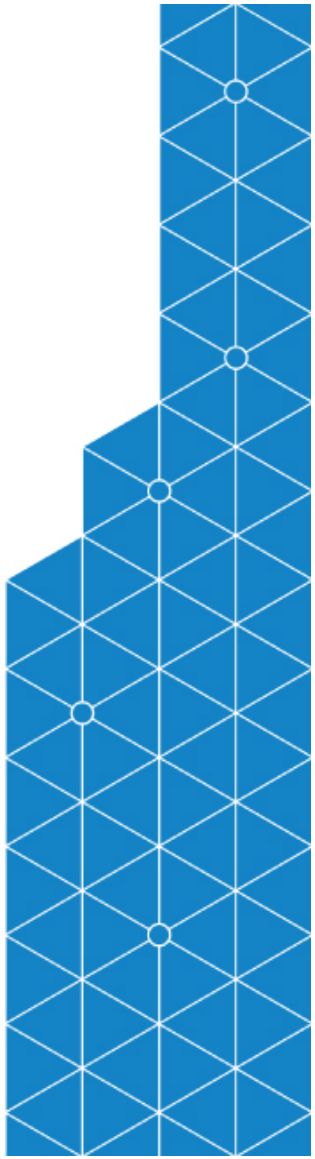
HOOSIER ENERGY

A Touchstone Energy® Cooperative

Integrating Renewable Energy

In the Rural Midwest

CIS-IEEE EnCon 2017
November 10, 2017



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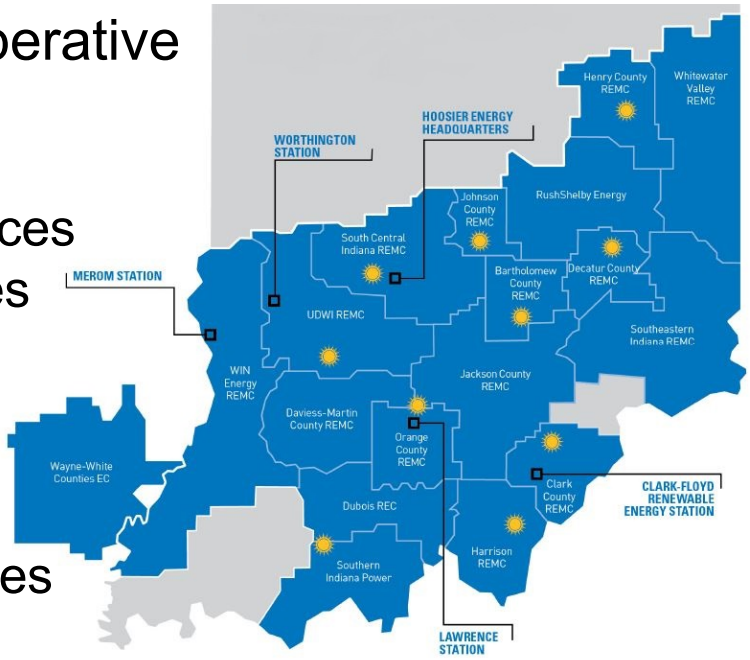
Hoosier Energy

