SOLAR LEASING 101:
Utility Scale Solar Development Trends
LEARNING OBJECTIVES

• Utility Scale Photovoltaic (PV) Solar Trends
• Ohio Solar Policy
• Solar Development in Ohio
• Utility-Scale PV Solar Construction
• Closing Thoughts and Questions
Utility Scale Photovoltaic (PV) Solar Trends
U.S. UTILITY SCALE ELECTRIC GENERATING CAPACITY ADDITIONS BY YEAR

- **gigawatts**
  - 60
  - 50
  - 40
  - 30
  - 20
  - 10
  - 0

- **Energy Sources**
  - Other
  - Petroleum
  - Hydro
  - Wind
  - Nuclear
  - Coal
  - Natural Gas

- **Solar**
  - 2% of total capacity
  - Average age: 3 years

- **Years**
  - 1930 and before
  - 1940
  - 1950
  - 1960
  - 1970
  - 1980
  - 1990
  - 2000
  - 2010
U.S. SOLAR INSTALLATIONS

U.S. PV Installations by Market Segment

The solar investment tax credit (ITC) is a tax credit that can be claimed on federal corporate income taxes against the eligible cost of a PV solar system.

- **30%** for construction before December 31, 2019
- **26%** for construction before December 31, 2020
- **22%** for construction before December 31, 2021
- **10%** for construction after December 31, 2021
NREL SOLAR SYSTEM INSTALLATION COST $ PER DC/WATT (INFLATION ADJUSTED), Q4 2010–Q1 2018

Source: NREL utility-scale PV system cost benchmark summary (inflation adjusted), 2010–2018
MODULE COST TRENDS
NREL UTILITY-SCALE PV BENCHMARK SUMMARY (INFLATION ADJUSTED), 2010–2018

OPERABLE UTILITY-SCALE SOLAR PV GENERATION UNITS (2015)

Total Operating Solar PV Capacity 13.6 GW

- Fixed Tilt, 6.4
- Single-Axis Tracking, 0.8
- Dual-Axis Tracking, 6.4

*0.1 MW  586 MW*
NOTE: Although placing a project in the interconnection queue is a necessary step in project development, being in the queue does not guarantee that a project will actually be built.
PJM is a FERC approved Regional Transmission Operator (RTO) who coordinates the movement of wholesale electricity across a high voltage transmission system in parts of 13 states in the northcentral/northeast region.
Recent Queue Trends: Z2 - AE2
Generation Interconnection Requests (Queue AE2) by State
- Requested Energy

Bulk of Solar project requests are in VA, OH and PA. Bulk of Wind project requests are in NJ and VA (large offshore wind projects).
U.S. OFF-SITE CORPORATE SOLAR PPAs

Ohio Solar Policy
Most RPS policies have been on the books for a decade or more. Most RPS policies have been on the books for a decade or more. States continue to make regular and significant revisions.
OHIO S.B. 232 ALTERNATIVE ENERGY ZONE POLICY

- Program provides owners of alternative energy projects with an exemption for the public utility tangible personal property tax and consolidates tax liabilities into one flat fee. The recipient pays a per-megawatt tax based on the facilities' total nameplate capacity for power production.

- In order to qualify, the owner must apply to Development Services Agency before December 31, 2022 for renewable energy projects.

- For projects greater than 20 MW in size, the Development Services Agency will forward the application for exemption to the local county commissioners and to each taxing unit in the affected counties.
  - County commissioners must approve the exemption by resolution within 30 days
  - If the county rejects the application or fails to act, the exemption is denied
  - County can establish itself an “alternative energy zone,” thus approving all projects
PAYMENT IN LIEU OF TAXES (PILOT) PROGRAM

• Require PILOTs of $7,000 per MW for qualified solar projects

• $6,000 to $8,000 per MW for all other renewable energy projects

• County commissioners may negotiate additional service payments, not to exceed $9,000 per MW when combined with the PILOT payment.

