



BALANCE Output Reports and Graphs

BALANCE Operating Procedure

1. Network/data preparation:
 - network drawing & labeling
 - ***data definition***
 - ***check of base year quantities & prices***
2. Prepare (run/check) the node visitation sequence
3. ***Run BALANCE***
4. ***Check/printout the results (tables/graphs/DOS files)***

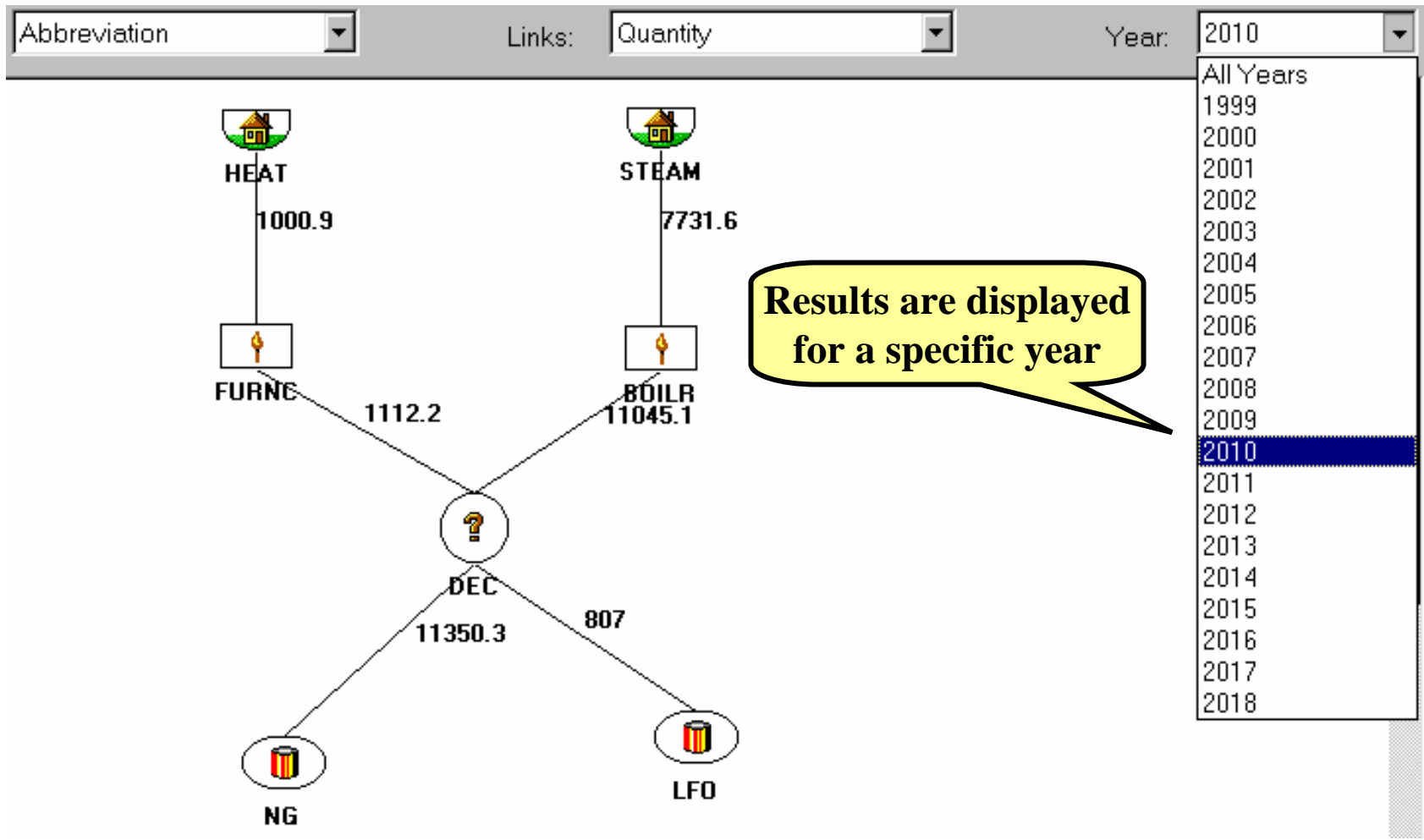
There Are Several Ways to Look at Simulation Results

- **Output variables include**
 - Prices
 - Quantities
 - Price X Quantity
- **Results are displayed in BALANCE in the form of**
 - Tables
 - Graphs
- **Values are displayed**
 - On the network for a specific sector & year
 - For all years for a single node or link
 - For all years for all links in a sector
- **Results can be exported and viewed in another software package (e.g., Excel)**

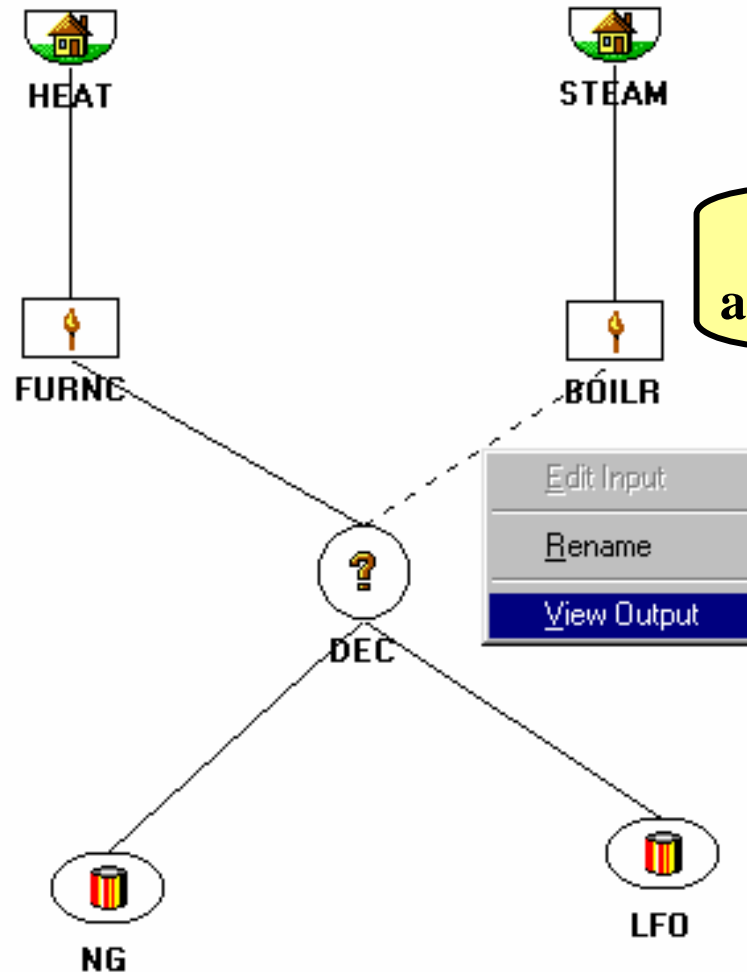
To Display Model Results for a Network Select *Price*, *Quantity*, or *Price Times Quantity* from the *Links List*

The screenshot shows the 'Simple Network Elements' software interface. At the top, there are three controls: 'Nodes:' with a dropdown menu set to 'Abbreviation', 'Links:' with a dropdown menu set to 'No Labels', and 'Year:' with a text box containing '1999'. The main area displays a network diagram with nodes: HEAT (house icon), FURNC (flame icon), BOILR (flame icon), DEC (question mark icon), NG (cylinder icon), and LFO (cylinder icon). Lines connect HEAT to FURNC, FURNC to DEC, BOILR to DEC, and DEC to NG and LFO. A dropdown menu is open over the 'Links:' control, listing options: Abbreviation, Name, Capacity, Price, Quantity (highlighted), Price Times Quantity, and No Labels. Two yellow callout boxes provide instructions: one points to the 'Year:' field with the text 'Results are displayed for a specified year', and another points to the 'Quantity' option in the dropdown menu with the text 'Select the type of result for display'.

