



REopt Lite Tutorial: Entering Site Data

This tutorial gives an overview of the financial modeling analysis inputs in the [REopt Lite™ web tool](#). Find additional REopt Lite [tutorials](#).

The following example uses the same input data as provided in the “sample site” option within the web tool.

REopt Lite

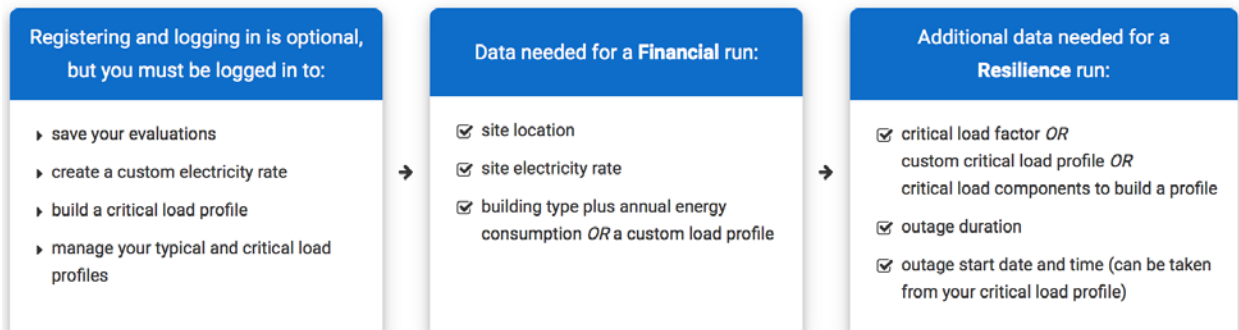
The REopt™ Lite web tool helps commercial building managers:

- Evaluate the economic viability of grid-connected PV, wind, and battery storage at a site
- Identify system sizes and battery dispatch strategies to minimize energy costs
- Estimate how long a system can sustain critical load during a grid outage.

REopt Lite offers a no-cost subset of features from NREL's more comprehensive [REopt model](#). REopt Lite also offers an [application programming interface \(API\)](#). Send questions and tool feedback to REopt@nrel.gov.



Step 0: Login and Gather Data



* For all non-required inputs, the gray default values will be used unless you enter custom inputs

Figure 1. Before you start using the tool, REopt Lite offers instructions for logging in and gathering data

Tool Inputs

Step 1: Choose either a financial or resilience focus

A financial analysis will identify the system that minimizes your cost of energy. A resilience analysis will also identify a system that minimizes your cost of energy, but with an added constraint that the system must be able to sustain your site’s critical load during an outage. For this example, choose a financial analysis (Figure 2).



Step 1: Choose Your Focus

Do you want to optimize for financial savings or energy resilience?

Figure 2. Choose the financial analysis button

Step 2: Enter site data inputs

Start by entering your site data. Data is entered under each expandable section shown in Figure 3. Expand or collapse a section with the plus or minus sign on the right-hand side.

Step 2: Enter Your Site Data

Enter information about your site and adjust the default values as needed to see your results.

Figure 3. REopt Lite site data inputs

In the Site and Utility section, note that required inputs are marked with an asterisk. There are only a few required inputs in REopt Lite, and location and electricity rate are two of them. If you just want to test out the tool, click “use sample site,” and all required inputs will be populated for you. Otherwise, begin by entering your site’s location (Figure 4). Select the best match from the dropdown menu that appears. You can enter a specific address or a city and state, but in either case the choice must be selected from the dropdown menu.

Step 2: Enter Your Site Data

Enter information about your site and adjust the default values as needed to see your results.

Figure 4. Required fields are marked with an asterisk



Next, select a locally available electricity rate from the dropdown menu (Figure 5). The most common rates are listed first, based on the number of customers. You can typically find your rate name on your utility bill.

There is often a long list of available utility rates, divided into classifications for commercial, industrial, and residential rates. Due to data limitations in some parts of the country, the full list of rates is limited to the rates available within 25 miles of the location specified.

