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SAM Webinars 2017:
Sizing Photovoltaic Systems in SAM 2017.1.17

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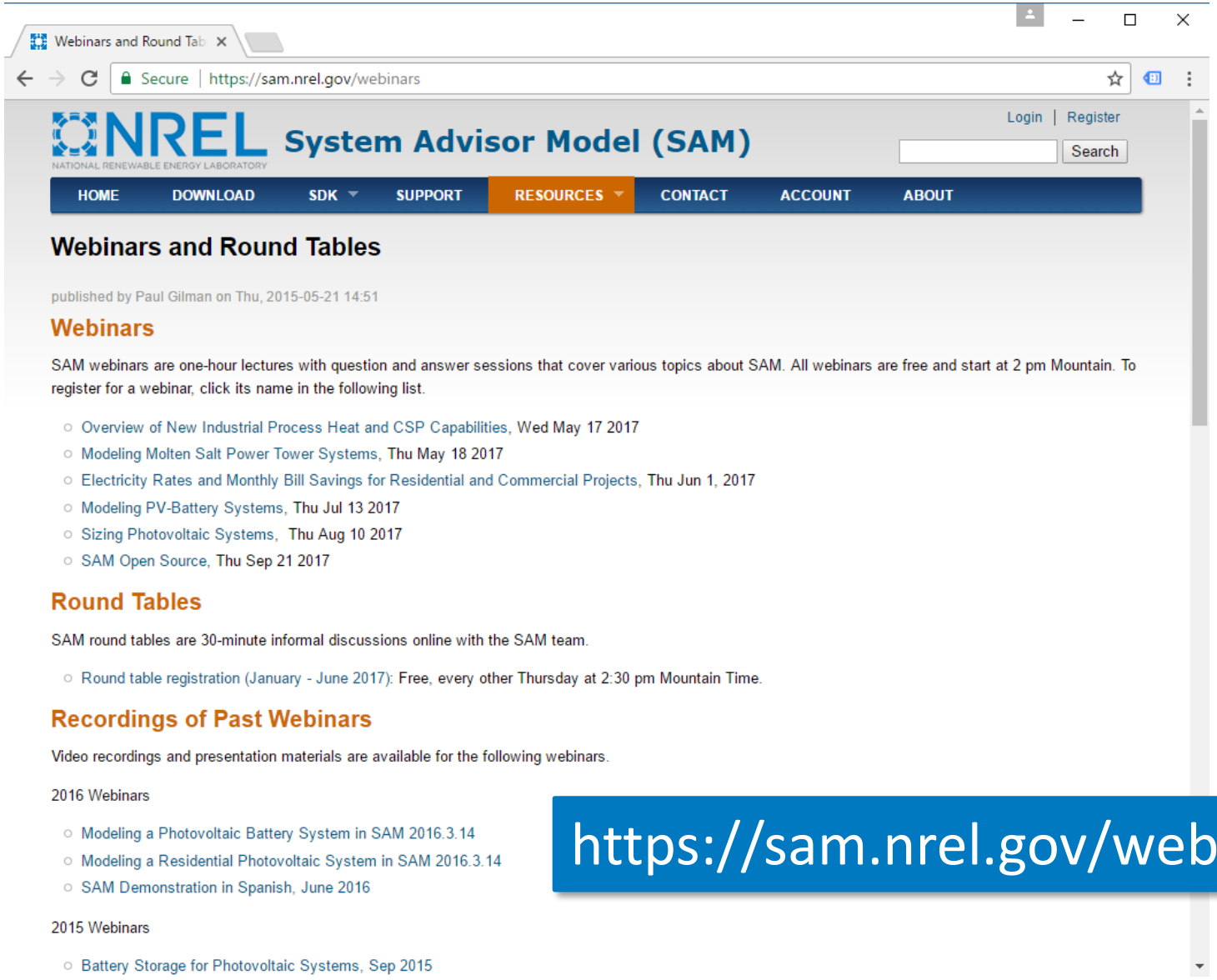
August 10, 2017

SAM Webinars 2017

- Overview of New Industrial Process Heat and CSP Capabilities, May 17
- Modeling Molten Salt Power Tower Systems, May 18
- Electricity Rates and Monthly Bill Savings for Residential and Commercial Projects, June 1
- Modeling PV-Battery Systems, July 13
- **Sizing Photovoltaic Systems, August 10**
- SAM Open Source, September 21

