DOCKETED	
Docket Number:	23-ERDD-01
Project Title:	Electric Program Investment Charge (EPIC)
TN #:	256871
Document Title:	WRIGHT WILLIAMS KELLY, INC Comments - Solutions Require Metrics for Comparison
Description:	N/A
Filer:	System
Organization:	WRIGHT WILLIAMS KELLY, INC
Submitter Role:	Public
Submission Date:	6/14/2024 12:09:11 PM
Docketed Date:	6/14/2024

Comment Received From: WRIGHT WILLIAMS KELLY, INC
Submitted On: 6/14/2024
Docket Number: 23-ERDD-01

Solutions Require Metrics for Comparison

WWK has developed a sophisticated Cloud-based application to allow for the calculation of the true cost of solar installations a well as changes to operating parameters. This allows for A-B comparisons between competing solutions.

Additional submitted attachment is included below.

A Guide to Using

Total Cost of Ownership for Energy™

TCOe™ version 1.0

By Wright Williams & Kelly, Inc.

Contents

Total Cost of Ownership for Energy™

Licensed Agreement

This software and documentation are furnished under a licensed agreement and may only be used in accordance with the terms of that agreement.

Technical Support

Technical support for TCOe™ v1.0 can be accessed at any of the following numbers. Response time is typically one business day.

FAX: 925-396-6174

VOICE: 925-399-6246

E-MAIL: support@wwk.com

WEB: http://www.wwk.com

Exclusive Distribution Rights

Worldwide distribution rights to TCOe™ v1.0 are the exclusive property of Wright Williams & Kelly, Inc. 6200 Stoneridge Mall Road, 3rd Floor, Pleasanton, CA 94588.

Copyright Notice

Copyright © 2011-2012 Wright Williams & Kelly, Inc. All rights reserved.

No part of this publication may be copied without the express written permission of Wright Williams & Kelly, Inc.

Trademarks

TCOe and Total Cost of Ownership for Energy are trademarks of Wright Williams & Kelly, Inc.

Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Software License Agreement

Wright Williams & Kelly, Inc. ("Company") is willing to license the downloaded Software (the "Software") only upon the condition that you accept all of the terms of this agreement. Please read these terms carefully before downloading any software packages, as installing any such package will indicate your agreement to these terms. If you do not agree to these terms, then Company is unwilling to license the Software to you, in which event you must return the Software within 14 calendar days to the place from which it was acquired, and your money will be refunded. No refunds will be provided for any other reason except as listed below.

License

You may use the Software for a single, specified user (or the number specified in your purchase agreement). You may copy the Software only for backup purposes, provided that you reproduce all copyright and other proprietary notices that are on the original copy of the Software provided to you. It is your responsibility to secure the installation files for future use. WWK makes no warranty as to the availability of the installation files once they are no longer the latest version. You may transfer the Software and all rights under this agreement to another party together with a copy of this agreement if the other party agrees to accept the terms of this agreement and you receive authorization in writing directly from Wright Williams & Kelly, Inc. prior to any such transfer. If you transfer the Software, you must at the same time either transfer all copies whether in printed or machine-readable form to the same party or destroy any copies not transferred. The license on the download site supersedes all others.

Restrictions

You may not use, copy, modify, or transfer the Software, or any copy, in whole or in part, except as expressly provided for in this agreement. You may not disassemble, decompile or modify the Software. Any attempt to transfer any of the rights, duties, or obligations hereunder except as expressly provided for in this agreement is void. You may not rent, lease, loan, resell for profit, distribute, or network the Software.

Limited Warranty

Company warrants for the period of ninety (90) days from the date of delivery of the Software to you as evidenced by a copy of your receipt that:

1. The Software, unless modified by you, will perform substantially in accordance with the user documentation provided by Company. Your sole remedy under this warranty is that Company will either correct, within a reasonable period of time, any failure of the Software to perform substantially in accordance with the user documentation reported during the warranty period or, if Company is unable to correct any such issues, refund to you the money paid for the Software. Company does not warrant that the Software will meet your requirements, that operation of the Software will be uninterrupted or error-free, or that all Software errors will be corrected.

2. The medium on which the Software is furnished will be free from defects in materials and workmanship under normal use. Company will, at its option, replace or refund the purchase price of faulty medium at no charge to you, provided you return the faulty medium with proof of purchase to Company or an authorized dealer. Company will have no responsibility to replace or refund the purchase price of any medium damaged by accident, abuse, or misapplication.

The above warranties are exclusive and in lieu of all other warranties, express or implied, and Company expressly disclaims all other warranties, including the implied warranties of merchantability, fitness for a particular purpose, and non-infringement. No oral or written information or advice given by Company, its employees, distributors, dealers, or agents shall increase the scope of the above warranties or create any new warranties. Some States do not allow the exclusion of implied warranties, so the above exclusion may not apply to you. In that event, any implied warranties are limited in duration to ninety (90) days from the date of delivery of the Software. This warranty gives you specific legal rights. You may have other rights, which vary from State to State.

Limitations of Remedies

Company's entire liability to you and your exclusive remedy shall be the correction of the Software or the replacement of the Software medium, or the refund of your purchase price, as set forth above. If Company is unable to deliver a replacement medium which is free of defects in materials and workmanship, you may terminate this agreement by returning the Software and your money will be refunded.

Regardless of whether any remedy set forth herein fails of its essential purpose, in no event will Company be liable to you for any damages, including any lost profits, lost data, or other incidental or consequential damages, arising out of the use or inability to use the Software or any data supplied therewith, even if Company or an authorized dealer has been advised of the possibility of such damages, or for any claim by any other party. Some States do not allow the limitation or exclusion of liability for incidental or consequential damages so the above limitation or exclusion may not apply to you.

Government Licensee

If you are acquiring the Software on behalf of any unit or agency of the United States government, this provision applies. The government acknowledges Company's representation that the Software and its documentation were developed at private expense and no part of them is in the public domain. The government acknowledges Company's representation that the Software is "Restricted Computer Software" as that term is defined in clause 52.227-19 of the Federal Acquisition Regulations (FAR) and is "Commercial Computer Software" as that term is defined in subpart 227.401 of the Department of Defense Federal Acquisition Regulation Supplement (DFARS). The government agrees that:

1. If the Software is supplied to the Department of Defense (DoD), the Software is classified as "Commercial Computer Software" and the government is acquiring only "Restricted Rights" in the Software and its documentation as that term is defined in clause 252.227-7013(c)(1) of the DFARS, and
2. If the Software is supplied to any unit or agency of the United States government other than DoD, the government's rights in the Software

and its documentation will be as defined in clause 52.227-19(c)(2) of the FAR.

Restricted Rights Legend

Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the rights in technical data and computer software clause at DFARS 252.227-7013 or subparagraphs (c)(1) and (2) of the commercial computer software -- restricted rights clause at 48 CFR 52.227-19, as applicable.

Export Law Assurances

You acknowledge and agree that the Software is subject to restrictions and controls imposed by the United States export administration act (the "Act") and the regulations thereunder. You agree and certify that neither the Software nor any direct product thereof is being or will be acquired, shipped, transferred, or reexported, directly or indirectly, into any country prohibited by the ACT and the regulations thereunder or will be used for any purpose prohibited by the same.

General

This agreement will be governed by the laws of the State of California, except for that body of law dealing with conflicts of law. If any provision of this agreement is held to be unenforceable, that provision will be removed and the remaining provisions will remain in full force. This agreement is the complete and exclusive statement of the agreement between us which supersedes any proposal or prior agreement, oral or written, and any other communications between us in relation to the subject matter of this agreement. If you have any questions concerning this agreement, you may contact Company by writing to:

Wright Williams & Kelly, Inc.
6200 Stoneridge Mall Road, 3rd Floor
Pleasanton, CA 94588

You acknowledge that you have read this agreement, understand it, and agree to be bound by its terms. The Software and the accompanying user documentation are protected by United States copyright law and international treaty. Unauthorized reproduction or distribution is subject to civil and criminal penalties.

Introduction

The Value of Modeling

With increased competition and decreased government subsidies, energy system manufacturers and project developers are living with increased pressure on operating margins. There is an old adage that says "you can't manage (or fix) what you can't measure." Modeling provides an opportunity to "measure" the results of changes before incurring the cost of those changes. The alternative is to make the changes and hope the outcome is as expected. Modeling is a forward-looking (predictive) measurement tool versus the alternative of a retrospective review.

For the energy industry, modeling solutions already exist; it is just a matter of management empowering its staff to use these tools to make better business decisions. One of the pitfalls of technical product manufacturing is forgetting that even technical decisions are business decisions. Modeling provides a "translation" of technical decisions (throughput, yield, materials consumption) into business results (cost, margin, profit).

The models available today fall into three broad categories, cost of ownership (COO), factory level modeling, and levelized cost of energy (LCOE). The first two are focused on system component manufacturing and assembly and are used by both manufacturers and their suppliers. LCOE is focused on project development but is impacted by the products produced by component manufacturers. Which model to use is based on what questions need to be answered. Selecting the right model and modeling methodology is the first step in the successful implementation of this business improvement process.

Levelized Cost of Energy (LCOE)

The retail cost of conventional electricity is rising while the cost of renewable electricity is dropping, so wide-scale grid parity is likely at some point in the future. There are numerous groups of stakeholders interested in tracking these developments, with quantitative accuracy carrying enormous value. Investors need to know their expected return on investment, regulators and policy makers help define the economics of energy production and require reliable information, funding agents need a means to analyze proposed technology development, and technology developers want to understand how they will compete relative to other technologies. One needs a method to fairly compare energy costs produced by different means, and LCOE is intended to be just this.

