



Solar 101

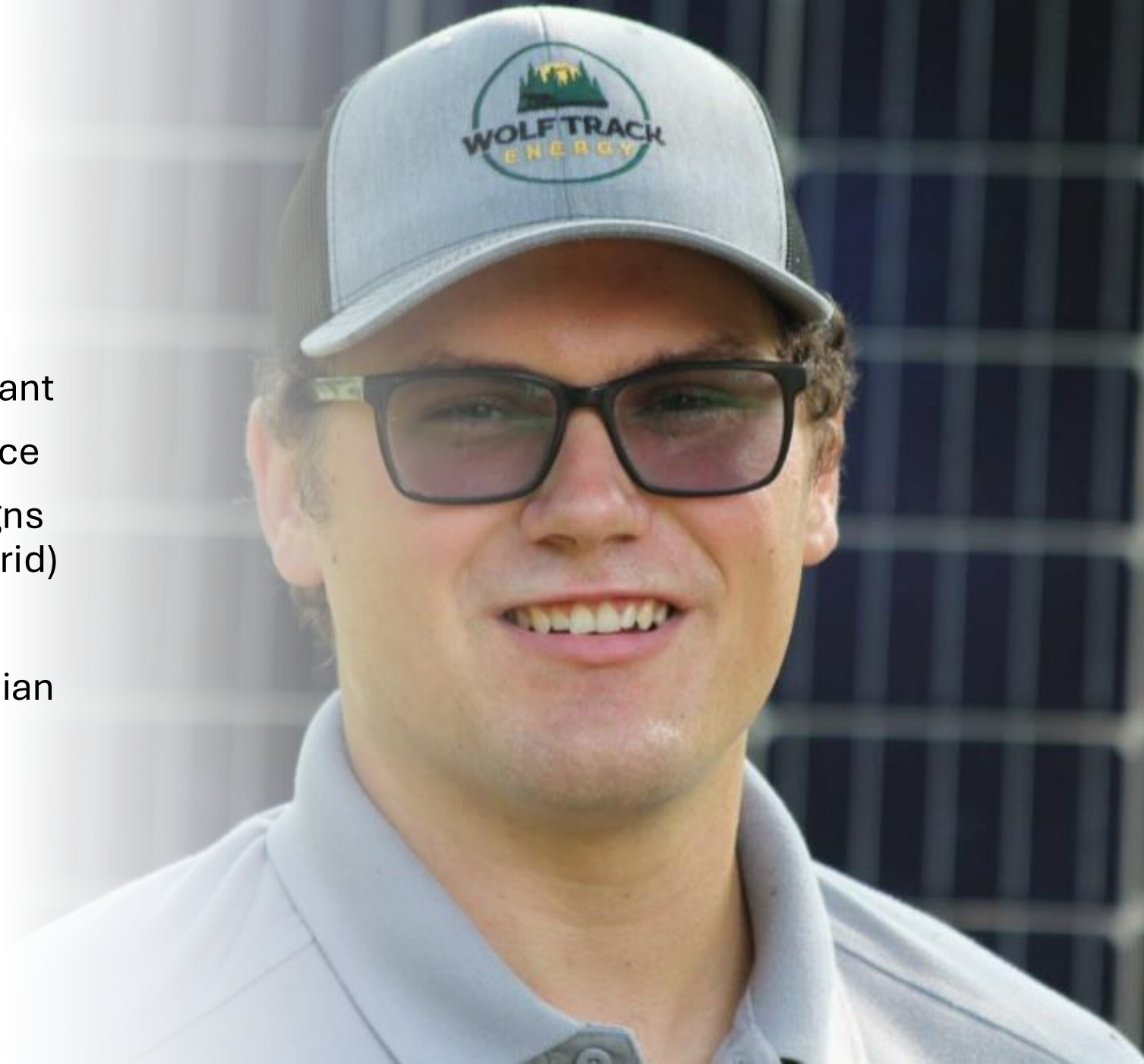
Dane Larson

Technical Sales Consultant

Wolf Track Energy

About Me

- Technical Sales Consultant
- Over 4 Years of Experience
- Over 300 Installed Designs (Off-Grid, Grid Tied, Hybrid)
- NABCEP PVIP Certified
- Building Analyst Technician (BA-T)



