Energy Policy Simulator Open Beta Test

Welcome

Welcome to the open beta test for the Energy Policy Simulator (EPS)! The EPS is a computer model developed by Energy Innovation LLC as part of its Energy Policy Solutions project, an effort which aims to provide guidance to policymakers and regulators about how to reduce emissions of greenhouse gases and other harmful pollutants.

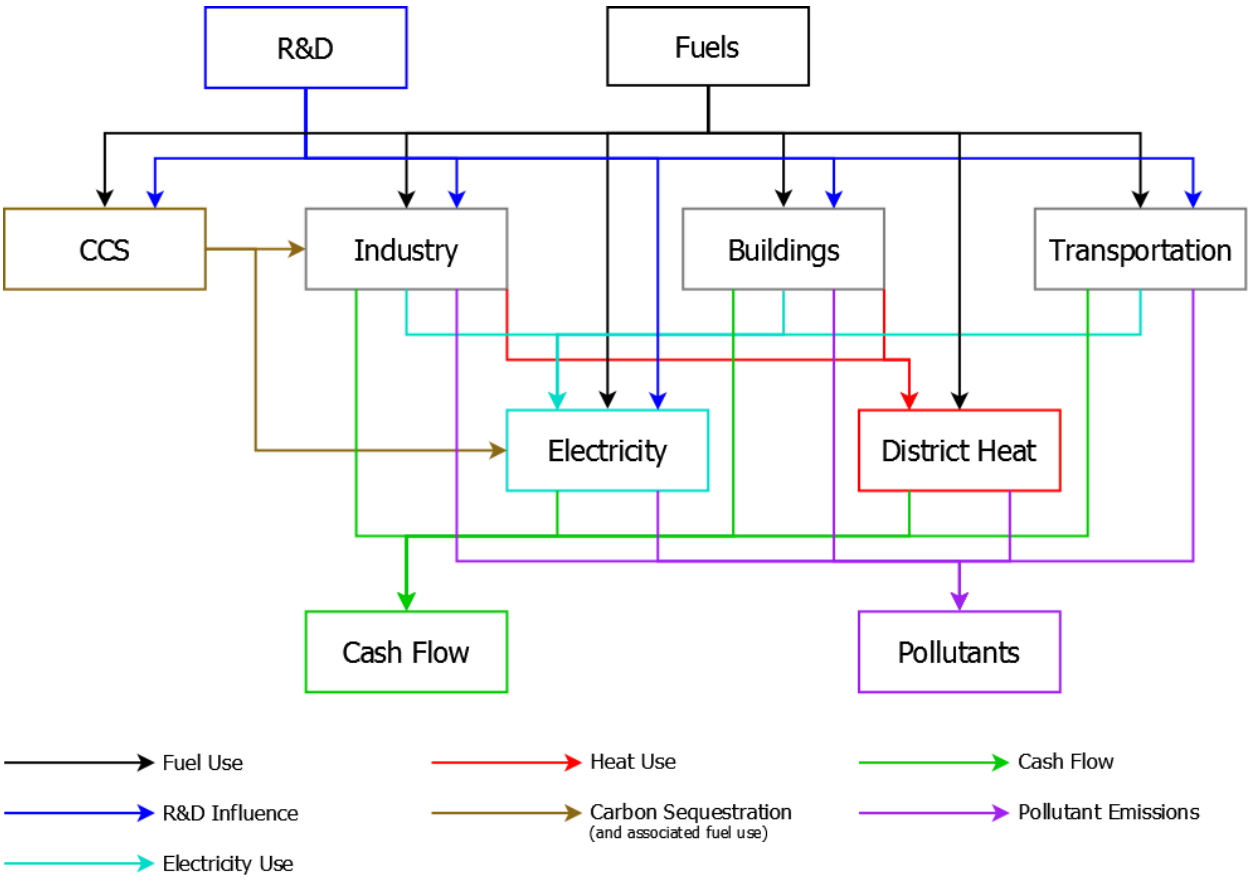
About the Energy Policy Simulator

The EPS allows the user to control 45 different policies that affect energy use and emissions in various sectors of the economy (such as a carbon tax, fuel economy standards for vehicles, reducing methane leakage from industry, and accelerated R&D advancement of various technologies). The model is designed to operate at national scale and focuses on four sectors: transportation, electricity supply, buildings, and industry. The model reports outputs at annual intervals with an initial year of 2013 and a final year of 2030. The model provides numerous outputs, including:

- Emissions of 12 different pollutants (CO_2, NO_x, SO_x, $PM_{2.5}$, and eight others), as well as CO_2e
- Direct cash flow (cost or savings) impacts on consumers, industry (as a whole), government, and several specific industries
- Monetized social benefits due to avoided mortality from particulates and avoided climate damages
- The composition and output of the electricity sector (e.g. capacity and generation from coal, natural gas, wind, solar, etc.)
- Energy use by fuel type from various energy-using technologies (specific types of vehicles, building components, etc.)

The EPS is a system dynamics computer model created in a commercial program called Vensim. Vensim is a tool produced by Ventana Systems for the creation and simulation of system dynamics models. While Vensim costs money (and is sold in several tiers), Ventana Systems makes available a free Vensim Model Reader that can read and simulate (but not edit) models. Directions on how to obtain Vensim Model Reader and the Energy Policy Simulator beta can be found below, in the "How to Get the Model" section.

The model is distributed with a complete set of input data representing the United States, but it is designed to be able to represent different countries by swapping the input data. The EPS reads in all of its input data from external text files, which are generated by accompanying Excel files. All of these files are included in the model distribution. Therefore, it is possible to change any of the model's input data (up to and including swapping all of the data, causing the model to represent a different country) without purchasing a commercial version of Vensim.



About the Open Beta Test

Energy Innovation LLC plans to release the Energy Policy Simulator version 1.0 in October 2015. In July 2015, we are making available a beta version of the model for public testing and use. The version 1.0 release in October will be accompanied by full documentation of the model, including textual descriptions of the structure and a number of screencast videos that explain how to use the model or how various aspects work. Since this is a beta test and documentation is not yet available, you will need to learn the model in part by exploring and playing with it. If this does not appeal to you, we recommend you wait for the 1.0 release.

We welcome feedback on the beta model; you may send feedback to EPSbetafeedback@energyinnovation.org. This is a temporary email address that will only be available from the start of the open beta test through shortly before version 1.0 is released in October.

Unfortunately, we may not be able to respond to all messages received at this address. If you are having trouble viewing or running the model, you should carefully read through the "How to Get the Model" section below. If that information does not solve your problem, we recommend that you view Vensim's help documentation or post to Vensim's help forum.

Note for Mac Users

Vensim is available for Windows and Mac operating systems. We have developed and tested the EPS exclusively on Windows computers, and all of the directions below assume you are using Windows. If you wish to use a Macintosh version of Vensim, proceed at your own risk. For Mac users, a better option may be to run a copy of Windows using Parallels Desktop, VMWare Fusion, or Boot Camp. This will enable you to use the Windows version of Vensim on your Mac.

How to Get the Model

Before obtaining the model, you should install a copy of Vensim Model Reader. You may download this software on the Vensim Free Downloads page. **Be sure to change the radio button in the "Product" section from "Vensim PLE" to "Model Reader."** The EPS will not function under Vensim PLE (personal learning edition). After installing Vensim Model Reader, open the program to ensure it runs successfully.

Note for people who already have a copy of Vensim: The EPS requires Vensim version 6.3B (released in June 2015) or later in order to produce correct numerical results. This is because the model relies on bug fixes that were implemented in Vensim v6.3B. Additionally, the model relies heavily on subscripts, which are not available in Vensim PLE or Vensim PLE Plus (the lower-tier versions of the editor). Please be sure you have Vensim Pro, Vensim DSS, or Vensim Model Reader version 6.3B or later before attempting to run the model. If you own Vensim Pro or DSS with a current maintenance subscription, you can download an updated version here. Otherwise, you should download the free Model Reader.

Once Model Reader is installed, you should download the beta version of the EPS by clicking the "Download the Energy Policy Simulator" button on the Energy Policy Solutions beta page.