LCOE can be thought of as the price at which energy must be sold to break even over the lifetime of the technology. It yields a net present value in terms of, for example, cents per kilowatt-hour. This is an assessment of the economic lifetime energy cost and lifetime energy production and can be applied to essentially any energy technology. For computing the financial costs the equations can be embellished to take into account not only system costs, but also factors such as financing, insurance, maintenance, and different types of depreciation schedules.[1]

$$LCOE = \frac{PCI - \sum_{n=1}^{N} \frac{DEP + INT}{(1+DR)^n} \times TR + \sum_{n=1}^{N} \frac{LP}{(1+DR)^n} + \sum_{n=1}^{N} \frac{AO}{(1+DR)^n} \times (1 - TR) - \frac{RV}{(1+DR)^N}}{\sum_{n=1}^{N} \frac{Initial\ kWh \times (1-SRD)^n}{(1+DR)^n}}$$

Where:

PCI	=	Project costs - (investment tax credits or grants)
n	=	Individual years in the project lifetime
N	=	Lifetime of project in years
DEP	=	Depreciation
INT	=	Interest paid
TR	=	Tax rate
DR	=	Discount rate
LP	=	Loan payment
AO	=	Operating costs
RV	=	Residual value
Initial kWh	=	Kilowatt-hours produced by equipment when first installed
SDR	=	Kilowatt-hours degradation rate

While it is clear from the above equation that this type of model is designed to assist project developers, component manufacturers do have an impact with sales price, conversion efficiency, degradation rate, and, as a photovoltaic (PV) example, the reduction of operating expenses through the inclusion of hydrophobic and oleophobic films on the cover glass.

Total Cost of Ownership for Energy™ (TCOe™)

Given that LCOE was originally designed as a breakeven model, it has limited application to situations where the project owner is interested in revenue (profit) generation or in installations where the electricity produced is displacing some or all of the high cost tier grid supply. For these applications, a new model has been developed called Total Cost of Ownership for Energy™ (TCOe™). TCOe™ includes additional factors such as revenue/displacement and cost factors applicable to both rooftop and utility scale applications.

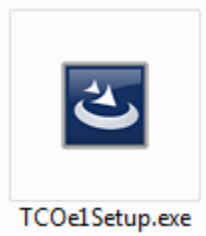
[1] Assumptions and the levelized cost of energy for photovoltaics, Seth B. Darling, et al, Energy & Environmental Science, Issue 9, 2011

By its nature, LCOE is limited in the breadth of questions it can answer and boils down to simply which energy producing project will generate the lowest kilowatt-hour cost in today's dollars? TCOe™ attempts to remove some of the limitations of LCOE with regard to revenue generation, the value of grid power displaced, and the value of power density when faced with space constraints inherent in rooftop installations. However, it is still meant to be a project ranking methodology.

Installation

Installation Download

The installation download contains the following file:



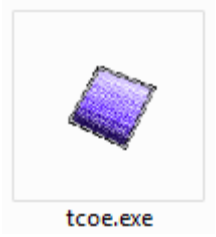
The installer program provides for automatic decompression of all TCOe™ v1.0 files. A dialog box driven installation procedure guides the user through the entire process.

To install TCOe™ v1.0 turn off all virus protection and then double click the setup program icon. During installation, the user will be asked to decide on the location for program and data files. It is recommended that the default location for program files remain either Program Files or Program Files (x86) depending on whether the computer has a 32bit or 64bit operating system.

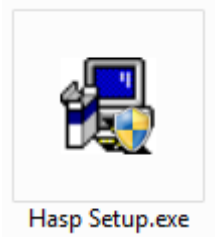
The default location of the database files is in a hidden directory in AppData. The default can be accepted or the user can use the "Browse" button to select a more accessible directory such as "My Documents." If you make this change, make sure that you also include the \TCOe 1.0\ at the end of the new installation location so that the installer will create a new folder with that title. Additionally, "My Documents" may show up as "Documents" in the installer directory structure, but they are the same directory.

File Structure

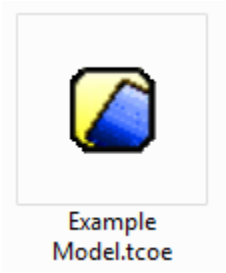
TCOe™ v1.0 has numerous file types: program executable, on-line help, hardware security, model data, database tables, and documentation. After installation is complete, the following files are available.



The start-up file is entitled "tcoe.exe". This file contains the code for the user interface and calculation engine and is the only file that is launched by the user. However, this is normally done through shortcuts on the start menu or on the desktop.



"Hasp Setup.exe" is used once to install the security key drivers. This file can be accessed in the Program Files directory or under the start menu.



"*.tcoe" are the model data files. These files contain all the input and output data and are located in the models subdirectory.

"TCOe v1.0 User Manual.pdf" is an electronic version of this user manual. This file requires Adobe Acrobat Reader.

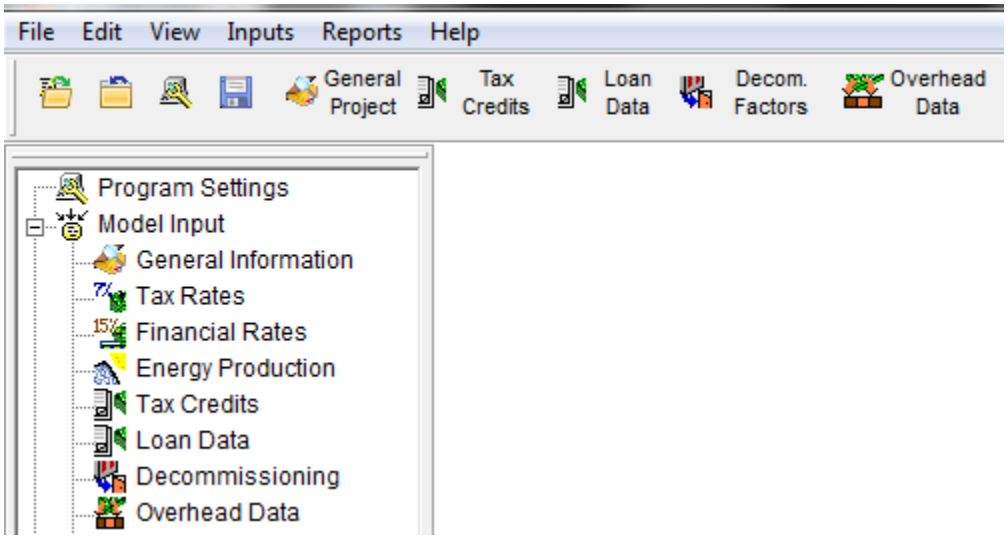
Getting Started

Start-Up

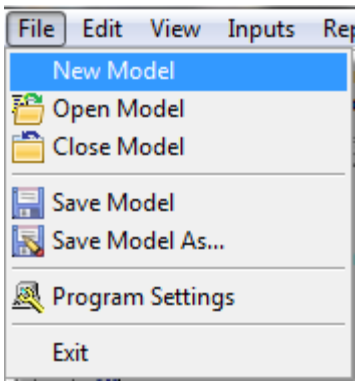
To begin operation, open TCOe™ directly from the desktop or the Start menu. Once open, the user can select an existing model to work on or create a new model. Both of these options are available under the file menu.

User Interface

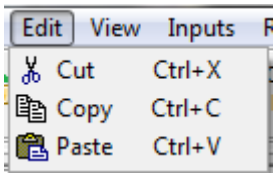
Once TCOe™ v1.0 has been launched; the user will be presented with a graphical user interface (GUI) containing 3 elements: menus, buttons, and navigation.



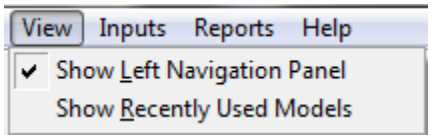
The menu items provide access to many of the same items that exist on both the button and navigation bars. Listed below are summaries of each menu and sub-menu item.



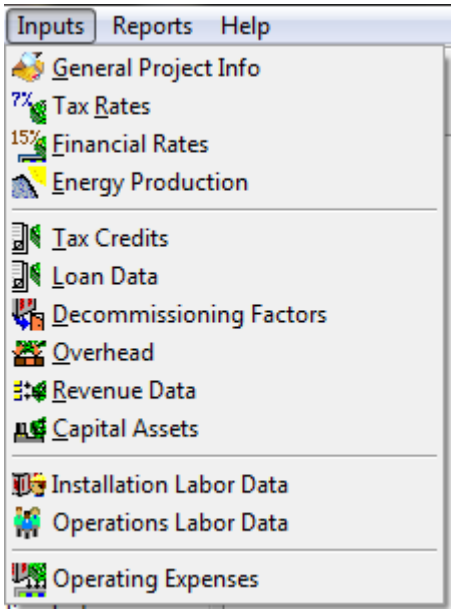
The file menu provides the ability to create a new model (empty databases), open an existing model, close an open model, and save a model under its existing name or a new name. Program settings indicate where the executable and model files are located.



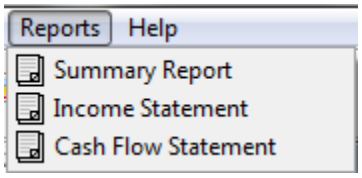
The edit menu allows for cutting, copying, and pasting of records within a database.



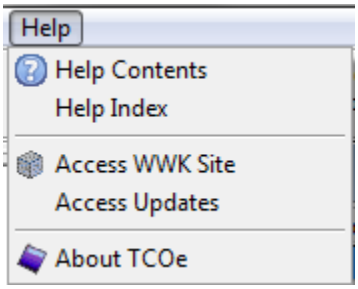
The view menu allows the user to determine whether the navigation bar is displayed and if a separate window showing the recently opened models will remain open.



