# The Costs of Not Going Solar

Dan Steinhardt, Arch Solar C&I

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# Agenda & Speakers

1. Understanding Parallel Generation
2. Understanding Your Utility Bill
3. Alternative Energy Supplier Example
4. State Legislation/PSC Update
5. Understanding the IRA Legislation
6. BESS (time dependent)

**Contact Information: (920) 838-4108**
dan@archelec.com

## Today's Speaker:


## Dan Steinhardt

**Solar Developer for Arch Solar C&I**

- 5 years of Solar Project Development
- 12 years of Energy Management
- 20 years in the Electrical Trades

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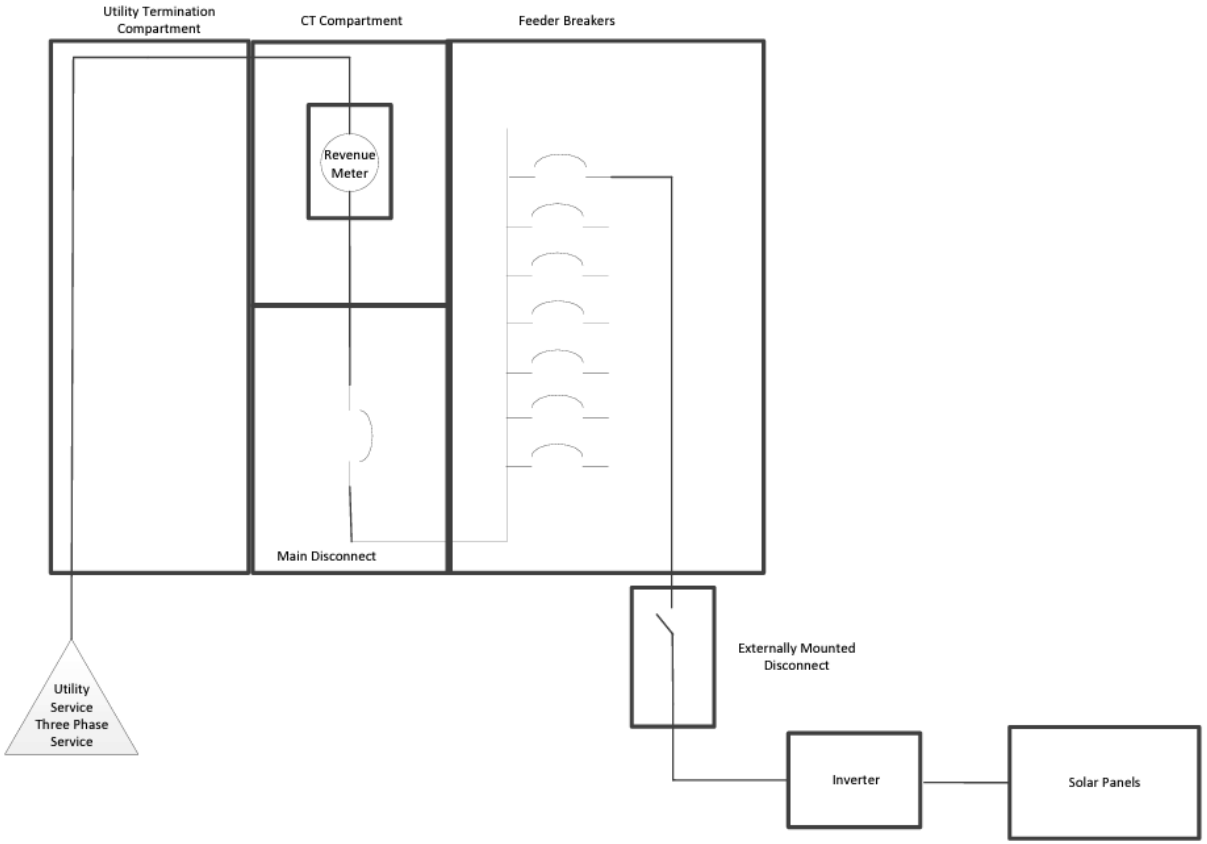
# What is Parallel Generation?

- Common Interconnection shows solar on the load side of the main disconnect switch or connected to load side distribution, but almost always behind the meter.
- NEC has different rules for ampacity allowances for either interconnection type.
- Solar electricity is available to feed facility loads before utility delivered electricity is ever needed.



# Alternative Energy Supplier (AES)

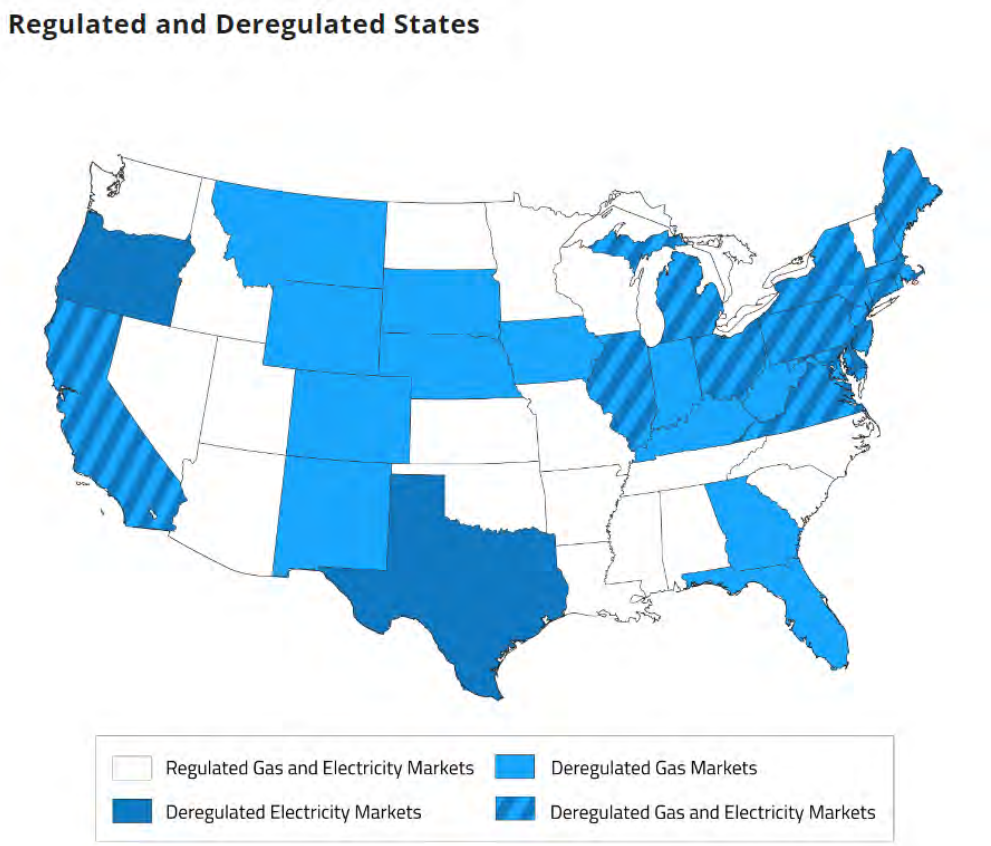
**Transmission Provider:** Regionally placed, no alternative. Costs are mainly fixed, or demand (kW) based.