• The PILOT is to be allocated just as tangible personal property tax is allocated — to local governments and school districts. Any additional service payment required by the county is to be deposited in the county general fund. § 5727.75(E)(1)(b).
ALTERNATIVE ENERGY ZONE MAP

Approved AEZ Projects

Applications Denied

John Werkman
Ohio Development Services Agency
Tax Incentives Manager
(614) 466-6791
John.Werkman@development.ohio.gov
New solar facilities with a generating capacity of 50 MW or more must obtain a certificate from the Ohio Power Siting Board.
OHI0 ADMINISTRATIVE CODE 4906: OHIO POWER SITTING BOARD
4906-4 CERTIFICATE APPLICATIONS FOR ELECTRIC GENERATION FACILITIES

4906-4-01 Purpose and scope.
4906-4-02 Project summary and applicant information.
4906-4-03 Project description in detail and project schedule in detail.
4906-4-04 Project area selection and site design.
4906-4-05 Electric grid interconnection.
4906-4-06 Economic impact and public interaction.
4906-4-07 Compliance with air, water, solid waste, and aviation regulations.
4906-4-08 Health and safety, land use and ecological information.
4906-4-09 Regulations associated with wind farms.
1) Prior to filing an application to build a new utility facility, the developer is required to hold a public meeting to share details of the project, gather input, and hear the public’s concerns. Representatives from the OPSB attend the pre-application meeting to discuss the siting process and public participation.
2) Interested parties are encouraged to submit informal written comments to the OPSB. Informal comments are filed in the public comments section of the case record and inform the OPSB during its investigation.
3). After the OPSB staff makes its recommendation, they host a formal public hearing where community members can provide sworn testimony or submit written statements to the case record.
4) Finally, individuals, organizations, and governments may request to formally intervene in the case and participate as a party of record in the case proceedings.
OPSB - How to Stay Connected

- Sign up to receive news releases and Board meeting agendas
- View case documents online
- Create an account and subscribe for case updates
- Developers are required to file a copy of application with local libraries
- Local newspapers publish required notifications of hearings/meetings
- Follow the OPSB on Facebook
- View the OPSB Calendar

Email: contactOPSB@puco.ohio.gov
Phone: 866-270-OPSB (6772)
Website: www.opsb.ohio.gov
Mail: Ohio Power Siting Board, 180 E. Broad Street, Columbus Ohio 43215
Solar Development in Ohio
### Comparing Existing Solar Capacity with Planned Projects Currently Under Review with the OPSB

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,787 Existing...</td>
<td>212</td>
</tr>
<tr>
<td>Hardin Solar</td>
<td>150</td>
</tr>
<tr>
<td>Vinton Solar</td>
<td>125</td>
</tr>
<tr>
<td>Hillcrest Solar</td>
<td>200</td>
</tr>
<tr>
<td>Willowbrook I</td>
<td>150</td>
</tr>
<tr>
<td>Hecate Highland</td>
<td>300</td>
</tr>
<tr>
<td>Hardin II</td>
<td>170</td>
</tr>
<tr>
<td>Nestlewood</td>
<td>80</td>
</tr>
<tr>
<td>Alamo</td>
<td>70</td>
</tr>
<tr>
<td>Angelina</td>
<td>80</td>
</tr>
<tr>
<td>Big Plains</td>
<td>196</td>
</tr>
<tr>
<td>Madison Fields</td>
<td>180</td>
</tr>
<tr>
<td>Atlanta Farms</td>
<td>200</td>
</tr>
</tbody>
</table>