The inputs menu allows access to the individual model database tables. This is a duplication of the navigation bar under model input and items on the button bar.



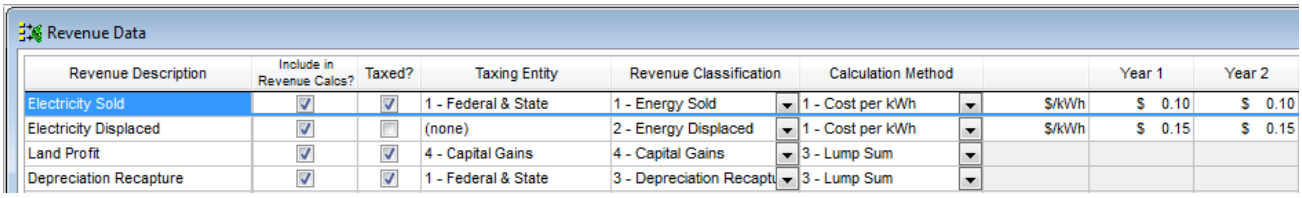
The reports menu provides access to the three output reports and replicates what is available on the navigation bar under model output and the button bar.



The help menu provides on-line help, access to the Wright Williams & Kelly, Inc. corporate web site (www.wwk.com) as well as the products download site where the installation package as well as product updates can be found. Additionally, information about software versions and support can be found under the About sub-menu.

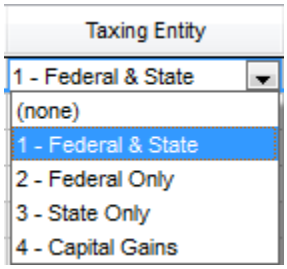
Data Entry Forms

Details for each database table will be covered in the data input chapter. However, in this section we will cover the basics that are applicable to all of the data entry forms.


Revenue Data

Revenue Description	Include in Revenue Calcs?	Taxed?	Taxing Entity	Revenue Classification	Calculation Method		Year 1	Year 2
Electricity Sold	☑	☑	1 - Federal & State	1 - Energy Sold	1 - Cost per kWh	$/kWh	$ 0.10	$ 0.10
Electricity Displaced	☑	☐	(none)	2 - Energy Displaced	1 - Cost per kWh	$/kWh	$ 0.15	$ 0.15
Land Profit	☑	☑	4 - Capital Gains	4 - Capital Gains	3 - Lump Sum			
Depreciation Recapture	☑	☑	1 - Federal & State	3 - Depreciation Recapt	3 - Lump Sum			

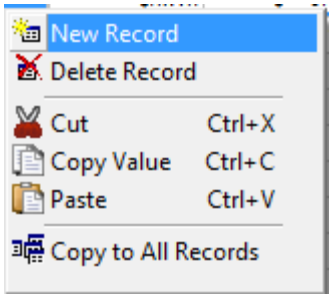
The far left column in most forms provides for the user to enter a description for that record. The rest of the information will be specific for the particular form that is open. Each record may contain yes/no check boxes, drop down choice boxes, and numeric entry cells (either single entry or annual). For annual entry records, data can be entered for up to the first six years and then, if the project lifetime is in excess of six years, the cost trend can be entered as an annual compounding inflation factor starting in year seven.



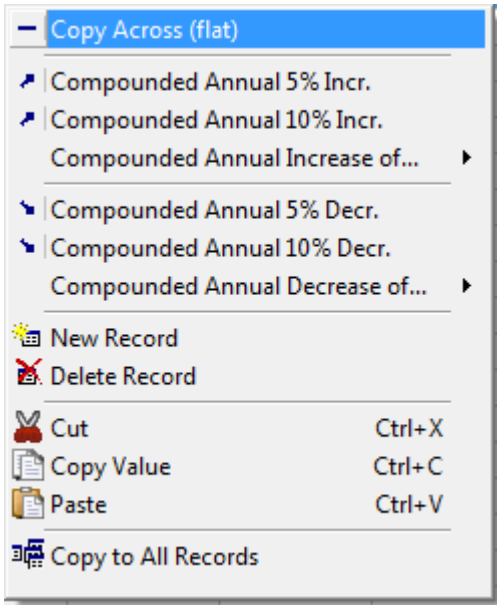
Taxing entity is an example of a drop down choice box.

Year 5	Year 6	Cost Trend
$ 0.10	$ 0.10	2.0 %
$ 0.15	$ 0.15	3.0 %

This is an example of records for years five and six and the corresponding annual percentage cost trend for the remaining years. The cost trend is an annual compounding factor.



TCOe™ v1.0 also provides context sensitive input assistance. By right clicking the mouse when on any non-annual numeric input for a record, the user will be presented with the following choices.



For inputs that are annual numeric, the context sensitive menu provides additional choices regarding the trend line for the data.

All of the forms also contain buttons at the bottom of the screen to access help files, to close the form, to undo any changes if they have been made, and to update the form if any changes have been made.

Project Summary Report

The project summary report provides a review of the important results. It is recommended that this report be used as a starting point since the results are easily followed and concisely presented.

The project summary report includes information on LCOE, TCOe™, return on investment (ROI), and the individual factors that are subsets of LCOE and/or TCOe™. See the chapter on data output for information on printing and exporting this and other reports.

Project Name: **Solar Project**

Discount Rate	9.0 %
Inflation Rate	3.0 %
Project Lifetime	10 years
First Year Energy Production	37,758,857 kWh
PCI	$ 5,470,000

	Real	Nominal
LCOE	$ 0.0502	$ 0.0552
TCOe	($ 0.0421)	($ 0.0371)
ROI (Capital - Tax Credits)	246.5 %	214.0 %
ROI (Capital Only)	223.4 %	194.0 %
Depreciation & Interest Factor	$ 1,825,049	$ 1,663,641
Loan Payment Factor	$ 6,103,693	$ 5,314,921
Operating Expense Factor	$ 5,376,981	$ 4,680,298
Residual Value Factor	$ 3,231,393	$ 2,404,526
Decommissioning Factor	$ 614,598	$ 457,331
Overhead Factor	$ 3,317,936	$ 2,889,164
Revenue Factor	$ 25,809,660	$ 22,407,020
Lifetime Energy Production	236,589,412	206,254,139 kWh

Shut Down

To return to the desktop, choose exit from the file menu, click on the red X in the upper right of the screen, or click on the red circle-X on the button bar. If you have your security key installed and have not saved your data, you will be given an opportunity to do so before TCOe™ v1.0 closes.

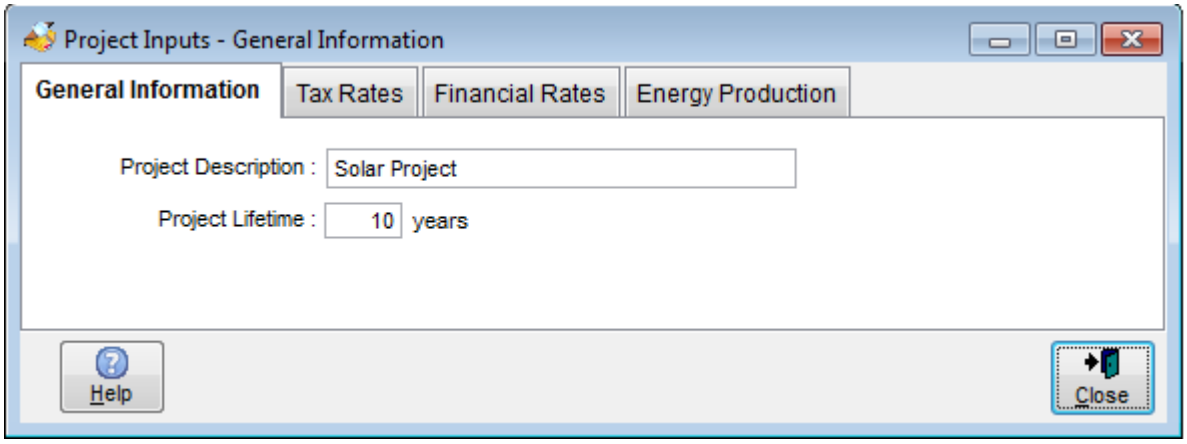
Data Input

Data Entry

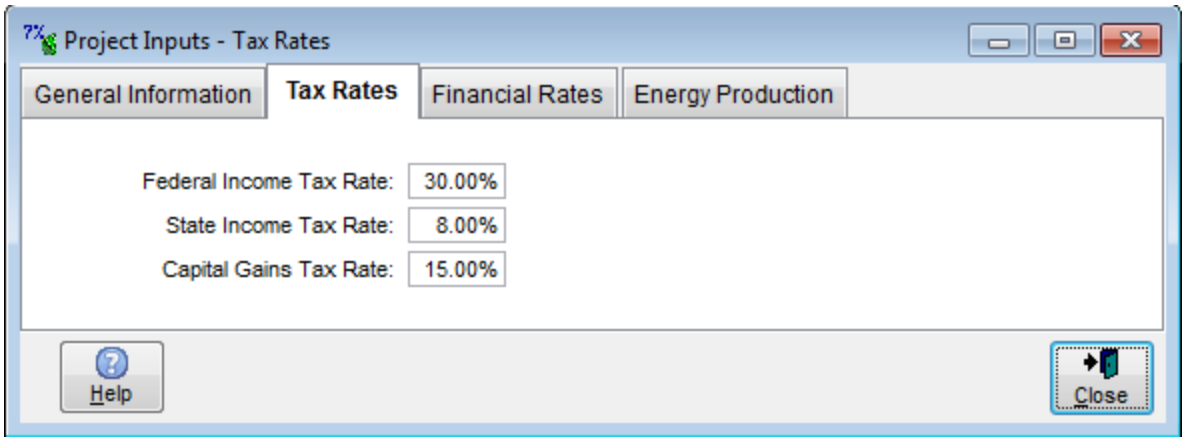
Data entry is divided into ten forms: general information, tax credits, loans, decommissioning, overhead, revenue, capital assets, installation labor, operations labor, and operating expenses. These forms are accessed through the input menu, navigation bar, or button bar. The general information form is the only form with multiple tabs to handle project information, tax rates, financial rates, and energy production.