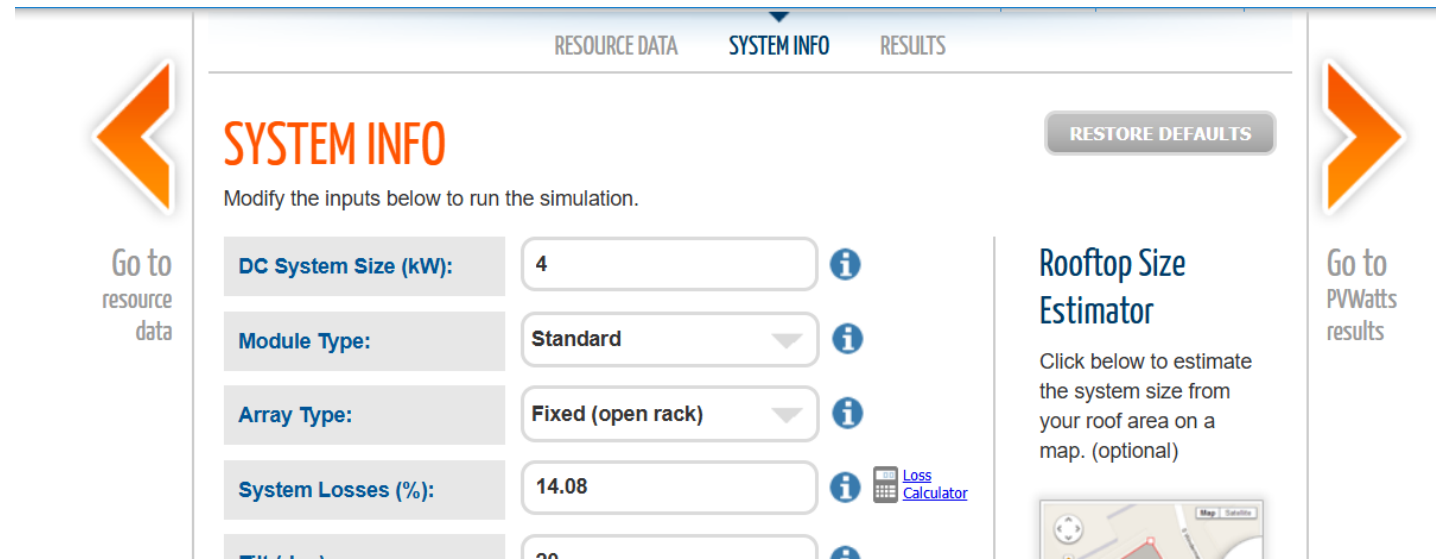
Key Terms

- Kilowatt (kW)
- Kilowatt hour (kWh)
- DC vs AC rating
- Inverter
- Interconnection point
- Meter
- Cost/Watt (\$/w)



Curious About Solar?

- U of M Solar Suitability Map
- PV Watts
- Energy Usage
- Energy Goals
- Utility Company



The screenshot shows the 'SYSTEM INFO' tab of the PV Watts calculator. It features a navigation bar with 'RESOURCE DATA', 'SYSTEM INFO', and 'RESULTS'. On the left, a 'Go to resource data' button is next to a large orange arrow. On the right, a 'Go to PVWatts results' button is next to a large orange arrow. The main area contains input fields for 'DC System Size (kW)' (set to 4), 'Module Type' (set to Standard), 'Array Type' (set to Fixed (open rack)), and 'System Losses (%)' (set to 14.08). Each field has an information icon. A 'RESTORE DEFAULTS' button is in the top right. Below the inputs, a 'Loss Calculator' link is visible. On the far right, a 'Rooftop Size Estimator' section includes a description and a map preview.

RESOURCE DATA SYSTEM INFO RESULTS

SYSTEM INFO

Modify the inputs below to run the simulation.