**Energy Provider:** Open Market, kWh costs are typically based upon annual usage.

Hypothetical Situation

- Let's say you're paying an average of $.08/kWh for 500,000 kWh annually with your existing supplier.
- For 2023, an AES comes along and says they can offer electricity at $0.06/kWh for the same 500,000 kWh.
- Would you gladly take the $10,000 savings?

**Note:** WI has a deregulated NG Market for large consumers.

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# 2022 We Energies Rate Sheet

## WE Energies Commercial Building - Electric Rates

### CG – 1 (Secondary Service)

- Lowest Billing Class, under 329 kWh/day
- Fixed Charge: $0.526/day
- Energy Charge: $0.13214/kWh
- PCAC Charge: $0.00764/kWh

### CG – 3 (Secondary Service)

- Highest Billing Class, over 986 kWh/day
- Fixed Charge: $2.00/day
- On Peak Energy Charge: $0.07135/kWh
- Off Peak Energy Charge: $0.05088/kWh
- On Peak Demand Charge: $15.184/kW
- Customer Maximum Demand: $2.55/kW
- PCAC Charge: $0.00764/kWh

### CG – 2 (Secondary Service)

- Mid Billing Class, Over 329 kWh/day but below 986 kWh/day
- Fixed Charge: $1.32/day
- On Peak Energy Charge: $0.11152/kWh
- Off Peak Energy Charge: $0.08287/kWh
- On Peak Demand Charge: $6.86/kW
- Customer Maximum Demand Charge: $2.00/kW
- PCAC Charge: $0.00764/kWh

### CP-1 (Primary Service) Base Rate

- 12.47 kV to 138 kV Service Rating
- Fixed Charge: $19.76/day
- On Peak Energy Charge: $0.07687/kWh
- Off Peak Energy Charge: $0.04949/kWh
- On Peak Demand Charge (Summer): $17.44/kW
- On Peak Demand Charge (Winter): $12.547/kW
- Customer Maximum Demand Charge: $2.23/kW
- PCAC Charge: $0.00764/kWh

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# CP-1 Customer (No Cost of Capital)

**Existing Annual Electricity Consumption:**
10,000,000 kWh

**2021 Electricity Spend:** $1.4 M

**Average Cost of Electricity: $0.14/kWh**

Solar Solution: 3 MW Ground Array (Fixed)

- Solar Cost: $5,300,000
  - Federal 30% Tax Credit: -$1,600,000
  - Focus on Energy Incentive: -$50,000
  - Federal Depreciation: -$950,000
  - Electricity Savings: -$340,000
- Annual Usage Offset: 30%

## 30-year Cost of Power: $0.026/kWh

**(includes annual maintenance program and inverter replacement in year 15)**

- ROI: 8 years
- Estimated 30-year savings: **$13,000,000**

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# CP-1 Customer (Includes Cost of Capital)

**Existing Annual Electricity Consumption:**
10,000,000 kWh

**2021 Electricity Spend:** $1.4 M

**Average Cost of Electricity: $0.14/kWh**

Solar Solution: 3 MW Ground Array (Fixed)

- Solar Cost: $5,300,000
  - Federal 30% Tax Credit: -$1,600,000
  - Focus on Energy Incentive: -$50,000
  - Federal Depreciation: -$950,000
  - Electricity Savings: -$340,000
- Annual Usage Offset: 30%

## 30-year Cost of Power: $0.045/kWh

**(includes annual maintenance program and inverter replacement in year 15)**

- ROI: 11.8 years
- Estimated 30-year savings: **$13,000,000**

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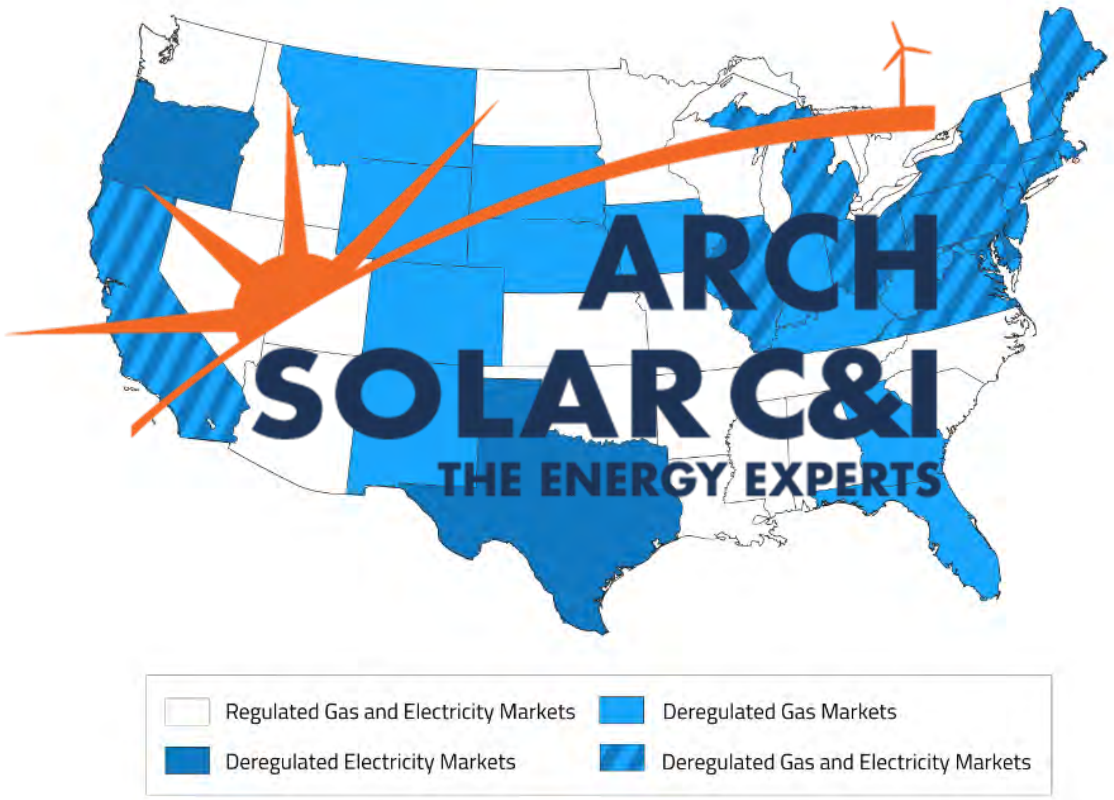
# Alternative Energy Supplier (Arch Solar)