General Information

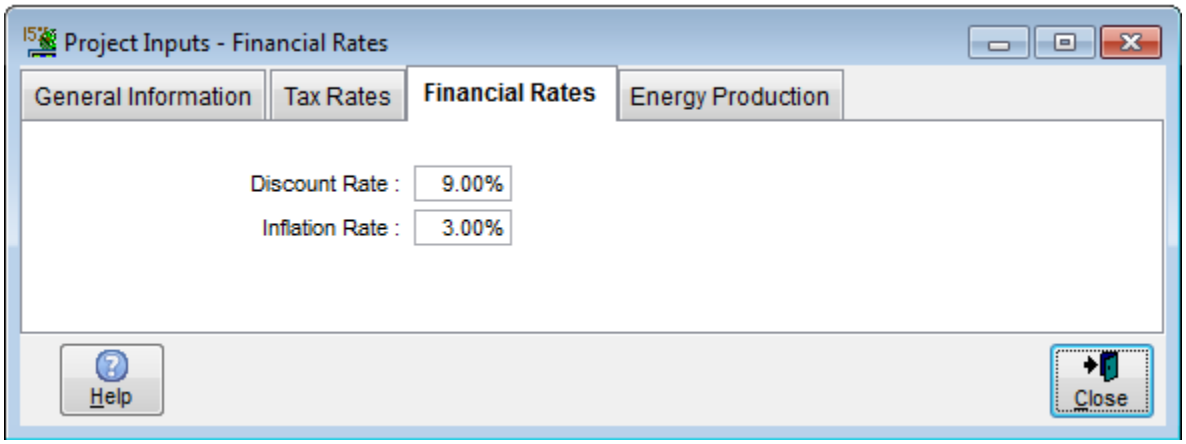
The general information form is a multi-tab form for data entry of high level inputs for the model.



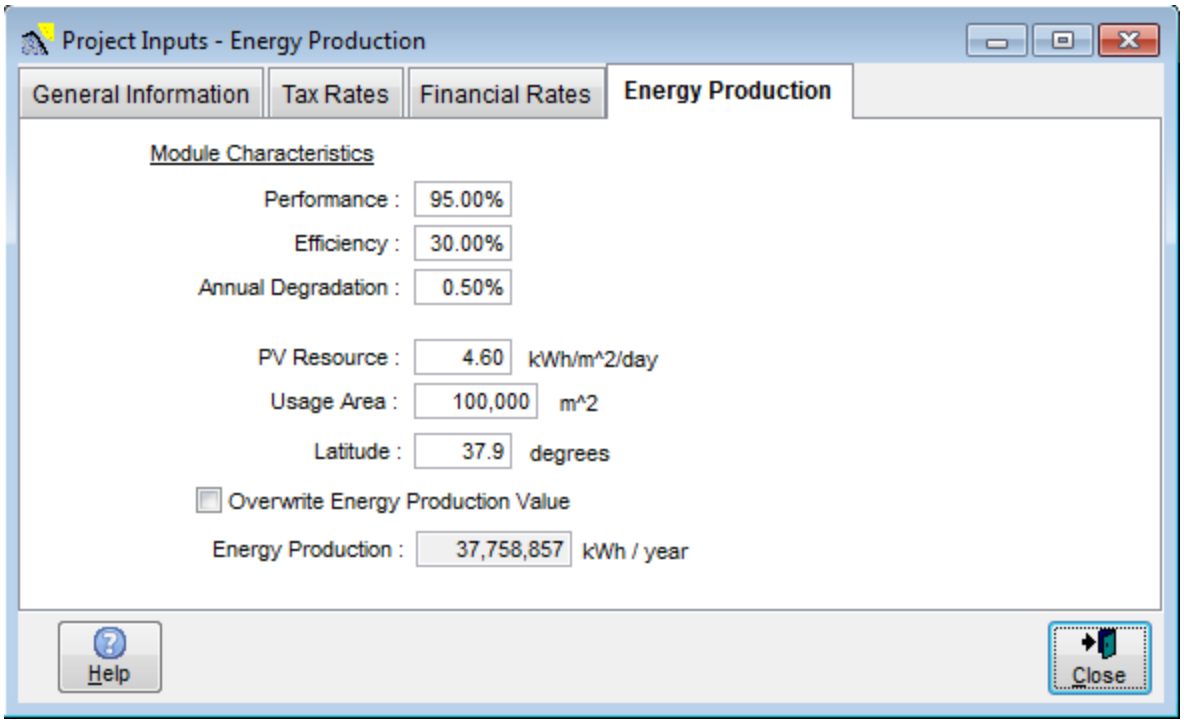
General information provides the project title and the lifetime.



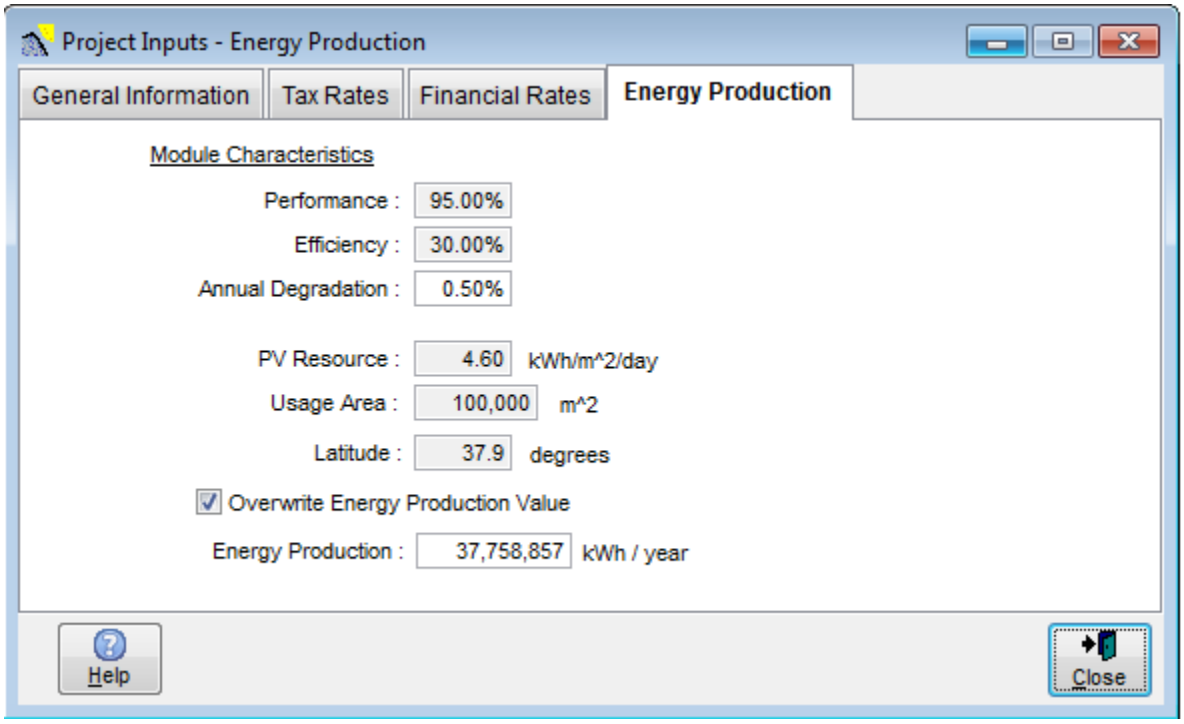
The tax rates tab allows entry of federal income tax, state income tax, and capital gains tax rates. On the revenue form, the user can assign individual tax rates to the sources of income.



Financial rates provide inputs for use in calculating net present value (NPV) and providing for the calculation of both $LCOE_{nominal}$ and $LCOE_{real}$ (see data output chapter for more information on these factors). The inflation rate is only used in these calculations and is not automatically applied to costs. Annual and recurring costs can be escalated through the use of the cost trend factor available on forms with those cost attributes.

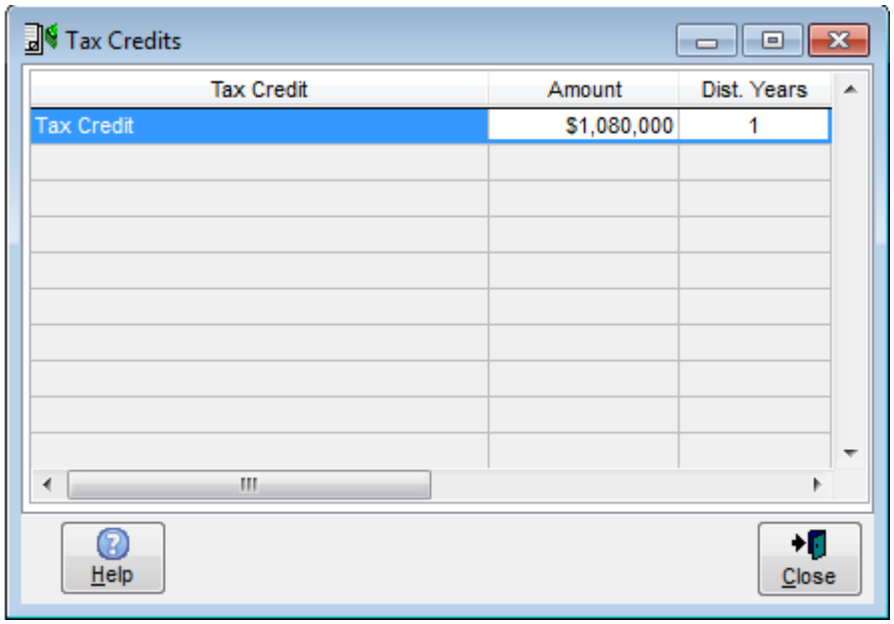


The energy production form allows users interested in PV installations to use basic information to estimate the initial kilowatt-hours produced. It is recommended that users with an interest in a highly accurate energy production estimate, use other detailed models or empirical measurements. In those cases, the user can click on the overwrite check box and directly enter the energy production. The user will also need to enter the annual degradation rate.