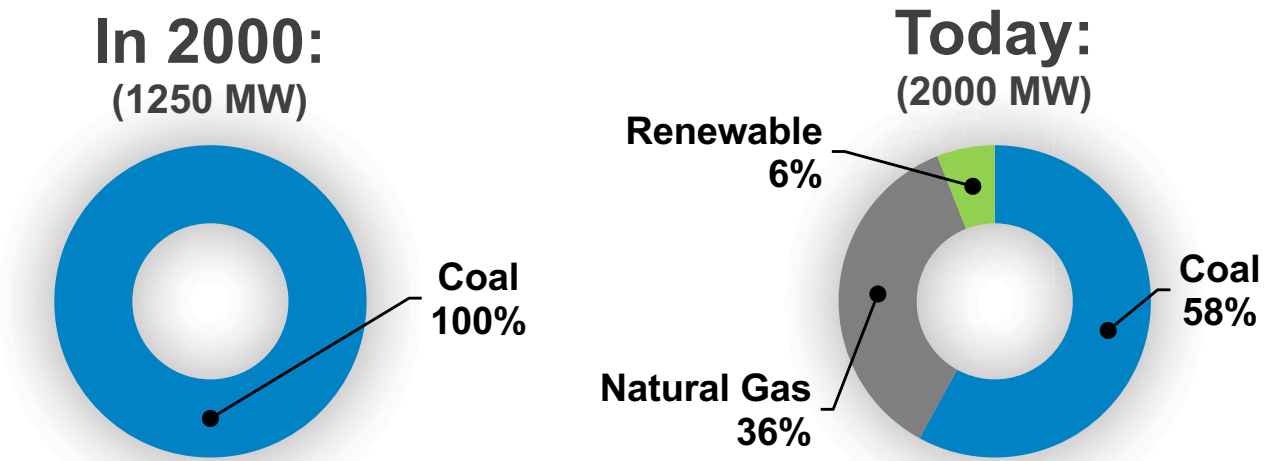
Hoosier Energy

- Generation and Transmission Cooperative
  - Founded in 1949
  - Based in Bloomington, Indiana
  - Wholesale electric power and services
  - 18 member distribution cooperatives
  - ~2,000 MW generation
  - ~1,700 miles of transmission lines
- Member Distribution Cooperatives
  - Serve 59 Indiana and Illinois counties
  - 36,000 miles of distribution lines
  - Nearly 300,000 consumers
  - Estimated 686,000 people



Hoosier Energy

- Diversified Generation Portfolio
  - Coal, natural gas, wind, solar, hydro and landfill gas resources
  - Energy efficiency



- Voluntary Board Approved Renewable Energy Policy
  - 10 percent of member energy by 2025
- Additions since 2000 have been gas and renewables

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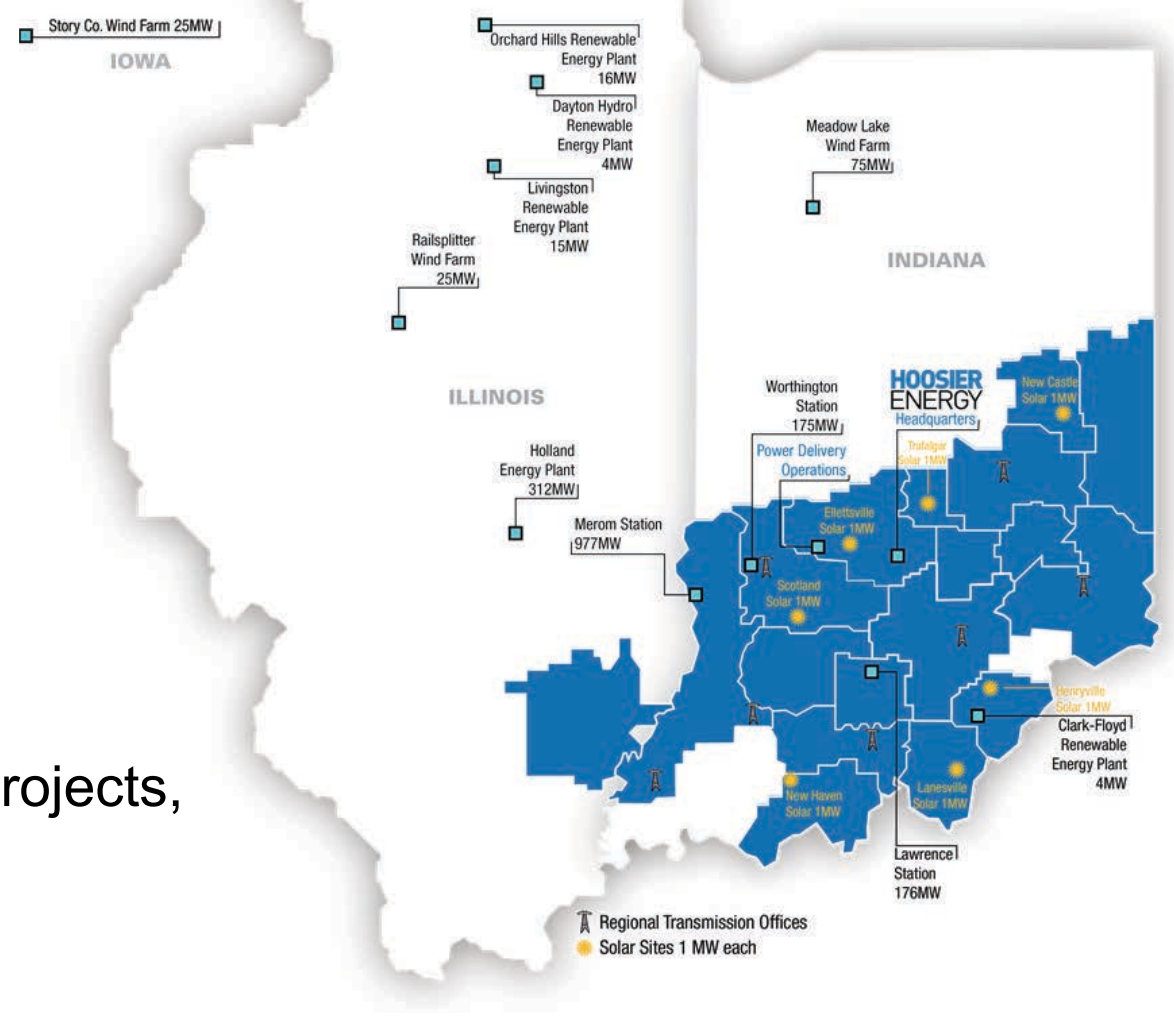
Hoosier Energy Renewables