You Can Specify the Year That Is Displayed on the Network



Results for a Specific Link Can Also Be Displayed

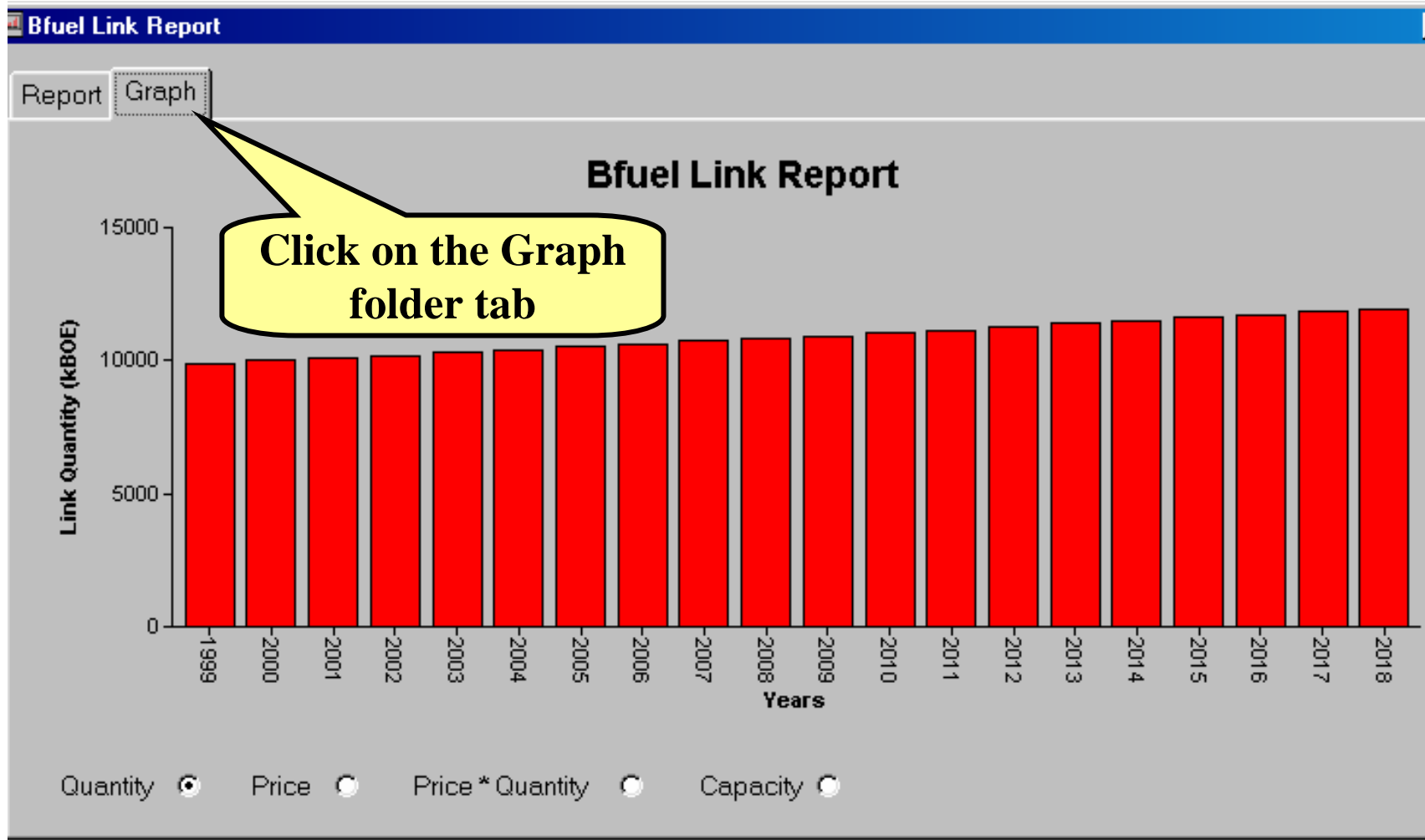


Reports for a Link Are in the Form of a Table

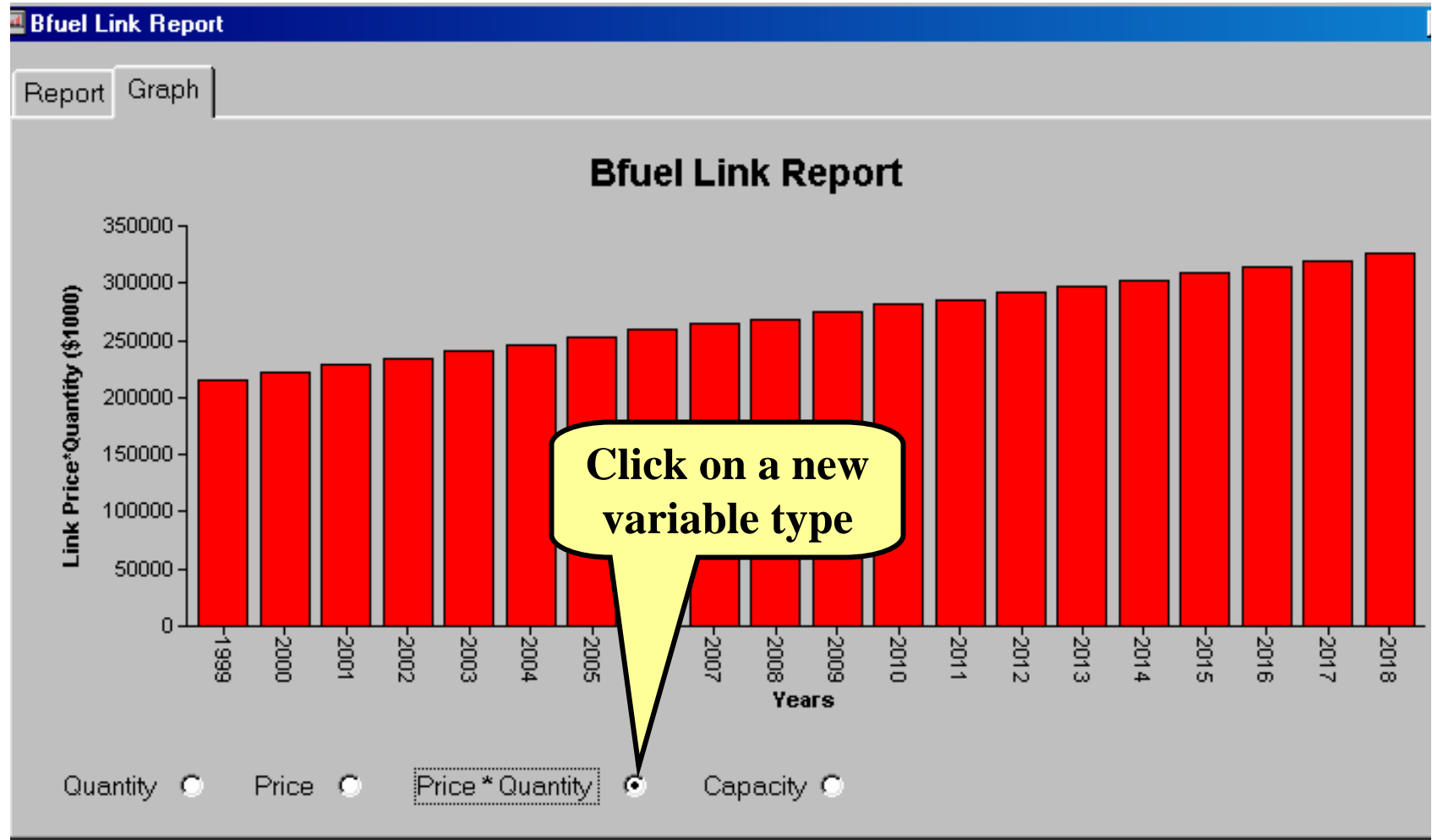
Report Graph

<u>Year</u>	<u>Link Quantity (kBOE)</u>	<u>Link Price (\$/BOE)</u>	<u>Link Price*Quantity (\$1000)</u>	<u>Link Capacity (kBOE)</u>
1999	9,900.000	21.800	215,820.000	
2000	9,999.000	22.200	221,977.800	
2001	10,099.000	22.600	228,237.400	
2002	10,200.000	23.000	234,600.000	
2003	10,302.000	23.300	240,036.600	
2004	10,405.000	23.700	246,598.500	
2005	10,509.000	24.000	252,216.000	
2006	10,614.100	24.400	258,984.040	
2007	10,720.300	24.700	264,791.410	
2008	10,827.500	24.800	268,522.000	
2009	10,935.800	25.100	274,488.580	

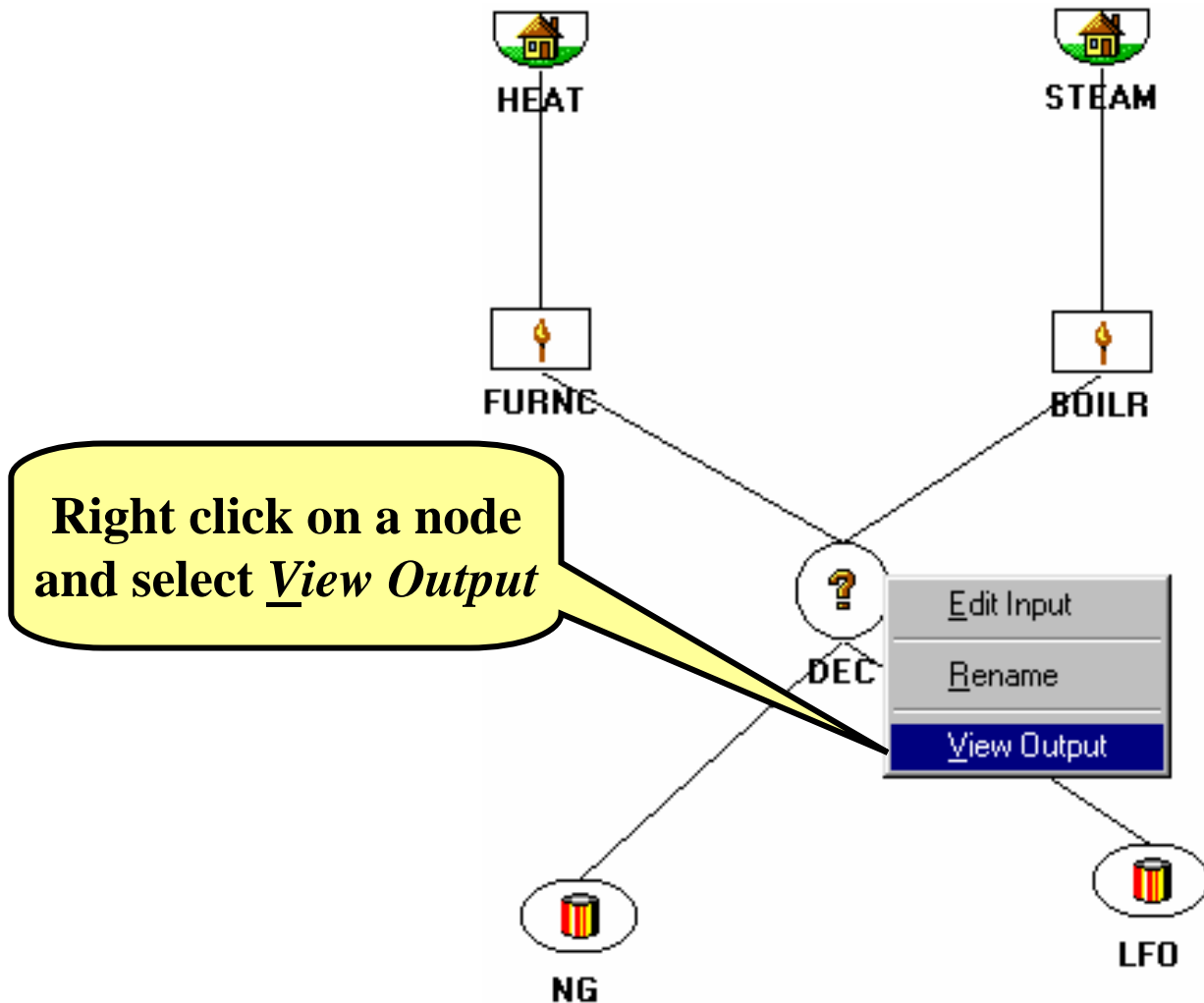
Results Can Also Be Displayed in the Form of a Graph (Quantity)



