

# CO2DB Software

## Carbon Dioxide (Technology) Database Users Manual

Version 3.0

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**This revised manual includes material from earlier versions co-authored with  
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## **1 Introduction**

The purpose of this manual is to document the CO2DB software as it stands after reprogramming and the inclusion of additional data. Although not a tutorial, this manual is designed to facilitate a step-by-step approach to mastering more and more features of CO2DB.

### **1.1 What is CO2DB?**

CO2DB was designed as a tool to collect detailed data on carbon mitigation technologies in a standardized format. Currently, CO2DB contains approximately 3000 technologies. CO2DB is an interactive software package describing in detail the technical, economic and environmental characteristics of technologies as well as data pertaining to their innovation, commercialization and diffusion. CO2DB also serves as a tool for performing comparisons and other basic data analysis.

### **1.2 What can you do with it?**

With CO2DB one can add to, select, filter, arrange, and compare CO2DB's data according to any of the technology characteristics included in each database entry. One can also make energy chain calculations as well as comparison tables and graphics on the technology and the chain level. The results can be saved as ASCII or T<sub>E</sub>X files or postscript graphics. The results can be exported to spreadsheets such as Excel (using the export function described in Section 7.1) for further data handling.

### **1.3 Overview of this manual**

Section 2 describes the installation of the software under Windows 95/98/NT/2000/XP using the CO2DB installation compact disc. Section 3 gives an overview of basic design features of CO2DB. Section 4 describes the first steps of information retrieval, i.e., opening a database and selecting technologies for which information is to be retrieved. Section 5 describes how to view the data tables belonging to each set of selected technologies and how to export them for further processing. Section 6 describes the steps involved in modifying the existing database (as delivered on the CO2DB compact disc) and creating new ones. Section 7 gives an overview of the most important CO2DB tools for data analysis. Section 8 explains how to take care of units and how to insert definitions. Section 9 discusses reports, Section 10 describes how to get user assistance, and Section 11 describes known bugs. Appendix 1 contains more formal reference information.

### **1.4 Acknowledgement**

The development of CO2DB includes input from many colleagues. For this version of CO2DB, we wish very much to thank Takeyoshi Kato from Nagoya University in Japan, who implemented and collected the additional data.

## **2 Installing and Starting CO2DB**

To initiate installation of CO2DB in Windows 95/98/NT/2000/XP from the CD-ROM, insert the CD-ROM in a CD-ROM drive, and double-click on SetupCO2DB.exe. This starts a setup wizard that is self-explanatory. To initiate installation from an e-mail attachment, simply double-click on the attachment icon for SetupCO2DB.exe. This starts the same setup wizard.

The first wizard screen suggests closing all other Windows programs and gives you the opportunity to do so after exiting the wizard by clicking the “Cancel” button.

The next wizard screen asks you to login by entering your name and company.

Once you are logged in, the next wizard screen allows you to select the destination folder in which to install CO2DB. After doing so click the “Next” button to move to the fourth wizard screen.

The fourth wizard screen allows you to choose the type of installation you prefer. There are three options to choose from:

- *Typical*: Program will be installed with the most common options. Recommended for most users.
- *Compact*: Only the program will be installed, leaving your data files untouched.
- *Custom*: You can choose the options to install. Recommended for advanced users.

Choose one of the options and then click the “Next” button.

Next will come a screen which will add program icons to the Program Folders. You may type a new folder name or select an existing one from the existing folder list. Click “Next” to continue.

The next screen “Start Copying Files” asks if you want to review and check any of the settings you have chosen. If you are satisfied with your selections, click “Next” to proceed with the installation.

The final wizard screen should report that the installation has been successfully completed. Click the “Finish” button to close the wizard and end the installation procedure.

To run CO2DB, just select *Start* → *Programs* → *co2db*. This will execute the file “co2db.exe” from the folder “<installDir>/IIASA/co2db”.

### 3 Basic Design of CO2DB

CO2DB is organized as a relational database system. To date it has been used with database systems such as Microsoft Access, Oracle and Postgres. The current implementation uses Gadfly, an open-source database completely implemented in Python (see <http://gadfly.sourceforge.net/>).

