

2025 SOFTWARE MANUAL

Stochastic Planning Inputs Tool

SPI-Tool



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Stochastic Planning Inputs Tool

SPI-Tool

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ACKNOWLEDGMENTS

EPRI prepared this report.

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This publication is a corporate document that should be cited in the literature in the following manner: *Stochastic Planning Inputs Tool: SPI-Tool*. EPRI, Palo Alto, CA: 2025. 3002032424.

SOFTWARE DESCRIPTION

Stochastic Inputs Planning Tool (SPI-Tool) helps resource planners characterize future uncertainty in their production cost modeling inputs.

Description

Welcome to the user manual for the Stochastic Planning Inputs Tool (SPI-Tool). This tool helps resource planners characterize future uncertainty in their production cost modeling inputs. By generating probabilistic inputs, SPI-Tool streamlines the initial steps toward risk assessment and mitigation through stochastic planning.

Platform Requirements

Windows 11 or MacOS Sequoia

Keywords

Stochastic Planning Inputs Tool, SPI-Tool, Stochastics, Samples, Uncertainty

ADDITIONAL FRONT MATTER SECTION(S)

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MANDATORY SOFTWARE INSTALLATION INFORMATION

Installation of EPRI Software at Client Site

This software uses third party software products, operating systems, and hardware platforms. Over time, security issues may be uncovered in these third party products. You should review your use of this software with your Information Technology (IT) department to ensure that all recommended security updates and patches are installed to all third party products when needed.

If you experience difficulties accessing the application

If you experience difficulties accessing the application after standard installation, please consult your IT department personnel to have proper access permissions setup for your use. If the problem cannot be resolved, please call the EPRI Customer Assistance Center (CAC) at 1-800-313-3774 (or email askepri@epri.com).

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1. WELCOME

Welcome to the user manual for the Stochastic Planning Inputs Tool (SPI-Tool). This tool helps resource planners characterize future uncertainty in their production cost modeling inputs. By generating probabilistic inputs, SPI-Tool streamlines the initial steps toward risk assessment and mitigation through stochastic planning.

SPI-Tool is currently in beta testing. If you encounter any issues or have any feedback, please reach out to the [SPI-Tool developers](#)

Disclaimer: This tool does not share any data with EPRI or any other third party. All data is stored locally on your machine.

2. TUTORIAL

In this section, you'll learn how to launch SPI-Tool, configure it to match your specific system, and use it to generate a set of Monte Carlo samples.

Launch the tool

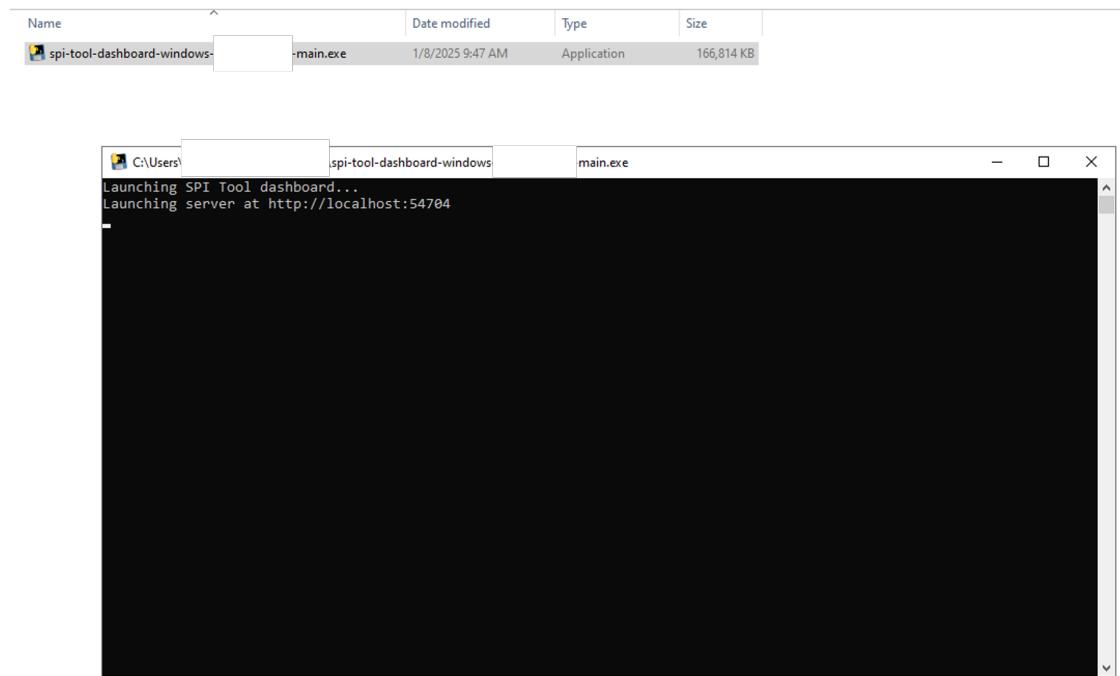
To launch the tool, first download it using the link provided by email.