## Customer Owned Co-Generation

Example

- Let's say you're paying an average of $.08/kWh for 20,000,000 kWh annually with your existing supplier.
- In 2023, Arch Solar comes along and says if you own your solar system, we can offer electricity at $0.045/kWh for half of that existing consumption.
- Would you gladly take the $350,000 savings difference, starting year 1?
- What else might this project affect: Human Resources, Marketing, Sustainability Metrics?

**Regulated and Deregulated States**



# Legislative/PSC Updates

**PSC 119 Rewrite (Rules for Interconnection)**

- **Category Sizing Rewrite**
- **Allows Exporting Controls to alter Category of review**

**Section 1. PSC 119.02 (4) is amended to read:**

**PSC 119.02 (4)** "Category 1" means a DG facility with an export capacity of 20 kW or less. A DG facility comprised of a resource no larger than 20 kW paired with a non-exporting energy storage system no larger than 20 kW shall be considered a Category 1 system.

**Section 2. PSC 119.02 (5) is amended to read:**

**PSC 119.02 (5)** "Category 2" means a DG facility with an export capacity of greater than 20 kW and not more than 200 kW. The nameplate rating shall be used instead of the export capacity for this definition if the non-exporting energy storage system is larger than 20 kW.

**Section 3. PSC 119.02 (6) is amended to read:**

**PSC 119.02 (6)** "Category 3" means a DG facility with an export capacity of greater than 200 kW and not more than 1 MW. The nameplate rating shall be used instead of the export capacity for this definition if the non-exporting energy storage system is larger than 200 kW.

**Section 4. PSC 119.02 (7) is amended to read:**

**PSC 119.02 (7)** "Category 4" means a DG facility with an export capacity of greater than 1 MW and not more than 15 MW. The nameplate rating shall be used instead of the export capacity for this definition if the non-exporting energy storage system is larger than 1 MW.

# Legislative/PCS Updates

**PSC 119 Rewrite (Rules for Interconnection)**

- **Public Que**

**PSC 119.04 (5)**

(a) All public utilities shall maintain a single application queue that shall identify the status of all applications submitted to the utility and shall be used to address applicant inquiries about application status.

(b) Public utilities who serve more than 100,000 customers shall make their application queue public. Public application queues shall be posted on the utility's website and updated on at least a monthly basis.

(c) At a minimum, the information maintained in an application queue, including public application queues, shall include for all applications active on or submitted to the utility after September 1, 2023:

1. Application or queue numbers that enable applicants to identify their submissions.
2. Technology type(s).
3. Proposed DG facility nameplate capacity and, where applicable, export capacity, in kW or MW.
4. Category assignment.
5. Location by city, state, and county.
6. Substation and circuit on which the proposed installation would be located.
7. Current application status (active, withdrawn, approved, in service).
8. Date application deemed complete, if applicable.
9. Current status of the application's progress through the application process steps outlined in PSC 119.04(4).
10. Date of signed interconnection agreement, if applicable.

# Legislative/PCS Updates

**PSC 119 Rewrite (Rules for Interconnection)**

- **Proposed Changed to Table 119.08**
- **Review/Study increases across the board**

**PSC 119.08 Table 1**

| Table 119.08–1 | | | | | |
|---|---|---|---|---|---|
| **Category** | **~~Generation~~ Export Capacity** | **Application Review Fee** | **Engineering Review Fee** | **Distribution System Study Fee** | **Commissioning Fee** |
| 1 | 20 kW or less | ~~None~~ $150 (1-8 kW) $300 (9-20 kW) | ~~None~~ Cost based | ~~None~~ Cost Based | $150 |
| 2 | Greater than 20 kW to 200 kW | ~~$250~~ $300 + $10/kW | ~~Max. $500~~ Cost Based | ~~Max. $500~~ Cost Based | $250 |
| 3 | Greater than 200 kW to 1 MW | ~~$500~~ $2000 + $2/kW | Cost based | Cost based | ~~$1000~~ |
| 4 | Greater than 1 MW to 15 MW | ~~$1000~~ $4000 + $0.50/kW | Cost based | Cost based | $2500 |

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# Legislative/PSC Updates

**3rd Party Financing – 2 Dockets**

- **Midwest Renewable Energy Association**
- **Vote Solar**
  - Public Comments Section Ended on Nov. 9th, 2022
  - Wisconsin is 1 of 15 states that has not clarified there language around solar (DG) ownership, that should change soon.
  - Ultimately 3rd party financing would open the doors to Power Purchase Agreements and Leasing mechanisms.
  - A decision is expected by end of January.