The screenshot shows a web form titled "Site and Utility (required)". The "Site location" field is populated with "Palmdale, CA, USA". A dropdown menu for "Electricity rate" is open, displaying a list of options. The first two options are "Most Likely [Primary]" and "Most Likely [Secondary]", both listing "Southern California Edison Co: Time of Use, General Service, Demand Metered, Option B". Other options include "GS-1 TOU A General Service Non-Demand Single Phase", "GS-1 TOU A General Service Non-Demand Three Phase", and "TOU General Service, Option C: GS-1 TOU A, 3-Phase". A "Use sample site" link is visible to the right of the dropdown.

Figure 5. Choose a local electricity rate

When the “sample site” option is used (Figure 6), these first two required fields populate with the following information:

- Site location: Palmdale, CA
- Electricity rate: Southern California Edison Co: TOU-GS-3, Option B

The screenshot shows the "Site and Utility (required)" form with the "Use sample site" option selected. The "Site location" field is populated with "Palmdale, CA" and the "Electricity rate" dropdown is set to "Southern California Edison Co: TOU-GS-3, Option B". A "Rate Details" link is visible below the dropdown.

Figure 6. Sample site location and rate

You can view more information about the rate you have selected by clicking on the “Rate Details” link to the Utility Rate Database, which provides information about the rate’s energy and demand charges and how it varies over time. If you do not see your rate listed in the dropdown menu, check the box to enter custom utility rate values (Figure 7). You can enter annual or monthly energy and demand costs without being logged in, but you will need to log in before you build and save a detailed custom utility rate.



*** Electricity rate** ?

Use custom electricity rate ?

Annual Monthly Detailed

Energy Cost (\$/kWh) Demand Cost (\$/kW/month)

Figure 7. Enter custom electricity rate values, if needed

Instructions on inputs for detailed custom utility rates, optional net metering system size limits, and wholesale rates are addressed in [REopt Lite Tutorial: Advanced Utility Rate Inputs](#).

The optional Site Name input field allows users to give each scenario a distinct name, in order to more easily distinguish various sites and scenarios on any downloaded results reports or on a registered user's saved evaluations dashboard.

Additional inputs can be found using the Advanced Inputs link at the bottom of each section. In the Site and Utility section, optional advanced inputs include constraints for available land or roof space, which will limit how large a system REopt Lite will recommend for your site.

Next, enter an electric load profile for your location (Figure 8). You can choose to either upload interval data from your utility, or simulate a load based on your building type and annual consumption.

Load Profile (required)

*** Typical load** ?

How would you like to enter the typical energy load profile?

*** Custom load profile** ?

[Sample custom load profile](#)

[Upload and manage your typical load profiles.](#)

[Chart typical load data](#)

Figure 8. Enter an electric load profile for your site

If you upload data, it needs to be in a .csv file format with either hourly, 30-minute, or 15-minute load data with no commas and no blank or text entries. You can download a sample file by clicking "Download typical load file."



When you select the Simulated Profile option, you will select a building type from 17 options based on U.S. Department of Energy (DOE) Commercial Reference Buildings, plus a flat load option for the unusual situation where the electric load is constant in all hours of the day (Figure 9). Each building has a different load shape that reflects the expected times of the day and year when load would be low or high for that type building. You can click “Chart typical load data” to see the differences.

A simulated residential load profile is not currently available. The most accurate way to model a residence is by uploading a custom load profile and checking that all financial, tax, and incentive inputs are relevant. A rough approximation can be made using the apartment building option, which most closely matches the timing of a residential electric load. The annual consumption would need to be scaled down to a relevant residential annual consumption total.

The default annual energy consumption that automatically populates that input field when you choose a building is an average consumption for a building of the type that you are simulating in the climate zone of your site. Estimated consumption changes depending on which building type and part of the country you have entered, and is based on typical building sizes and climate zones listed in the “Building Details” pop-up. You will get a more accurate approximation if you overwrite the default consumption with your building’s actual annual consumption. In that case, the simulated profile will be scaled to match your building’s consumption.