Registration Links and Webinar Recordings



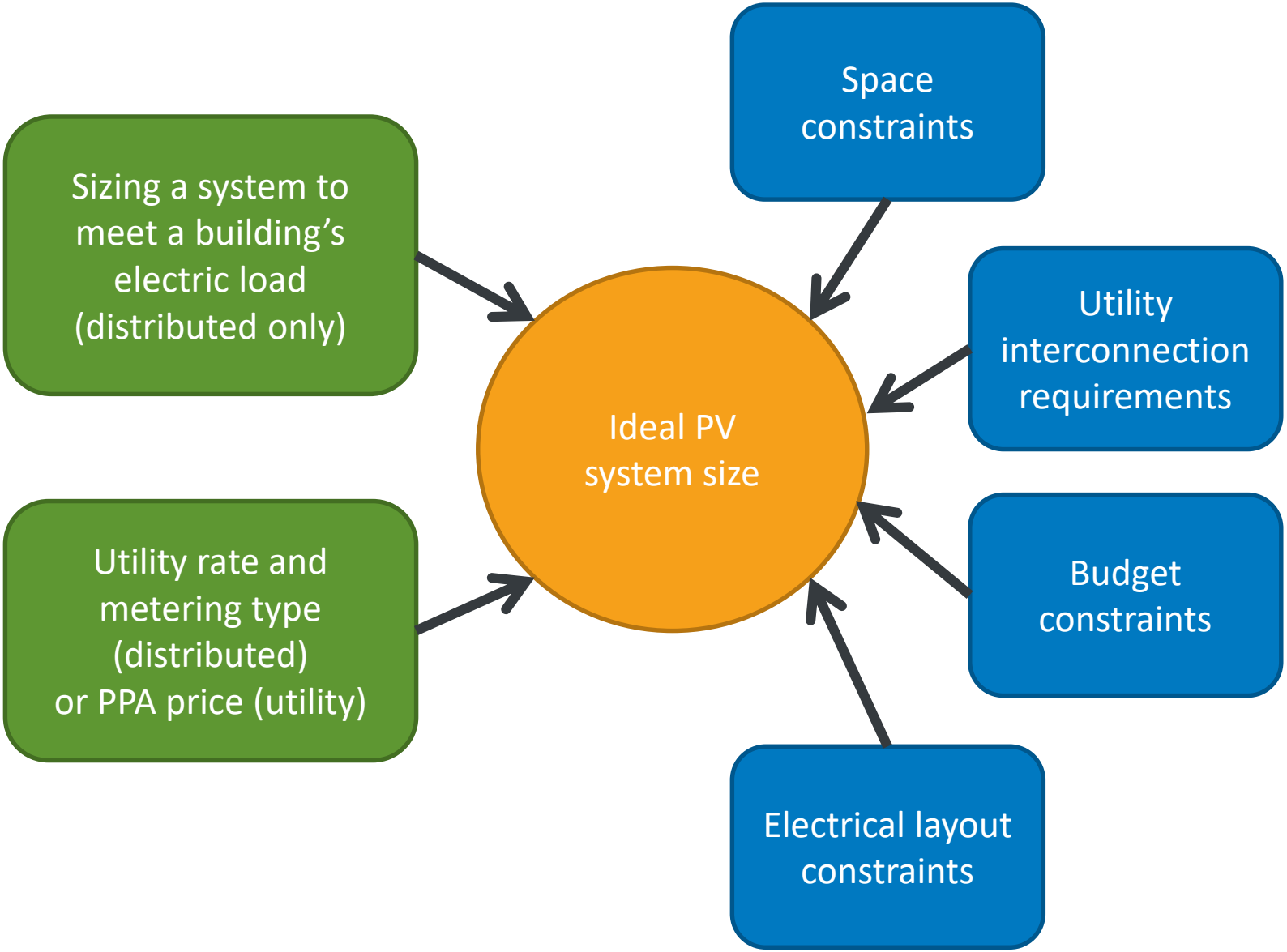
https://sam.nrel.gov/webinars

Outline

- PV Sizing Considerations
- Electrical System Sizing Overview
- DC to AC Ratio
- Inverter Sizing Macro
- Microinverters, DC Optimizers, and More
- Multiple Subarrays
- Physical System Sizing
- Limitations of SAM for System Sizing
- Q&A