# Legislative/PSC Updates

**Important Solar Rate Cases**

- **WE Energies**
  - **“Solar Now” Program Expanded from 35 MW to 60 MW**
    - **Limited to 2.25 MW AC**
  - **Renewable Energy Rider (RER) Tariff Introduced**
    - **Virtual PPA**
    - **Reduces costs at Retail Rate for a unit of kWh**
- **WPS**
  - **Introduced their own “Solar Now” Program**
    - **Capped at 20 MW in total portfolio**
    - **7.75 MW set aside for Non-Profits**

# Inflation Recovery Act Update

Signed into law on August 16th, 2022

**ITC: Investment Tax Credit**

- Extended for 10 years at the 30% level
- Now qualified for standalone energy storage projects

**PTC: Production Tax Credit**

- Now qualified for solar projects
- Extended for 10 years, starting at $0.027/kWh (rate climbs with inflation)
- Tax Credit apples to 1st 5 years of operation

- **Direct Pay Provisions in lieu of tax credits for Tax Exempt Organizations, including state and local governments**

**Transferability of tax credits to a 3rd party organization**

- Allows the sale of tax credits to a 3rd party

**10% Tax Credit Bonuses for:**

- Domestic Supply
- Affordable Housing, Low-Income Communities, Indian Land
- Energy Communities

**Extended Carryback/Carryforward of Tax Credits**

- 3 years back
- 22 years forward

**Standalone Energy Storage Incentive (BESS)**

- 10 years at the 30% level

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# IRA – “Further Guidance from IRS”

- **IRS Guidance Letter**
  - Within 180 days from the date of enactment of the IRA, the IRS must establish a formal program to consider and award certifications for qualified investments.
  - Further Guidance expected in late January thru mid-February.

# IRA – “Domestic Content”

**Domestic Steel Requirement (Solar Racking)**

- Steel and iron must be 100 percent produced in the United States.

**Manufactured Products (Solar Modules and Electronics)**

- Manufactured products are deemed to have been manufactured in the United States if the adjusted percentage of the total cost of the components and subcomponents of the project is attributable to components that are mined, produced, or manufactured in the United States.[34] The adjusted percentage is 40 percent.
  - 40 percent for projects that begin construction before 2025,
  - 45 percent for projects that begin construction in 2025,
  - 50 percent for projects that begin construction in 2026, and
  - 55 percent for projects that begin construction thereafter.

**The IRA references the Buy American Act, we could assume:**

- For a manufactured product to be considered produced in the United States: (i) all of the manufacturing processes for the product must take place in the United States; and (ii) all of the components of the product must be of U.S. origin. A component is considered of U.S. origin if it is manufactured in the United States, regardless of the origin of its subcomponents.

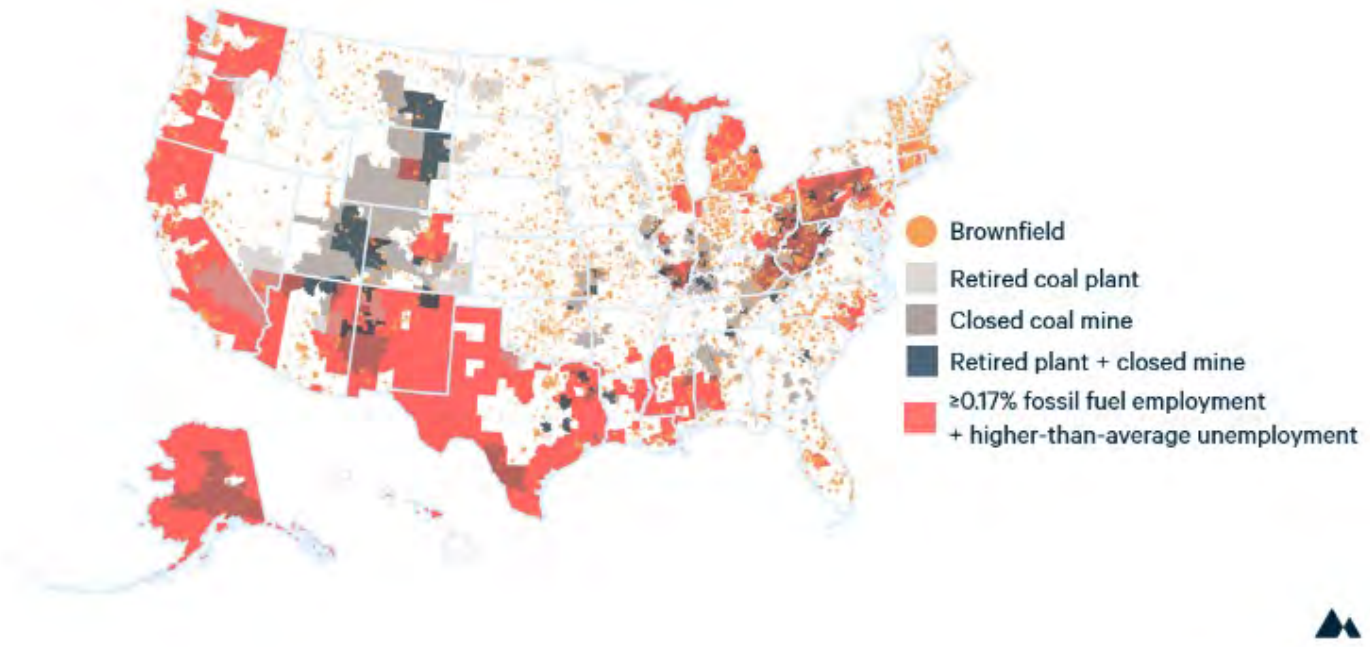
**We need additional guidance from the IRS at this point.**