Once downloaded, you will see the following files in the folder

1. MANUAL.docx
2. spi-tool-dashboard-macos-0.1.0-abcdef-main
3. spi-tool-dashboard-windows-0.1.0-abcdef-main.exe

Windows

On Windows, you can launch the tool by double-clicking the executable file in File Explorer.



MacOS

On macOS, you can launch the tool by using the terminal.

First, open a terminal by pressing Cmd + Space and typing Terminal. Then, navigate to the folder where you downloaded SPI-Tool. You can do this by typing cd followed by the path to

the folder where you downloaded SPI-Tool. For example, if you downloaded SPI-Tool to your Downloads folder, you would type:

```
cd ~/Downloads
```

Next, you can setup SPI-Tool by typing the following commands:

```
# make script executable, only needs to be done the first time after you download the tool
chmod +x ./spi-tool-dashboard-macos-0.12.0-e5af5ca-main
```

and you can launch the tool by typing:

```
./spi-tool-dashboard-macos-0.12.0-e5af5ca-main
```

```
[...]
./spi-tool-dashboard-macos-[REDACTED]-main
Launching SPI Tool dashboard...
Matplotlib is building the font cache; this may take a moment.
Launching server at http://localhost:61610
```

Automatically Opening the Browser



Note

It will take about 30 seconds for SPI-Tool to build before it launches. When the tool launches, your default web browser will open.

You will see the following in your browser:

The screenshot shows the SPI Tool Dashboard interface. At the top, there's a navigation bar with a back button, forward button, refresh button, and a link to 'localhost:51610'. Below the navigation bar is a blue header bar with the title 'SPI Tool Dashboard' and a 'Home' button. The main content area has a heading 'Welcome to the SPI-Tool Dashboard' and a sub-section 'Scenario Generation Models' which includes 'Demand Model', 'Gas Price Model', and 'Carbon Price Model'. Each model has a small icon and a corresponding button below it. At the bottom of the page are links for 'Help' and 'FAQ', and a note about the version: 'version: 0.2.1-2dc2599-main'.

Generate a set of load samples from example data

To generate a set of load samples, click the Load button. You will see the following screen:

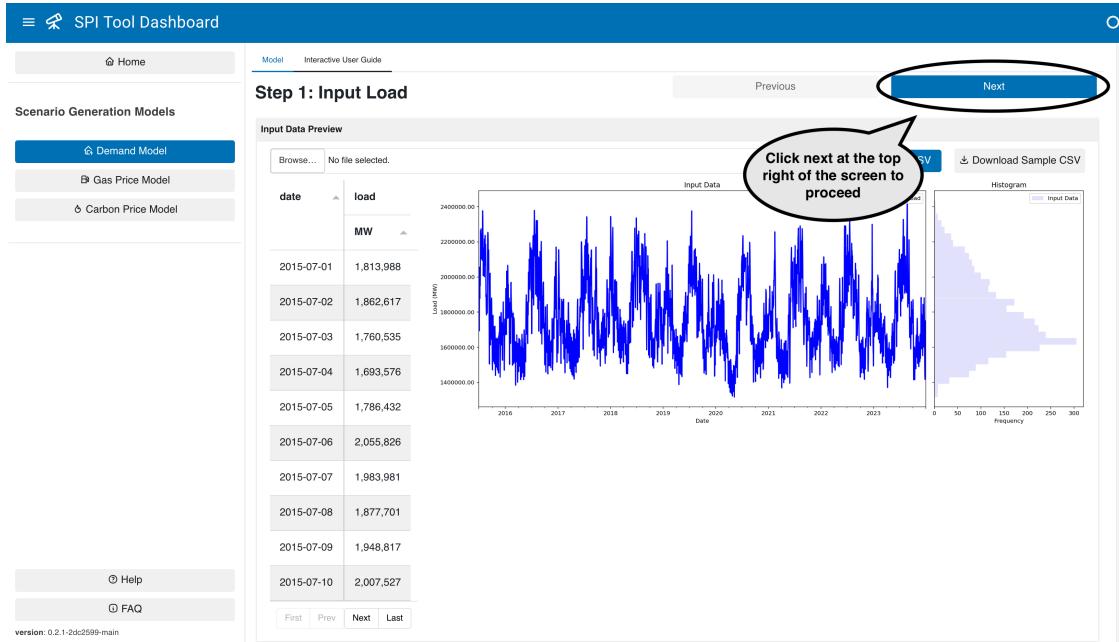
This screenshot shows the 'Step 1: Input Load' screen. On the left, there's a sidebar with 'Demand Model' selected (indicated by a blue oval). Other options are 'Gas Price Model' and 'Carbon Price Model'. A callout bubble points to the 'Demand Model' button with the text 'Select Demand Model to begin'. The main content area has a heading 'Step 1: Input Load' and a sub-section 'Input Data Preview'. It shows a file input field with 'Browse...' and 'No file selected.' A callout bubble points to this field with the text 'Upload Data In Valid Format'. Another callout bubble points to a 'Load Sample CSV' button with the text 'OR Load Sample Data'. To the right of the preview area is a 'Next' button. Below the preview area, there's a note about CSV file columns, instructions for sorting, and an example CSV file. At the bottom, there's a note about missing data interpolation and instructions for loading or downloading sample data.

Step 1: Input Example Historical Load

In this step, you could either upload historical load data for your system or use the example data provided in SPI-Tool. For this now, click the Load Example CSV button to load an example dataset. In the next section of the tutorial, you will learn how to upload historical load specific to your system and how to tailor the samples generated by SPI-Tool to your stochastic analysis.

You can download the sample CSV by clicking the Download Example CSV button. This will allow you to explore the input data formatting requirements in your preferred CSV viewer (e.g., Excel).

After loading the sample CSV, the screen will update to show a view of the input data as well as a visualization of the data.



Additionally, the Next button at the top right will be highlighted dark blue. Click Next to proceed to Step 2: Generate Load Samples.

Step 2: Generate Load Samples from Example Data

In Step 2 of generating load samples, you'll see the following screen:

The screenshot shows the SPI Tool Dashboard at Step 2: Scenarios Load. On the left, a sidebar lists 'Scenario Generation Models' with 'Demand Model' selected. The main panel displays a configuration for a 'Regression Model (linear)'. It includes checkboxes for 'Use day type for prediction' and 'Use month for prediction', both of which are checked. A dropdown menu for 'Choose Regression Kind' is set to 'linear'. The 'End date' is set to '2033-12-28'. The 'Number of Scenarios' is set to '10'. The 'Random seed' is set to '42'. Below these settings are two plots. The first plot, titled 'Mean-Reverting Processes', shows 'Load (kWh)' on the y-axis (ranging from 1,000,000.00 to 3,500,000.00) against 'Date' on the x-axis (from 2016 to 2034). It displays four series: 'Input' (blue line), 'All scenarios' (red line), 'Scenario (sample_1)' (black line), and 'Average Load' (black line). The second plot, titled 'Weekday-Jan', shows 'Normalized Frequency' on the x-axis (from 0.0 to 1.0) for three categories: 'Input Data' (purple), 'sample_1' (orange), and 'Mean' (grey).

