

EMFAC2011-HD

User's Guide



California Environmental Protection Agency

 **Air Resources Board**

September 19, 2011

1. Introduction and Design

EMFAC2011-HD was developed using Microsoft Visual Basic 2010 Express and MySQL Community Server (5.5). Microsoft Visual Basic 2010 Express was used to develop the front end graphic user interface and MySQL was used to manage the input and output data, and perform the emissions calculations.

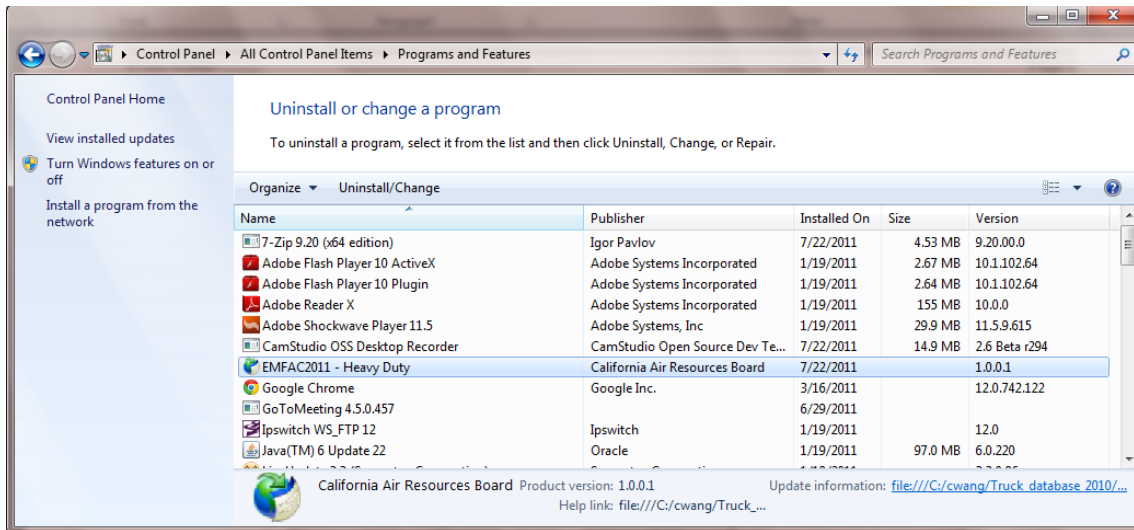
Microsoft Visual Basic 2010 Express is part of the Visual Studio 2010 Express family, a free set of tools that developers in windows can use to create custom applications using basic and expert settings. MySQL Community Server is a free downloadable open source database software.

2. System Requirements:

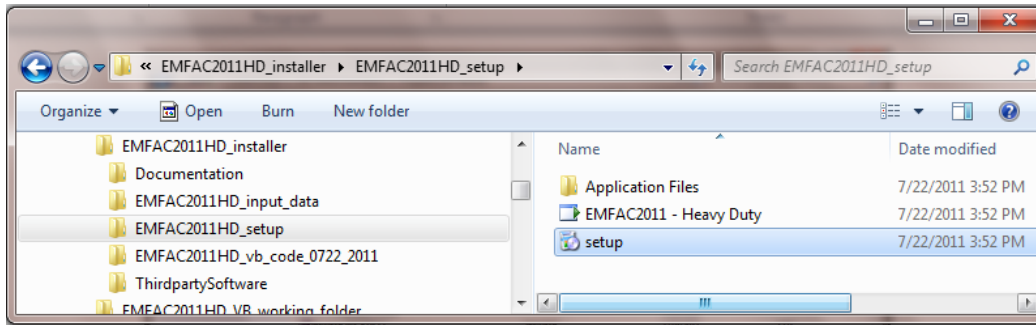
- a. Windows 2007 64-bit is required.
- b. .NET Framework 4 is required and can be downloaded from <http://msdn.microsoft.com/en-us/netframework/aa569263.aspx> .
- c. MySQL Community Server 5.5 (mysql-5.5-winx64.msi) is required. The software can be downloaded from <http://www.mysql.com/downloads/mysql/>.
- d. Mysql-connector-net-6.2 is required. The software can be downloaded from <http://www.mysql.com/downloads/connector/net/6.2.html#downloads>.
- e. About 70 MB of free space is needed to install the module and the data files needed to run the module.
- f. The module needs up to 68 GB of free space to hold the output files depending on the number of regions and calendar years the user chooses to calculate emissions for.
- g. The module was tested on the following system
 - i. Processor: Intel® Core™ 2 Duo CPU E8400 @3.00GHZ;
 - ii. Installed memory (RAM): 4.00 GB (3.90 GB Usable);
 - iii. System type: 64-bit Operating System;
 - iv. Windows Edition: Windows 7 Enterprise;

