

SAM 2011.12.2 New Features



Webinar

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February 14 2012



- Quick Overview
- New Technologies
 - Linear Fresnel
 - Direct steam power tower
 - Biopower
- New Capabilities
 - PV modules from spec sheet data
 - PV monthly soiling derate factors
 - P50/P90 analysis
 - Generic system with hourly or subhourly generation profile as input
- New Tools
 - Integrated time series data viewer
 - Report generator
 - Case compare



SAM 2011.12.2 New Features

SAM Overview

What is SAM?

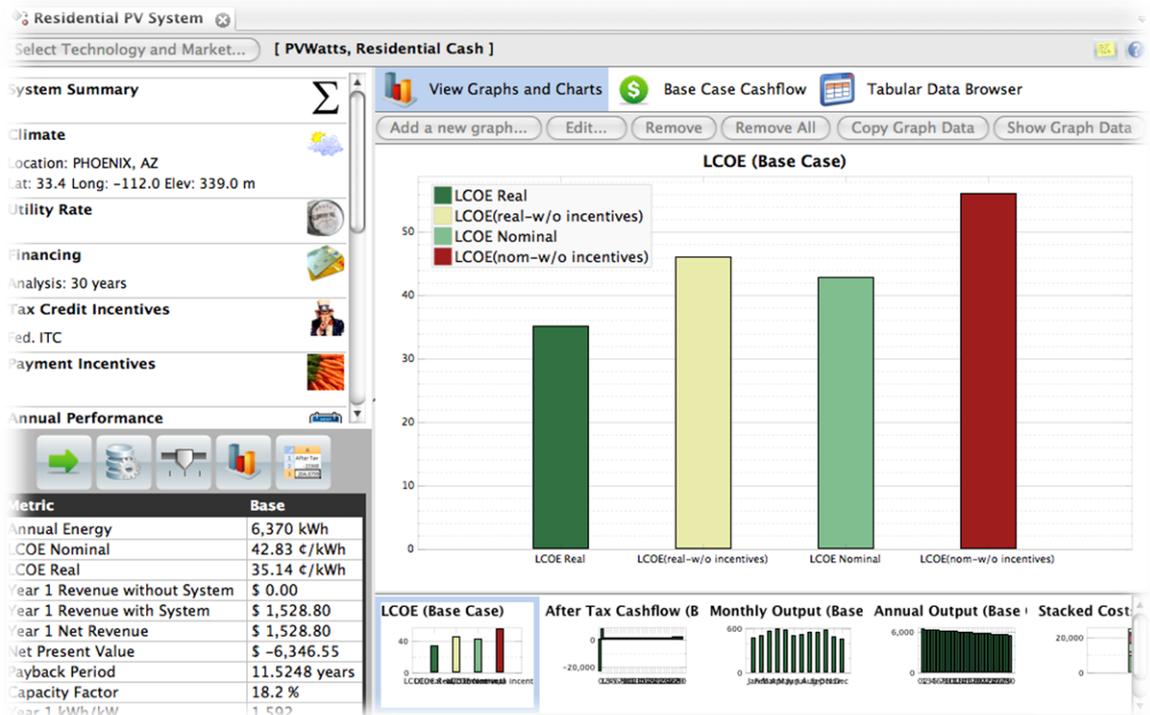


The System Advisor Model (SAM) is a free computer program that **calculates a renewable energy system's hourly energy output** over a single year, and **calculates the cost of energy** for a renewable energy project over the life of the project.

Performance model makes energy output calculations

Financial model makes cash flow calculations

Default values help you get started



What can you do with SAM?



- Model solar, wind, geothermal, and biomass power systems in a single application
- Evaluate and compare options using consistent models across technologies
- Calculate economic metrics such as LCOE, NPV, payback for projects in different markets
- Present modeling results in graphs and tables
- Perform parametric and uncertainty analyses



- Photovoltaics
- Concentrating Solar Power
 - Parabolic Troughs
 - Power Towers
 - Linear Fresnel
 - Dish-Stirling
- Solar Water Heating
- Wind turbines and farms
- Geothermal power plants
- Biomass power plants

Key outputs

- Hourly energy production (kWh)
- Capacity factor
- Efficiency

- Residential, commercial, and utility-scale projects
- Installation and operating costs
- Tax credit and payment incentives
- Complex electric utility rates