Results Can Also Be Displayed in the Form of a Graph (Price Times Quantity)



Results for a Specific Node Can Also Be Displayed



Reports for All Links Out of a Node Are in the Form of a Table

DEC Node Report

Report | Graph

	<u>Year</u>	<u>Link Abbreviation</u>	<u>Link Quantity (kBOE)</u>	<u>Link Price (\$/BOE)</u>	<u>Link Price*Quantity (\$1000)</u>	<u>Link Capacity (kBOE)</u>
Output Links	1999	Bfuel	9,900.000	21.800	215,820.000	
		Ffuel	1,100.000	21.800	23,980.000	
	2000	Bfuel	9,999.000	22.200	221,977.800	
		Ffuel	1,101.100	22.200	24,444.420	
	2001	Bfuel	10,099.000	22.600	228,237.400	
		Ffuel	1,102.200	22.600	24,909.720	
	2002	Bfuel	10,200.000	23.000	234,600.000	
		Ffuel	1,103.300	23.000	25,375.900	
	2003	Bfuel	10,302.000	23.300	240,036.600	
		Ffuel	1,104.400	23.300	25,732.520	
	2004	Bfuel	10,405.000	23.700	246,598.500	

Reports for All Links Into a Node Are in the Same Table

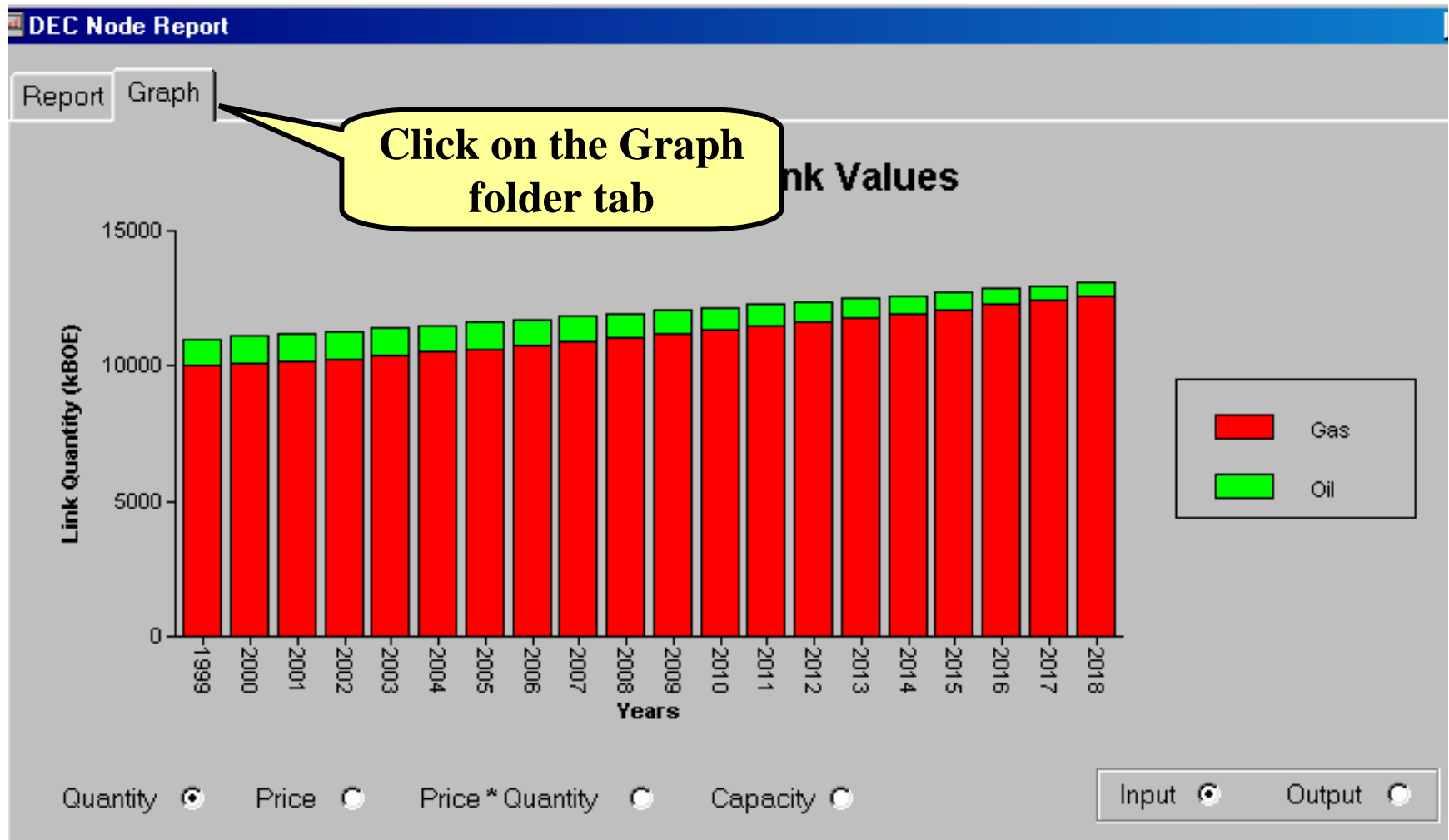
DEC Node Report

Report | Graph

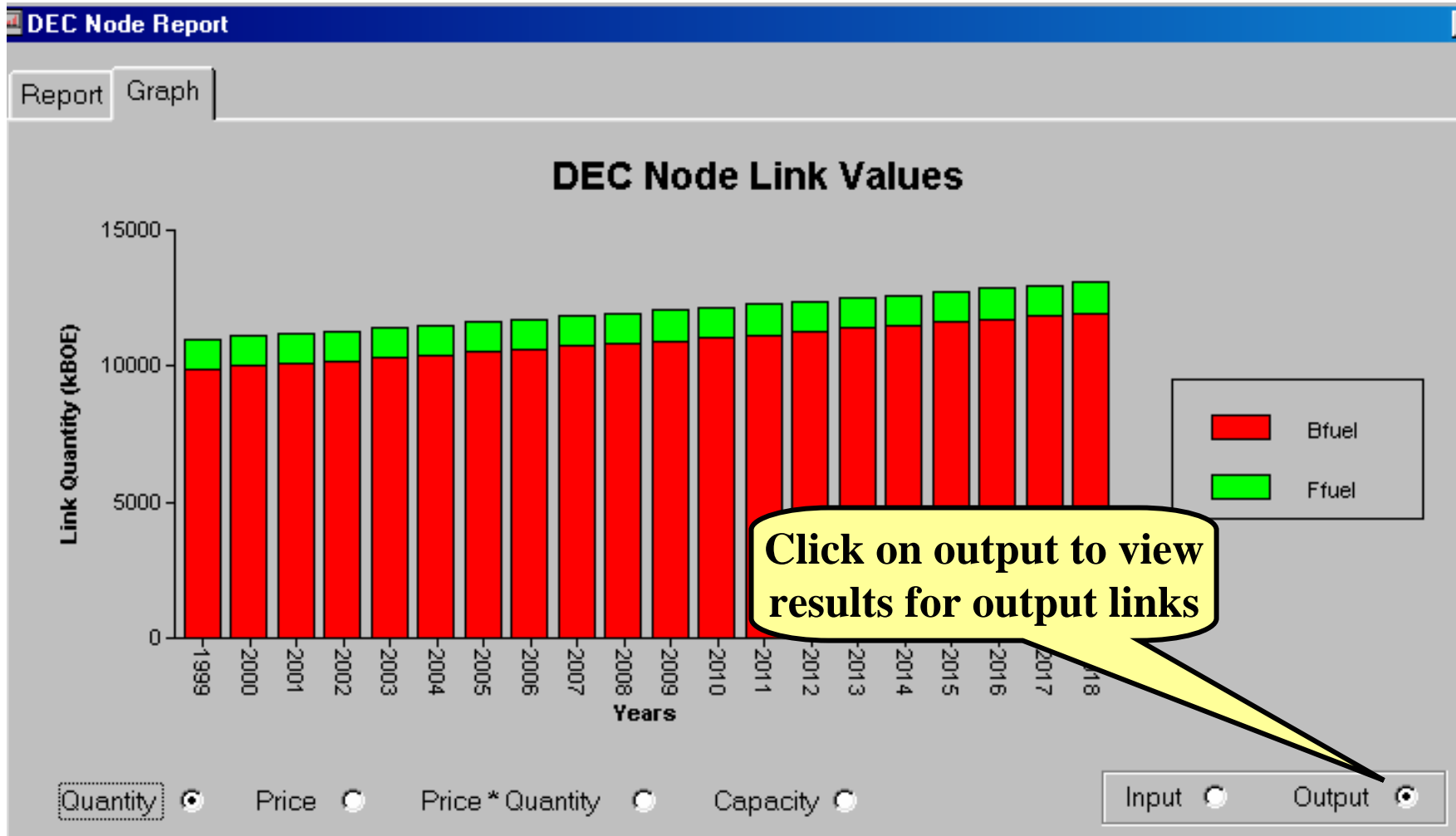
	Year	Link Abbreviation	Link Quantity (kBOE)	Link Price (\$/BOE)	Link Price*Quantity (\$1000)	Link Capacity (kBOE)
Input Links	2001	Gas	10,174.500	20.400	207,559.800	
		Oil	1,026.700	48.600	49,226.940	
	2002	Gas	10,279.300	21.000	220,825.500	
		Oil	1,024.000	51.100	50,849.610	
	2003	Gas	10,393.500	21.200	225,652.800	
		Oil	1,012.900	53.600	52,083.120	
	2004	Gas	10,515.500	21.400	230,647.060	
		Oil	995.100			
	2005	Gas	10,644.000			
		Oil	971.700			
	2006	Gas	10,777.900			

You must scroll down the table to display results for input links

Results Can Also Be Displayed in the Form of a Graph (Link Input Quantities)



Results Can Also Be Displayed in the Form of a Graph (Link Output Quantities)



Reports Are Generated For the Entire Sector

The screenshot shows the ENPEP for Windows application window. The menu bar includes File, Edit, View, Window, and Help. The View menu is open, displaying options: Zoom In (Ctrl+I), Zoom Reset (Ctrl+R), Zoom Out (Ctrl+B), and Sector Report. A yellow callout bubble points to the Sector Report option with the text: "The Sector Report option is on the View List". Below the menu, the Nodes list shows "Sector Report" selected. The Links list shows "No Labels". The main workspace contains a diagram with four nodes: HEAT (top left), STEAM (top right), FURNC (bottom left), and BOILR (bottom right). HEAT and STEAM are connected to FURNC and BOILR respectively by vertical lines. FURNC and BOILR are also connected to each other by a diagonal line.

