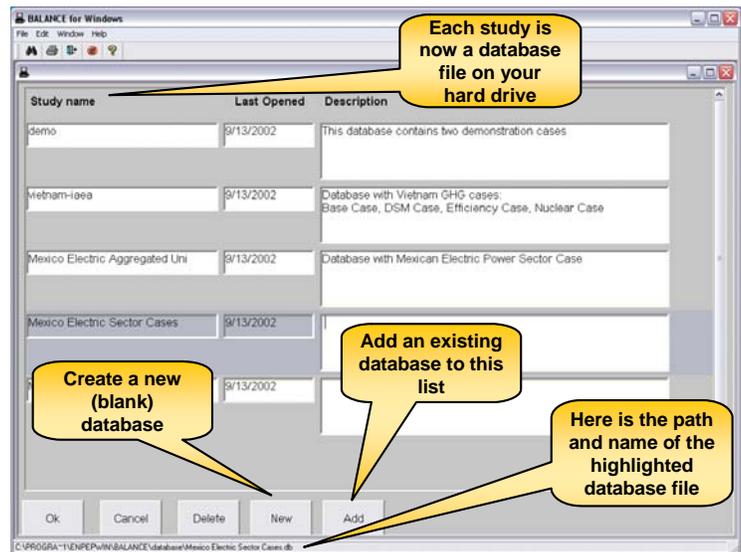


Modifications and Enhancements to ENPEP for Windows

For Upgrades from Version 2.15g to 2.20

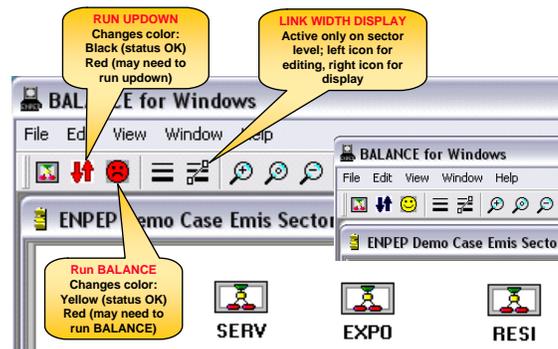
System, Database, and File Management Features

- ❑ For ENPEP to work properly, the regional settings on your computer must be set to English (United States) with a point as decimal symbol instead of a comma. The regional settings can be found in the Windows Control Panel. ENPEP now checks the regional system settings for the number and date format, and issues a warning if your current setting is not set to English (United States).
- ❑ During the model installation, you now have the option of allocating a portion of the physical RAM to ENPEP. Typically, we recommend using about 50% of the actual RAM of your computer for ENPEP. Memory will be allocated only when you start the BALANCE module and will be released when BALANCE is closed. Memory allocation reduces model run times – the more RAM you allocate, the faster your case runs.
- ❑ ENPEP now has a new database management, backup, and recovery routine. Instead of relying on only one database (enpepwin.db) as in earlier versions, version 2.20 now allows you to keep your cases in different databases. In fact, the databases replace the studies used in previous versions. Each database can be thought of as a study. Each database will be backed-up at regular intervals set by the user under “Run Parameters.” This design change significantly reduces data loss in case of power outages or system crashes.
- ❑ If you transition from 2.15 or an earlier version to 2.20 and you have more than one study in your database, please contact us for more detailed instructions.
- ❑ A new 30-day trial and evaluation version for ENPEP for Windows 2.20 is now available. Please contact us at ceeesa@anl.gov to request a CD.