Source: https://www.resources.org/common-resources/what-is-an-energy-community/

# IRA – “Energy Communities”

**Energy Communities – 3 Types of Geography**

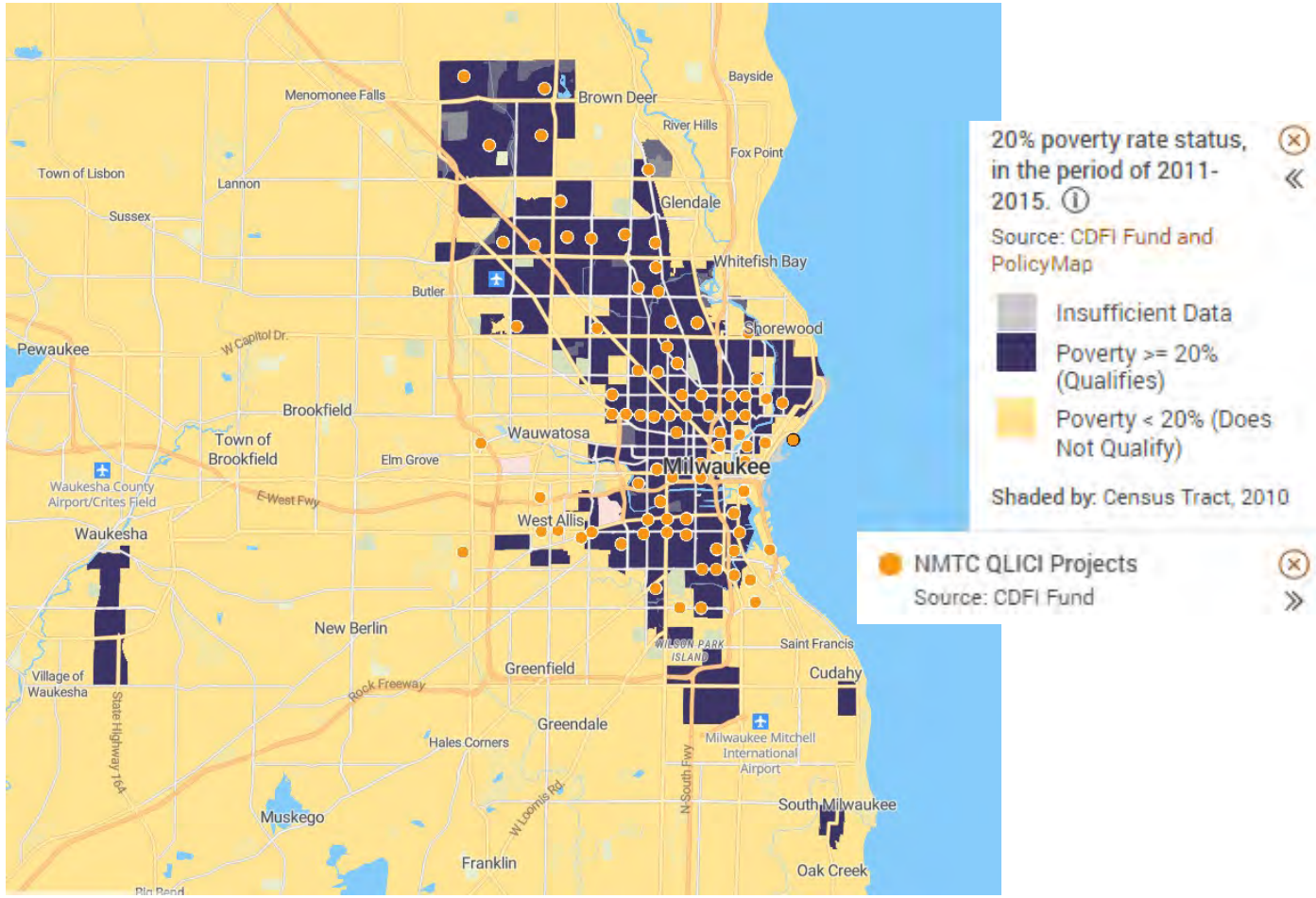
- US Environmental Protection Agency Defined Brownfields
- Any Census Tract where a Coal Fired Power Plant has closed since 2010 or a coal mine since 2000
- Any statistical area defined by the Office of Management and Budget where .17% or greater direct employment or at least 25% of local tax revenues are related to extraction, processing, transport, or storage of coal, oil, or natural gas and unemployment is at or above the national average in the previous year.




Source: https://www.resources.org/common-resources/what-is-an-energy-community/

# IRA – “Low Income Communities”

- Low Income Communities
  - A low-income community is generally defined as any population census tract if the poverty rate for such tract is at least 20 percent or if the median family income for such tract does not exceed 80 percent of statewide median family income.
  - Defined at “New Market Tax Credit” eligible areas.
  - **IRS must first make specific allocation for funds (application-based process).**

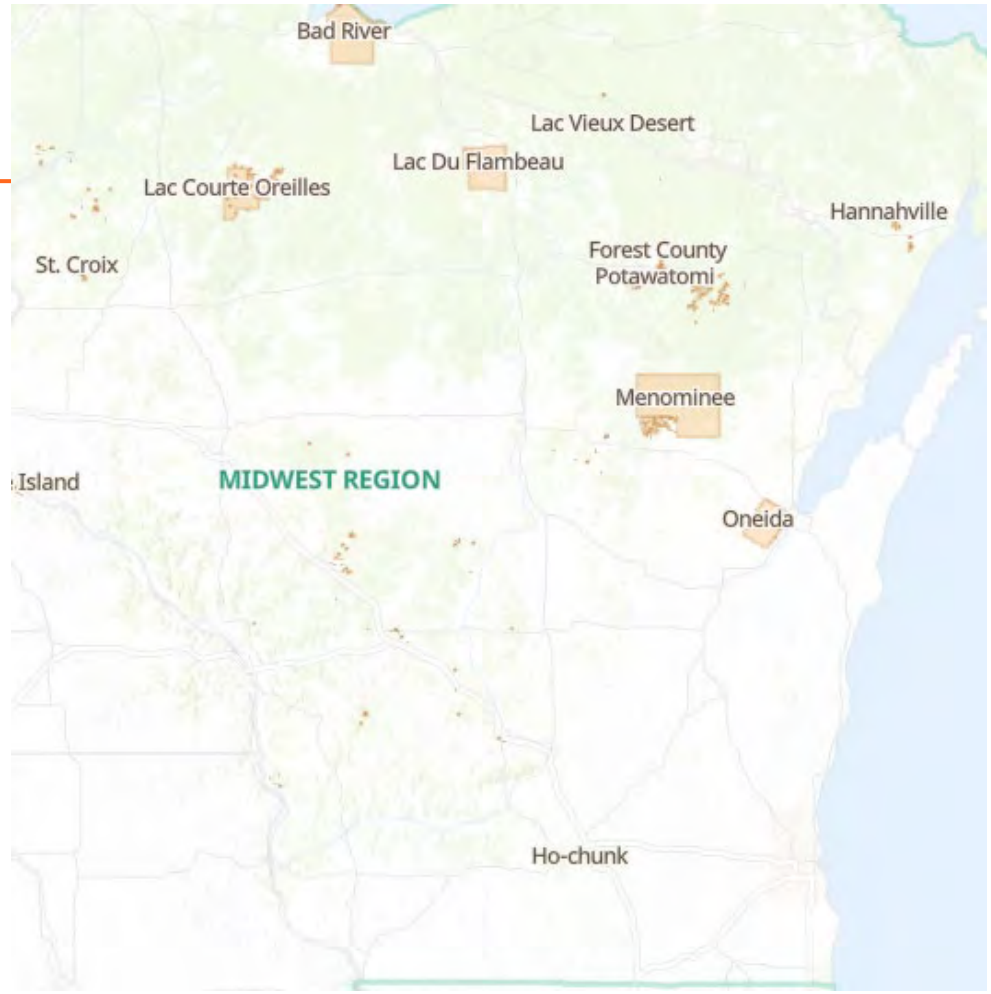



Source: www.policymap.com

# IRA – “Indian Land”

**Indian Land**

- Indian land includes “Indian reservations, public domain Indian allotments, former Indian reservations in Oklahoma, land held by incorporated Native groups, regional corporations, and village corporations under the provisions of the Alaska Native Claims Settlement Act, and dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territorial thereof, and whether within or without the limits of a State.