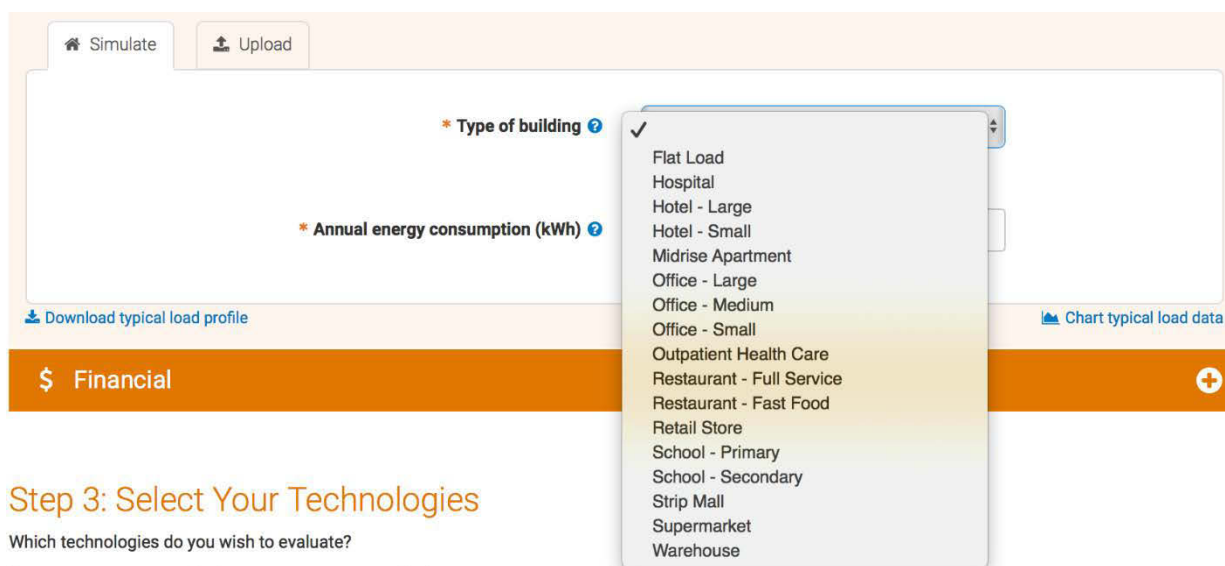


Figure 9. Building types from DOE Commercial Reference Buildings

For the sample site evaluation used in the tutorial, a retail store that consumes about 1 million kilowatt-hours per year is modeled (Figure 10).



Load Profile (required) -

* Required field

*** Typical load** ?
How would you like to enter the typical energy load profile?

[Simulate](#) [Upload](#)

*** Type of building** ? Retail Store
[Building Details](#)

*** Annual energy consumption (kWh)** ? 1000000

[Download typical load profile](#) [Chart typical load data](#)

Figure 10. Sample site building type and annual energy consumption

This is all the required information you need to enter in order to complete a financial analysis. All other inputs can be left as default values if you wish.

Within the Financial section, you can opt to keep the default values, or you can easily change them based on the specific financial attributes of your business (Figure 11).

\$ Financial -

Host discount rate, nominal (%) ? 8.3%

Electricity cost escalation rate, nominal (%) ? 2.3%

Show fewer inputs

Analysis period (years) ? 25

Host effective tax rate (%) ? 26%

O&M cost escalation rate (%) ? 2.5%

[Reset to default values](#)

Figure 11. The Financial inputs section

Step 3: Choose the technology to be evaluated

Finally, select which technologies you want to evaluate. The model defaults to solar photovoltaic (PV) and battery systems, but you can also evaluate wind (Figure 12).



Step 3: Select Your Technologies

Which technologies do you wish to evaluate?