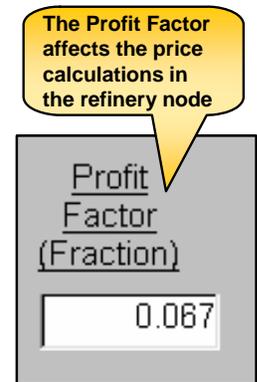
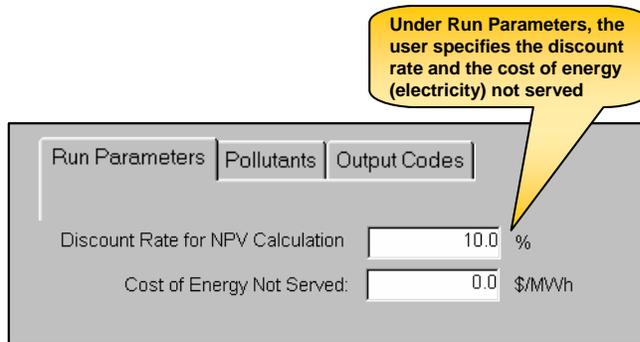
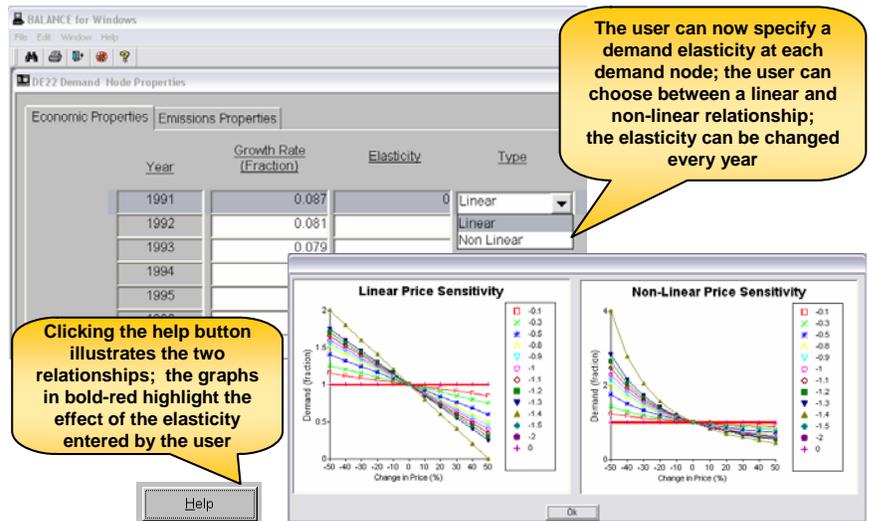
Interface Features

- ❑ We added icons in the toolbar for the execution of the up-down routine (determines the calculation sequence during the simulation) and the actual BALANCE simulation.
- ❑ The two new icons change color to indicate whether changes to the network structure or input data may require executing one or both of the routines.



Modeling Algorithm and Methodology

- We have now implemented price elasticities at the demand nodes. You can choose from two price-demand relationships: linear and nonlinear. An interactive help feature quickly illustrates how the elasticity you specified will affect the model results.
- The economic cost calculation (NPV) is now fully integrated into the model. Additional inputs to run the NPV calculations can be found in the “Run Parameters.” You need to specify the discount rate to be used when calculating the net present value of the total economic system costs as well as the cost of energy (electricity) not served. Please contact us for more details and/or the manual for the NPV calculations.



- We introduced a profit factor to the multiple output (refinery) nodes. Specifying a profit factor will change the prices of all process output products. Please consult the manual or the appropriate training materials for more details on the price calculations.
- We removed some size limitations for network design. The model dimensions, i.e., the number of nodes in the network, have been significantly increased. Now, you can have up to 999 nodes of each node type in BALANCE, with the total number of links being 999.