This Tables Displays Outputs for All Links Within a Sector & Links that Connect to Other Sectors

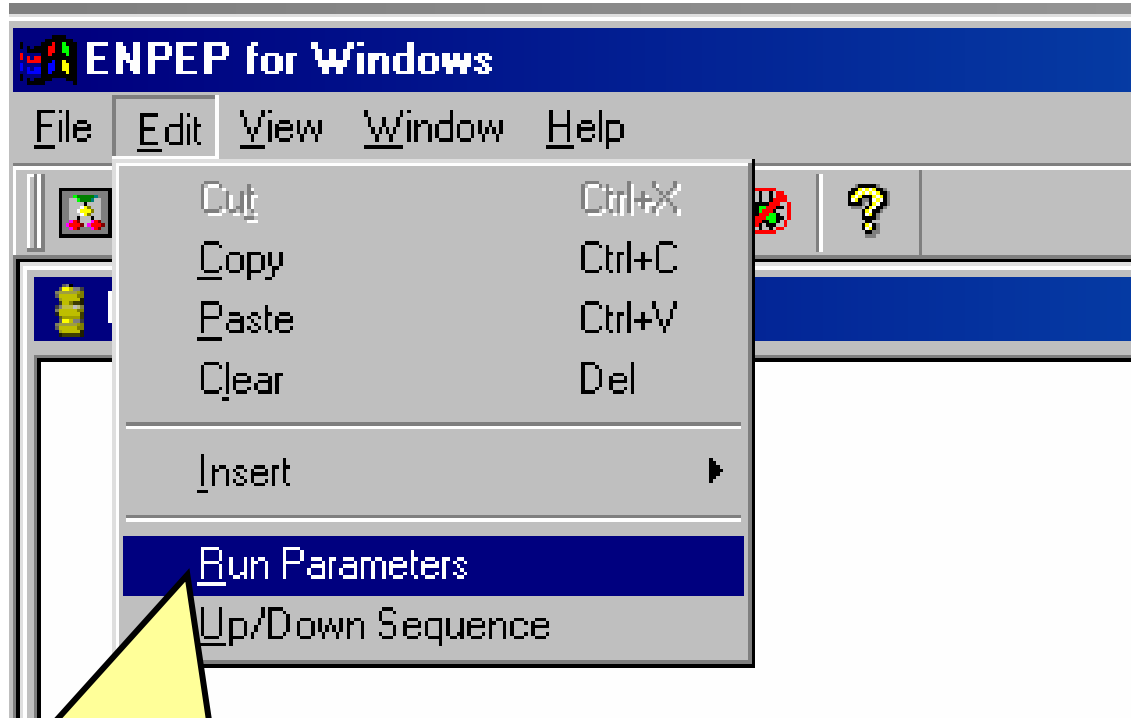
Simpl Sector Report

Report | Graph

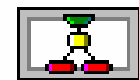
	Year	Link Abbreviation	Link Quantity (kBOE)	Link Price (\$/BOE)	Link Price*Quantity (\$1000)	Link Capacity (kBOE)
Within Sector	1999	Bfuel	9,900.000	21.800	215,820.000	
		Ffuel	1,100.000	21.800	23,980.000	
		Gas	10,000.000	20.000	200,000.000	
		Heat	990.000	34.200	33,858.000	
		Link	6,930.000	61.200	424,116.000	
		Oil	1,000.000	40.000	40,000.000	
	2000	Bfuel	9,999.000	22.200	221,977.800	
		Ffuel	1,101.100	22.200	24,444.420	
		Gas	10,080.800	20.200	203,632.160	
		Heat	991.000	34.600	34,288.600	
		Link	6,999.300	61.700	431,856.810	
		Oil	1,000.000	40.000	40,000.000	

Scroll to view data for links going into and out of the sector

Default Units in BALANCE Are KBOE for Quantity and \$/BOE for Price -- This Can Be Changed by the User



There is a folder under Run Parameters that allow the user to change price and quantity units



Simpl

The User Specifies the Units To Be Displayed

Illis Case Properties

Run Parameters | Output Codes | **Non-electric Units** | ...

Default unit

Chose this folder to change units

Default units are divided by the conversion factor

<u>Unit Type</u>	<u>Default Unit</u>	<u>Unit Name</u>	<u>Unit Conversion Factor</u>	<u>Unit Description</u>
Energy Quantities/Capacities	kBOE	TJ	0.172	TeraJoules
Energy Prices	US \$/BOE	\$/GJ	5.814	US Dollars per GigaJoule
Costs	US \$1000	\$1000	1.000	Thousands of US Dollars

Select a predefined unit or define a new one

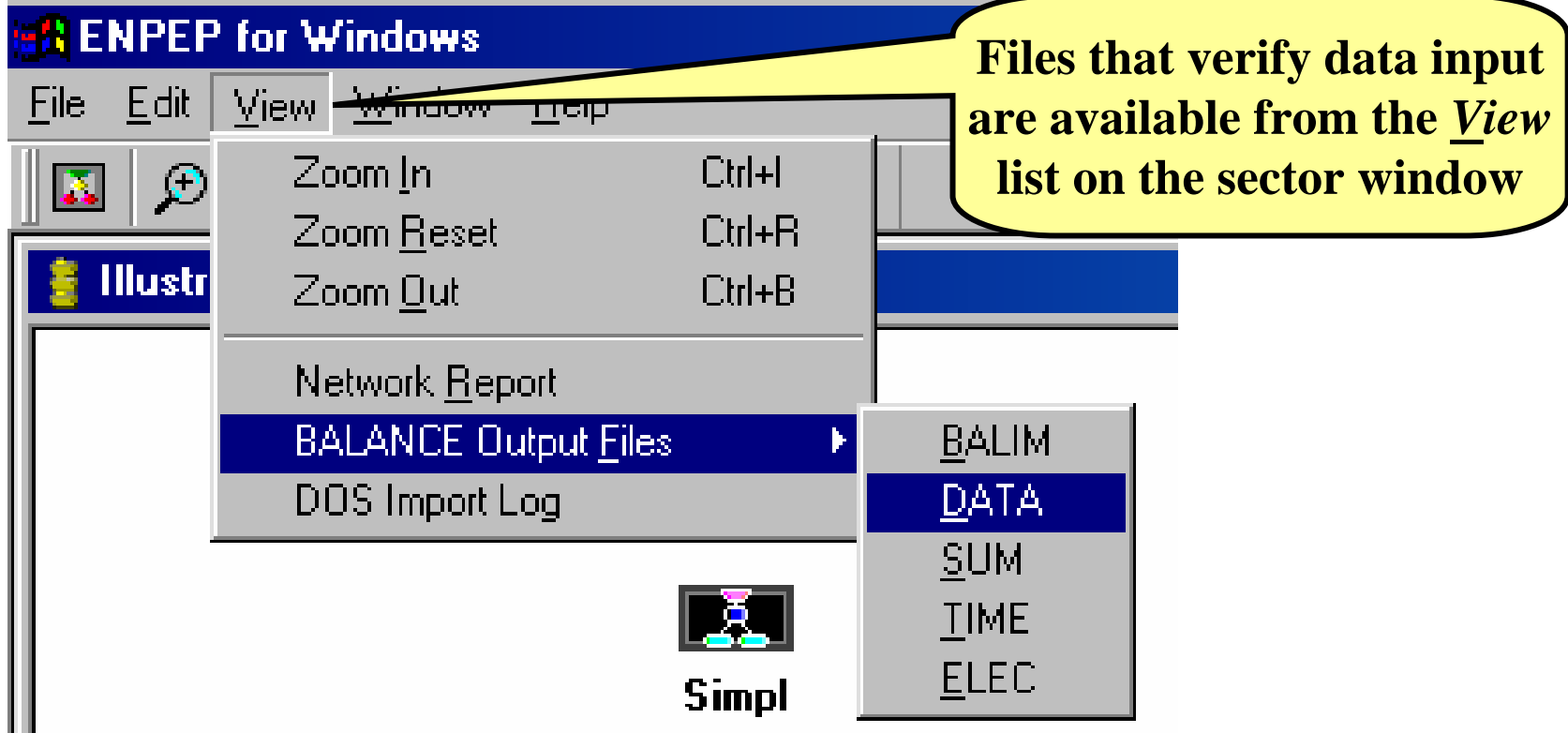
These factors are used to convert values from the default value to the user specified unit

Output Reports Reflect the User Specified Units

Bfuel Link Report

Year	Link Quantity (TJ)	Link Price (\$/GJ)	Link Price*Quantity (\$1000)	Link Capacity (TJ)
1999	57,558.140	3.750	215,820.000	
2000	58,133.721	3.818	221,977.800	
2001	58,715.116	3.887	228,237.400	
2002	59,302.326	3.956	234,600.000	
2003	59,895.349	4.008	240,036.600	
2004	60,494.186	4.076	246,598.500	
2005	61,098.837	4.128	252,216.000	
2006	61,709.884	4.197	258,984.040	
2007	62,327.326	4.248	264,791.410	
2008	62,950.581	4.266	268,522.000	
2009	63,580.233	4.317	274,488.580	
2010	64,215.698	4.386	281,650.050	
2011	64,858.140	4.403	285,583.360	

Sometime Invalid Input Data Will Crash the Model



- The **DATA** file will indicate invalid network information
- The **ELEC** file will indicate invalid dispatch data