Go to resource data

RESTORE DEFAULTS

Go to PVWatts results

DC System Size (kW): 4

Module Type: Standard

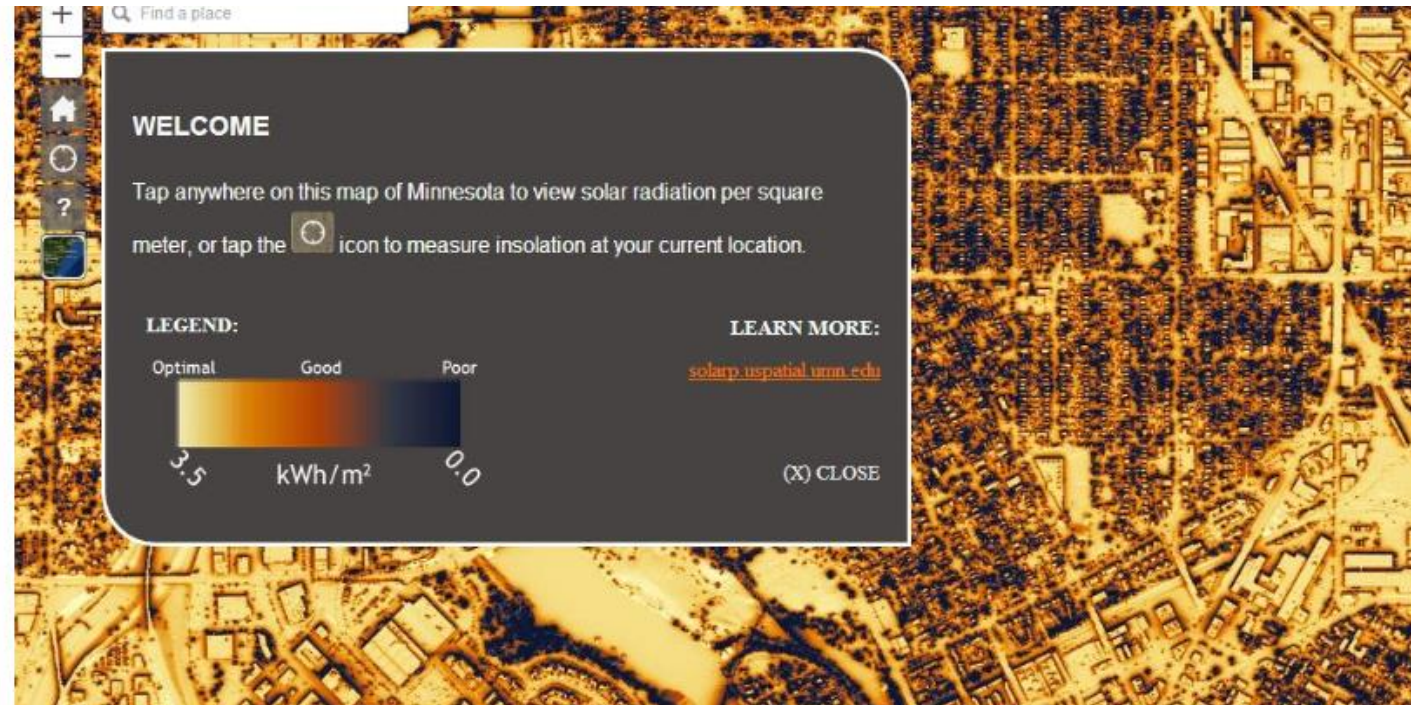
Array Type: Fixed (open rack)

System Losses (%): 14.08

[Loss Calculator](#)

Rooftop Size Estimator

Click below to estimate the system size from your roof area on a map. (optional)



An aerial photograph of a residential property. In the foreground, a large array of dark blue solar panels is installed on a grey shingled roof. The house has light-colored siding and a prominent stone chimney. In the background, there is a well-manicured lawn, a paved driveway with a silver car, and a dense line of green trees. Beyond the trees, a body of water and a distant shoreline are visible under a clear blue sky.

Initial Considerations

- What is your total energy usage?
(Consider an energy audit)
- Size of system (roof size, amount of land available for ground mount)
- How many panels to meet your goals?
- Battery Storage?
- Equipment selection
(microinverters, string inverters, racking type..)
- Any required electrical upgrades?

Roof Mount

- Type of Roof (Shingle, Standing Seam, Tin, Flat Roof, Etc..)
- Azimuth (Orientation)
- Tilt
- Age of roof
- Structural Integrity of Building (Professional Engineering may be Required)
- Lower upfront cost, can be more limited



Ground Mount

- Distance from meter and/or electrical panel
- Ground type
- Length of trench
- Fixed tilt or adjustable?
- Higher upfront cost
- Easier maintenance



Working with an Installer

- Installer will collect all data as discussed before
- Site visit (virtual or in person)
- Sales proposal catered to meet your needs
- Contract
- Interconnection Application
- Permits
- Inspections



Customer Relationship with Itasca Mantrap

- Interconnection Application
- Interconnection Agreement
- Net Metering- Average Retail Rate
- Installer will work with them on ensuring all requirements are met to their standards



Complications/Design Considerations

- Multiple services- off peak, dual fuel, etc.
- Subtractive meter
- Steep roofs/multiple roof lines
- Location for batteries
- Meter upgrade (bi-directional meter)
- Transformer upgrade
- Unfavorable ground conditions



Broad Overview

- Do some independent research
- Contact installers
- Receive multiple bids
- Ensure you know what you are getting and when
- Sign