https://biamaps.doi.gov/indianlands/

# The Dark side of Solar PV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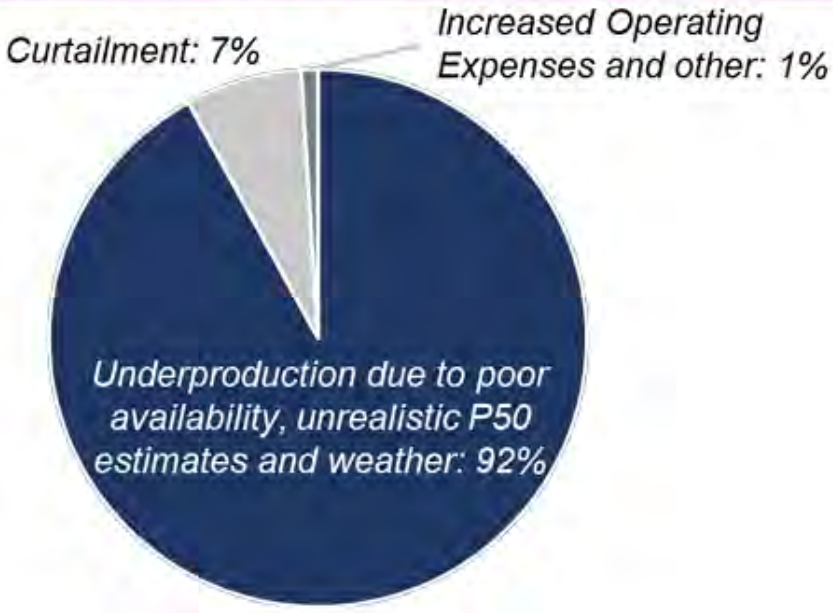
# The Dark side of Solar PV

- **2022 Solar Risk Assessment Report**
  - 92% of lost revenue is due to underproduction

Figure 1. The average difference between actual and expected EBITDA

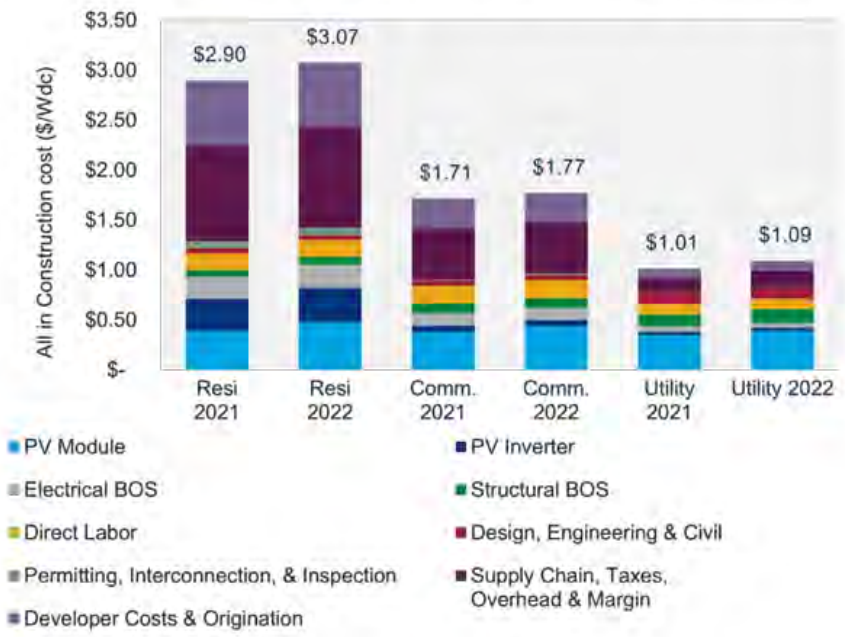
**Underproduction is the largest driver of lost EBITDA**



# The Dark side of Solar PV

- **2022 Solar Risk Assessment Report**
  - New Solar Builds have seen an 8% increase in price
    - Elevated Commodity Prices
    - Tariffs and Anti-Circumvention Cases
    - Elevated Freight Costs
    - Labor Shortages
    - Increases in Risk

Figure 1. Modeled US national average system prices by market segment, 2021 and 2022 (US$/Wdc)




*Average residential system: 8 kWdc rooftop system with mono PERC modules and microinverters*

*Average Commercial system: 500 kWdc rooftop system with mono PERC modules and three-phase string inverters.*

*Average Utility system: 100 MWdc ground-mount system with bifacial modules, central inverters and 1P single-axis tracking*