Tax Credits

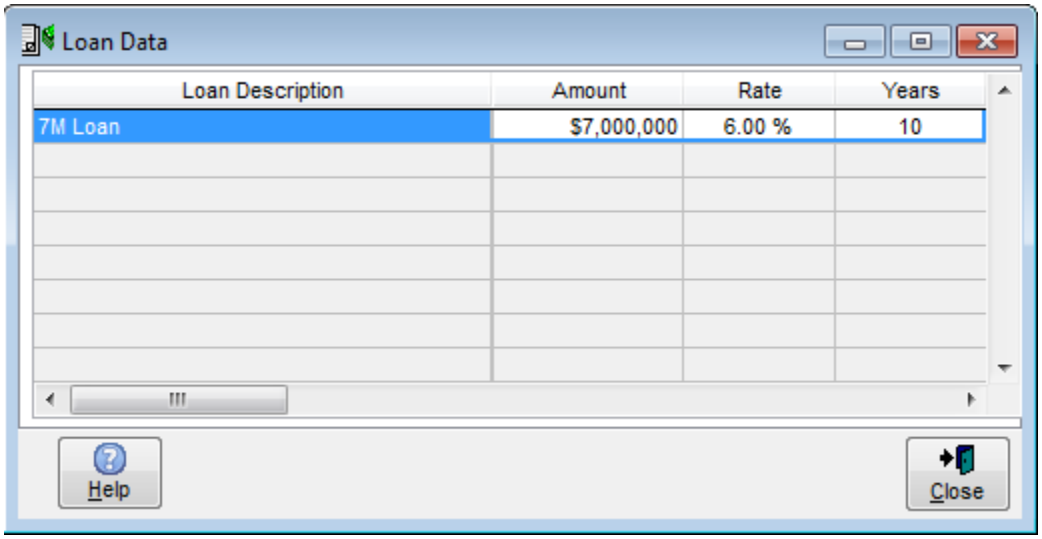
The tax credit form allows for the entry of all tax credits and grants that are associated with the project.



Each individual tax credit or grant is entered as a separate record with a corresponding amount and year of receipt. If a tax credit or grant is received over multiple years, a separate record should be created for each year.

Loan Data

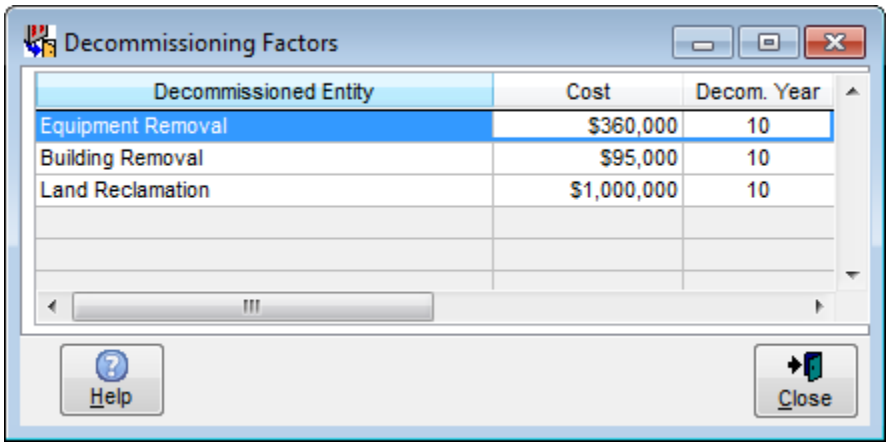
The loan data form allows for entry of any loans used for the initial capital investment in the project.



Each loan is entered as a separate record with a corresponding principal balance, interest rate, and duration. The loan is associated with a specific asset on the capital asset form.

Decommissioning Factors

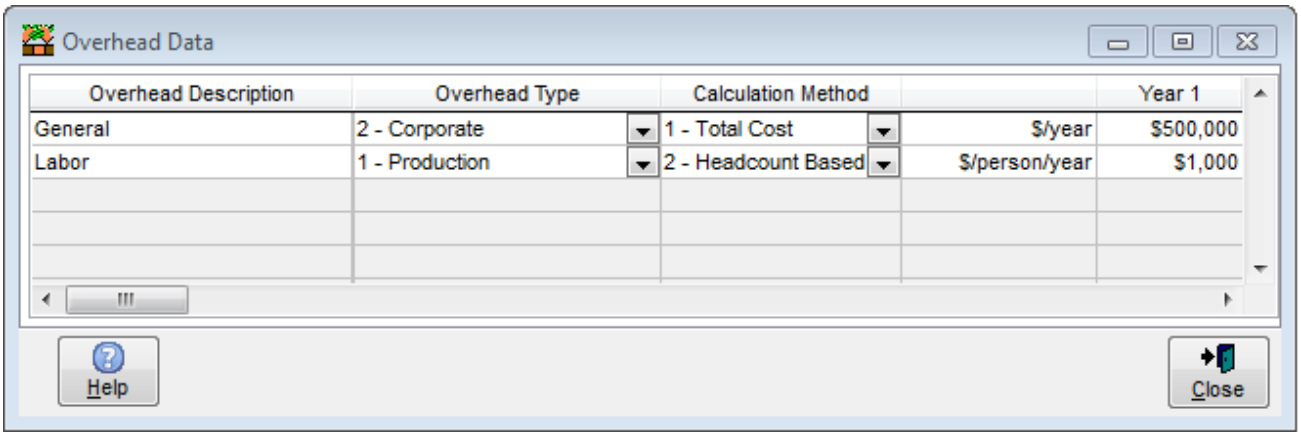
The decommissioning form allows the user to enter costs associated with removing equipment from service or returning the land or roof to its original or required condition.

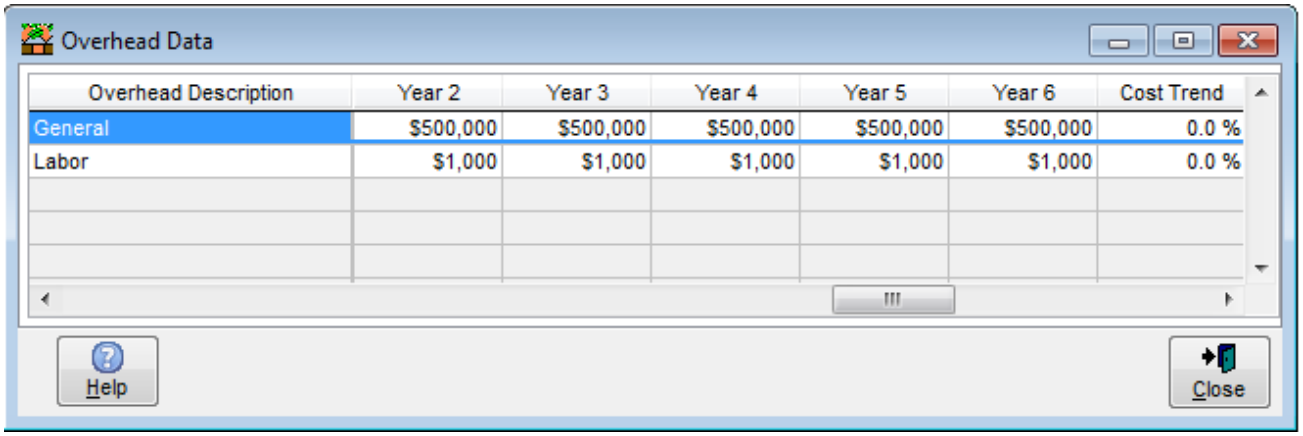


Items that are to be decommissioned can be entered as separate records with an associated cost and the year in which they are removed from service or reclaimed.

Overhead Data

The overhead data form allows the input of overhead costs as absolute costs or as a function of headcount.