The technologies included in the database are characterized by the “technology name”, the economic “sector” in which they are used, the technology “type”, and their position in the reference energy system (RES) (see Figure 1), which is expressed as “input” from and “output” to a specific level in the RES.

Within CO2DB each technology is characterized by a unique technology number issued internally, which the user cannot change.

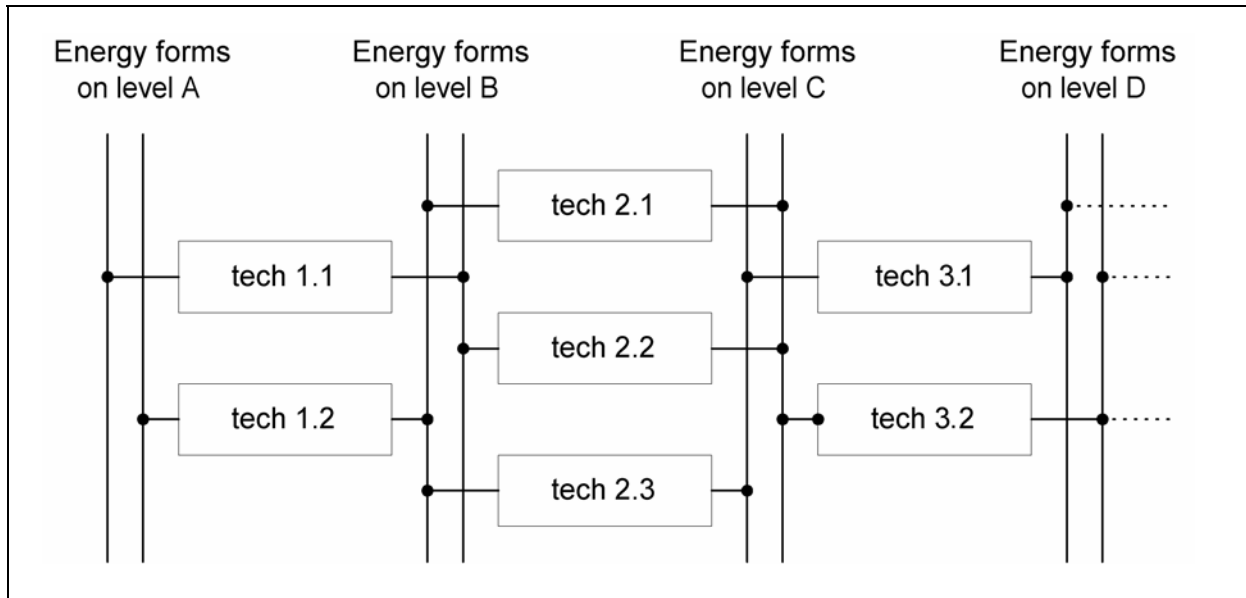


Figure 1: Reference Energy System (RES).

Each technology's data are described in six tables: one main table (called GEN) and six sub-tables: technology data (TEC), economic data (ECO), environmental data (ENV), materials data (MAT), data on applications (APP), and literature references (LIT). Multiple sub-tables can be used to describe different versions of one and the same technology (e.g., data sets for different years of production, different regions, different installation sizes, etc. (see Figure 2.)