PV  Battery  Wind 

 PV	
 Battery	

Figure 12. Evaluate PV, battery, and/or wind technologies in your financial modeling analysis

In each technology section you can adjust the technology-specific assumptions. For example, if you expand the PV section, you'll see cost and incentive assumptions. There is also an option to include an already existing PV system in the optimization (Figure 13).

Under Advanced Inputs, you'll find additional performance characteristics like module type and array type. You can specify a minimum or maximum technology size. Entering a minimum new PV size forces a new PV system of at least that size to appear in the results, even if it is not economically optimal. If you want to model a new PV system with a specific size, enter it as both the minimum and the maximum size. If there is not enough space available, or there is an interconnection limit that will not accommodate the minimum system size specified, you will get a message that the system is infeasible.

Similar inputs are available in each technology section.



⚙️ PV
☰

System capital cost (\$/kW)

Existing PV system?

Existing PV systems size (kW)

Type of load profile

- Net (gross load minus existing PV generation)
- Gross load (also known as native load)

Capital Cost or System Size Based Incentives

[Database of state incentives for renewables](#)

	Incentive based on percentage of cost (%)	Maximum dollar amount for incentive based on percentage of cost (\$)	Rebate based on system size (\$/kW)	Maximum dollar amount for rebate based on system size (\$)
Federal	<input type="text" value="26%"/>	<input type="text" value="Unlimited"/>	<input type="text" value="\$0"/>	<input type="text" value="Unlimited"/>
State	<input type="text" value="0%"/>	<input type="text" value="Unlimited"/>	<input type="text" value="\$0"/>	<input type="text" value="Unlimited"/>
Utility	<input type="text" value="0%"/>	<input type="text" value="Unlimited"/>	<input type="text" value="\$0"/>	<input type="text" value="Unlimited"/>

Production Based Incentives

	Production incentive (\$/kWh)	Incentive duration (yrs)	Maximum incentive (\$)	System size limit (kW)
Total	<input type="text" value="\$0"/>	<input type="text" value="1"/>	<input type="text" value="Unlimited"/>	<input type="text" value="Unlimited"/>

PV Incentives and Tax Treatment

Tax Treatment

MACRS schedule

MACRS bonus depreciation

Show fewer inputs

PV Costs

O&M cost (\$/kW per year)

PV System Characteristics

Minimum new PV size (kW DC)

Maximum new PV size (kW DC)

Module type

Array type

Array azimuth (deg)

Array tilt (deg)

DC to AC size ratio

System losses (%)

[↻ Reset to default values](#)

Figure 13. PV cost, incentives, and advanced inputs



Once you have completed these steps, click “Get Results” to run the financial analysis (Figure 14).

Step 3: Select Your Technologies

Which technologies do you wish to evaluate?

The screenshot shows a user interface for selecting technologies. At the top, there are three buttons: "PV" with a gear icon and a checked checkbox, "Battery" with a battery icon and a checked checkbox, and "Wind" with a wind turbine icon and an unchecked checkbox. Below these is a list of selected technologies: "PV" and "Battery", each with a plus icon to its right. At the bottom right of the interface is a blue "Get Results" button with a right-pointing arrow. A "Reset to default values" link is also visible near the bottom right.

Figure 14. After you’ve entered all your site data, click the Get Results button

Learn More

For more information on tool inputs and default values, please see the [REopt Lite Web Tool User Manual](#).

Find additional REopt Lite tutorial documents and videos on reopt.nrel.gov/user-guides.html.



NREL’s REopt Lite web tool helps users evaluate the economic viability of grid-connected PV, wind, and battery storage systems at a site. It identifies system sizes and battery dispatch strategies to minimize energy costs, and estimates how long a system can sustain the site’s critical load during a grid outage.

Learn more about REopt Lite at reopt.nrel.gov/tool.

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National Renewable Energy Laboratory
15013 Denver West Parkway
Golden, CO 80401
303-275-3000 • www.nrel.gov

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