Here you can specify the number of Monte Carlo samples that you want to generate for your stochastic analysis. To demonstrate this functionality, change the number of samples from 10 to 25 and hit enter (or click away). SPI-Tool will now generate 25 probabilistic load samples.

If you scroll down on this page, you'll see an Output Data section with a table with the probabilistic samples generated by SPI-Tool. You can click on Download Samples button to download the probabilistic samples as a CSV file.

The following table shows the generated output values for each sample.

date	sample_1	sample_2	sample_3	sample_4	sample_5	sample_6	sample_7	sample_8	sample_9	san
	MW									
2023-12-31	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0
2024-01-01	1,846,770.32	1,727,754.92	1,780,085.08	1,733,551.63	1,740,124.83	1,661,294.49	1,683,690.42	1,570,196.32	1,604,821.15	1,700,000.00
2024-01-02	1,915,293.74	1,793,196.62	1,725,391.24	1,758,768.55	1,962,344.3	1,749,465.48	1,814,294.11	1,656,597.03	1,668,935.41	1,650,000.00
2024-01-03	1,938,882.73	1,850,515.94	1,738,819.1	1,718,104.87	1,817,286.03	1,793,690.13	1,835,802.93	1,769,265.97	1,751,150.59	1,740,000.00
2024-01-04	1,852,352.67	1,808,184.74	1,750,981.61	1,892,931.71	1,941,095.57	1,841,855.66	1,797,663.15	1,730,565.89	1,682,476.56	1,750,000.00
2024-01-05	1,783,660.04	1,880,192.22	1,701,580.64	1,957,917.96	1,951,589.79	1,841,976.44	1,826,189.24	1,743,227.92	1,737,326.34	1,830,000.00
2024-01-06	1,583,368.63	1,672,322.68	1,758,815.7	1,775,366.36	1,785,026.67	1,723,906.03	1,660,439.11	1,502,039.3	1,721,632.6	1,920,000.00
2024-01-07	1,704,217.87	1,577,183.77	1,769,963.55	1,688,545.45	1,898,395.83	1,534,044.47	1,698,409.94	1,637,470.35	1,754,721.2	1,830,000.00
2024-01-08	1,771,869.64	1,746,684.14	1,729,496.38	1,811,225.56	1,901,126.02	1,670,215.05	1,710,505.37	1,761,949.92	1,730,209.87	1,920,000.00
2024-01-09	1,849,905.74	1,837,565.49	1,742,115.46	1,878,160.24	1,870,442.67	1,778,773.37				1,725,723.58

Download samples
as a CSV file

4 5 Next Last

Download Probabilistic Samples

The CSV file that you download will look something like the following: `Load_normal_25-samples_using-day-using-month_end-date-2033-12-28_downloaded-2025-01-08-08-57-50.csv`.

The name of the CSV file will contain the following information:

- stochastic input (Load)
- assumed probability distribution (normal)
- the number of samples (25)
- whether the sample generation process considered day-of-week and seasonal effects (using-day-using-month)
- the end date of the sample time series (2033-12-28)
- the timestamp describing when the samples were downloaded from SPI-Tool (2025-01-08-08-57-50)

In the file, you'll see the following data:

Date	Sample_1	Sample_2	Sample_3	Sample_4	Sample_5	Sample_6	Sample_7	Sample_8	Sample_9	Sample_10	Sample_11	Sample_12	Sample_13	Sample_14	Sample_15	Sample_16	Sample_17	Sample_18	Sample_19	Sample_20	Sample_21	Sample_22	Sample_23	Sample_24	Sample_25
2023-12-30	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	1868566	
2023-12-31	1783,183	1580,807,13	1718,171,33	1689,715,35	1870,784,49	1688,302,13	1545,188,84	1869,038,07	1695,399,99	1760,462,79	1350,535,16	1868,379,38	1769,899,91	1587,643,99	103,001,21	152,072,45	1352,522,68	1566,436,36	1399,054,66	1398,236,88	1323,991,14	1354,040,77	1366,618,73	1369,71,25	1714,154,25
2024-01-01	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-02	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-03	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-04	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-05	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-06	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-07	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-08	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-09	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-10	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-11	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-12	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-13	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-14	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-15	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-16	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-17	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-18	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-19	1860,654,79	1518,952,79	1865,810,23	1790,843,28	1718,053,31	1574,652,17	1687,191,84	1667,412,22	1645,353,22	1600,231,15	1783,143,78	1797,18,69	1688,381,63	1684,146,71	1794,475,79	1660,112,49	1472,566,14	1711,009,67	1648,387,19	1548,387,19	1714,251,35				
2024-01-20	1860,																								

Generate load probabilistic samples for your system

To generate probabilistic samples using historical data from your own system, click Previous in the top-right of your screen to return to Step 1: Input Historical Load.

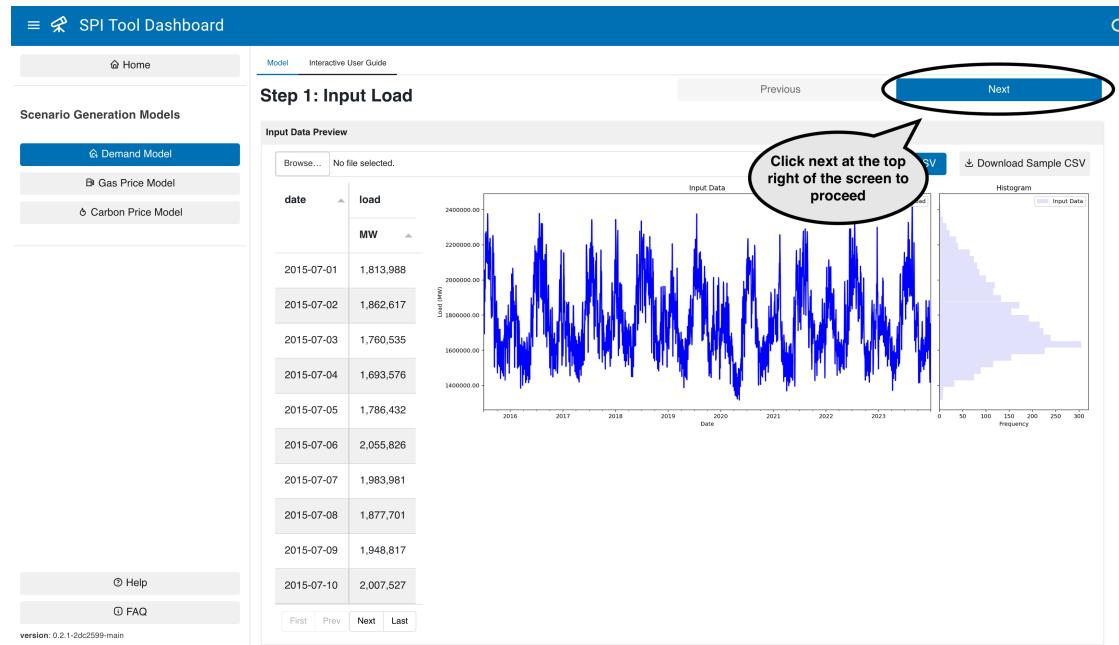
Step 1: Input Historical Load

Here, you can click Browse... to upload historical data for your system. The input that you provide should be in the following format:

```
date,load
,MW
2021-01-01,200
2021-01-02,210
2021-01-03,250
```

Note that the input data requires a second header row where the first column is blank, and second column specifies the units of the load data.

Once the uploaded data is in the correct format, the screen will update to show a view of the input data as well as a visualization of the data. Click Next to proceed to Step 2: Generate Load Samples.



Step 2: Generate Load Samples

Now, you can tailor the sample generation process to your system. Click the ? icon next to each setting to find out more about each setting. You can also select the User Guide tab at the top

of the page to learn more about the methodology that SPI-Tool uses to generate stochastic samples.