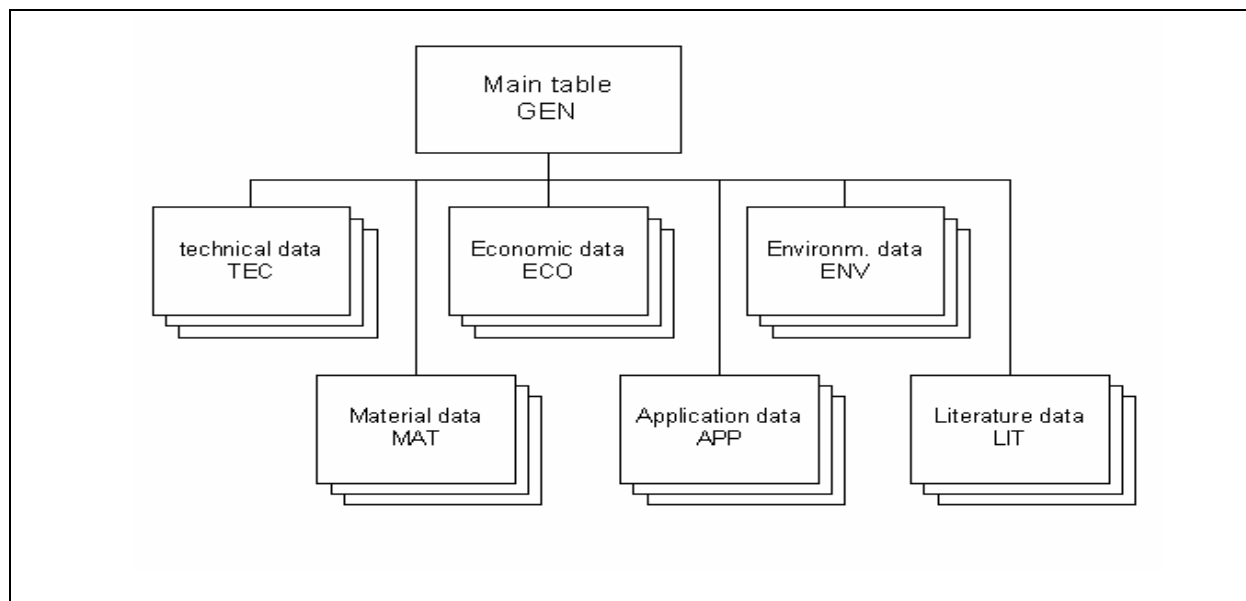


Figure 2: Representation of a technology with multiple versions.

The number of sub-tables need not be equal for different versions of the same technology. For example, if several versions of the technology are based on the same literature source, a separate literature sub-table is not needed for each version. As each of these sub-tables is characterized by an identification label (ID), care has been taken to choose the IDs so that they can be recognized easily as sub-tables belonging together (see the example in Table 1).

Table 1: Example: Sub-table names for a technology.

	TEC	ECO	ENV	MAT	APP	LIT
Version	id32_weu id32_nam id32_lam	id32_weu id32_nam id32_lam	id32_oecd  id32_devs	-	-	id32_all

One important area in the database design is units. Seemingly strange units (such as dollars per annual seat kilometers for the costs of an automobile) serve the purpose of using the database information directly for modeling. The reason for following a rather strict scheme for units is CO2DB's ability to perform chain calculations. For the software to be able to do this, costs must be defined in currency unit *per energy (service) unit* and efficiencies must be defined in energy unit per energy (service) unit.

At input time, the user is advised to add units to each quantitative piece of data. If units are used that are included in CO2DBs "units" tables, they can always be automatically converted to other units, e.g., to facilitate the comparison of cost or performance data of different technologies. The automatic conversions are based on CO2DB-internal conversion tables for each type of units. The conversion tables must be maintained by the user. From the main screen these conversion tables can be reached via Tables → Units → unit table. See also the description of "conversion tables" in Appendix 1.

## 4 Opening the Database and Selecting Technologies

The database is opened by selecting the 'File' drop-down menu from the main screen and clicking on 'Open'. A selection menu allows the user to open the desired database by double-clicking on its name. Currently there are four possibilities. "co2db" is the comprehensive database likely to be used by most users. "china" and "india" are smaller databases created for specific projects. Most of the technologies in these databases are also in "co2db". "other..." is a placeholder for future possible additions and currently does not lead to additional databases.

After a database has been successfully opened, the other drop-down menus of the main screen are also made selectable. By clicking on 'Select' a drop-down list allows the user to select technologies according to the following criteria:

Table 2: Selection criteria.

by sector...	Sector of economy (industry, transport, agriculture, etc.)
by input level...	Energy input level (primary, secondary, final, etc.)
by input fuel...*)	Fuel name (coal, oil, gas, etc.)
by output level...	Energy output level (primary, secondary, final, useful, services)
by output fuel...*)	Fuel name (gasoline, electricity, gas, district heat, etc.)
by type...	Technology type (efficiency improvement, fossil fuel conversion, etc.)
by author...	Person(s) who entered data
by regex...**)	A regular expression used to select from technology names (e.g.: .*gas.*)
enter new tec	User may input new technologies
from all	Selection of all technologies
previous list...	Reselect previous list

\*) these two selections lead first to the selection of the level on which the fuel should be searched for

\*\*\*) a UNIX-style regular expression (like in vi) which allows search strings with \*, ?, ., etc.