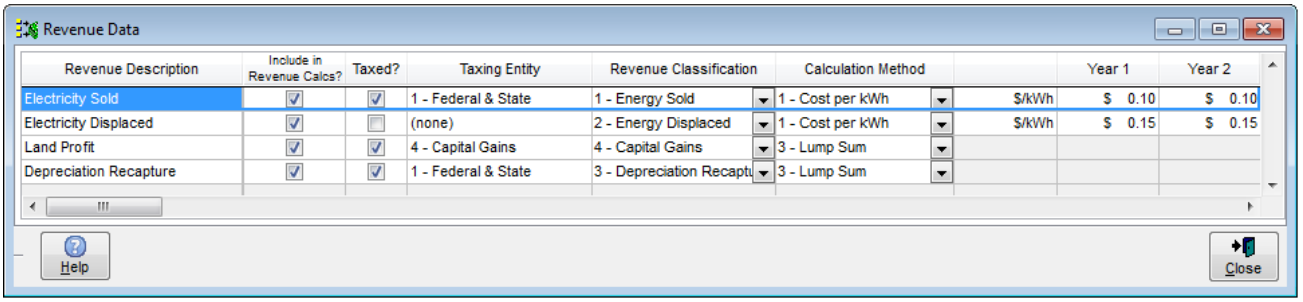


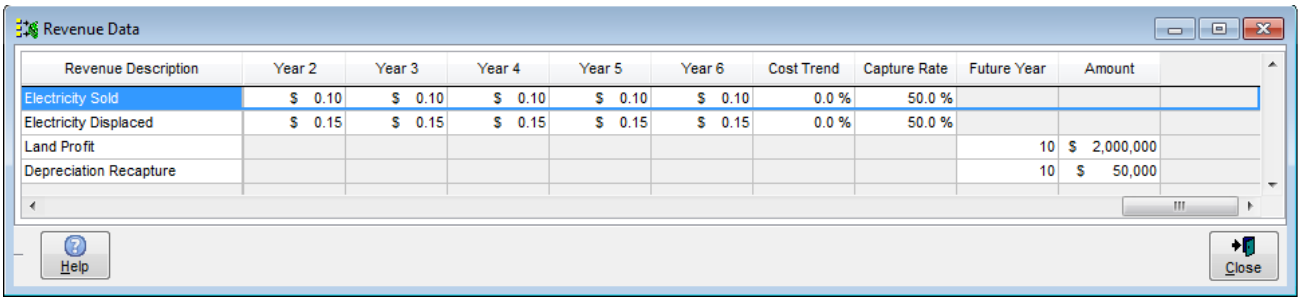


Each overhead category can be entered as a distinct record. The overhead type determines if the record will be considered an operating cost (production) or an "other cost" (corporate) that will be below the gross margin calculation line. The calculation method allows for either an absolute dollar amount ($/year) or an amount based on headcount ($/person/year). These values are entered specifically for the first six years or the length of the project life, whichever is shorter. For years in excess of six, the cost trend can be entered as an annual compounding inflation factor starting in year seven.

Revenue Data

This form provides for entry of data regarding revenue generation both directly from energy production but also from the sale of other assets. Additionally, the user is allowed to consider grid energy displacement as an equivalent to a revenue stream.





Each record on the revenue data form has several attributes. The first is whether the record should be included in the revenue calculations as used by the output reports. Some users may wish to exclude asset sales or energy displaced from their income streams. Other information required is whether an income stream is taxed and by

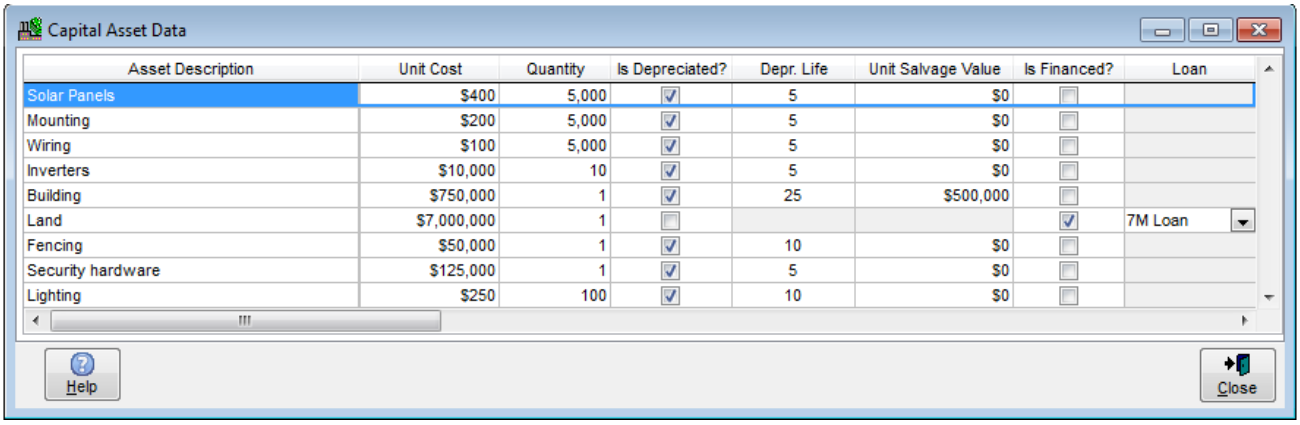
which taxing agency. For reporting purposes, each revenue record is classified as energy sold, energy displaced, depreciation recapture, or capital gains. There are three methods for calculating revenue streams (cost per kWh, recurring annual, or lump sum). The choice of calculation method determines the nature of the remaining inputs.

For cost per kWh inputs, the inputs are entered specifically for the first six years or the length of the project life, whichever is shorter. For years in excess of six, the cost trend can be entered as an annual compounding inflation factor starting in year seven. Additionally, the capture rate allows the total energy production to be divided between various records using this calculation method.

Recurring annual inputs are entered specifically for the first six years or the length of the project life, whichever is shorter. For years in excess of six, the cost trend can be entered as an annual compounding inflation factor starting in year seven. Lump sum inputs indicate the amount and the year of receipt.

Capital Assets

The capital assets data form provides for a listing of all initial capital investments. The records can be for assets that are depreciated or not and financed or not.



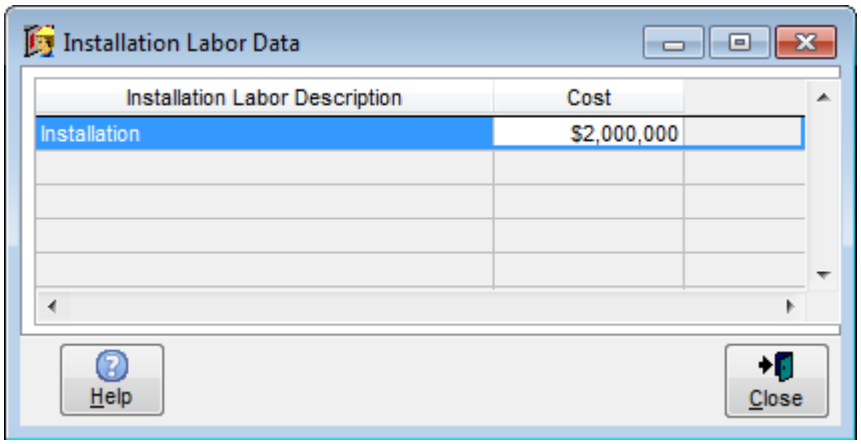
Each asset class can be entered as a record with the following attributes:

1. The cost of a single unit
2. The number of units of that asset class acquired
3. Is the asset class depreciated
4. If depreciated, over what timeframe (straight-line depreciation)
5. What is the salvage value per unit, if any
6. Is the asset financed
7. If the asset is financed, all loans listed on the loan data table will be available for selection from a drop down choice box

If an asset is not depreciated, the depreciation life and unit salvage value inputs will be unavailable.

Installation Labor

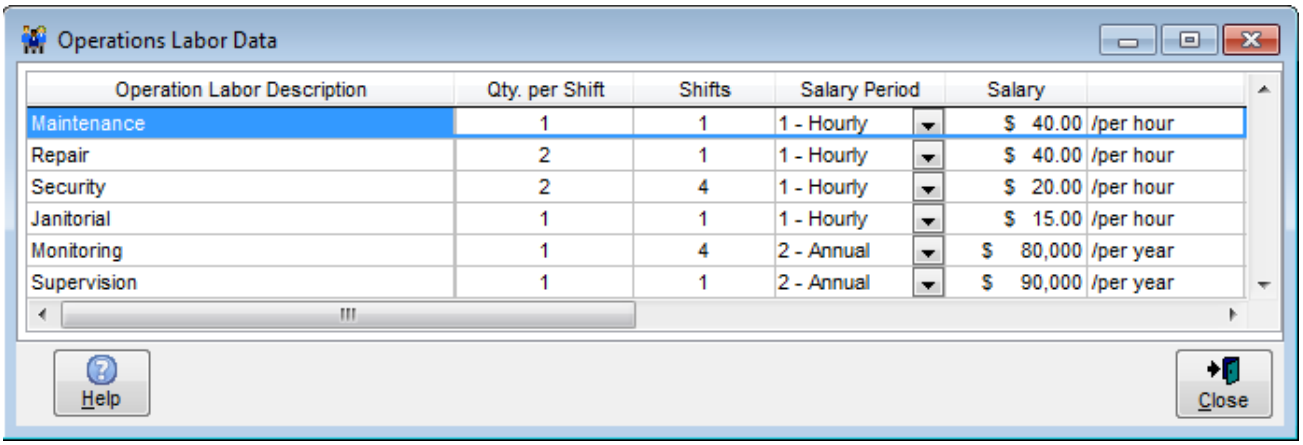
Any labor classes that are used during the installation of project assets can be listed in this form.



The only attribute besides the record name is the lump sum cost.

