

What's New in LEAP Version 2011

The Stockholm Environment Institute (SEI) has released a major new version of LEAP, the Long range Energy Alternatives Planning system, its software system for integrated energy planning and greenhouse gas (GHG) mitigation assessment.

LEAP2011 adds major new features including least cost optimization capabilities, improved modeling of seasonal and time-of-day variations in energy demand and supply and a new file format. This new version also includes an improved user interface that is intended to be less cluttered and easier to use than previous versions, while at the same time being immediately familiar to current users.

As always this version is backwards compatible with earlier versions. You can download the full version here: <http://tinyurl.com/leapdownload>

This new version of LEAP installs in a different folder than the existing version. You can continue to use the older version alongside the newer version, and you can also run both simultaneously so you can compare results. The new version of LEAP will also automatically make backup copies of your existing data sets and upgrade them to the new file format. Upgrading is a one-time process that takes approximately one minute.

Because LEAP2011 is a major new version with a new file format, it requires a full download and installation from the above link. The in-application "Check for Updates" option in LEAP version 2008 will not work.

Below is a more complete description of the new features in LEAP2011.

- **New Optimization Algorithms:** LEAP 2011 includes a new method for calculating capacity expansion and dispatch in Transformation scenarios using a least-cost optimization approach. This option works with the new Open Source Energy Modeling System (OseMOSYS) and the open source GLPK linear programming library to calculate least cost capacity expansion scenarios, with or without emissions constraints. OSeMOSYS has been developed by a coalition of organizations including SEI, the International Atomic Energy Agency (IAEA), the U.N. Industrial Development Organization (UNIDO), the UK Energy Research Center, the Royal Technical University of Sweden (KTH), and others. See the OSeMOSYS web site (www.osemosys.org) for more information about OSeMOSYS or refer to the new Quick Start Guide to using optimization in LEAP (<http://tinyurl.com/LEAPOptimization>).

***Important Note:** Currently the optimization features in LEAP2011 are still experimental and so should be used for testing purposes only. While we believe that the optimization calculations work well, we also welcome feedback from users on issues they may identify. The optimization calculations should not yet be relied upon for the preparation of any final analyses or reports. We expect to finalize these aspects in the coming few months.*

- **Improved Modeling of Seasonal and Time-of-day Variations in Demand and Supply:** LEAP 2011 has greater flexibility in specifying seasonal and time-of-day load shapes. It includes a new time slice setup wizard that lets you easily generate a wide range of time slicing arrangements. Time slices can be daily, weekly, monthly or seasonal and may be further subdivided into days vs. nights and weekdays

vs. weekend days. You can create libraries of load shapes using these time slice schemes, either by entering data manually or by importing data from standard hourly load shape profiles, such as those available from Itron and other companies.

- **New File Format:** LEAP 2011 uses a new file format, which is less prone to data corruption, allows running of multiple copies of LEAP simultaneously, uses Unicode to fully support any language (including those with complex characters like Chinese, Japanese, and Russian) and will allow for the development of future new capabilities such as multi-level undo, as well as multi-user and web based versions of LEAP. It also eliminates LEAP's reliance on the obsolete Borland Database Engine (BDE) and provides for more reliable installation and improved operation with newer versions of Windows.
- **Improved User Interface:** LEAP 2011's screens have been refined to reduce screen clutter and make them more consistent and easier to use. User interface elements have also been refined to make entering and selecting data easier. For example, where appropriate, selection boxes now highlight most recently used (MRU) items at the top of each list while lists have been alphabetized to make them easier to select from.
- **New Data Entry Tools:** New tools help you to create consistent data and models much more easily. These include:
 - **A Function Wizard (Ctrl-F),** which helps you to create mathematical expressions in an easy-to-use popup window. The wizard provides detailed help on each of the parameters required by each of LEAP's 200+ functions. It also provides quick selection boxes to help you choose valid entries for each parameter.
 - **Check-as-You-Type** error checking is now available wherever you enter an expression. This feature provides instant feedback by highlighting errors in your expressions in real time and informing you of any problems.
 - **The Time-Series Wizard** has been improved to support all time series functions. It also includes a new expression preview.
 - **A New Branch/Variable** selection box makes it easier to embed references to other variables in your expressions. You can also simply drag a branch from the main tree into the main data entry table if you wish to create a reference to a branch in the tree.
 - **The Expression Builder** screen has been improved and simplified, making it easier to write complex expressions in cases where the Analysis View data entry table does not provide enough space to easily edit an expression. The Expression Builder now works as a popup box attached to each expression in the data entry table. It fully supports Check-as-you-Type error checking, the Functions wizard and all the other new data entry tools.
- **Improved Cost Analysis:** LEAP 2011 provides more powerful cost analysis including the ability to specify different methods for annualizing capital costs, better handling of salvage values and decommissioning costs and new reports that compare the costs of operation of supply modules to the revenue generated from energy sales (i.e. their profitability).
- **Improved Error Reporting:** LEAP 2011 now displays detailed source code information should an error occur in LEAP. This will make debugging easier in future. When reporting errors that require you to

edit the Area's Basic Parameters, you will be given the choice to go directly to the General: Basic Parameters screen to fix problems.

- **An Improved Scenario Manager** makes it easier to manage scenario names and abbreviations. The Scenario Manager's layout has been improved to better highlight scenario names and abbreviations, and a new area summarizes the expression search order among scenarios. Examples have been added to help to provide better explanation of how the expression search algorithm operates.
- **Improved Results Reports.** The results view features simplified and reorganized selection boxes and quicker chart updating.
- **Improved Bibliographic References:** The References screen has been improved with a better layout, the addition of new fields (publication type, journal, volume, start and end pages) and the ability to export to the standard RIS format used by standard bibliographic software such as [EndNote](#) or [Zotero](#).
- **More Flexible Dispatch Modeling:** Transformation dispatch rules can now be varied between scenarios. Previously you had to choose an approach common to all scenarios.
- **Full support for International Languages.** Previously LEAP's software screens supported complex character sets (Chinese, Korean, Greek, Cyrillic, Arabic, etc.), but text data such as branch, fuel and region names could not reliably be specified in these languages. LEAP now fully supports Unicode text so that all text data can be entered in LEAP in any character set.
- **Improved Diagram View:** The Diagram view now shows energy flows by default from left-to-right. A right-to-left layout can also still be displayed.
- **Improved Summaries view:** The cost-benefit summary report now shows savings in terms of CO2 equivalent emissions avoided rather than Carbon equivalent emissions. Also, the report no longer discounts avoided CO2.
- **Improved performance:** while most data sets take about the same time to calculate as in the older (2008) version, LEAP 2011 has been significantly improved in terms of how it calculates multi regional data sets. Now, if you make a change to data affecting only a single region and a single scenario, then only that single region/scenario combination will need to be recalculated when redisplaying results. Previously all regions were recalculated. In this situation, recalculation times can be reduced enormously. For example in a data set containing 27 regions we found that calculation times are reduced in most circumstances from about 10 minutes to less than 1 minute. In addition to faster recalculations, most results view charts and tables now update more quickly.
- **Numerous bug fixes, updated help and expansion of the LEAP Application Programming Interface (API).**

LEAP2011 is available immediately from the LEAP web site: www.energycommunity.org

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