After selecting a category from the above list, a list with matching technologies is shown, from which one can be selected by double-clicking its name. The main technology table with general information is shown. ‘Previous’ and ‘Next’ buttons on the main technology table allow one to move up and down the selected list of technologies. The buttons TEC, ECO, ENV, MAT, APP, and LIT allow one to view, respectively, technical data, economic data, environmental data, materials consumption data, data on applications of the technology, and the relevant literature references.

The main technology table of the selected technology (denoted by the suffix “(gen)” in the title bar) contains the following data:

Table 3: Data in the main technology table.

<b>Field name</b>	<b>Description</b>
Technology name	Long name of technology
ID	Identification of technology (is set automatically, but can be changed)
No	Sequential number of technology (cannot be changed)
Technical availability	Year when technology became technically available
Commercial availability	Year when technology became commercially available
By	Name of person who entered the data
Valuation	Valuation of data quality
Invention	Year of invention
Innovation	Year of major innovation
Prototype	Year when first prototype became operational
Commercial	Year of commercial availability
1% market share	Year when 1 percent market share was reached
50% market share	Year when 50 percent market share was reached
Life-cycle phase	Description of current life-cycle phase
Notes	Field for notes
Sector	Sector in which this technology is used (e.g., agriculture)
Type	Type of technology (e.g., electricity production)
Output	Name of fuel output level
Input	Name of fuel input level
File	Computer file with additional information
Hard copy	Hard copy file with additional information

## 5 Viewing and Retrieving Technology Data

The remaining six tables (TEC, ECO, ENV, MAT, APP, and LIT) are generally divided into four sections:

- 1 A title bar showing the technology name and the table type,
- 2 A bar with pull-down menus,
- 3 An area with push-buttons, and
- 4 The data section.

All tables show the information on technology name, identifier, number, technical and commercial availability, author and valuation as they also appear on the top of the main technology table. This information cannot be changed in the sub-tables.

The sub-tables also all contain a field called ‘Table ID’. This field makes it possible to distinguish between different applications of the technology (e.g.: different degrees of

desulphurization, specific installations, applications in different years, etc.). The adjoining push-button ‘ID list’ creates a window showing the currently used IDs for this technology.<sup>1</sup> To change the ID of the current technology, enter the new ID and press the push-button ‘change ID’. (See also the description of CO2DB’s basic design in Section 3.)

Where appropriate the tables contain radio buttons, which indicate if the data are given per unit of main input or output.

Only the “Table ID” and the “Data per” radio buttons can be changed.

Table 4: Common data fields at the top of all sub-tables.

<b>Field name</b>	<b>Description</b>
Technology name	Long name of technology
ID	Identification of technology
No	Sequential number of technology
Technical availability	Year when technology became technically available
Commercial availability	Year when technology became commercially available
By	Name of person who entered the data
Valuation	Valuation of data quality

In cases where there are different tables belonging to the same technology, the buttons ‘Previous’ and ‘Next’ in the button area can be used to switch among them.

### 5.1 The technical data table (TEC)

The technical data table, denoted by the suffix “(tec)” in the title bar, for each technology includes the information listed below in addition to the seven items that are common to all tables.

Table 5: Data items in the technical data table.

<b>Field name</b>	<b>Description</b>
Unit size	Size of a single unit (e.g., powerplant with 100 MW)
Technical availability	Maximum availability factor
Average utilization	Average availability factor
Construction time	Time needed for construction of the plant
Plant life	Length of useful lifetime
Inputs	Energy inputs: name, amount, unit (first entry is ‘main input’)
Outputs	Energy outputs: name, amount, unit (first entry is ‘main output’)
Notes	Table-specific notes

By clicking the right mouse button on the name of an input or output a selection window allows one to delete the selected line, add a new entry, or select an energy form name from the list of already used names.