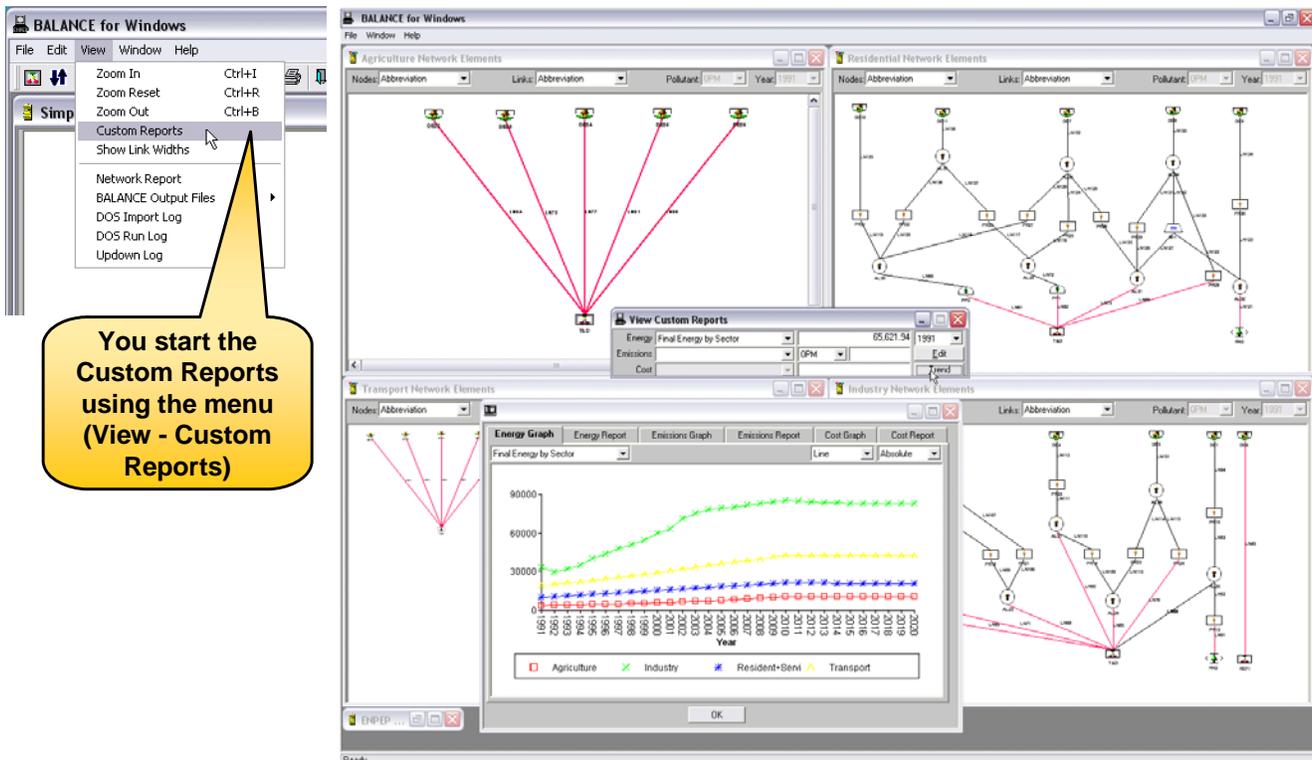
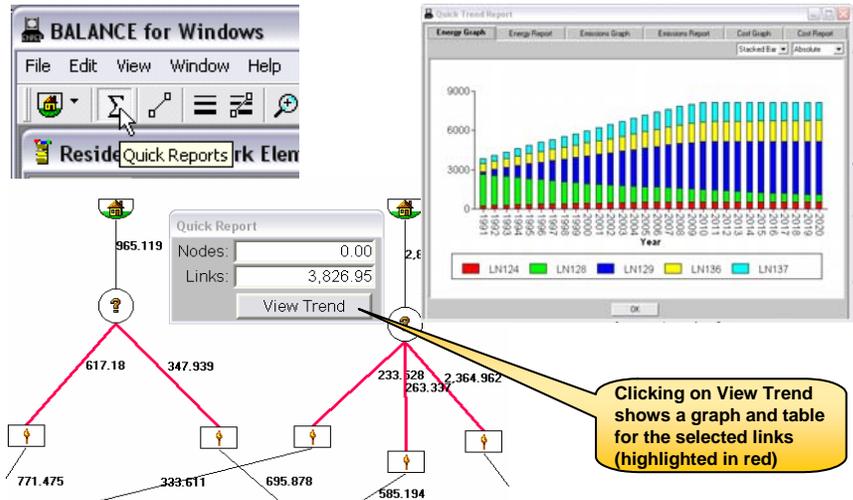
New Reporting Features

- We added several new reporting features to the model.
- The first new report is the “Quick Report.” You will find this feature particularly useful during the initial case debugging and verification stage, because it allows you to quickly compare model results with historical statistics. You start the Quick Report by clicking on the sigma icon in the tool bar. To debug energy flows, please make sure you first select “Quantities” as link overlay. The report works the same for emission results. In this case, you must first select “Emission” as node overlay. To use the feature to verify energy results, you click on individual network links to include them in the report. Selected links are highlighted in red (clicking a link again will de-select it). The report window shows the sum of energy flows on all selected links for a given year. BALANCE automatically updates the value in the pop-up window as links are added to (subtracted from) the