Renewables

- 17 projects
- 4 technologies
  - Solar
  - Wind
  - Hydro
  - Landfill Gas
- 3 states
- 2 RTO's
- 4 PPAs, 3 owned projects, 10 leased assets



1MW Solar Fields Details

- 3,888 panels used in 2017 (340W)
  - 4,320 panels in 2015 (310W)
- 18 string inverters, converting 1000v DC to 480v AC
  - 2 central inverters used in 2015
- Single axis tracking system
  - Panels move as the sun moves
  - Generates 20% more energy
- 25 year life expectancy
- ~ Three month construction process
- 30% tax credit and accelerated depreciation

Ogilville Solar Site – Bartholomew County REMC & Jackson County REMC

Landfill Gas Facilities

- **Clark Floyd Landfill Gas Facility**
  - Borden, Indiana
  - Clark County REMC's service territory
  - 4MW
- **Livingston Landfill Gas Facility**
  - Pontiac, Illinois
  - 15MW capacity
- **Orchard Hills Landfill Gas Facility**
  - Rockford, Illinois
  - 16MW capacity

Orchard Hills Landfill Gas Facility – Rockford, Illinois

Dayton Hydro Facility

- Power Purchase Agreement with Eagle Creek Renewables
- Located in Dayton, Illinois on the Fox River
- 3.6MW until end of 2031
- Three turbines
- In operation since 1979

Wind Power Purchase Agreements

- **Story County Wind Farm**
  - NEXTera Energy
  - Story County, Iowa
  - 25MW until end of 2018

- **Meadow Lake Wind Farm**
  - Dedicated on Oct 10, 2017
  - EDP Renewables
  - Northwest Indiana
  - 25MW in 2018
  - Additional 50MW in 2020
  - Agreement expires at end of 2039

- **Rail Splitter Wind Farm**
  - EDP Renewables
  - Central, Illinois
  - 25MW until end of 2029