<sup>1</sup> This window is for information purposes only. Different technologies have been entered into CO2DB by different people, sometimes using slightly different conventions concerning technology IDs. The window summarizes the IDs used for a given technology, but does not provide a shortcut for switching among sub-tables.

## 5.2 The economic data table (ECO)

This table, denoted by the suffix “(eco)” in the title bar, contains economic data for the selected technology. In addition to the seven items that are common to all tables, the economic data table includes:

Table 6: Data items in the economic data table.

<b>Field name</b>	<b>Description</b>
Currency/year	Currency in which the following data are given
Investment costs	Investment costs per unit (amount, unit)
Fix O&M costs	Fixed operation and maintenance costs (amount, unit)
Variable O&M costs	Variable operation and maintenance costs (amount, unit)
Fuel costs	Input fuel costs (amount, unit)
Decommissioning costs	Costs for decommissioning the plant (amount, unit)
Total (excl. fuel)	Total production cost excluding fuel costs (amount, unit)
Total (incl. fuel)	Total production cost including fuel costs (amount, unit)
Notes	Table-specific notes

Note that not all the entries in ECO tables are independent. Where both total costs and component costs are entered, the components should sum to the totals. If a user inputs new data, it is the user’s responsibility to check for consistency. The software will not alert the user to inconsistencies. Nor will it do the calculations automatically.

## 5.3 The emissions data table (ENV)

This table, denoted by the suffix “(env)” in the title bar, contains data concerning emissions from the selected technology. In addition to the seven items that are common to all tables, the environmental data table includes:

Table 7: Data in the emissions data table.

<b>Field name</b>	<b>Description</b>
Pollutants (e.g., CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub> )	Name, amount, unit
Notes	Table-specific notes

By clicking the right mouse button on the name of a pollutant a selection window allows one to delete the selected line, add a new entry, or select a pollutant name from the list of already used pollutant names.

## 5.4 The material consumption data table (MAT)

This table, denoted by the suffix “(mat)” in the title bar, contains data on materials consumption and labor requirements during construction and operation of the selected technology. In addition to the seven items that are common to all tables, this table includes:

Table 8: Data in the materials data table.

<b>Field name</b>	<b>Description</b>
Labor	Amount, unit
Materials	Name, amount, unit
Notes	Table-specific notes

By clicking the right mouse button on a name on the materials list, a selection window allows one to delete the selected line or to add a new entry.

## 5.5 The application data table (APP)

This table, denoted by the suffix “(app)” in the title bar, contains additional information on current installations, producers and known limits as listed below:

Table 9: Data in the application data table.

Field name	Description
Region	World region in which the described unit is installed
Producer	Producer of the described unit
Research	Research laboratory working on R&D of the technology
Prerequisites	Prerequisites for installing a unit
Limits	e.g., maximum unit size, maximum total installations (description, value)
Existing installations	Number/size of existing installations (description, value, unit)
Notes	Table-specific notes

By clicking the right mouse button on the name field of the limits list, a selection window allows one to delete the selected line or to add a new entry.

## 5.6 The literature data table (LIT)

This table, denoted by the suffix “(lit)” in the title bar, contains information on where the data given in the other tables were found.

Table 10: Data in the literature data table.

Field name	Description
Book title	Book/article/paper in which the information was found
Chap. Title	Chapter title
Author	Author(s) of the cited reference
Publisher	Publisher of the cited reference
Type	Type of reference (book, article, paper, etc.)
Year	Year of publication
IIASA-Nr.	IIASA publication number
Access	Where to get the book/article
Notes	Table-specific notes

## 6 Modifying the Database

Most data entered are only stored in the database when the user clicks ‘save’ in the ‘Table’ drop-down menu or after clicking ‘Save’ in the dialog box which appears if the user wants to leave a table without having saved it before. Exceptions are data entered into multiple entry blocks (inputs, outputs, pollutants, etc). These data are saved immediately. If a wrong item was entered in such a block, that item has to be deleted by hand (select wrong line → click right mouse button → select delete) as currently no undo option exists.