Sample BALANCE ELEC File

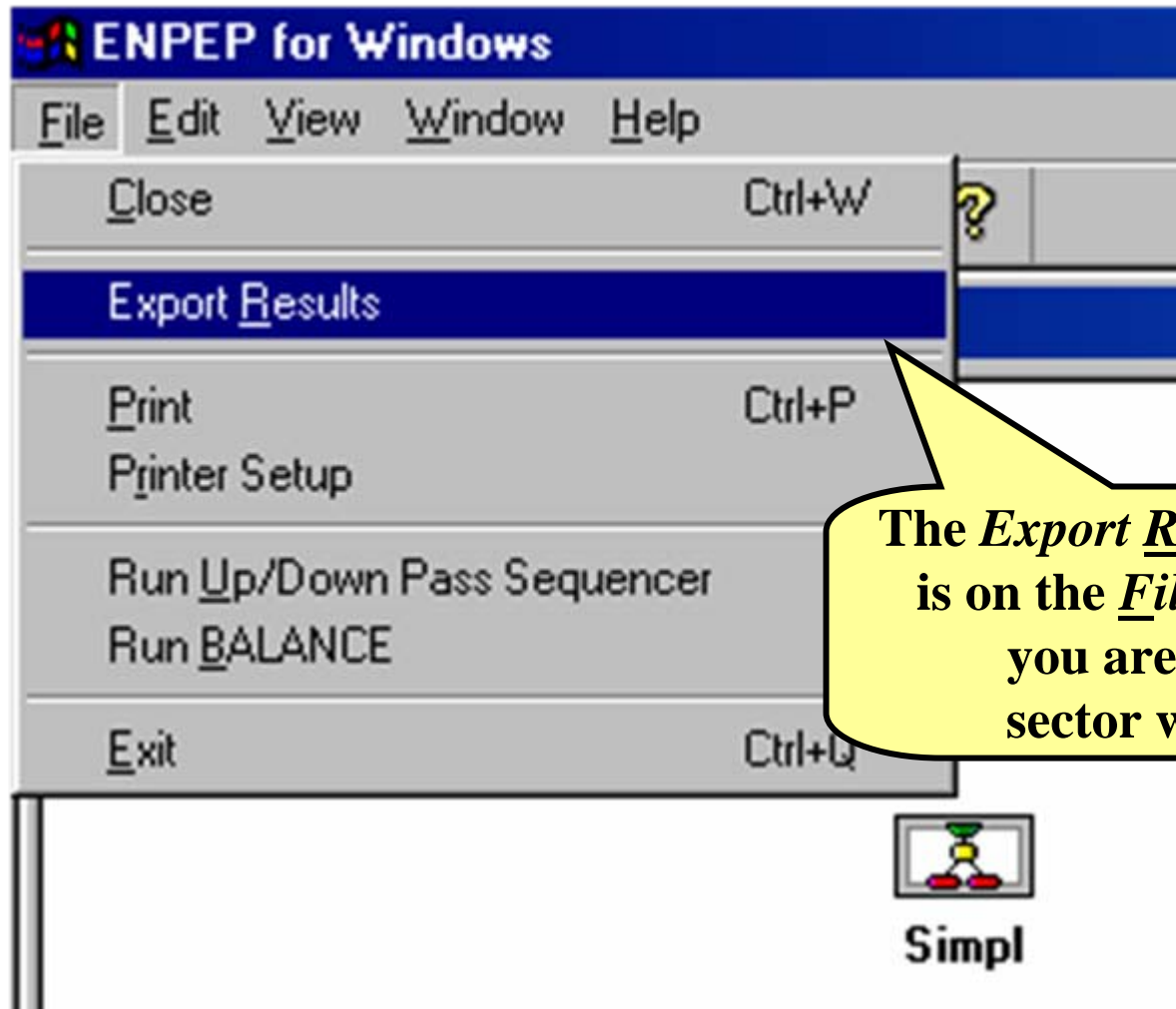
Illis BALANCE ELEC File

Text Output

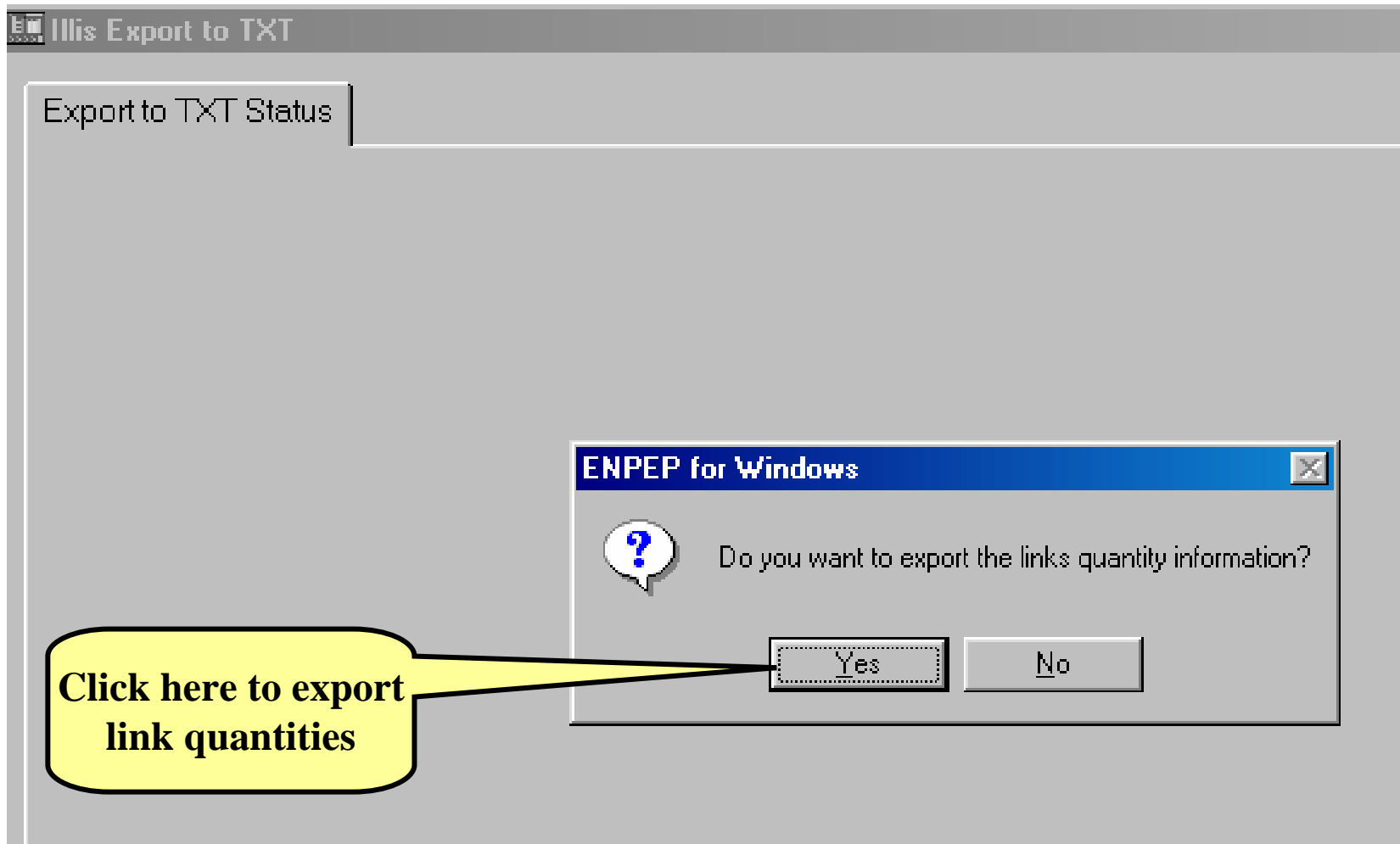
LWRI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ITEL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ITLL	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
INPUT LINKS 1-10								1		3									
PROC OUT LKS 1-10								2		9		10							
OUTPUT LINK								8											
BASE YEAR ELEC								200.00											
PK FRAC, RES MAR								0.01		0.15									
INTEREST RATE								0.10											
LOAD CURVE OPTION								2		0.300		3.600							
LOAD CURVE COEFS.								1.00		-3.00		13.90		-32.80		34.			
NO CELLS								30											
1CORN4								3	10	268.60		122.71		20.00		3.10			
2PALOV								3	10	435.96		197.01		50.00		2.00			