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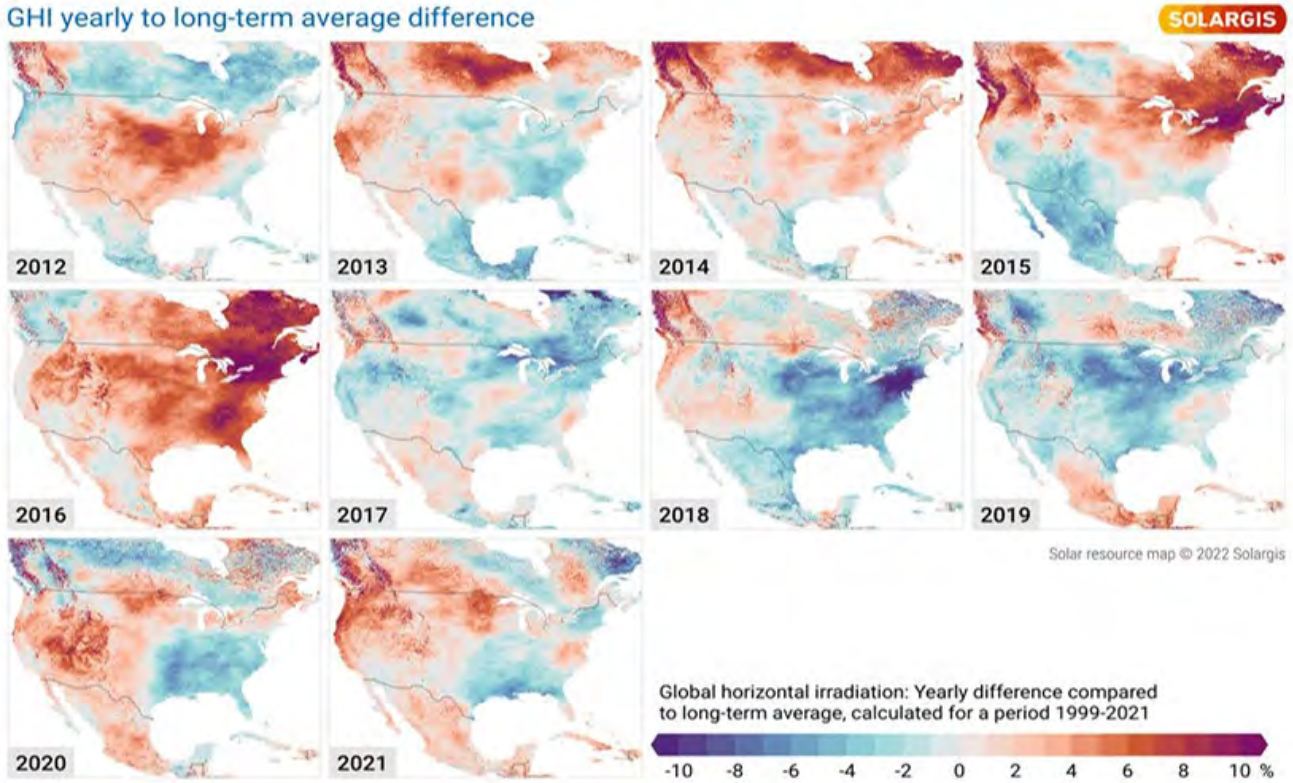
# The Dark side of Solar PV

- **2022 Solar Risk Assessment Report**
  - Decrease in a key solar resource in key regions:
    - Irradiance (sunlight)
    - 10% Increase In Northern Regions in past 10 - years

Figure 1: GHI variability across North America compared to 23-years long-term average



# The Dark side of Solar PV

- **2022 Solar Risk Assessment Report**
  - Inverters are critical components to the performance of a PV site
    - On average they account for 60% of a site's total energy lost
    - Most inverters fail within the first 2 years of operation

Figure 1. Technical Availability

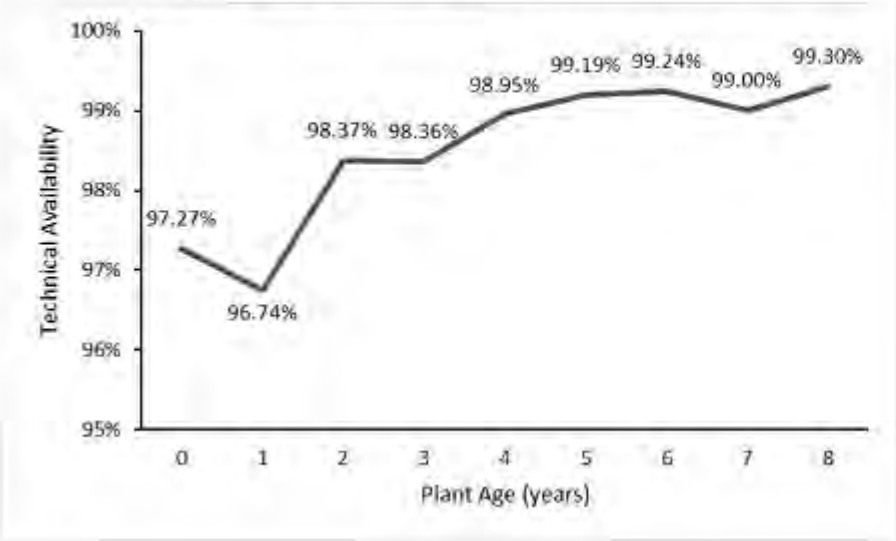
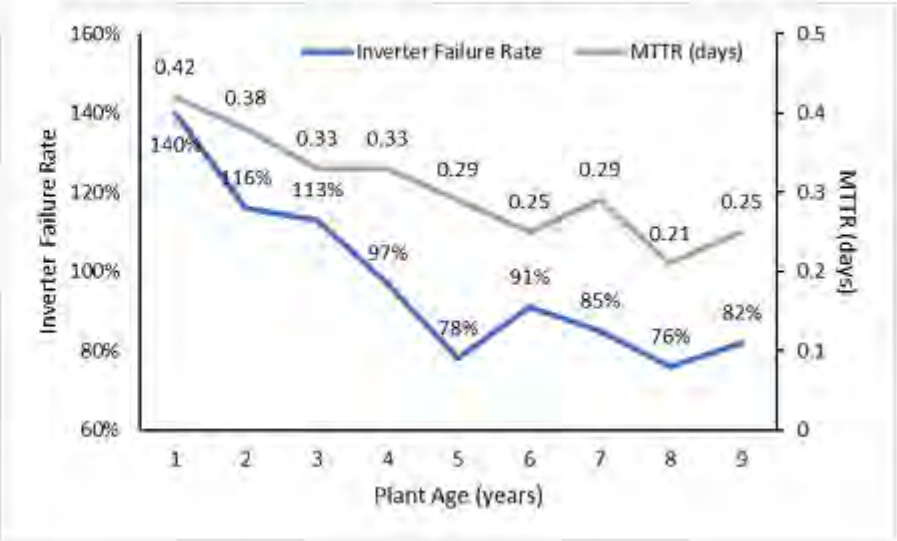