There is no set of required data that have to be entered, and the software does not prevent the user from saving the table if not all data were entered. Only tables in which no data were entered are not saved.

### 6.1 Creating a new database

To create a new database click on File->New. An entry-window will allow the user to enter the new database name and a short description of this database. If this database should be

started as a copy of an existing database, fill also the field 'Copy of:' with the name of the base database. This database will be copied to the new database. This database can then be used like any other database in the system. If the new database already exists a selection dialog allows to overwrite the existing database or to stop the action.

## 6.2 Entering new and modifying existing technology data

To enter a new technology, select the 'Table' drop-down menu from the technology main table for any technology and select "New". This opens a new table with a new technology identifier and a sequence number. All other fields are empty or contain default values. You will note that when the pointer on the screen rolls over some of the fields for entering data, it changes to a finger pointing to the right. When it does, clicking on the right mouse button will open a window showing all the entries used elsewhere in the database for that field. Double-clicking on one of the options in the window will insert it in the appropriate field.

When clicking on one of the buttons to open a sub-table of a new technology, a small window appears, indicating that no such data are available. Click on the button 'New data' to open a new, empty sub-table.

For adding additional sub-tables (e.g., for different versions of a technology in terms of installation sizes, years, etc.), select Table → New in one of the existing tables.

To modify data, just enter new values in the required fields.

## 6.3 Deleting and copying selected technologies

To **delete** a complete technology, select the 'Table' drop-down menu from the technology's main table (GEN) and click on delete. To delete one of the sub-tables, select the according button in the sub-table.

**Copying** technologies inside the same database or between databases can be accomplished by exporting (using the pull down menu 'Export' in one of the data tables) and importing (using the pull down menu 'File' from the main window). The import function ensures that technology names, identifiers and numbers remain unique. If there is a conflict, a pop-up window will appear giving the user an opportunity to modify a name, identifier, or number to eliminate the conflict.

# 7 Processing Data

## 7.1 Technology comparisons

Technology comparisons are started from the pull-down menu 'Comparison' in the main menu. The selection of 'Select' opens the same list of technology categories as the Select option on the main window. Once a category is selected, a window appears listing, in its top section, the features of technologies that the user might want to compare and, in its bottom sections, the technologies in the category chosen. These all appear in the left section of the window. By clicking on entries in the left-hand lists they are selected and inserted in the right-hand lists, indicating that these are the features and technologies the user wishes to use in the comparison. If there are several versions of a technology, windows will appear asking the user which should be used in the comparison. To deselect items click on them in the right-hand lists to insert them back into the left-hand lists. A selection list can be saved into a file by clicking the push-button 'Save'. Such saved files can later be used by selecting 'Existing'

from the drop-down menu 'Comparison' in the main window. In this case, the data are extracted from the database at the time at which the results are viewed.

Once the features and technologies that the user wants to compare have been selected and appear in the right-hand lists, the results of comparisons can be viewed as tables (using the push-button 'Table'), aligned bars ('al. Bar'), or stacked bars ('st. Bar').

The item 'New' on the drop-down menu 'Comparison' in the main window allows the user to choose a new combination of features and technologies to compare using the same technology category as in the last comparison.

Comparison results can be saved as an ASCII table, T<sub>E</sub>X -file, or as a txt-file, which can be imported into a spreadsheet program such as Excel. When importing a txt file into Excel the import wizard might ask for information about the file (delimited or fixed width). Choosing "delimited" and then "tab" guarantees that data appear neatly in columns.

## 7.2 Chain calculations

Chain calculations are used to calculate the overall costs or emissions of concatenated technologies, e.g. the chain: Refrigerator → electricity transmission → coal power plant → coal transport → coal extraction.

Chain calculations are started from the drop-down menu 'Chains' in the main window. A chain is always constructed in the reverse order of its physical sequence, that is, it is constructed by beginning from any technology delivering the required energy form or energy service and then adding links in the direction toward primary energy up to a level chosen by the user. The particular technologies to be included in the chain are determined by the user constructing the chain. The item 'New' allows one to start constructing a new energy chain in the following way.