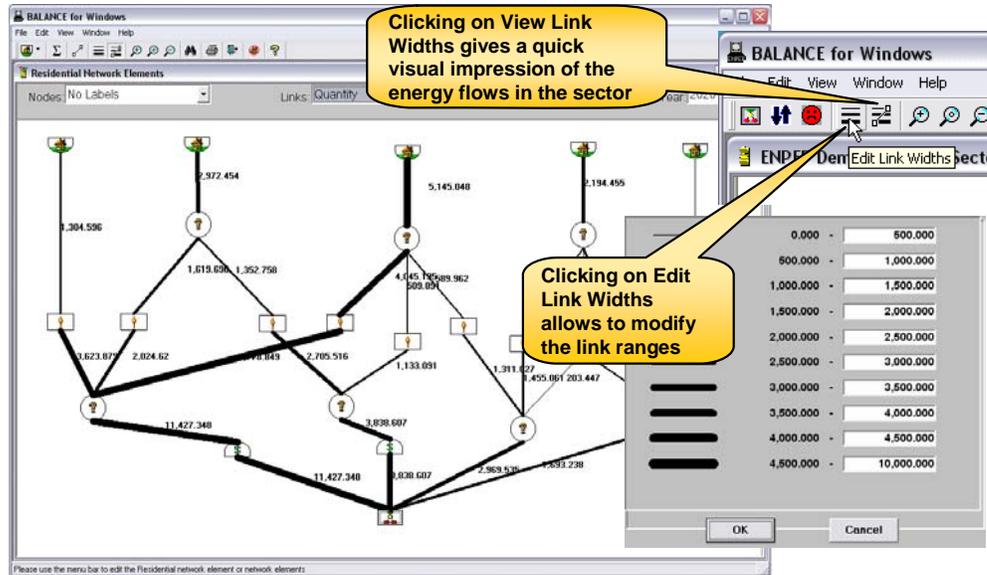
report. Click on “View Trend” to see a graph for the selected links over the entire study period.

Graphing options include lines and stacked bars (absolute and 100%). You can also look at the results in tabular format and even export the values to a text file for post-processing in Excel.

- Another new report type is the Custom Report. You will find this feature particularly useful for the final stages of your analysis or result reporting, because it allows you to easily set up standard reports (final energy consumption by sector or fuel type, primary energy supply, power sector fuel consumption, emissions by sector or fuel type, etc.). Custom Reports are similar to the Quick Reports. One difference is that Custom Reports are permanently stored in the database, while Quick Reports are temporary reports and not saved anywhere unless you export the results to a text file. Also, Custom Reports are more flexible in the way you can configure them. You define the reports under “Edit – Custom Reports.” You start the Custom Reports under “View – Custom Reports.” A pop-up window appears that allows you to select either an energy report, an emissions report by pollutant, or a cost report. If the report you want to view spans more than one sector, the model opens all sectors that are part of this report, highlights the links and shows the total for a given year. Click on “Trend” to see a graph for the entire study period. Graphing options include lines and stacked bars (absolute and 100%). You can also look at the results in tabular format and export the values to a text file for post-processing in Excel.



- A new interface feature allows you visualize energy flows on the network links; that is, links are displayed by using different link widths. Links with large energy flows are displayed with thick lines, while links with small flows are displayed with thin lines. This feature is designed to help you more easily verify model results and also present graphical results.



- We substantially improved model error reporting. The number of errors reported has increased noticeably, and all errors are now clearly identified by sector, node, and error type. This allows you to more quickly pinpoint potential problems with the network configuration or your model input data.

```
Warning: Capacity exceeded on all remaining allocation links, quantities are capacities
Warning: Sector: INDU4      Allocation Node: AL66      Capacity limit reached on all input links.
1998 ITERATION = 1  MAX REL ERR = 9.975867e-001  ABS ERR = 2272.3 #
Warning: Capacity exceeded on all remaining allocation links, quantities are capacities
Warning: Sector: INDU4      Allocation Node: AL66      Capacity limit reached on all input links.
1998 ITERATION = 2  MAX REL ERR = 3.327975e-001  ABS ERR = 1136.1 #
```

- In connection with the improved error reporting, we expanded the validity checks for all model input data. Valid data ranges are now defined for all input fields, and warnings are issued if you enter values that are outside the range. Also, in case you add nodes to the network but forget to enter input data, ENPEP now issues a list of the minimum input data that are required to execute the model.



```
Reading allocation node data ...
Reading conversion process data ...
Error: Sector: Sect1      Conversion Node: gas      Efficiency Should be > 0
Error: Sector: Sect1      Conversion Node: gas      Single Plant Capacity Should be > 0
Error: Sector: Sect1      Conversion Node: gas      Capacity Factor Should be > 0
Error: Sector: Sect1      Conversion Node: gas      Life Should be > 0
Error: Sector: Sect1      Conversion Node: gas      Interest Rate Should be > 0
Reading multi-input conversion process data ...
```

Code Corrections

Several code corrections were made with regard to electric units, input limitations, or valid data ranges for input fields, as well as the case import and export routines. Please contact us if you need more details on these corrections.