Figure 2. Inverter Failure Rate and MTTR

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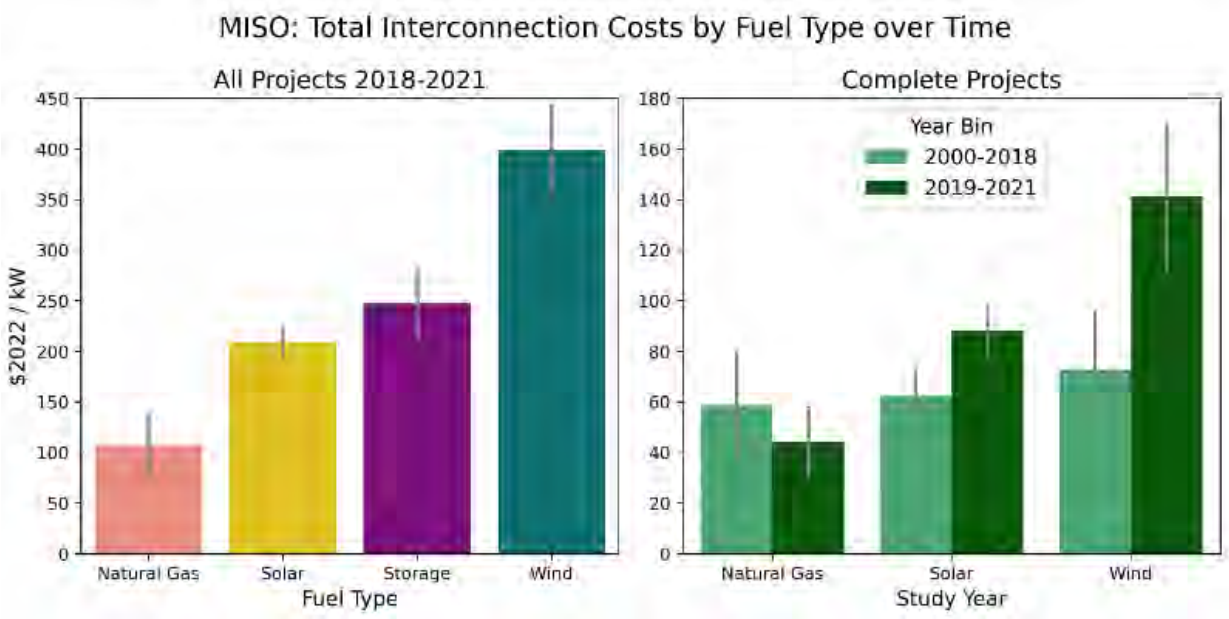
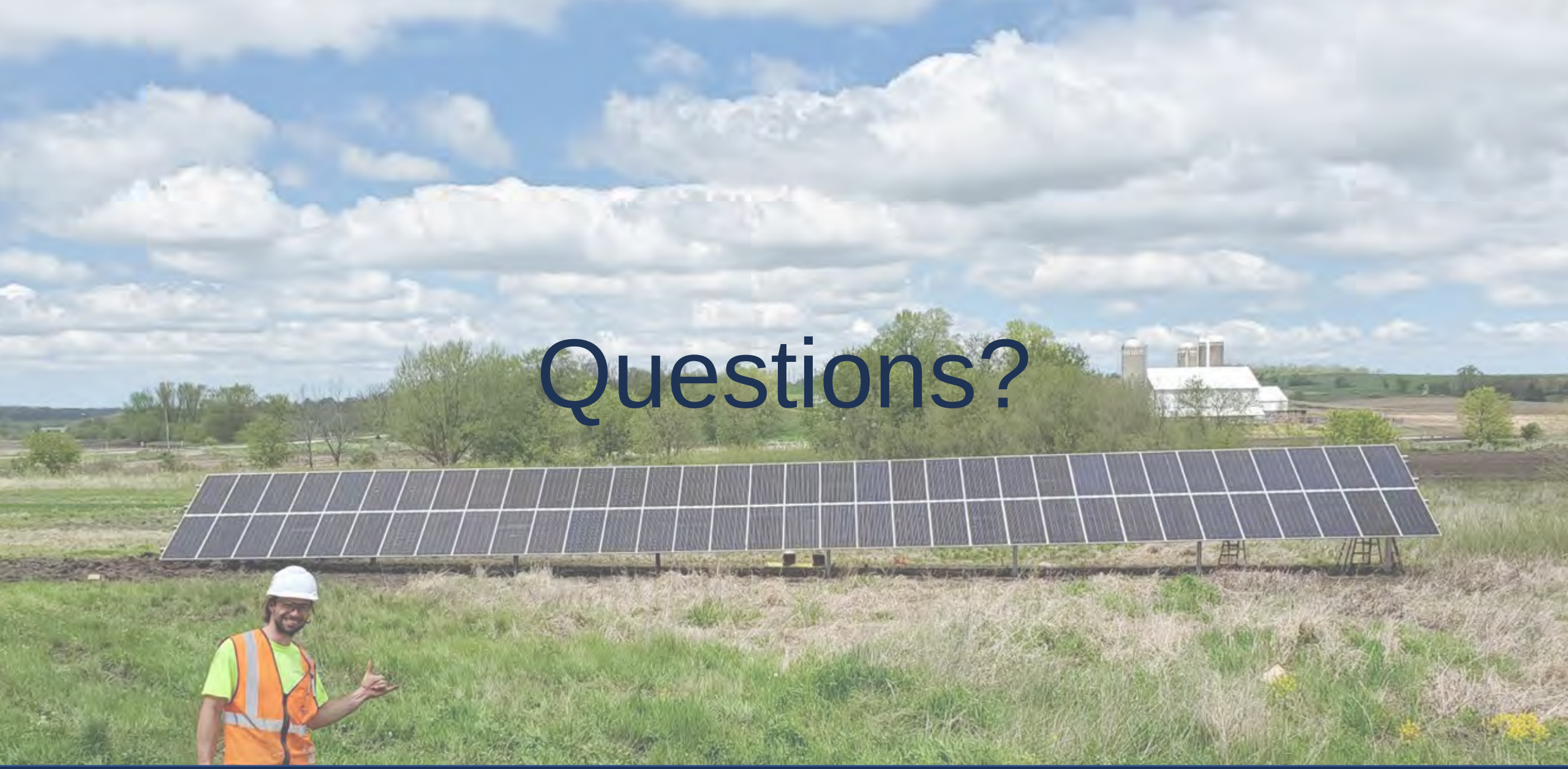
# The Dark side of Solar PV

## MISO Interconnection Costs

- Average interconnection costs have grown substantially over time.
- Projects that have completed all required interconnection studies have the lowest cost compared to applicants still actively working through the interconnection process or those that have withdrawn.
- Broader network upgrade costs are the primary driver of recent cost increase.
- Interconnection costs for wind, storage, and solar are larger than for natural gas
- Larger generators have greater interconnection costs in absolute terms, but economies of scale exist on a per kW basis.




Source: https://emp.lbl.gov/interconnection_costs



# Questions?

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