# Utility Solar Development 50 MW or Greater

<table>
<thead>
<tr>
<th>Project Name</th>
<th>County</th>
<th>Size (MW)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardin Solar</td>
<td>Hardin County</td>
<td>150 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Hardin II</td>
<td>Hardin County</td>
<td>170 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Vinton Solar</td>
<td>Vinton County</td>
<td>125 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Hillcrest Solar</td>
<td>Brown County</td>
<td>200 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Willowbrook I</td>
<td>Highland County</td>
<td>150 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Hecate Highland</td>
<td>Highland County</td>
<td>300 MW</td>
<td>Approved</td>
</tr>
<tr>
<td>Nestlewood</td>
<td>Brown/Clermont</td>
<td>80 MW</td>
<td>Pending</td>
</tr>
<tr>
<td>Alamo</td>
<td>Preble County</td>
<td>70 MW</td>
<td>Pending</td>
</tr>
<tr>
<td>Angelina</td>
<td>Preble County</td>
<td>80 MW</td>
<td>Pending</td>
</tr>
<tr>
<td>Big Plains</td>
<td>Madison County</td>
<td>196 MW</td>
<td>Pre-App</td>
</tr>
<tr>
<td>Madison Fields</td>
<td>Madison County</td>
<td>180 MW</td>
<td>Pre-App</td>
</tr>
<tr>
<td>Atlanta Farms</td>
<td>Pickaway County</td>
<td>200 MW</td>
<td>Pre-App</td>
</tr>
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</table>

**Total = 1,900 MW**
<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Net Summer Capacity (Megawatts)</th>
<th>GHI** (kWh/m²/day)</th>
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<tbody>
<tr>
<td>1</td>
<td>CA</td>
<td>18,876</td>
<td>5.15</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>4,135</td>
<td>4.63</td>
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<tr>
<td>3</td>
<td>AZ</td>
<td>3,231</td>
<td>5.78</td>
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<tr>
<td>4</td>
<td>TX</td>
<td>2,448</td>
<td>4.96</td>
</tr>
<tr>
<td>5</td>
<td>NJ</td>
<td>2,240</td>
<td>4.17</td>
</tr>
<tr>
<td>6</td>
<td>MA</td>
<td>2,164</td>
<td>4.06</td>
</tr>
<tr>
<td>7</td>
<td>NV</td>
<td>2,027</td>
<td>5.35</td>
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<tr>
<td>8</td>
<td>FL</td>
<td>1,623</td>
<td>4.91</td>
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<td>9</td>
<td>NY</td>
<td>1,529</td>
<td>3.90</td>
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<td>10</td>
<td>UT</td>
<td>1,100</td>
<td>4.68</td>
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<tr>
<td>25</td>
<td>Ohio</td>
<td>208.3</td>
<td>4.03</td>
</tr>
</tbody>
</table>

** Global Horizontal Irradiance for this chart is based on the location of the state capital.

Ohio’s transmission grid consists of 6,983 miles of high voltage transmission lines and 112 miles of low voltage transmission lines.

To reduce project cost, developers will seek sites with low interconnection costs.

Pre-application studies help developers strategically identify optimal grid interconnection locations, while dismissing problematic sites that require additional upgrades in grid infrastructure.
COMPARISON OF TRANSMISSION LINES

Southwest Ohio

Northwest Ohio
UNDERSTANDING THE SCALE OF DEVELOPMENT

• 1,900 MW of solar development in hopper

• OPSB Applications – The 12 projects combined have a project area of over 21,000 acres or 32 Sq. Miles
  
  o Eden Township is 30 Sq. Miles
With research, guidance, and collaboration.....large facilities could provide:

- **Water quality protection** – Perennial ground cover that reduces runoff, soil conservation, vegetated wetland and waterway buffers
- **Habitat value** – Pollinators, small mammals, birds, reptiles
- **Agricultural opportunities** – beehives, hay production, grazing, high-value hand-picked crops, pollinator benefits for nearby crops

Vegetation benefits to PV:

- **Increased PV efficiencies** – Lowers temperatures beneath panels
- **Reduced O&M costs** – With low height vegetation and/or grazing

Source: National Renewable Energy Laboratory. 2018. Land Use Planning for Large-Scale Solar
Utility-Scale PV Solar Construction
Thank You!

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