Key outputs

- Levelized Cost of Electricity (LCOE)
- Payback
- Net present value
- Multi-year cash flow

Background



Developed by the Department of Energy, National Renewable Energy Laboratory, and Sandia National Laboratories

Vision

- Model different renewable energy projects in a single platform
- Facilitate technology comparison by handling performance, costs and financing consistently across technologies
- Make high-quality performance models developed by NREL, Sandia, and other partners available to the public

Users and Applications



Feasibility studies

- Project developers, Federal Energy Management Program

Use as benchmark for other models

- System integrators and utilities

Research projects

- Universities and engineering firms

Plant acceptance testing for parabolic trough systems

Evaluate technology research opportunities and grant proposals

- Department of Energy

35,000+ Downloads

Manufacturers
Engineering Firms
Consultants
Developers
Venture Capitalists
Policy Analysts

Current Development Team



Management

- Nate Blair, NREL

Programming

- Aron Dobos, NREL
- Steven Janzou, NREL*
- Tom Ferguson, NREL*

Documentation and User Support

- Paul Gilman, NREL*

PV Model Validation

- Clifford Hansen, Sandia

Biopower

- Jennie Jorgenson, NREL

Geothermal

- Chad Augustine, NREL

Concentrating Solar Power

- Mark Mehos, NREL
- Craig Turchi, NREL
- Ty Neises, NREL
- Mike Wagner, NREL

Water Heating

- Jay Burch, NREL
- Craig Christensen, NREL

Financial Modeling

- Mike Mendelsohn, NREL

* Contractors

Downloading SAM



<http://sam.nrel.gov>

- 1) Register
- 2) Complete registration form
- 3) Download

The screenshot shows the NREL System Advisor Model (SAM) website. The header includes the NREL logo, the text "System Advisor Model (SAM)", and links for "Login" and "Register". A search bar is also present. The navigation menu includes "HOME", "DOWNLOADS", "SUPPORT FORUM", "LEARNING", "RESOURCES", "CONTACT US", and "MY ACCOUNT". The "Downloads" section is active, displaying "Current Official Release" information for Version 2011.12.2. A "SAM Downloads" box on the right contains the text "Login or Register to download SAM for Windows XP/Vista/7 or Mac OS X". A large blue arrow points from the bottom right towards this box. Below the main text, a small screenshot of the SAM Help menu is shown, listing "Help Contents", "User Support", and "Release Notes".

Getting Help



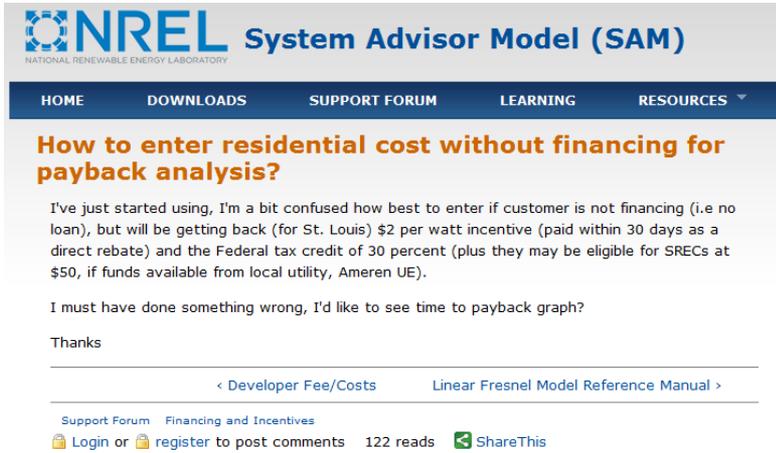
Online Help



– Help menu and buttons

Support Forum

– <http://sam.nrel.gov>



NREL System Advisor Model (SAM)
NATIONAL RENEWABLE ENERGY LABORATORY

HOME DOWNLOADS SUPPORT FORUM LEARNING RESOURCES

How to enter residential cost without financing for payback analysis?

I've just started using, I'm a bit confused how best to enter if customer is not financing (i.e no loan), but will be getting back (for St. Louis) \$2 per watt incentive (paid within 30 days as a direct rebate) and the Federal tax credit of 30 percent (plus they may be eligible for SRECs at \$50, if funds available from local utility, Ameren UE).