PV System Sizing is a Complicated Problem

PV System Size Selection Has a Lot of Input Factors



System Size Metrics

$$Nameplate\ capacity\ in\ SAM = DC\ capacity\ of\ PV\ modules\ (kW)$$

$$DC - AC\ Ratio = \frac{DC\ capacity\ of\ PV\ modules\ (kW)}{AC\ capacity\ of\ inverters\ (kW)}$$

$$Modules\ per\ string\ (modules\ in\ series)$$

$$Strings\ in\ parallel$$

$$Number\ of\ inverters$$

DC-AC Ratio is Limited by Discrete Component Sizes

EXAMPLE

PV Panel: 200 W DC

Inverter: 3 kW AC

Desired system size: 8 kW DC
Desired DC-AC ratio: 1

Number of modules:	40
Number of inverters:	3
Actual DC system size:	8 kW
Actual DC-AC ratio:	0.89

Number of modules:	40
Number of inverters:	2
Actual DC system size:	8 kW
Actual DC-AC ratio:	1.3

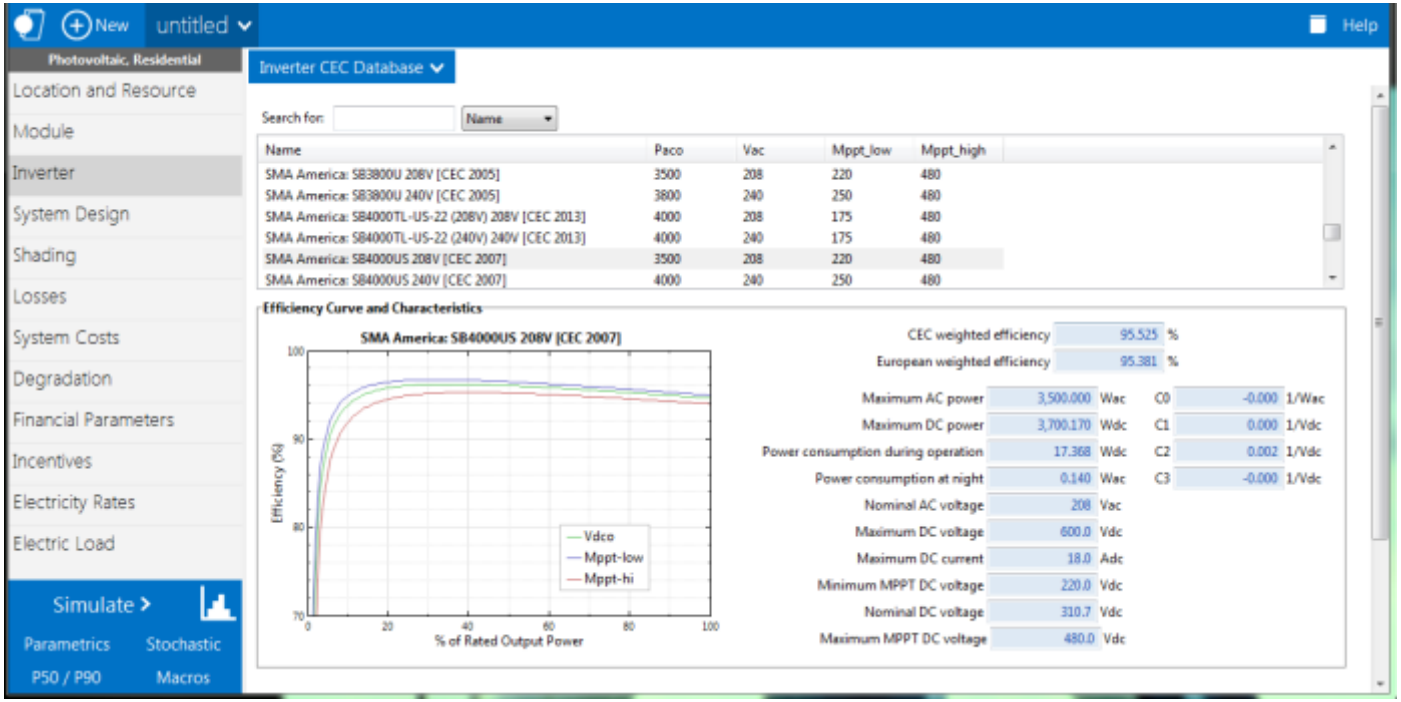
Electrical Sizing: Live Demo

Selecting a DC-AC Ratio

Selecting a DC-AC Ratio

Ideal DC-AC ratio isn't always 1:

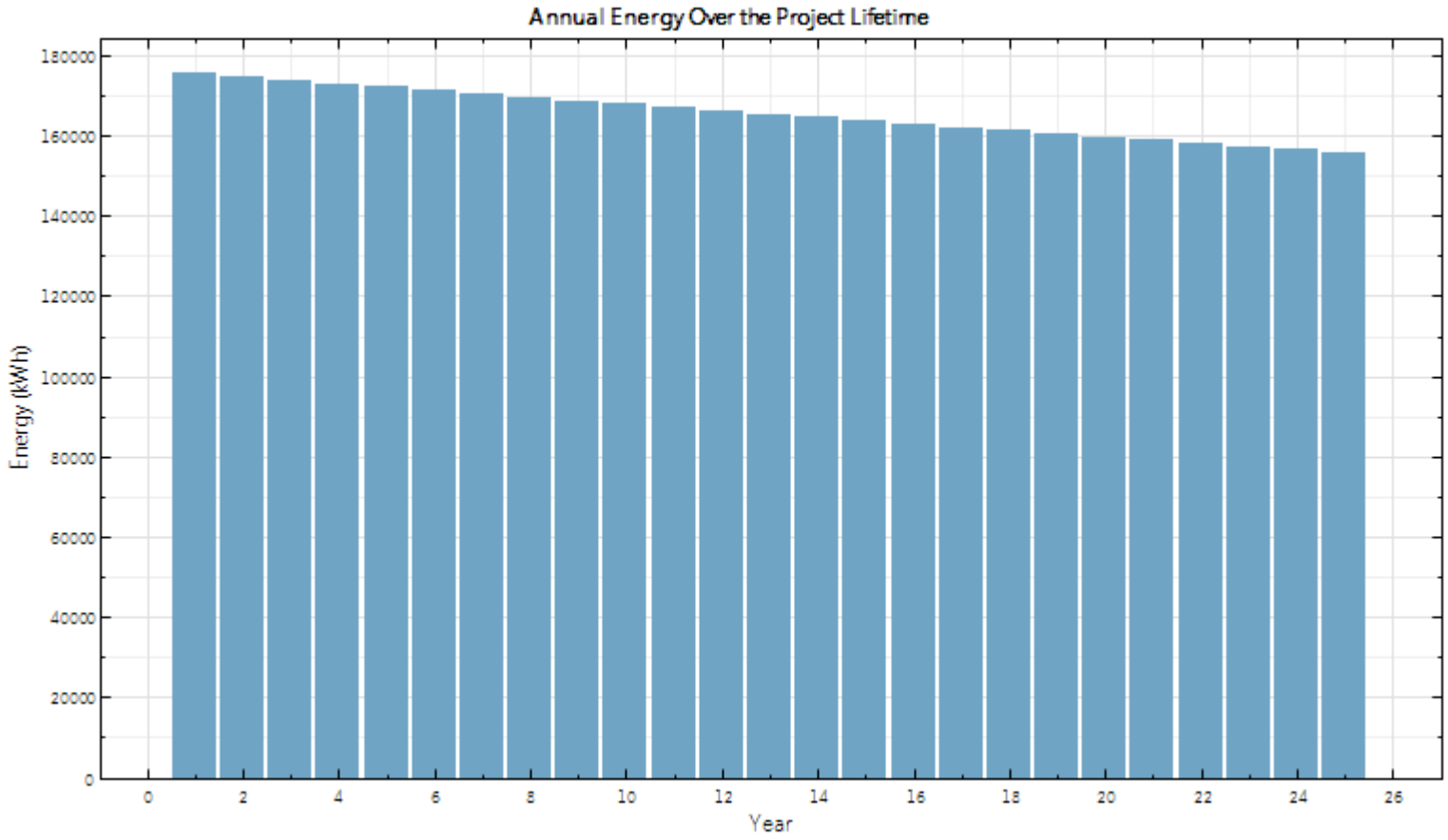
- Price difference in inverter sizes
- Inverter efficiency- inverter's kW-DC rating



Selecting a DC-AC Ratio

Ideal DC-AC ratio isn't always 1:

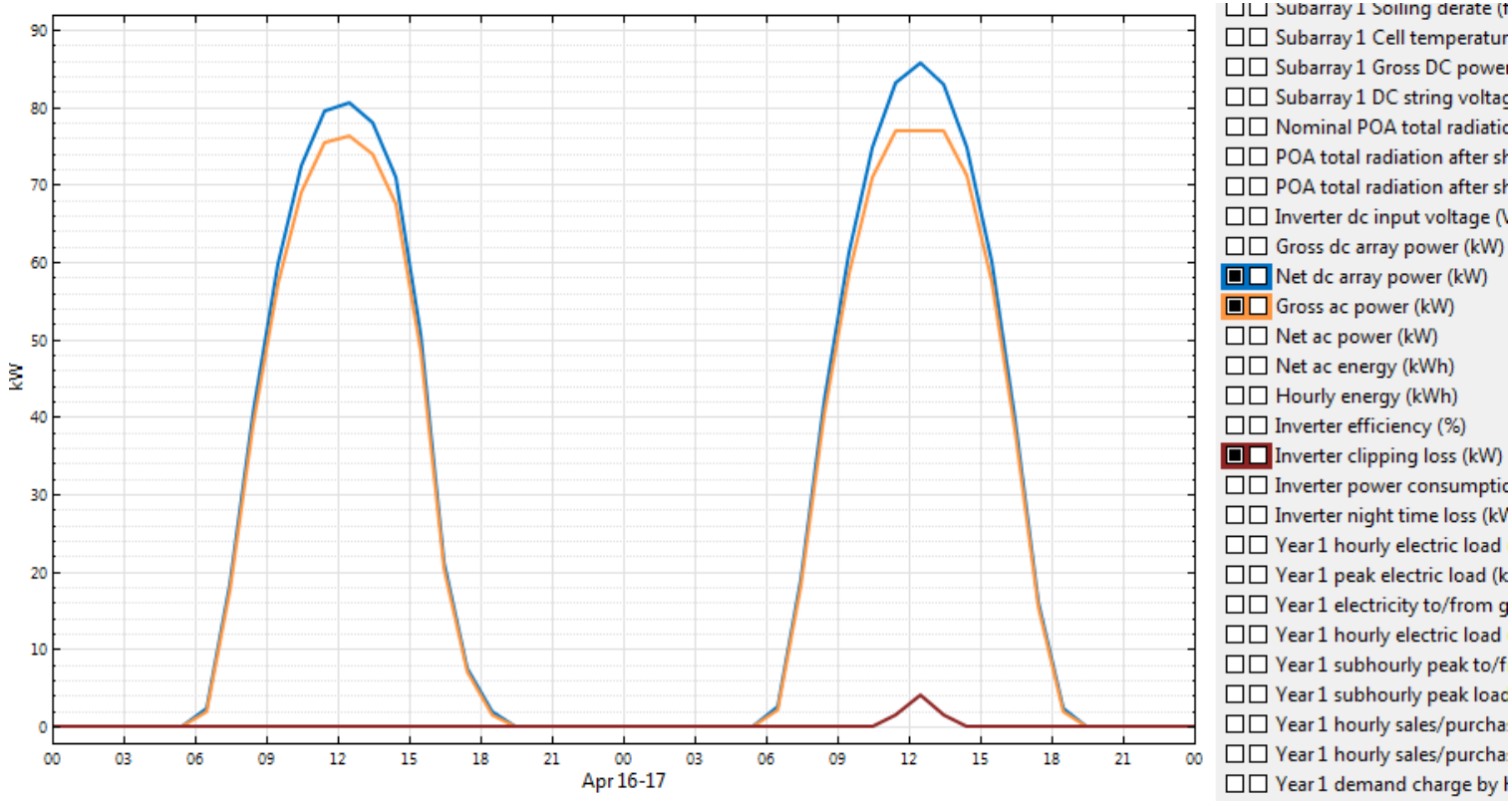
- Planning for degradation of PV modules



Selecting a DC-AC Ratio

Ideal DC-AC ratio isn't always 1:

- Infrequent occurrence of rated module conditions (aka planning for inverter clipping)



Limitations of SAM for System Sizing

- Does not perform a full electrical model
- Does not show frequency effects
- Does not properly model inverter operation if the string voltage is outside of the MPPT range
- Assumes that the grid can handle any level of power created for distributed system models
- Does not calculate wiring losses (% loss)
- Cannot model stand-alone systems (system must be grid-tied)

Thank you!

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