Operations Labor

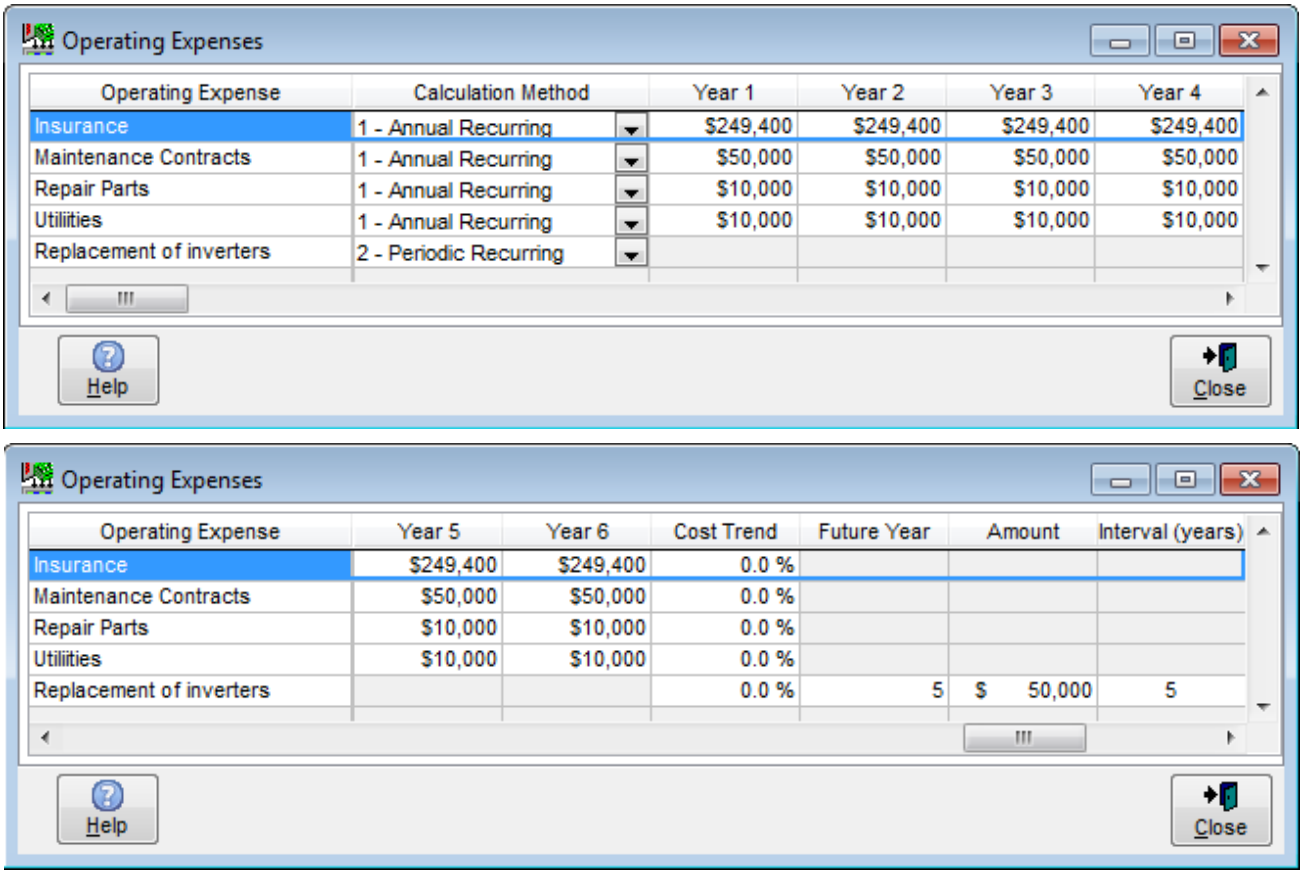
Labor categories for on-going support of the project can be entered in this table.



Each labor entry requires information on the number of people per shift, the number of unique shifts, whether the employee or contractor is paid on an hourly or annual basis, and the hourly wage or annual salary.

Operating Expenses

All on-going operating expenses can be categorized and entered into this form. The user can also use this form to enter assets added after the initial year. These assets will not be depreciated, so the user will have to make a decision regarding the method of data entry.



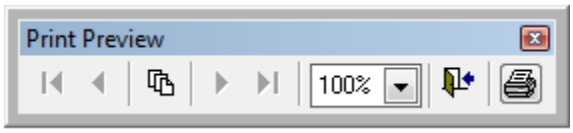
Each record contains information regarding the expense class as well as the calculation method (annual recurring, periodic recurring, or one time only). The choice of calculation method impacts which other attributes are available for the record of interest.

Annual recurring inputs are entered specifically for the first six years or the length of the project life, whichever is shorter. For years in excess of six, the cost trend can be entered as an annual compounding inflation factor starting in year seven. For periodic recurring expenses, the first occurrence of the expense is entered in the future year column, the cost is entered in the amount column, and then information regarding the interval between expenses. For one time expenses, the inputs are solely the future year in which the expense occurs and the amount.

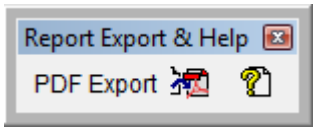
Data Output

Reports

TCOe™ v1.0 provides outputs consisting of three results reports, a project summary report, income statement, and cash flow statement. The individual reports can be accessed through the reports menu, the navigation bar, or the button bar. Once a report is selected, the user will be presented with two floating controls.



The print preview control allows the user to move between pages in multi-page reports, adjust the on-screen magnification, exit the report, or print.



The export control allows the user to convert the report to pdf (requires Adobe Reader to view). There is also context sensitive help available on this control.

Project Summary Report

The project summary report provides a review of the important project results. It is recommended that this report be used as a starting point since the results are easily followed and concisely presented.

The project summary report includes information on LCOE, TCOe™, return on investment (ROI), and the individual factors that are subsets of LCOE and/or TCOe™.

Project Name: **Solar Project**

Discount Rate	9.0 %
Inflation Rate	3.0 %
Project Lifetime	10 years
First Year Energy Production	37,758,857 kWh
PCI	$ 5,470,000

	Real	Nominal
LCOE	$ 0.0502	$ 0.0552
TCOe	($ 0.0421)	($ 0.0371)
ROI (Capital - Tax Credits)	246.5 %	214.0 %
ROI (Capital Only)	223.4 %	194.0 %
Depreciation & Interest Factor	$ 1,825,049	$ 1,663,641
Loan Payment Factor	$ 6,103,693	$ 5,314,921
Operating Expense Factor	$ 5,376,981	$ 4,680,298
Residual Value Factor	$ 3,231,393	$ 2,404,526
Decommissioning Factor	$ 614,598	$ 457,331
Overhead Factor	$ 3,317,936	$ 2,889,164
Revenue Factor	$ 25,809,660	$ 22,407,020
Lifetime Energy Production	236,589,412	206,254,139 kWh

Since TCOe™ includes revenue streams, it is possible for the project to show a net profit. This is represented by a negative net present value. Also, LCOE, TCOe™, and their sub-factors are shown as both real and nominal which represents different assumptions regarding the discount rate (DR). DR_{real} is the discount rate entered in the financial rates table. $DR_{nominal}$ is shown in the below equation:

$$DRnominal = (1 + \text{DRreal}) \times (1 + inflation\,rate) - 1$$

Income Statement

The income statement shows the revenue, expenses, and taxes for each year of the project. These figures are in absolute dollars and are not adjusted by the discount rate or inflation rate.

Income Statement

Project Name: **Solar Project**

	Year 1	Year 2	Year 3	Year 4
Total Revenue	**$ 4,696,258**	**4,672,777**	**4,649,413**	**4,626,168**
Electricity Sold	$ 1,878,503	1,869,111	1,859,765	1,850,467
Electricity Displaced	$ 2,817,755	2,803,666	2,789,648	2,775,701
Depreciation Recapture	$ 0	0	0	0
Capital Gains	$ 0	0	0	0
Total Operating Expenses	**$ 1,360,000**	**1,360,000**	**1,360,000**	**1,360,000**
Operating Expenses	$ 1,343,000	1,343,000	1,343,000	1,343,000
Product Overhead	$ 17,000	17,000	17,000	17,000
Gross Margin	**$ 3,336,258**	**3,312,777**	**3,289,413**	**3,266,168**
Gross Margin %	71.0 %	70.9 %	70.7 %	70.6 %
Other Expenses	**$ 1,682,500**	**1,650,635**	**1,616,859**	**1,581,056**
Depreciation	$ 762,500	762,500	762,500	762,500
Interest	$ 420,000	388,135	354,359	318,556
Decommissioning	$ 0	0	0	0
Corporate Overhead	$ 500,000	500,000	500,000	500,000
Pre-Tax Net Income	**$ 1,653,758**	**1,662,142**	**1,672,554**	**1,685,112**
Pre-Tax Taxable Income	($ 1,163,997)	(1,141,524)	(1,117,094)	(1,090,589)
Income Tax	$ 0	0	0	0
Capital Gains Tax	$ 0	0	0	0
Net Income	**$ 1,653,758**	**1,662,142**	**1,672,554**	**1,685,112**

While the user can enter as many revenue items as they wish in the revenue data table, the income statement aggregates those values into the four revenue classifications listed on that table.

Cash Flow Statement

The cash flow statement shows the sources of cash and cash uses for each year of the project. These figures are in absolute dollars and are not adjusted by the discount rate or inflation rate.

Cash Flow Statement

Project Name: **Solar Project**

	Year 1	Year 2	Year 3	Year 4
Cash Sources	**$ 5,776,258**	**4,672,777**	**4,649,413**	**4,626,168**
Electricity Sold	$ 1,878,503	1,869,111	1,859,765	1,850,467
Electricity Displaced	$ 2,817,755	2,803,666	2,789,648	2,775,701
Depreciation Recapture	$ 0	0	0	0
Capital Gains	$ 0	0	0	0
Tax Credits	$ 1,080,000	0	0	0
Cash Uses	**$ 7,361,076**	**2,811,076**	**2,811,076**	**2,811,076**
Capital Investment	$ 4,550,000	0	0	0
Loan Payments	$ 951,076	951,076	951,076	951,076
Operating Expenses	$ 1,343,000	1,343,000	1,343,000	1,343,000
Decommissioning	$ 0	0	0	0
Overhead	$ 517,000	517,000	517,000	517,000
Income Tax	$ 0	0	0	0
Capital Gains Tax	$ 0	0	0	0
Net Cash Flow	**($ 1,584,818)**	**1,861,701**	**1,838,337**	**1,815,092**
Cumulative Cash Flow	**($ 1,584,818)**	**276,883**	**2,115,220**	**3,930,312**

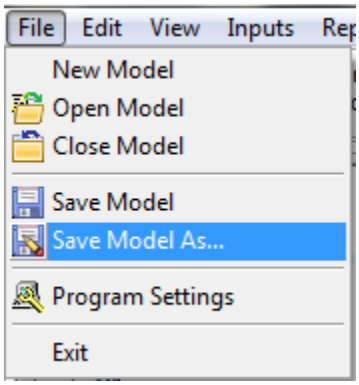
While the user can enter as many revenue items (cash sources) as they wish in the revenue data table, the cash flow statement aggregates those values into the four revenue classifications listed on that table. Additionally, any tax credits or grants are aggregated and displayed as a cash source.