A compressed archive (.zip file) will be downloaded. It is necessary to extract the files from the archive before running the model. On Windows, .zip archives look similar to folders, and you can double-click on them to open them and even open the files inside them. **This does not mean you have extracted the files from the archive.** Vensim will not be able to write files into the .zip archive, so it will not be able to properly run the model, as this process generates an output file. On Windows, you must right-click on the .zip archive and select "Extract All..." then click "Extract" in the dialogue box that appears. This will generate an uncompressed folder containing the model files. You should now delete the .zip archive, so that there is no possibility of accidentally running the copy of the model that is still located inside the .zip archive.

The model folder will contain the following files and folder:

- EPS-beta.vpm, the model in compiled form, suitable for use in Vensim Model Reader

- EPS-beta.mdl, the model source code, suitable for use in Vensim Pro or Vensim DSS (and viewable in a text editor)
- three scripts in the Python programming language (with .py extension), used to produce Vensim command scripts. Vensim command scripts are files only usable by Vensim DSS that allow for batch runs and other automated behavior.
- OutputVarsToExport.lst, a text file listing the names of output variables, which is used by the Python scripts
- GraphDefinitions.vgd, a text file defining properties of graphs that appear when the model is opened in Vensim
- License.txt, a copy of the GNU General Public License version 3 (GPLv3), under which the EPS is licensed (see the "License Information" section below for more detail)
- ReadMe.pdf, this file
- InputData, a folder that contains all of the data files (in .csv format) read by the model at runtime, as well as the Excel files used to generate those data files. The Excel files contain bibliographic source information, so model users know the origin of every piece of data used in the model. Data are sorted into folders by model section and then by acronyms for variable names, or occasionally acronyms that encompass several variables. (Acronyms are used to reduce file path lengths, because Windows would give errors if full variable names were used here.) A key to the meaning of all acronyms is provided in the InputData folder (the file "acronym-key.xlsx").

It is easiest to use the EPS if your operating system is not configured to hide file extensions, which unfortunately is the default behavior. If you do not see file extensions such as .vpm, .mdl, .py, .lst, .vgd, .csv, and .xlsx in the files in the model distribution, it is recommended that you change your OS settings to display file extensions. On Windows 7, this can be done by going to the Control Panel, type "file extensions" in the search field, and click "Show or hide file extensions" under the "Folder Options" header. In the "Folder Options" dialogue box that appears, the "View" tab should be active. Clear the box for "Hide extensions for known file types" and click "OK". The process is likely to be similar on other versions of Windows.

If you are using Vensim Model Reader, the only files you will need are the compiled model (with .vpm extension) and the InputData folder. The .mdl file and .vgd file are only useful if you have Vensim Pro or Vensim DSS. (A copy of GraphDefinitions.vgd is bundled into the compiled .vpm file, so you do not need the graph definitions text file to view graphs when using the compiled version of the model.) The .py files and the .lst file are only useful if you have Vensim DSS (because this is the only version of Vensim that supports command scripts). To use these scripts, you will also need to have Python 3 installed.

Double-click the .vpm model file to open the model in Vensim Model Reader. (If the .vpm file extension is not associated to Vensim, you may need to browse for Vensim Model Reader and select it in order to associate .vpm to this program.) You may now examine and run the model. As a new user, the second sheet, named "Policy Control Center," is the place to go to find levers that control the various policies when running the model in SyntheSim (interactive) mode. How to use Vensim is beyond the scope of

this web page, but you should experiment with all the tools available in Vensim Model Reader. If you are having trouble, you may wish to refer to Vensim's help documentation.

You are also encouraged to explore the files within the InputData folder, to see the sources and often the calculations that produced the input data used by the model.

License Information

The EPS is released under the GNU General Public License version 3 (GPLv3) or any later version and is free and open-source software. The full license text is available in English and in many other languages. A simple, easy-to-read, unofficial guide to the main attributes of the GPLv3 is available here.

Note that this license applies to the EPS, not to Vensim. Vensim is commercial software and is owned by Ventana Systems. We recommend the use of Vensim Model Reader to run the model. You may change the input data using Microsoft Excel or any program capable of reading Excel files, such as Open Office.