The last valid input is displayed in the report

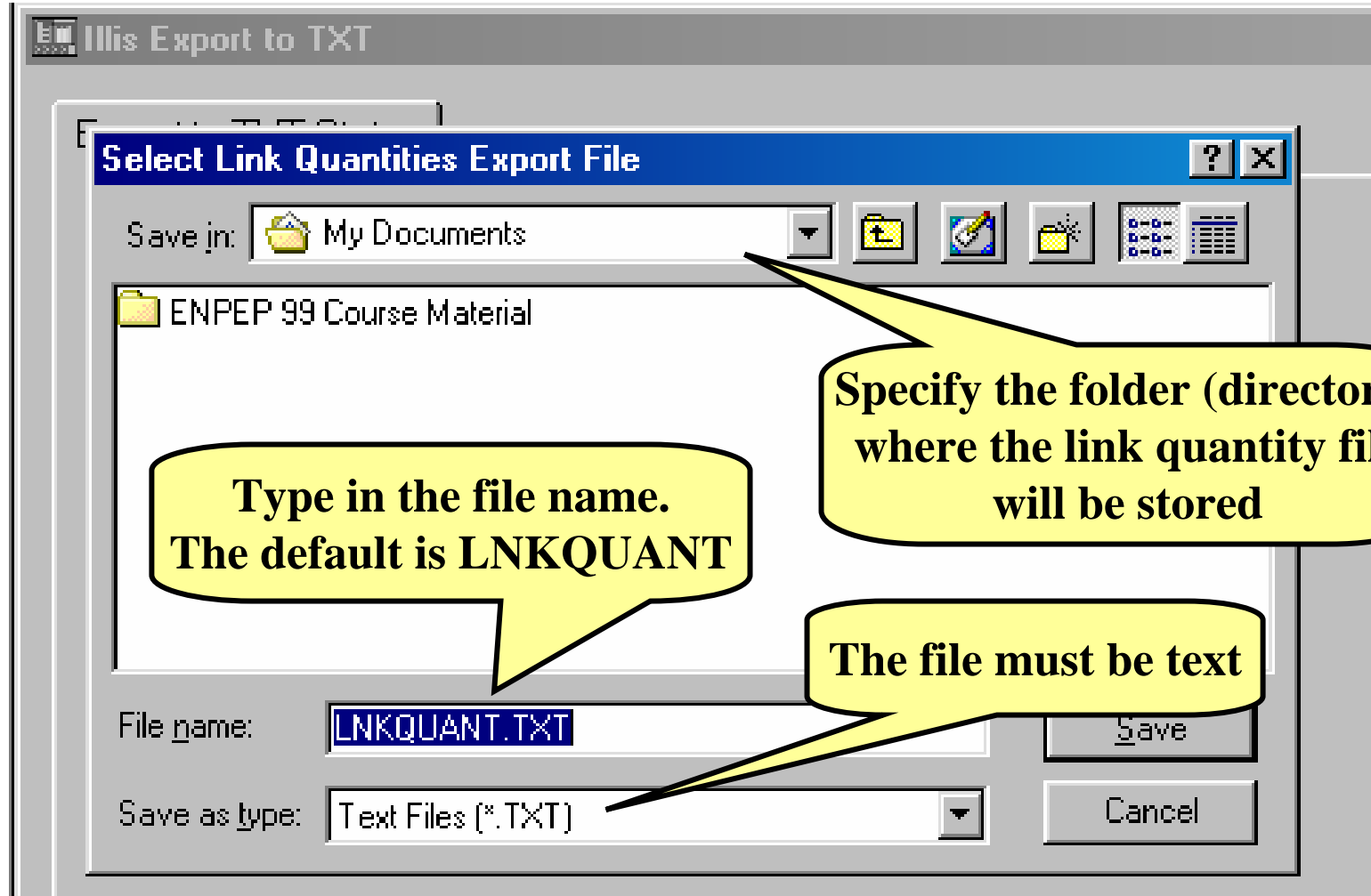
Model Results for Link Prices and Quantities Can Be Exported to a Flat File



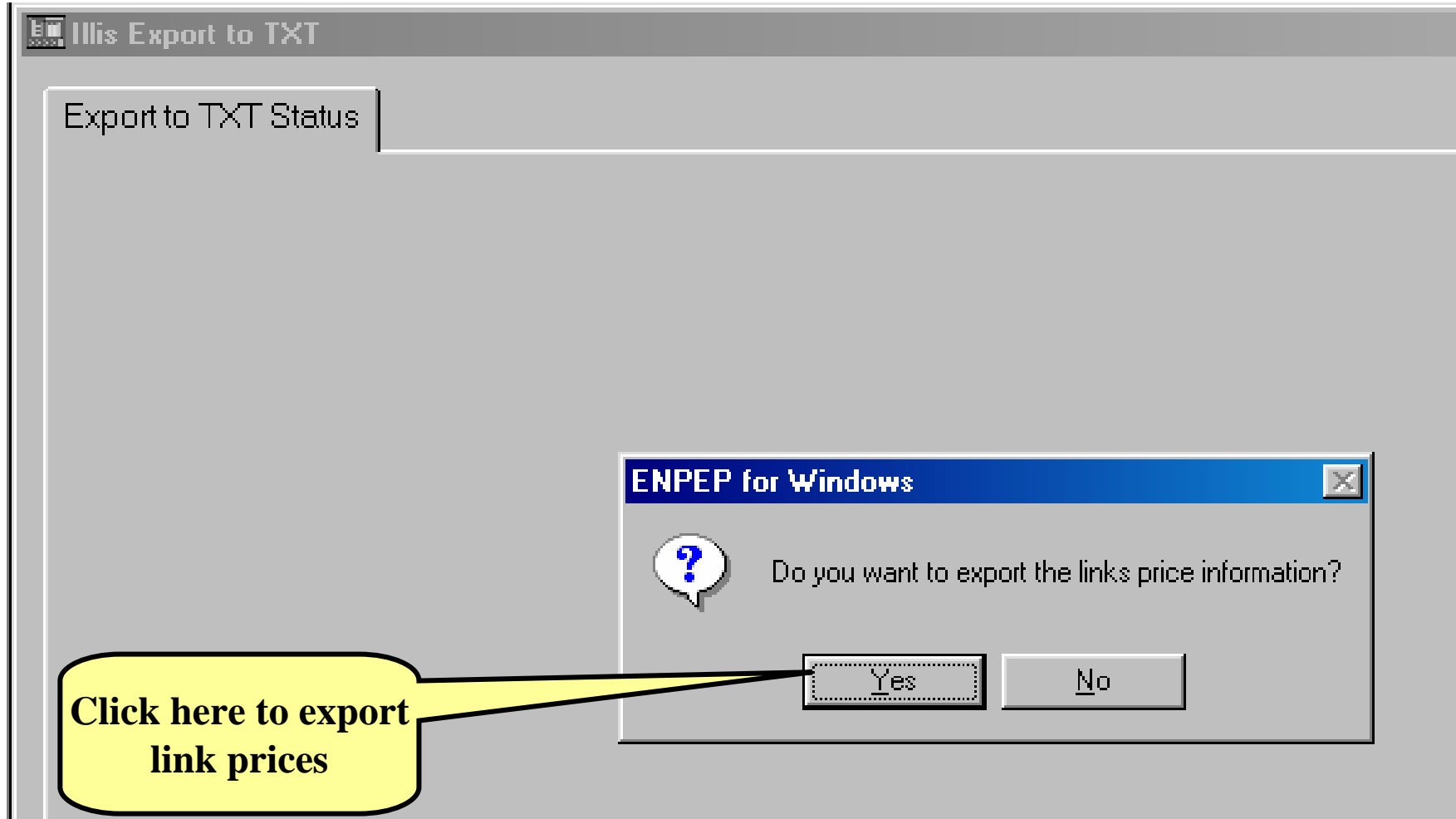
BALANCE Asks for User Confirmation to Export BALANCE Results for Link Quantities



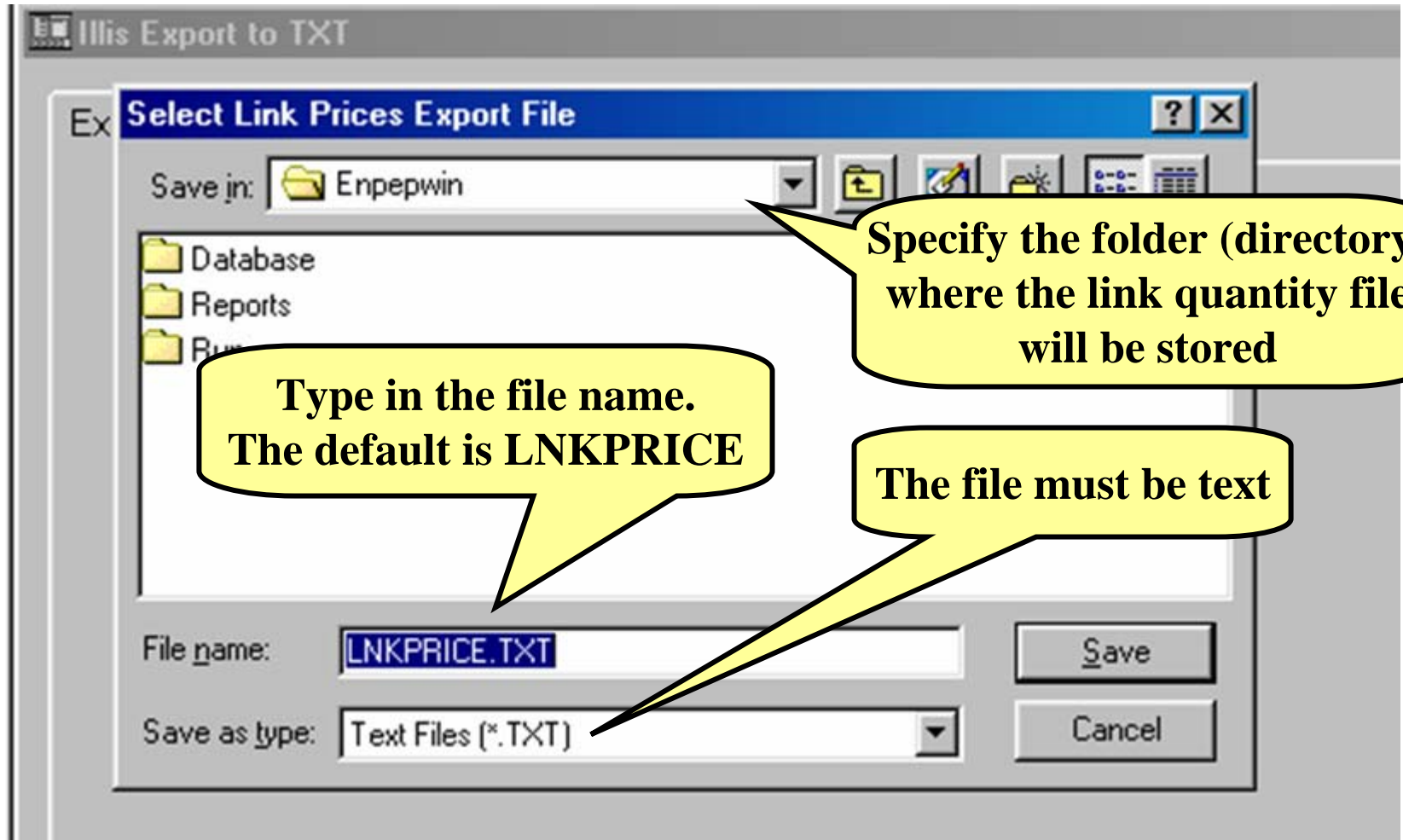
The User Specifies the Name and Location of the File That Contains Link Quantities