First a window with a list of the available energy levels is shown. The selection of a level leads to a window showing the energy forms on that level, and the selection of an energy form leads to a window showing all technologies producing the selected energy form on the selected level. By selecting a technology another window pops up, which shows all technologies producing the input fuel for the technology selected before. This sequence can be repeated until the end of the chain in the direction of primary energy is reached. The window for selecting the next technology always contains three push-buttons: 'Calculate' to stop further selections and to start the calculation, 'Show list' to show which technologies have been selected so far, and 'Quit' to stop the selection process.

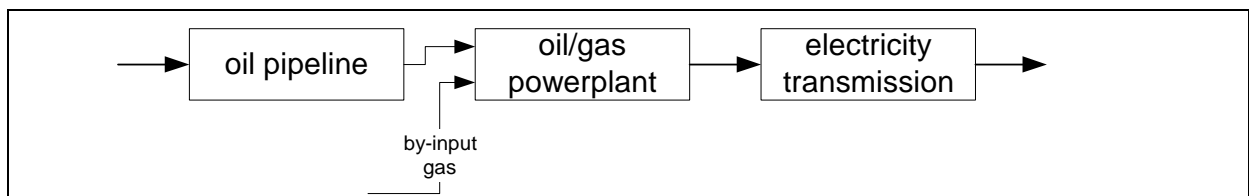


Figure 3: Representation of a chain with an additional input ("by-input").

If a technology requires an additional energy input ("by-input"), the user is requested to state the cost of this additional input into the energy chain. The questioning about these costs can be controlled via radio buttons in the menu reached via Tables → user units from the main window (see Section 8.1).

After the chain calculation is performed, a new window shows the results and allows the user to save the selected chain, or the results of the calculation. In order to compare different energy chains, each selected chain must be saved via the 'Save chain' button.

### **7.3 Chain comparisons**

Chains that have previously been saved to files can be compared to each other by clicking on 'compare' in the Chains drop-down menu in the main window. This selection shows a file selection window from which the required files can be selected. After selecting a chain file the file selection reappears allowing the selection of another chain file for comparison. To end the selection process, click on 'Cancel' in the file selection menu. Then a window like the one used for technology comparisons pops up and allows the user to select the items to be compared. Again, like with technology comparisons, the result may be saved as simple tables, T<sub>E</sub>X files, txt files with tab-separated entries, or as postscript files.

## **8 Units and Definitions Tables**

The rightmost drop-down menu on the main screen is 'Tables'. It allows the user to set his or her preferred units for technology and chain calculations and comparisons, to define conversion factors between different units, and to enter descriptions for various lists used in the data tables.

Additionally this drop-down menu also contains the entries 'Database' and 'Cleanup'. The first entry allows one to view the data tables or export them in CSV-format. The second entry tries to synchronize all the tables containing fuel and level entries, which may become inconsistency after deletions of technologies or inputs to /outputs from technologies. (Such inconsistencies may be detected when the selection of certain elements show matches in one selection but not in another.

### **8.1 Output units**

The units defined in this table are those to be used in the tabular and graphical outputs from the calculations possible within CO2DB. The four radio buttons towards the end of the table let the user define which action to take if, during the calculation of an energy chain, a technology has "by-inputs" (see Section 7.2). In order to calculate the total cost of the chain a value for this by-input should be supplied, but the user can also decide to skip the entry of such additional costs. This is the same as entering costs of zero.

### **8.2 Units**

The unit tables offered under this label allow the user to enter the conversion factors for all units used in the data tables. There is always one unit designated by the word MAIN. All other conversion factors must reflect the multiplicative value to convert from the given unit to the one designated MAIN.

### **8.3 Definitions**

These tables allow the user to add descriptions to the items in the various lists used in the data tables (sectors, levels, fuels, etc.). These definitions are solely for documentation. A click on the right mouse button in the left column allows the user to add or delete categories. One should be careful not to delete categories that are still in use.

Before showing the table with definitions, the user is asked if the table should be updated from the database. If this is answered with 'Yes', all elements currently unused are deleted and new values are inserted into the definitions table.

## **8.4 Database**

This option allows one to select one of the data sheets contained in the database for viewing on screen or exporting it in csv format for import into other tools.