I must have done something wrong, I'd like to see time to payback graph?

Thanks

< Developer Fee/Costs Linear Fresnel Model Reference Manual >

Support Forum Financing and Incentives

Login or register to post comments 122 reads ShareThis

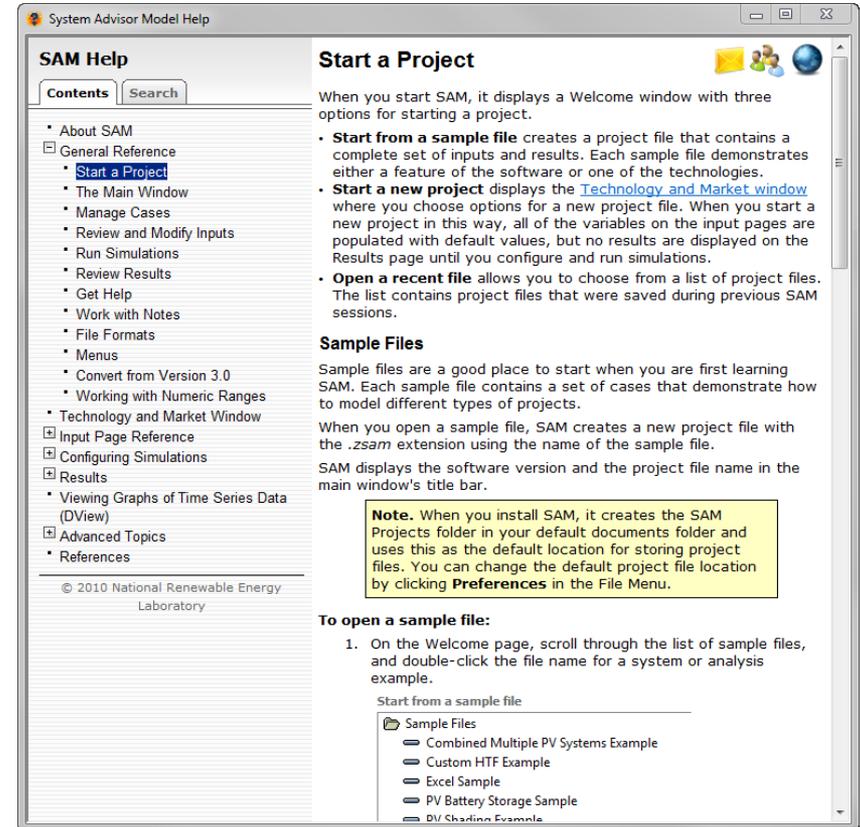
Wow, thank you thank you for

Submitted by tubegrll on Fri, 2012-01-06 13:32.

Wow, thank you thank you for such detailed responses! I am very grateful, will have to digest all the above.

I hope that some of this will help other users also.

Typically all the load data we can easily get for residential is the actual total kWh per month from the utility. Ameren also shows the average monthly temperature



System Advisor Model Help

SAM Help

Contents Search

- About SAM
- General Reference
 - Start a Project
 - The Main Window
 - Manage Cases
 - Review and Modify Inputs
 - Run Simulations
 - Review Results
 - Get Help
 - Work with Notes
 - File Formats
 - Menus
 - Convert from Version 3.0
 - Working with Numeric Ranges
- Technology and Market Window
- Input Page Reference
- Configuring Simulations
- Results
 - Viewing Graphs of Time Series Data (DView)
- Advanced Topics
- References

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Start a Project

When you start SAM, it displays a Welcome window with three options for starting a project.

- Start from a sample file** creates a project file that contains a complete set of inputs and results. Each sample file demonstrates either a feature of the software or one of the technologies.
- Start a new project** displays the [Technology and Market window](#) where you choose options for a new project file. When you start a new project in this way, all of the variables on the input pages are populated with default values, but no results are displayed on the Results page until you configure and run simulations.
- Open a recent file** allows you to choose from a list of project files. The list contains project files that were saved during previous SAM sessions.

Sample Files

Sample files are a good place to start when you are first learning SAM. Each sample file contains a set of cases that demonstrate how to model different types of projects.

When you open a sample file, SAM creates a new project file with the `.sam` extension using the name of the sample file.