Meadow Lake Wind Farm Phase V Dedication – 10/10/17

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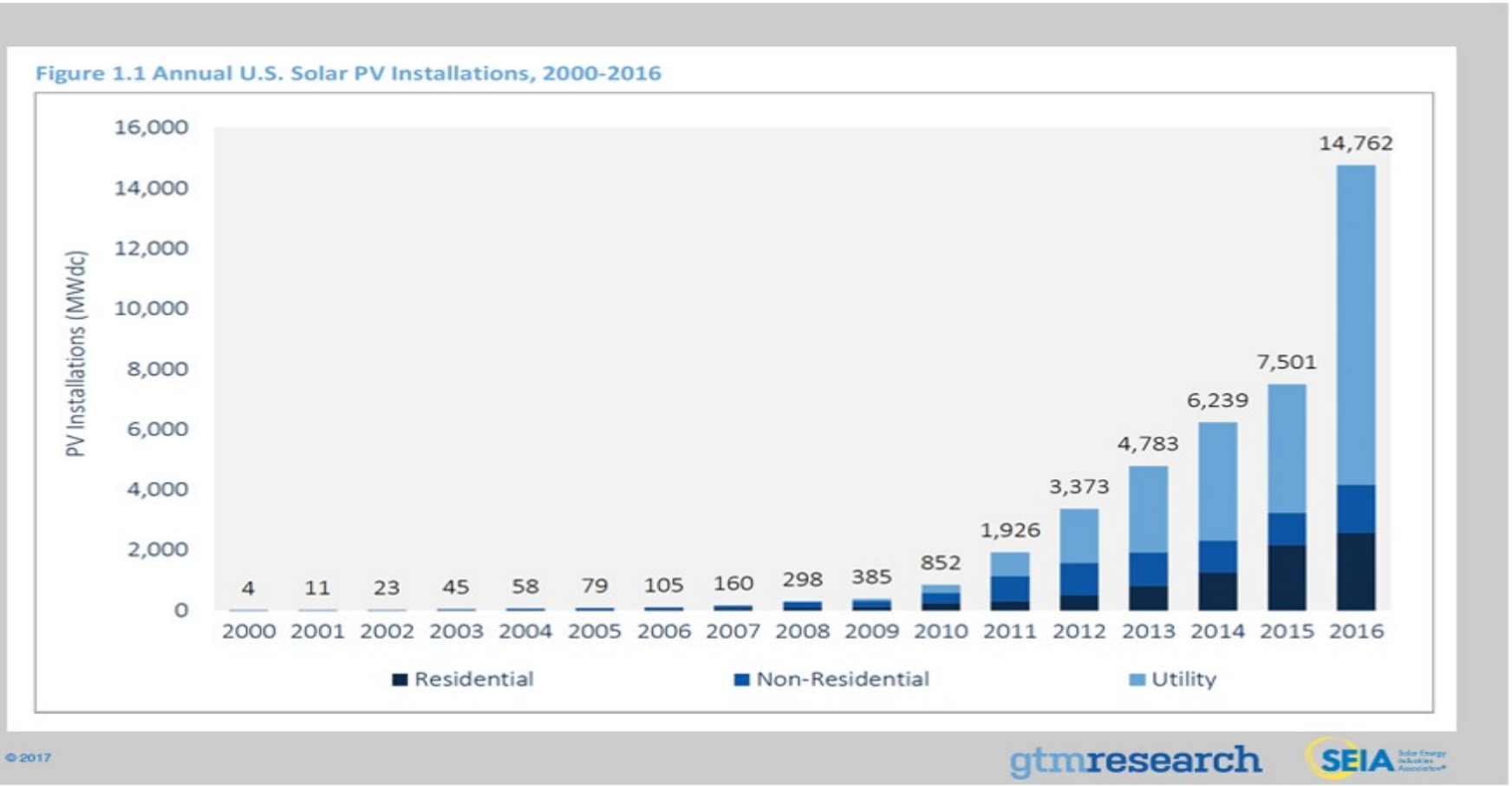
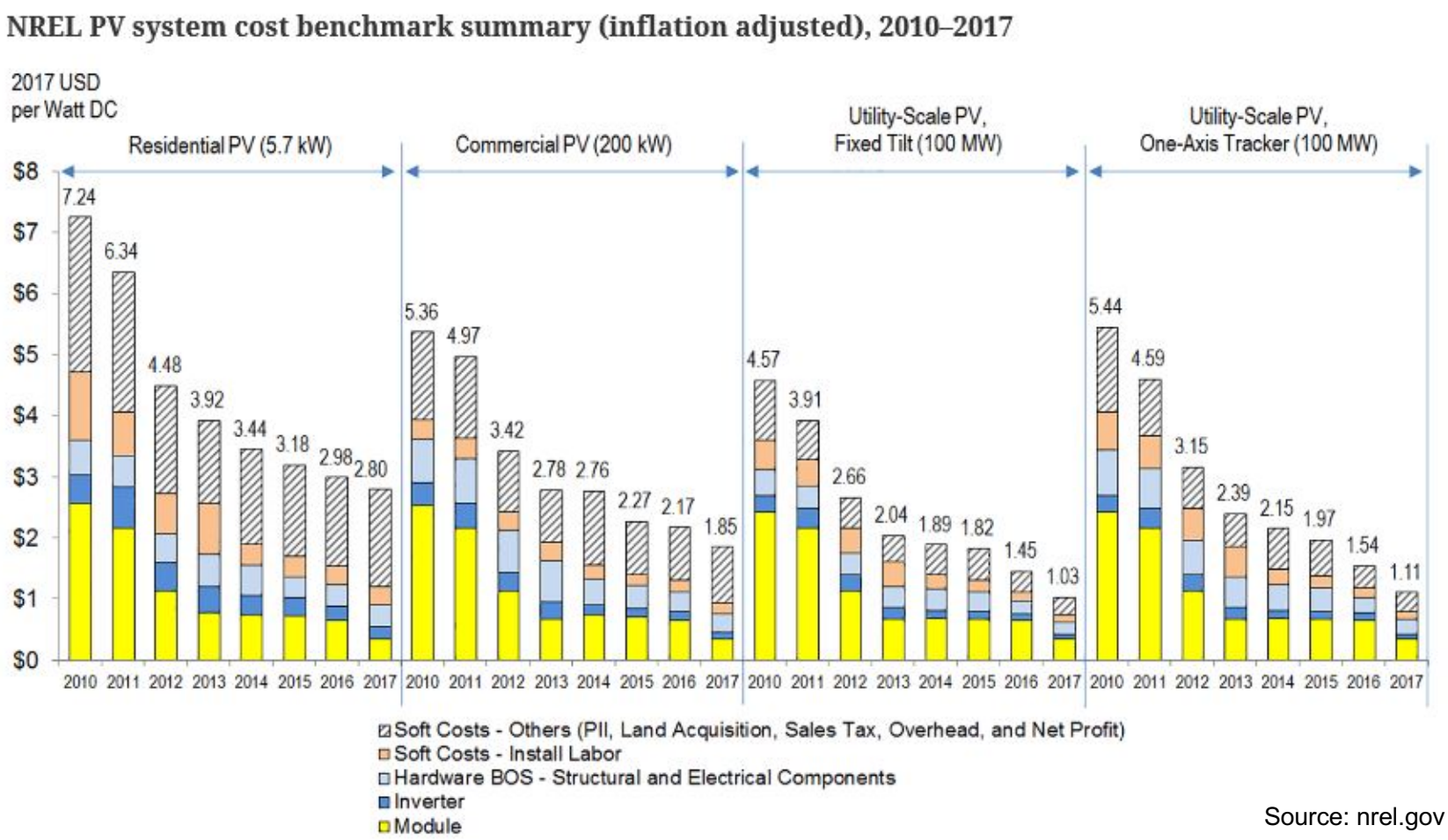
Solar Trends