Change the sample generation settings to match your system. For example, you may wish to uncheck the Consider seasonal effects checkbox if you do not want to consider seasonal variability in your stochastic analysis. You can also adjust the time horizon End Date to match your analysis needs.

Once you have selected the appropriate sample generation settings for your system, you can click the Download Probabilistic Samples button to download probabilistic samples tailored to your system and analysis needs.

The following table shows the generated output values for each sample.

date	sample_1	sample_2	sample_3	sample_4	sample_5	sample_6	sample_7	sample_8	sample_9	sample_10
	MW									
2023-12-31	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0	1,651,806.0
2024-01-01	1,846,770.32	1,727,754.92	1,780,085.08	1,733,551.63	1,740,124.83	1,661,294.49	1,683,690.42	1,570,196.32	1,604,821.15	1,700,500.00
2024-01-02	1,915,293.74	1,793,196.62	1,725,391.24	1,758,768.55	1,962,344.3	1,749,465.48	1,814,294.11	1,656,597.03	1,668,935.41	1,670,000.00
2024-01-03	1,938,882.73	1,850,515.94	1,738,819.1	1,718,104.87	1,817,286.03	1,793,690.13	1,835,802.93	1,769,265.97	1,751,150.59	1,740,000.00
2024-01-04	1,852,352.67	1,808,184.74	1,750,981.61	1,892,931.71	1,941,095.57	1,841,855.66	1,797,663.15	1,730,565.89	1,682,476.56	1,680,000.00
2024-01-05	1,783,660.04	1,880,192.22	1,701,580.64	1,957,917.96	1,951,589.79	1,841,976.44	1,826,189.24	1,743,227.92	1,737,326.34	1,830,000.00
2024-01-06	1,583,368.63	1,672,322.68	1,758,815.7	1,775,366.36	1,785,026.67	1,723,906.03	1,660,439.11	1,502,039.3	1,721,632.6	1,920,000.00
2024-01-07	1,704,217.87	1,577,183.77	1,769,963.55	1,688,545.45	1,898,395.83	1,534,044.47	1,698,409.94	1,637,470.35	1,754,721.2	1,830,000.00
2024-01-08	1,771,869.64	1,746,684.14	1,729,496.38	1,811,225.56	1,901,126.02	1,670,215.05	1,710,505.37	1,761,949.92	1,730,209.87	1,920,000.00
2024-01-09	1,849,905.74	1,837,565.49	1,742,115.46	1,878,160.24	1,870,442.67	1,778,773.37			1,725,723.58	1,920,000.00

Download samples
as a CSV file

4 5 Next Last

[Download Probabilistic Samples](#)

Depending on the commercial modeling tool that you are using to run your stochastic analysis, your tool may also generate stochastic samples natively in the tool. To download the parameters necessary to generate these stochastic samples, open the Sample Generation Parameters view and click Download Sample Generation Parameters.

The AR(1) process used is:

$$y_t = \mu \cdot (1 - \varphi) + \varphi \cdot y_{t-1} + S \cdot Z_t$$

and can be rewritten as:

$$y_t = \mu \cdot \theta + (1 - \theta) \cdot y_{t-1} + S \cdot Z_t$$

where:

- $Z_t \sim N(0, 1)$: A standard normal random variable (mean 0, variance 1), introducing stochasticity into the process.

- S : The standard deviation of the noise, scaling the randomness.

index	slope	intercept	p_value	r_value	steyx	mean_reversion	long_run_mean	volatility
Weekday-Jan	0.793761	397,737.114618	0.0	0.810246	83,479.81943	-0.793761	-501,079.015304	16.660011
Weekend-Jan	0.683509	515,344.169477	0.0	0.709201	96,191.140828	-0.683509	-753,968.718565	12.757975
Weekday-Feb	0.75033	463,888.564122	0.0	0.768409	76,268.471279	-0.75033	-618,245.762679	12.336271
Weekend-Feb	0.631551	610,955.386644	0.0	0.686753	100,371.64975	-0.631551	-962,245.762679	12.336271
Weekday-Mar	0.760168	420,091.458497	0.0	0.826782	46,355.621909	-0.760168	-501,079.015304	16.660011

Download parameters
as a CSV file

Please note that these parameters may require additional formatting before they can be input into your commercial modeling tool. Refer to your tool's documentation for details on that formatting.