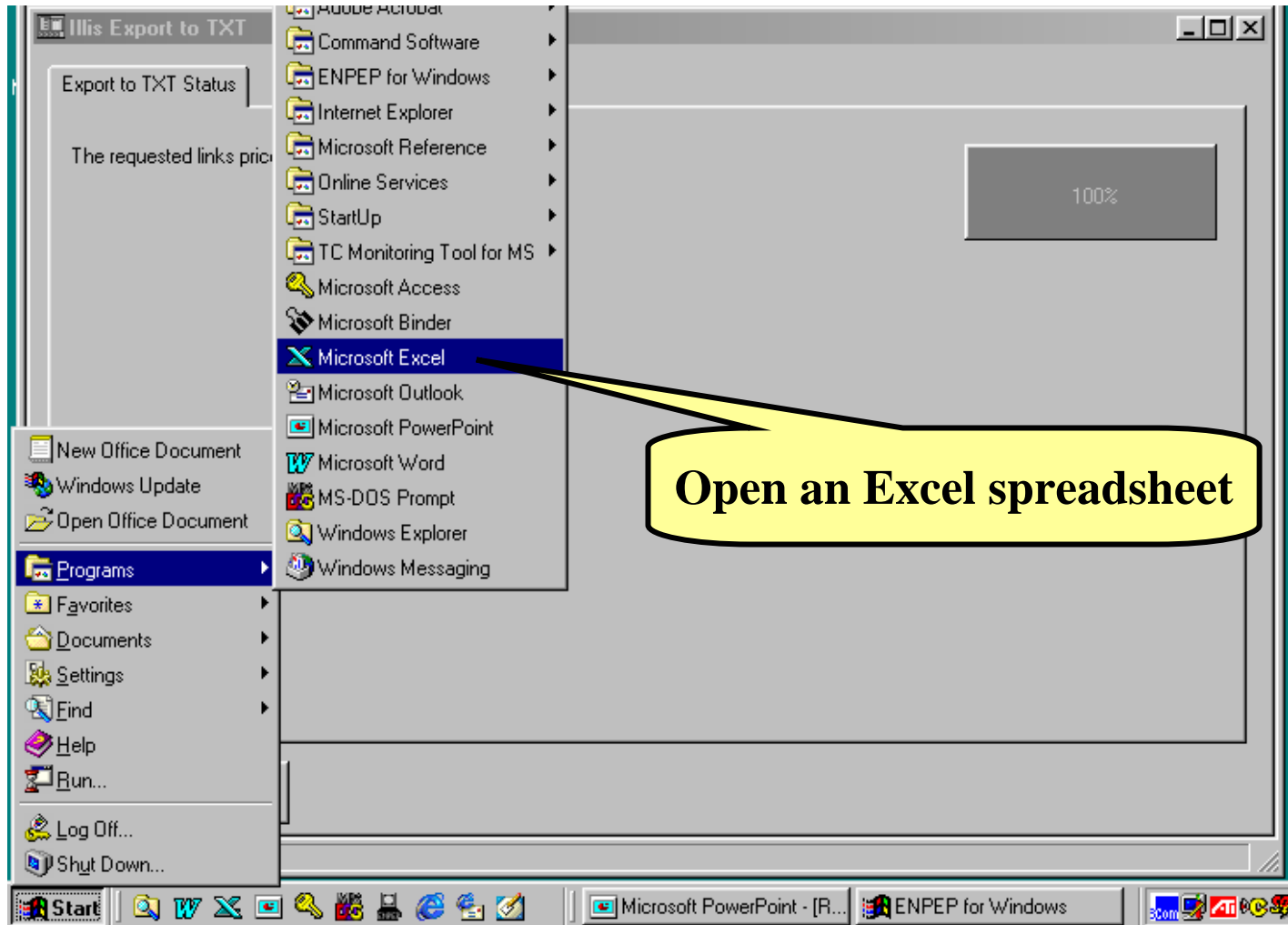
BALANCE Asks for User Confirmation to Export BALANCE Results for Link Prices



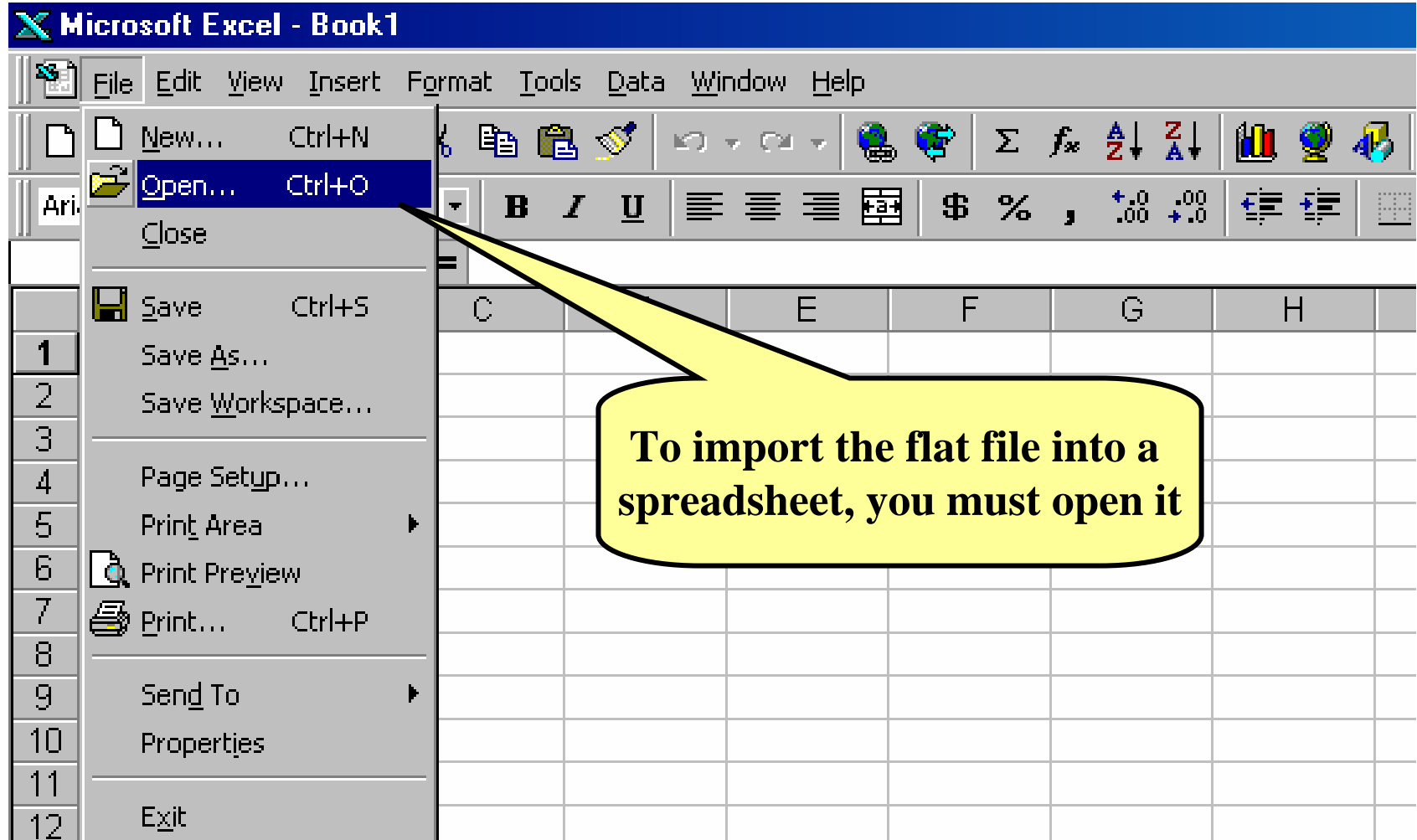
The User Specifies the Name and Location of the File That Contains Link Prices



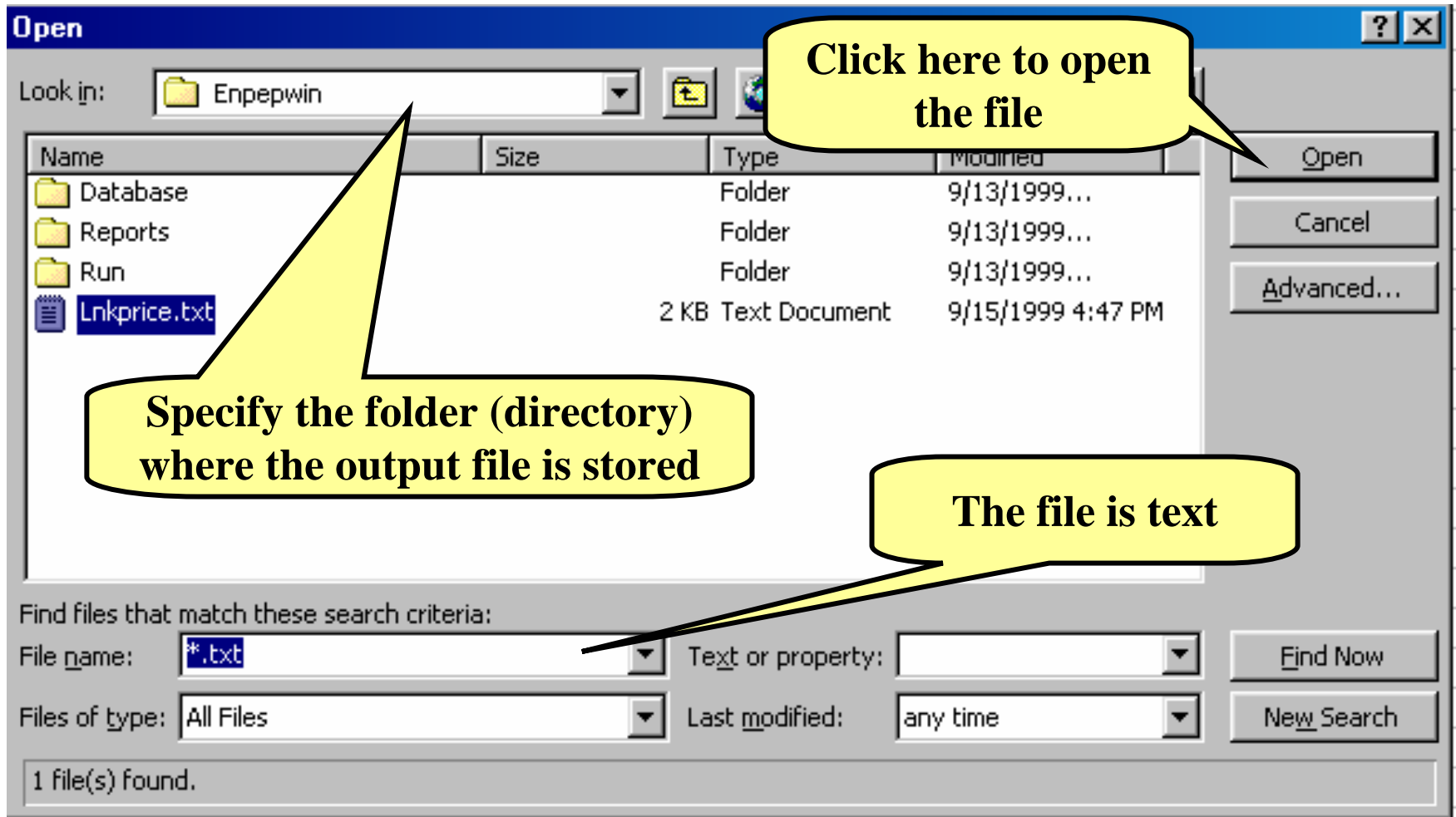
You Can Open Excel While ENPEP For Windows Is Open