PV Capacity (MW) Trend



PV Cost Trend



Source: nrel.gov

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Tools, Tips and Interconnection Process

Production On Website

Ellettsville Solar Generation

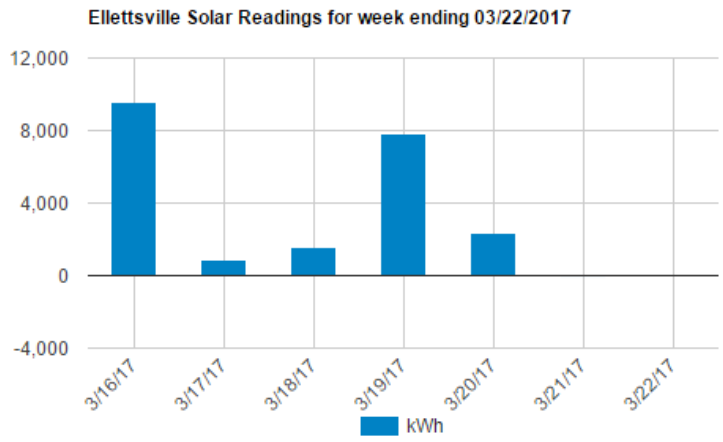
Select a site: Ellettsville ▾

Select a start date: 03/22/2017

View Daily | View Weekly | View Monthly

Cumulative Totals:

From _____ to _____ Submit



Ellettsville

Date operational: 10/17/2016

Features

1.08MW(AC)
4,104 315W solar panels
Single Axis Tracking System - 2 motors
Power for 150 average cooperative homes each year
18 60kW String Inverters

https://hoosierenergy.com/about/energy-strategy/renewable-energy/

Tools

- nrel.gov – National Renewable Energy Laboratory
  - Free tools for all facets of renewables
    - pvwatts.nrel.gov - estimates energy production and cost of grid-connected PV systems
    - sam.nrel.gov – performance and financial model for renewables
    - nsrdb.nrel.gov – National Solar Radiation Database – complete collection of meteorological and solar irradiance data sets
- solarreviews.com – local installer reviews
- dsireusa.org – Renewables and efficiency incentive database
- seia.org – Solar energy industries trade organization

Utility Scale vs. Residential Solar PV

- **Residential / Small Commercial**
  - Size: 4 kW – 500 kW
  - Space: 1 kW = 100 sq. ft.
  - Cost: $2 – $4.50 / Watt
  - Build time: 1 day – 2 months
- **Large Commercial / Utility Scale**
  - Size: 500 kW and above
  - Space: 1 MW = ~8 acres
  - Cost: $1.50 - $3 / Watt
  - Build Time: 2 – 8 months

Tips

- Energy conservation first
  - Turn off lights and appliances when not in use
  - Saves money without having to spend any
- Smart energy efficiency projects next
  - Allows you to put in smaller solar system
  - Offers best pay back
- Engage with your utility early
  - Interconnection application and agreement

Interconnection Process

- Understand the Interconnection Process
  - Typically varies by size, type, and voltage
  - Process typically has various time associated with each phase
    - Contact the electric utility
    - A State-Level Comparison of Processes and Timelines for Distributed Photovoltaic Interconnection in the United States (NREL/TP-7A40-63556) – https://www.nrel.gov/docs/fy15osti/63556.pdf
- Interconnection Application/ Request
  - Application and timeline impact
  - System Impact Study
- Interconnection Agreement
  - Construction, commissioning, testing and inspections
  - Permission to Operate
  - Understand capital and O&M responsibilities of the interconnection

Tips

- Have a site audit performed to determine feasibility
- Find the right installer
  - Obtain several quotes
- Understand any necessary warranties, financing needs, maintenance, tax implications, etc…