Generate a set of carbon price samples from default data

To generate a set of load samples, click the Carbon Prices button. You will see the following screen:

The screenshot shows the SPI-Tool Dashboard interface. On the left, there's a sidebar with 'Stochastic Inputs' sections for 'Load', 'Gas Price', and 'Carbon Price'. The 'Carbon Price' section is highlighted with a blue background and has a callout bubble pointing to it with the text 'Select Carbon Price to begin'. The main content area has a header 'Info' with a note about CSV file requirements. Below this, there's a text area with instructions and an example CSV file. At the bottom, there's a note about missing dates and a footer with version information.

Note: The CSV file should have 2 header rows.
The first row should have the following columns:

- date: The date column contains the dates for the scenarios
- scenario_1_(2022 \$/MTCO2e): The values of the first scenario
- scenario_2_(2022 \$/MTCO2e): The values of the second scenario
- scenario_3_(2022 \$/MTCO2e): The values of the third scenario
- ...
- scenario_N_(2022 \$/MTCO2e): The values of the Nth scenario

The second row should contain the units for the carbon price bounds. All units should be the same and use real (i.e., base year) dollars. For example, the units may be "2022 \$/MTCO2e".

The third row onwards should contain the data for the bounding carbon price forecasts.

The data should be sorted by date in ascending order. The date format should be YYYY or YYYY-MM-DD.

The values of the scenarios should be numbers.

The second row should contain the units without any units for the date.

Here's an example of a valid CSV file:

```
date,scenario_1,scenario_2,scenario_3,scenario_4
,2022 $/MTCO2e,2022 $/MTCO2e,2022 $/MTCO2e,2022 $/MTCO2e
2024-01-01,24.39,37.97,30.12,28.45
2025-01-01,40.23,22.18,34.06,38.00
2026-01-01,34.06,38.40,23.22,18
```

The column names for the bounding carbon price forecasts can be any string, but the column names should not contain any special characters. Column names will be used as labels in the next section.

If any dates are missing, the values will be interpolated. If any hourly or monthly dates are provided, or if the years are duplicated, those values will be averaged.

version: 0.11.4-57fb48-main

Step 1: Input Example Carbon Prices

In this step, you could either upload data or use the data provided in SPI-Tool. For this now, click the Load Default CSV button to load the default dataset.

The Next button at the top right will be highlighted in dark blue. Click Next to proceed to Step 2: Generate Carbon Price Samples.

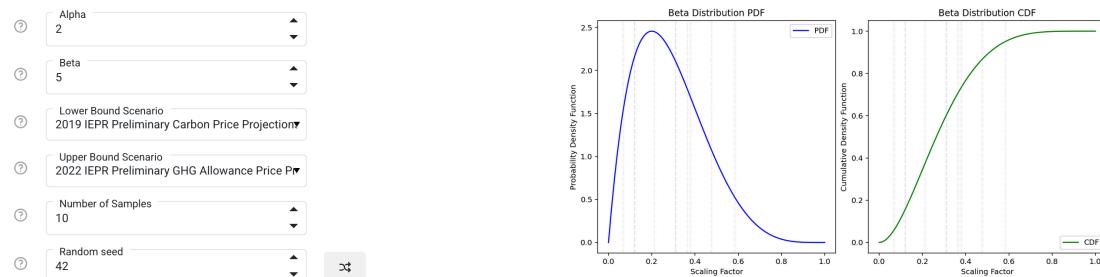
Step 2: Generate Carbon Price Samples

In Step 2 of generating carbon price samples, you'll see the screen that contains options to tailor your carbon price samples. You can specify the number of Monte Carlo samples that you want to generate for your stochastic analysis. To demonstrate this functionality, change the number of samples from 10 to 25 and hit enter (or click away). You can also specify the "Alpha" and "Beta" parameters of the beta distribution that SPI-Tool uses to generate the carbon price.