SAM displays the software version and the project file name in the main window's title bar.

Note. When you install SAM, it creates the SAM Projects folder in your default documents folder and uses this as the default location for storing project files. You can change the default project file location by clicking **Preferences** in the File Menu.

To open a sample file:

1. On the Welcome page, scroll through the list of sample files, and double-click the file name for a system or analysis example.

Start from a sample file

- Sample Files
 - Combined Multiple PV Systems Example
 - Custom HTF Example
 - Excel Sample
 - PV Battery Storage Sample
 - PV Shading Example

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NEW TECHNOLOGIES

Linear Fresnel

Direct-steam generation (DSG) plant that produces superheated steam to drive a conventional power cycle.

- Solar field with either a recirculated or once-through boiler design
- Optional auxiliary fossil backup
- Steam Ranking power cycle
- Heat rejection system
- Feedwater pumps
- Plant control

SAM's linear Fresnel model can also represent a compact linear Fresnel reflector (CLFR) system

- Adjust the polynomial heat loss equation coefficients for the receiver geometry and heat loss parameters.

Direct Steam Power Tower

Central receiver concentrating solar power system where steam flows through the tower and directly to the power cycle.

Tower and receiver consists of boiler, superheater, and reheater

- Recirculating boiler accepts feedwater from the power cycle and generates boiling flow at the quality you specify.
- Dry steam from the boiler passes through the superheater where solar flux heats the steam to the temperature set point.
- Steam passes through the reheat loop before passing to the remainder of the power cycle.

Run field optimization wizard before running simulations

Biomass Power

Models an electric power plant that uses solid biomass as a feedstock and a combustor to convert it to thermal energy to drive a Rankine cycle power cycle. See Biomass Power webinar recording for details

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NEW CAPABILITIES

PV Modules from Spec Sheet Data

This new option on the Modules page allows you to use the CEC Module model for a module not included in the standard CEC database

If a module is not in the Sandia or CEC module libraries, you can use manufacturer spec sheet data to create your own module

Choose CEC Performance Model with User Entered Specifications

After entering specs, click Calculate and Plot

Error message will appear if there is a problem with the specifications

Note that temperature coefficients of V_{oc} and I_{sc} are in $V/deg\ C$ and $A/deg\ C$, respectively.

PV Monthly Soiling Derate Factors

- On the PV array page, the new soiling derate factors have been updated from previous versions of SAM:
- The derating factor applies to the incident radiation instead of to the array's DC output
 - You can specify monthly derating factors

P50/P90 Analysis

Calculates exceedance probability for annual output and LCOE

Uses weather files from NCDC

SAM calculates P10, P50, and P90 annual output values using two distributions: A normal distribution and interpolated

A P90 value means that the annual output met or exceeded that value 90% over the period for which there was data

The P50/P90 analysis runs a complete simulation using a different weather file for each year over the period, so we can compare the results from a typical year file with those from the individual years.

Generic System with Generation Profile as Input

The generic model is a way to model a conventional power system in SAM for comparison with renewable systems. In previous versions of SAM, the generic model was based on a simple capacity factor and heat rate.

In the new version, you can import power generation data from another model. The data must be an hourly or subhourly time series data set.

This is one way you can use performance data from a model other than SAM with one of SAM's financial models.

Use the Edit Data window to import an 8,760 data set, or change the time step if you have higher resolution data.

To see what the file format looks like, click Export and then open the Text file that SAM creates.

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NEW TOOLS

Integrated Time Series Data Viewer

Older versions of SAM relied on third-party software called DView to display graphs of hourly data. The new time series data viewer integrates that function into the SAM user interface.

You can display different variables, and split the graph into two graphs.

Right-click a graph to export and image of the graph.

The old DView is still available from the Results menu, and is available as a separate download. Google "DView" to find the website.

Report Generator

The new report generator is still in development, but makes it possible to generate some basic reports.

For example, for a PV component case, click Tools, Reports, Create Report

You can design your own reports with the template editor.

- Click tools, reports, open template editor

Case Compare

When your SAM files contains more than one case, you can use the new Case Compare tool to quickly find variables with different values.

For example:

Create two PV component commercial cases

Change the location, real discount rate, and desired array size in one case

Click tools, case compare