The Exported Files Can Be Imported Into an Excel Spreadsheet



You Must Specify the Location and Name of the File



The Flat File Is Converted to a Spreadsheet Format Automatically by the Text Import Wizard

Text Import Wizard - Step 1 of 3

The Text Wizard has determined that your data is Delimited.
If this is correct, choose Next, or choose the Data Type that best describes your data.

Original data type

Choose the file type that best describes your data:

Delimited

Fixed width - Fields are aligned

Start import at row: 1 File Origin: Windows (ANSI)

Preview of file C:\Program Files\ENPEPWIN\LNKPRICE.TXT.

1	Illis Export to TXT Links prices		9	
2				
3	Base	Nb of	Nb of	
4	Year	Years	Links	Unit
5				
6	1999			

Buttons: Cancel, < Back, Next >, Finish

The Wizard performs three steps

The exported flat file is delimited by tabs

The exported flat file is in ANSI format

Click Next to go to the next Wizard step

Step 2 of the Text Import Wizard

Text Import Wizard - Step 2 of 3

This screen lets you set the delimiters and how your text is affected in the preview.

Delimiters

Tab Semicolon Comma
 Space Other:

Treat consecutive delimiters as one

Data preview

Illis Export to TXT Links prices				Septem
Base Year	Nb of Years	Nb of Links	Unit	
1999	20	6	\$/BOE	

Buttons: Cancel < Back Next > Finish

Callouts:

- The exported flat file is tab delimited
- You can preview the imported file here
- Click Next to go to the next Wizard step

Step 3 of the Text Import Wizard

Text Import Wizard - Step 3 of 3

This screen lets you select each column and set the Data Format.

'General' converts numeric values to numbers, date values to dates, and all remaining values to text.

Column data format:

- General
- Text
- Date: MDY
- Do not import column (Skip)

Data preview:

General	General	General	General
Illis Export to TXT Links prices			Septem
Base Year	Nb of Years	Nb of Links	Un
1999	20	6	\$/BC

Click on Finish

Cancel < Back Next > **Finish**

Sample Link Quantity Data in Excel

	A	B	C	D	E	F	G	H
1	Illis Export to TXT Links quantities				16-Sep-99	12:57		
2								
3	Base	Nb of	Nb of					
4	Year	Years	Links	Unit				
5								
6	1999	20	6	TJ				
7								
8	Link	Node	Node	Sector	Sector			
9	Abbr.	Source	Dest.	Source	Dest.	1999	2000	2001
10								
11	Bfuel	DEC	BOILR	Simpl	Simpl	57558.14	58133.72	58715.12
12	Ffuel	DEC	FURNC	Simpl	Simpl	6395.349	6401.744	6408.14
13	Gas	NG	DEC	Simpl	Simpl	58139.53	58609.3	59154.07
14	Heat	FURNC	HEAT	Simpl	Simpl	5755.814	5761.628	5767.442
15	Link	BOILR	STEAM	Simpl	Simpl	40290.7	40693.6	41100.58
16	Oil	LFO	DEC	Simpl	Simpl	5813.953	5926.163	5969.186
17								

Export Date & Time

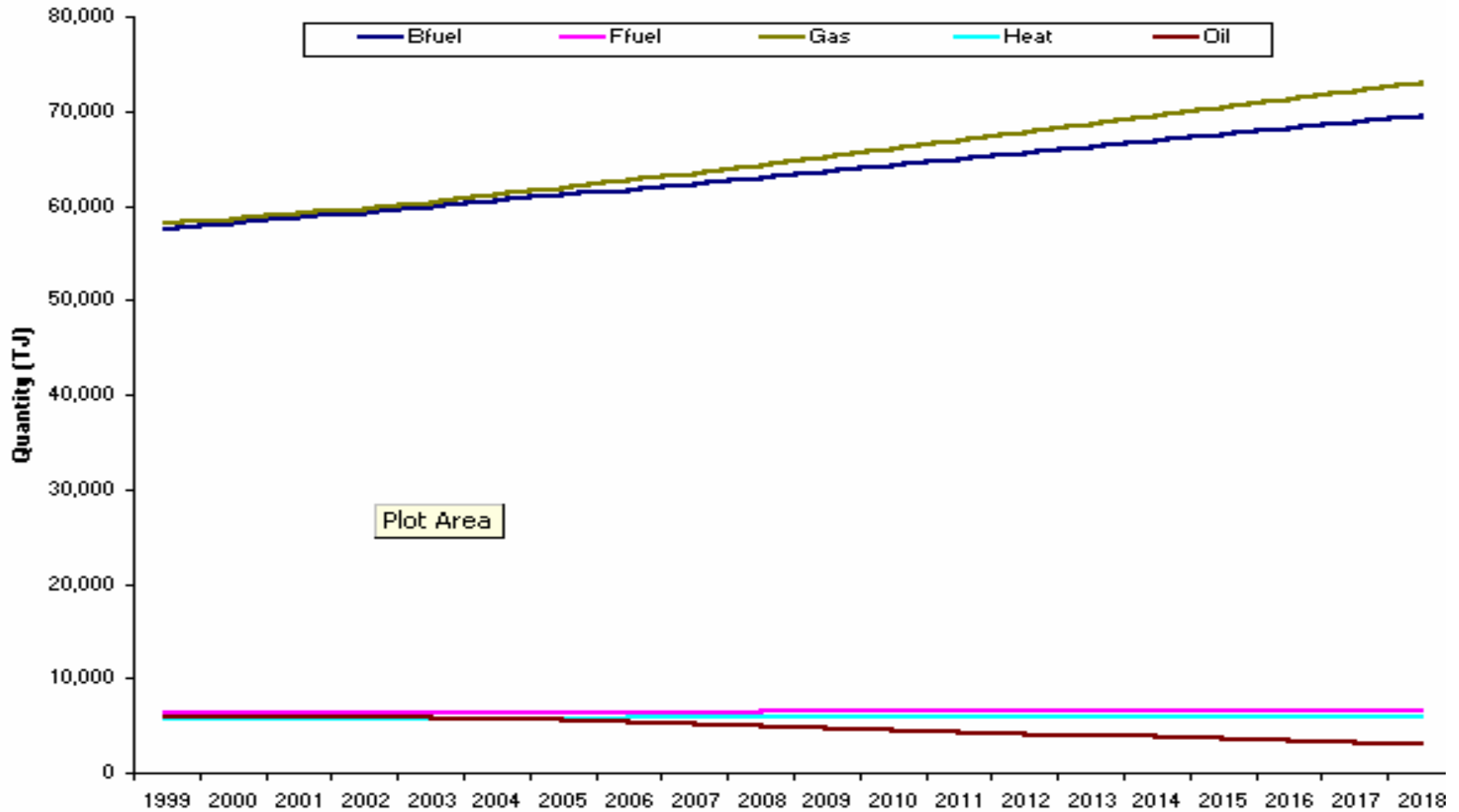
Units are in TJ since it was specified by the user

Years

In Excel You Can Create Custom Tables (Pivot Table)

	A	B	C	D	E
1	Node Dest.	(All) ▼			
2					
3		Link Abbr.			
4	Data	Bfuel	Ffuel	Gas	Heat
5	Sum of 1999	57558.13953	6395.348837	58139.53488	5755.813953
6	Sum of 2000	58133.72093	6401.744186	58609.30233	5761.627907
7	Sum of 2001	58715.11628	6408.139535	59154.06977	5767.44186
8	Sum of 2002	59302.32558	6414.534884	59763.37209	5773.255814
9	Sum of 2003	59895.34884	6420.930233	60427.32558	5779.069767
10	Sum of 2004	60494.18605	6427.325581	61136.62791	5784.883721
11	Sum of 2005	61098.83721	6433.72093	61883.72093	5790.697674
12	Sum of 2006	61709.88372	6440.116279	62662.2093	5796.511628
13	Sum of 2007	62327.32558	6446.511628	63466.86047	5801.744186
14	Sum of 2008	62950.5814	6452.906977	64292.44186	5807.55814
15	Sum of 2009	63580.23256	6459.302326	65134.30233	5813.372093

It is Also Easy to Create Custom Charts



Conclusions

- **To make a simulation you must**
 - Run up/down pass and make adjustments if needed or enter the sequences manually
 - Execute BALANCE
- **There are several ways to look at the results**
 - On the network for a specific year
 - For all years for a single node or link
 - For all years for all links in a sector
 - By exporting results and viewing in another software package (e.g., Excel)