The equation for generating carbon price samples is given by:

$$\text{Sample}_x = \text{scenario1} + f(x; \alpha, \beta) \times (\text{scenario2} - \text{scenario1})$$

For example, a scaling factor of 0.25 places the carbon price at 25% of the distance from the lower bound to the upper bound for every forecast year.

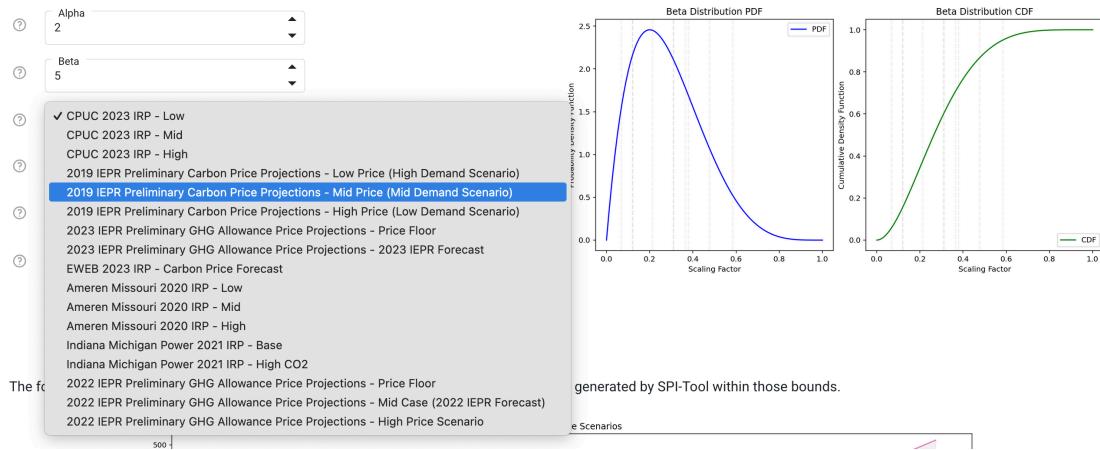


To select the bounds of the beta distribution that SPI-Tool uses to generate the carbon price, use the drop down for "Lower Bound Scenario" and "Upper Bound Scenario".

The equation for generating carbon price samples is given by:

$$\text{Sample}_x = \text{scenario1} + f(x; \alpha, \beta) \times (\text{scenario2} - \text{scenario1})$$

For example, a scaling factor of 0.25 places the carbon price at 25% of the distance from the lower bound to the upper bound for every forecast year.



Once you have selected the appropriate settings for your system, you can click the Download Carbon Price Samples button to download samples tailored to your system and analysis needs.

date	sample_1	sample_2	sample_3	sample_4	sample_5	sample_6	sample_7
	2022 \$/MTCO2e						
2024-01-01	34.390994	34.969712	34.65065	34.541743	34.247482	34.247464	34.166458
2025-01-01	38.678263	39.234723	38.927933	38.823214	38.540271	38.540254	38.462363
2026-01-01	43.515533	44.049734	43.755216	43.654686	43.38306	43.383044	43.308269
2027-01-01	48.948559	49.453082	49.174926	49.079981	48.823445	48.82343	48.752809
2028-01-01	55.073098	55.533104	55.279491	55.192924	54.959024	54.95901	54.89462
2029-01-01	61.932784	62.322306	62.107553	62.03425	61.836189	61.836178	61.781654
2030-01-01	69.667619	69.960687	69.799111	69.743959	69.594943	69.594934	69.553911
2031-01-01	71.449894	74.859135	72.979535	72.337959	70.604458	70.604356	70.127145
2032-01-01	73.448588	80.352394	76.546153	75.246944	71.736558	71.73635	70.769986
2033-01-01	75.68704	86.504611	80.540614	78.504884	73.004462	73.004136	71.48994

First Prev 1 2 3 Next Last

[Download Carbon Price Samples](#)



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