Note: When viewing data tables it may take a rather long time to set up the screen. A warning is issued when a certain table size is exceeded, but, of course, the time required to set up the screen depends on the computer speed. The export of tables and import into Excel, etc. is often much faster for large tables (mainly the gen-table).

## **8.5 Clean up**

After clicking this selection, one can see on the underlying text window how many entries were deleted or inserted into the different tables.

Note: The synchronization of tables is not very well tested, but, on the other hand, showed no problem so far.

## **9 Reports**

Reports, in the forms of the tables and graphs that can be created from CO2DB as described in Sections 7.1 and 7.3, cannot be printed directly using CO2DB. To get printed reports, the user must first save results as ASCII, T<sub>E</sub>X, or txt files if they are tables, and as postscript files if they are graphics, as described in Sections 7.1 and 7.3. The saved files must then be imported into another application, such as an Excel spreadsheet, from which the desired reports can be printed.

## **10 User Assistance**

A limited user service in cases of unforeseen troubles with CO2DB is available via e-mail. For general software features and installation, please contact Manfred Strubegger ([strub@iiasa.ac.at](mailto:strub@iiasa.ac.at)).

## **11 Known Bugs**

### **11.1 Technology comparison**

When doing technology comparisons, a selected technology disappears from the left-hand lists after one combination of sub-tables has been selected. It should remain in the window until all possible combinations are selected.

The only possible way to work-around this is to not use the feature of sub-tables.

### **11.2 Technology tables**

The valuation field in the main technology table should have a selection window with pre-defined criteria.

Data entered in multiple-entry blocks in technology sub-tables are stored immediately to the database.

### **11.3 Multiple entries**

After clicking the right mouse button in the multiple entry sections of the MAT and APP screens (Materials, Limits, Existing installations) the focus cannot be set to any other field.

Click the right mouse button again in any of the multiple entry sections, then into any other field to overcome this blocking.

## Appendix 1: Organization of CO2DB

The relational database in the background of CO2DB consists of the following tables:

<b>Data tables:</b>	
<b>Gen</b> <sup>*)</sup>	<b>general data</b>
<b>Tec</b> <sup>*)</sup>	<b>technical data</b>
Inp	input fuels
Out	output fuels
Levfuel	energy forms/levels cross table
<b>Eco</b> <sup>*)</sup>	<b>economic data</b>
<b>Env</b> <sup>*)</sup>	<b>environmental data</b>
Pol	Emissions
<b>Mat</b> <sup>*)</sup>	<b>materials data</b>
Cmat	construction materials
Omat	operation materials
<b>App</b> <sup>*)</sup>	<b>data on actual installations</b>
Lim	Limits
<b>Lit</b> <sup>*)</sup>	<b>literature data</b>
<b>Supporting tables:</b>	
Sectab	sectors (descriptions)
Typtab	technology types (descriptions)
Levtab	energy levels (descriptions)
Polltab	pollutants (descriptions)
Fueltab	energy forms (descriptions)
Colortab	color table for pollutants
<b>Conversion tables:</b>	
Enetab	energy units conversions
Montab	monetary units conversions
Multab	Multipliers
Powtab	power unit conversions
Timtab	time unit conversions
Wgttab	weight unit conversions
<b>User's table:</b>	
Users	user's default values

The **data tables** are accessible via the CO2DB interface. Tables marked with an asterisk (\*) are the main tables, which also are represented as separate windows on the user's interface. Each technology (defined in **gen**) can have more sub-tables (**tec**, **eco**, ...) to describe variants of the basic technology.

The **supporting tables** are basically controlled by CO2DB, but the user can add descriptions to the items contained in these tables via Tables → Definitions from the main screen.

The **conversion tables** must be kept up to date by the user. The latter tables are needed to convert data, which are often supplied in different units, to a common unit. If new units are used, CO2DB complains about missing conversion factors, and the user must then update the according tables via Tables → Units from the main screen. Each of these tables must contain one unit which is marked with the word 'MAIN', all other conversion factors must be given relative to this unit.

The **User's table** contains the user's preferred units, which he or she would like to see used when results are presented. The user is identified by the environmental variable USER. This table can be reached via Tables → Output Units from the main screen.

