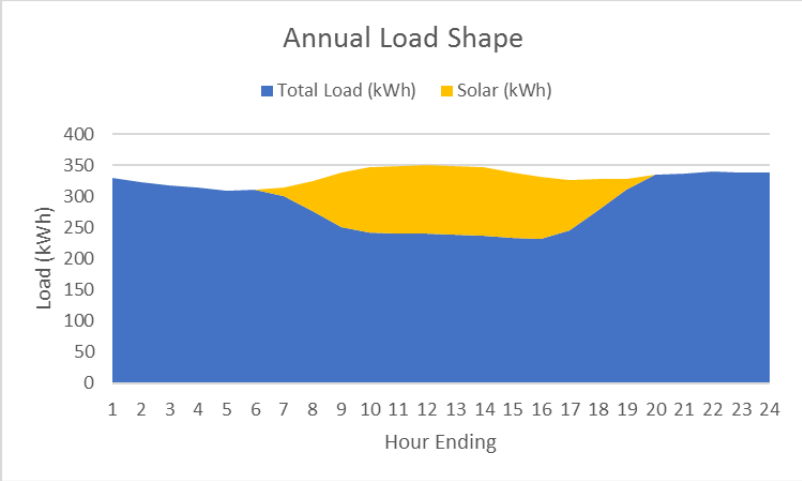



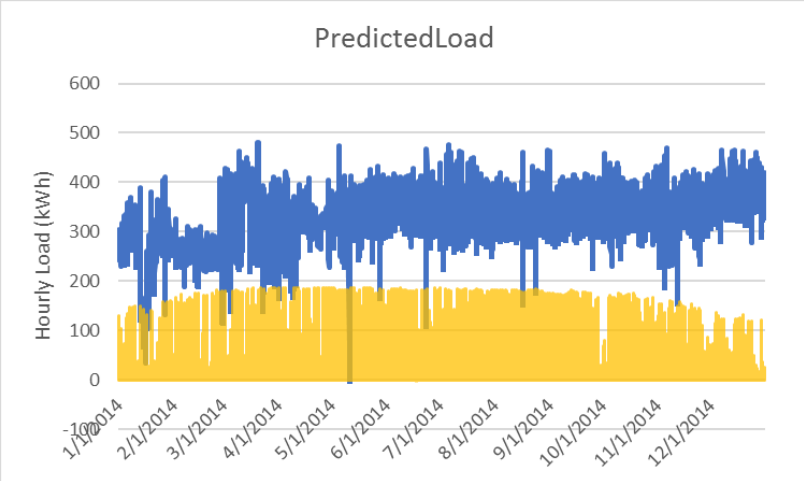

- Actual developer sizing for customer load. Approximately 2300 hours of yearly export. Expensive to customer with small benefit.
- Some developers will oversize system to fit land available

*Analysis uses customer load data from 1/1/2017 through 12/1/2017. Solar production is based on Clean Power SolarAnywhere V3.2 TMY3 data.

# Case Study: Correct Solar Sizing

## Municipal Load




- Updated size system for same customer
- Approximately 10 hours export
- In this case, limited opportunity because flat load produces small demand benefits, or energy only benefits
- Regulated customer without control of PLC/NSPL

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# THANK YOU


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