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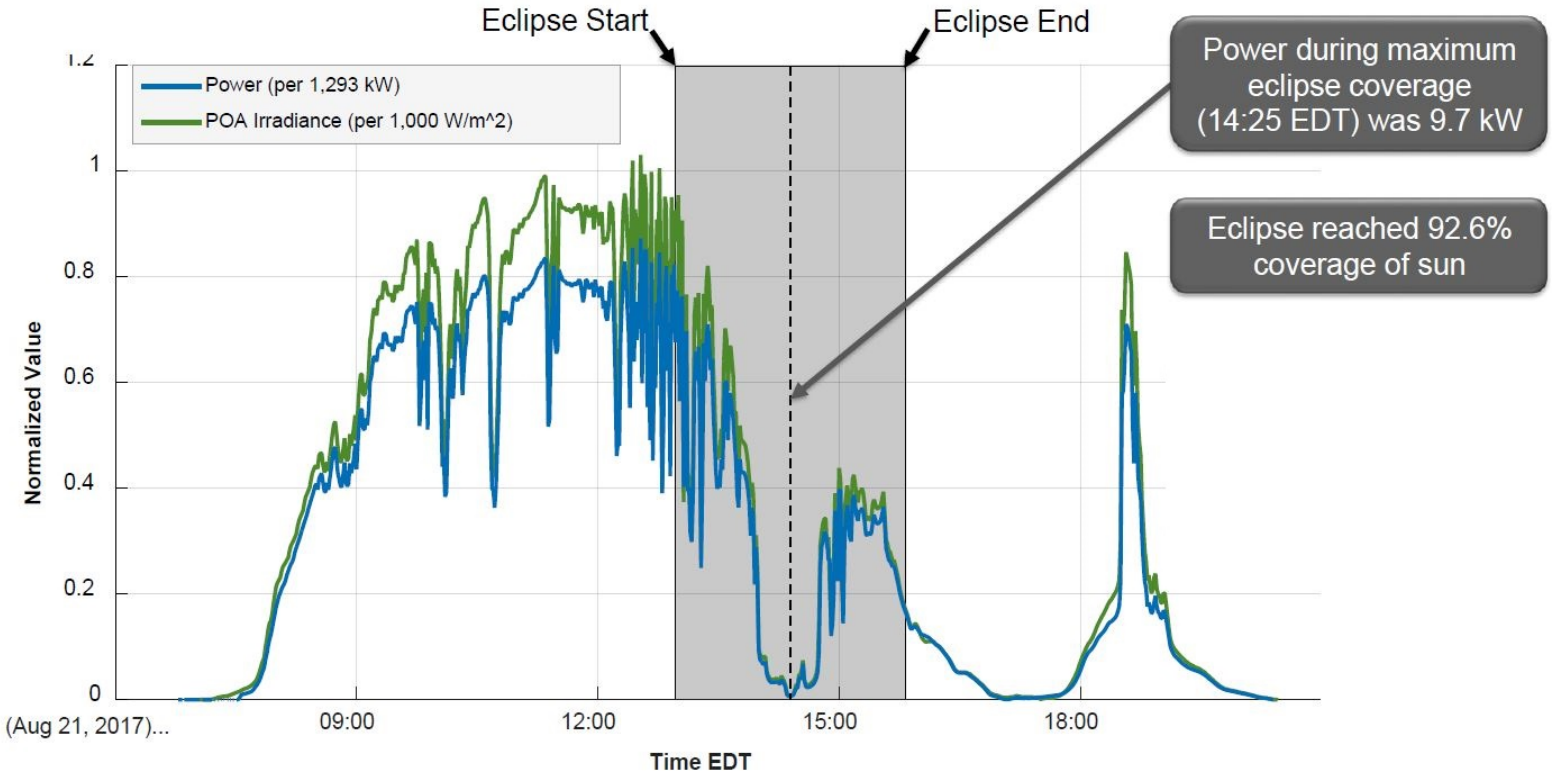
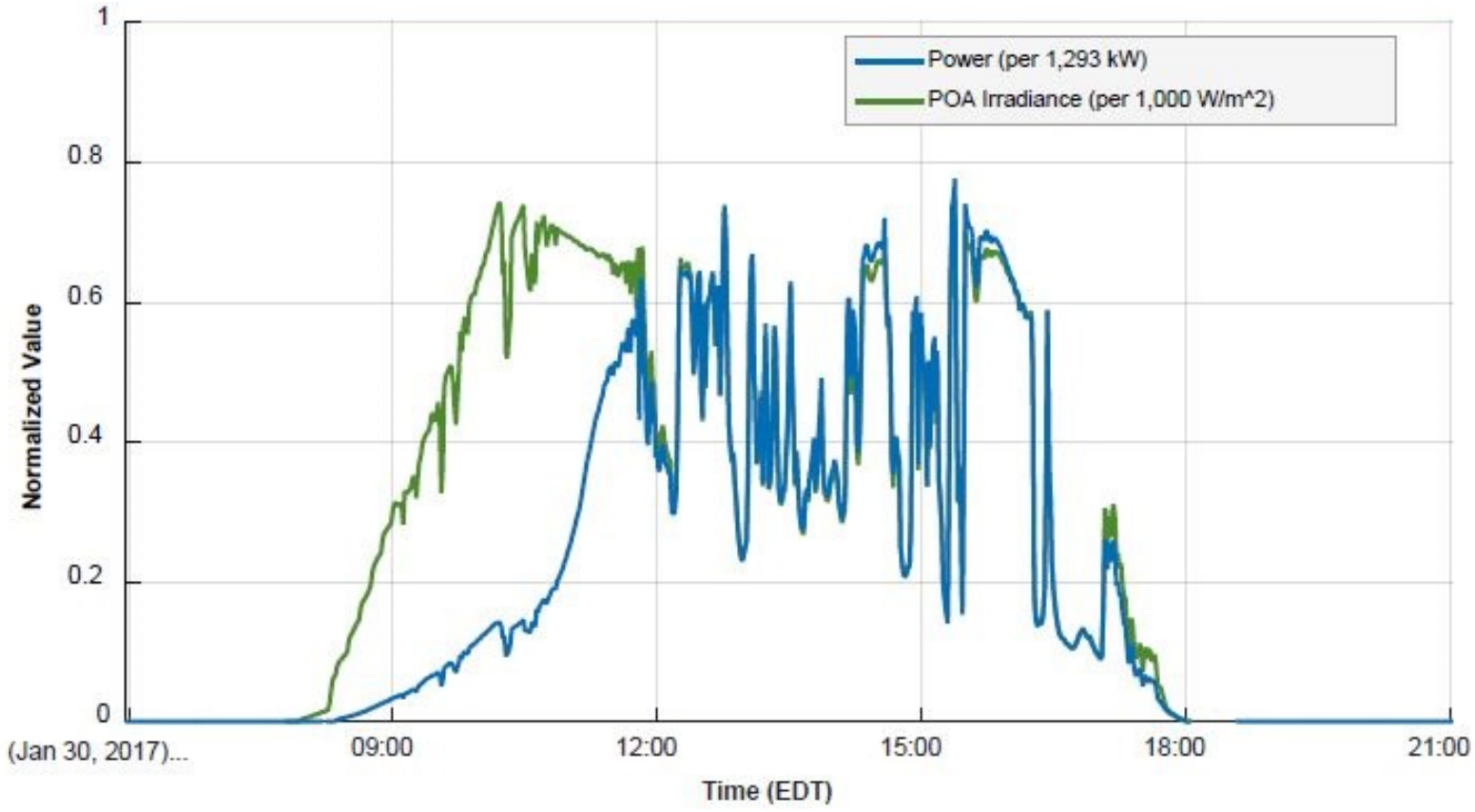
Weather Events

Partial Solar Eclipse



Source: EPRI/Hoosier

Snow Accumulation



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Questions?