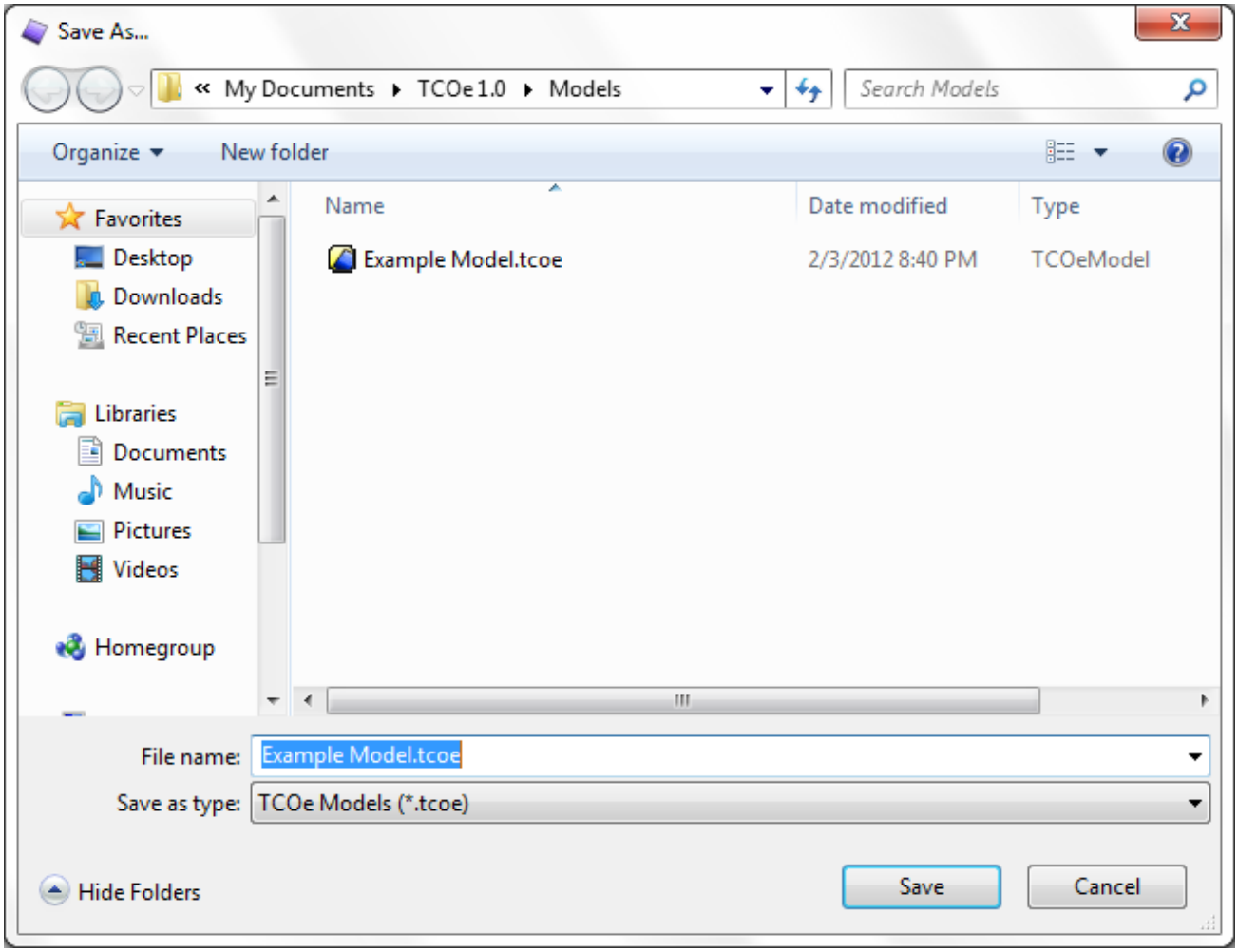
For cash uses, the items entered into the capital asset table (excluding those that are financed) are summed into the capital investment category. All other items are the summation of their respective data entry tables.

Data Storage

Saving Data

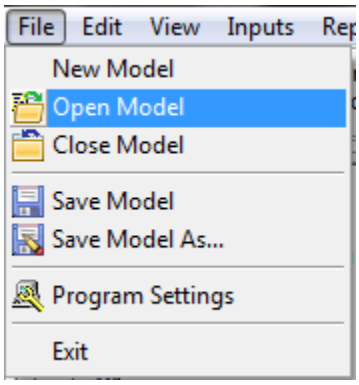
Model data files, once created, can be stored in the TCOe™ v1.0 integrated database. To save a model, select save from the file menu or click on the save button on the button bar. To save an existing model under a new name, use the save as function under the file menu. For new models that have not previously been saved, the save option acts the same as save as.





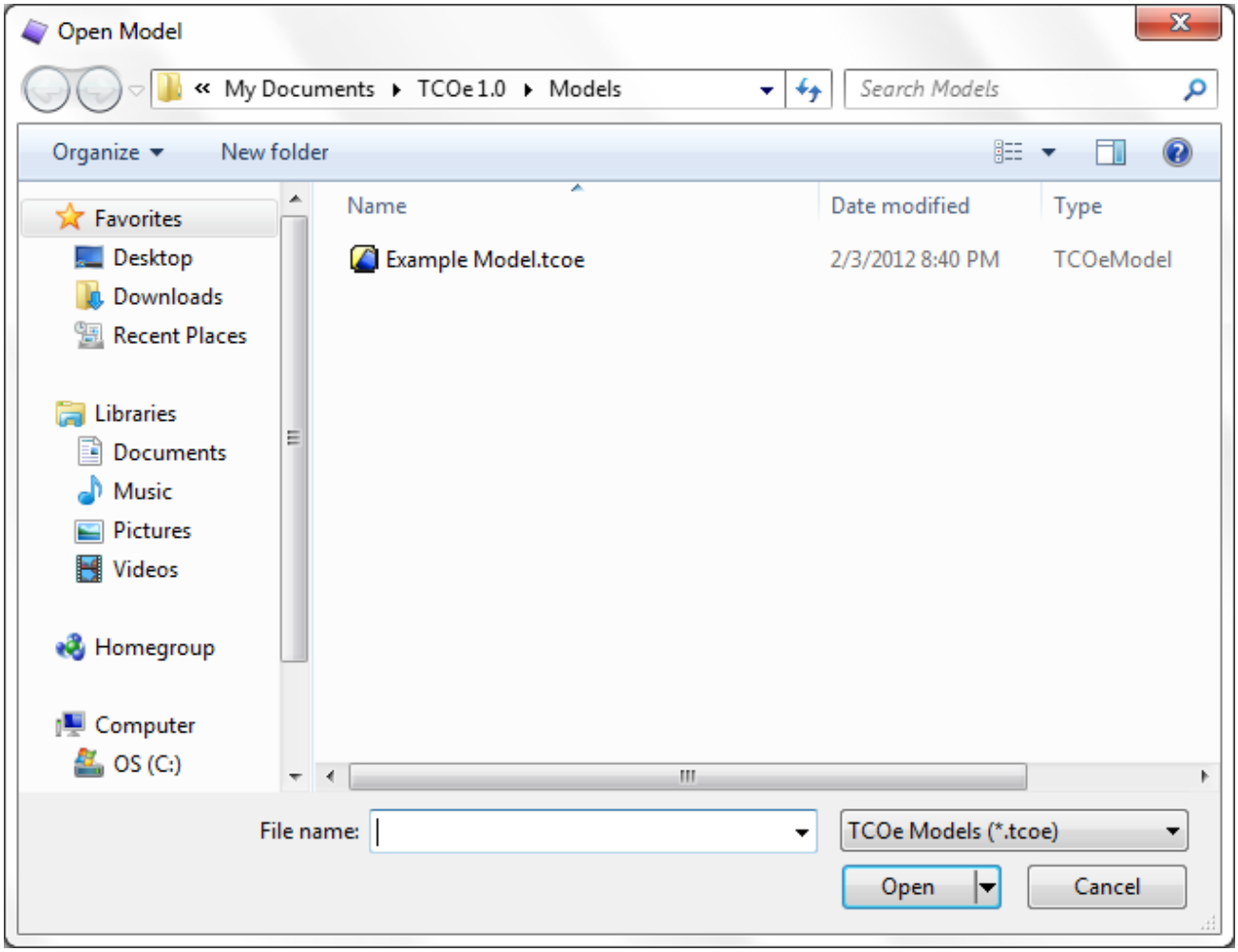
Retrieving Data

Once data has been stored in a database, TCOe™ v1.0 allows for easy and automatic retrieval. To access this function, select the file menu and select open model or click on the open folder button on the button bar.



This will display the open model dialog box. The user can select the model to be opened. Any model can be opened by simply selecting the file and choosing the

open button or double-clicking on the model name directly. Also, the columns can be sorted in ascending or descending order by clicking on the column headers.



Index