3. How to Install the Module:

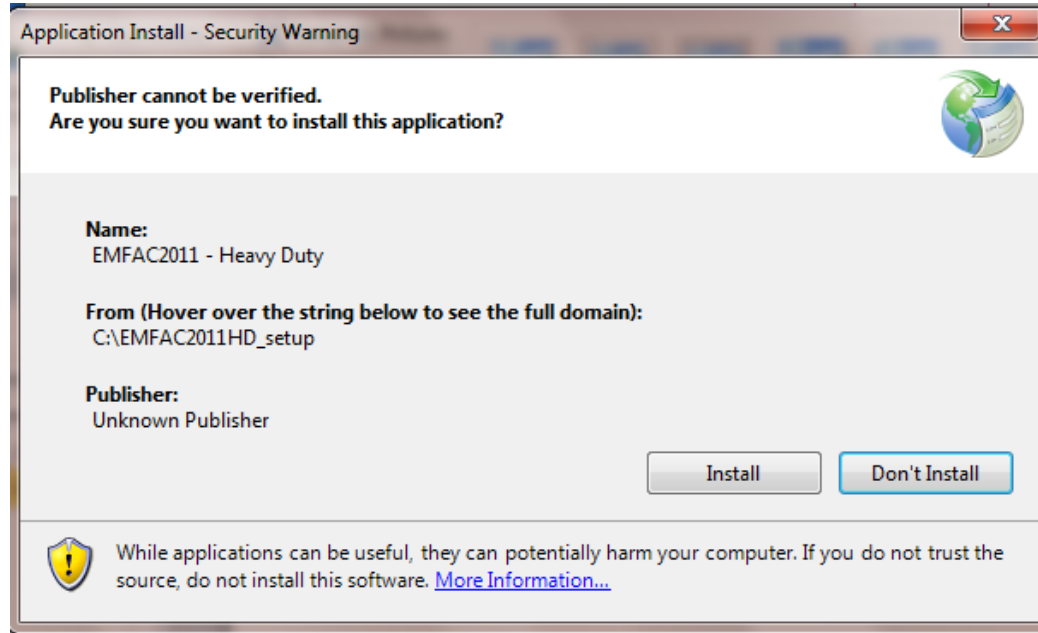
- a. Install third party software and import input data
 - i. Install MySQL Community Server 5.5 following MySQL installation instructions from www.mysql.com;
 - ii. Write down your server name, user name and password information which is required to run the module.
 - iii. Install a MySQL database manager application program (MySQL Workbench is recommended) for importing the input data for the module. The recommended software is available at <http://dev.mysql.com/downloads/workbench/5.2.html>;
 - iv. Import the module input data files included in the package (http://www.arb.ca.gov/msei/emfac2011_hd.htm) to MySQL server following instructions of database manager application. The instructions for MYSQL Workbench are available at <http://dev.mysql.com/doc/workbench/en/wb-server-administration.html>. A new schema, “emfac2011_hd”, with 32 data tables should appear on the MySQL server if the data were successfully imported;
 - v. Install mysql-connector-net-6.2;
- b. Install the EMFAC2011-HD module
 - i. Downloading and unzipping the installation package to a folder on local drive and installing the module from the local drive are recommended.
 - ii. If a previous version of the module is already installed, use the control panel to uninstall it prior to installing the new module. The name of the module is “EMFAC2011-Heavy Duty” in the program list.



iii. Double click the “setup” file in the module installer folder to begin the module installation.

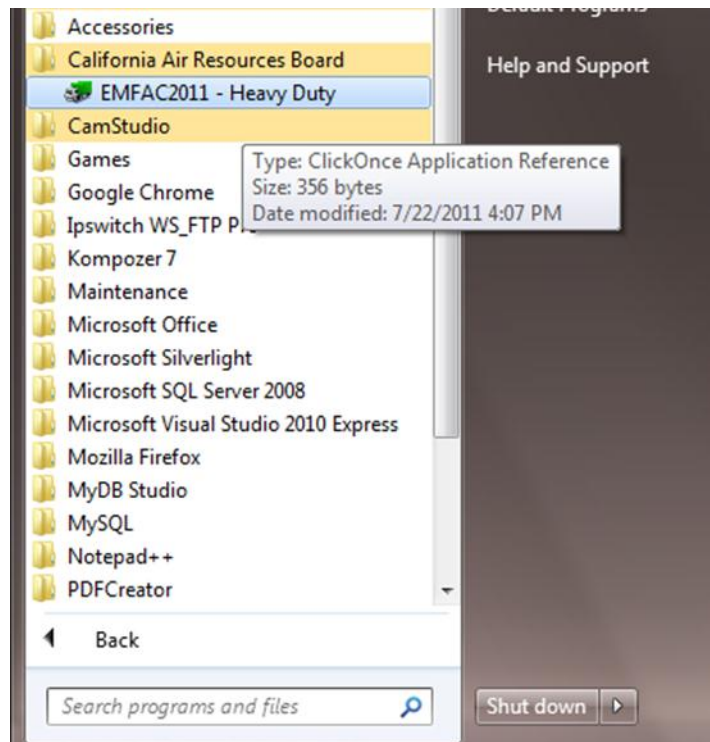


- iv. Click the “Install” button in the window as shown below and the module will be installed.

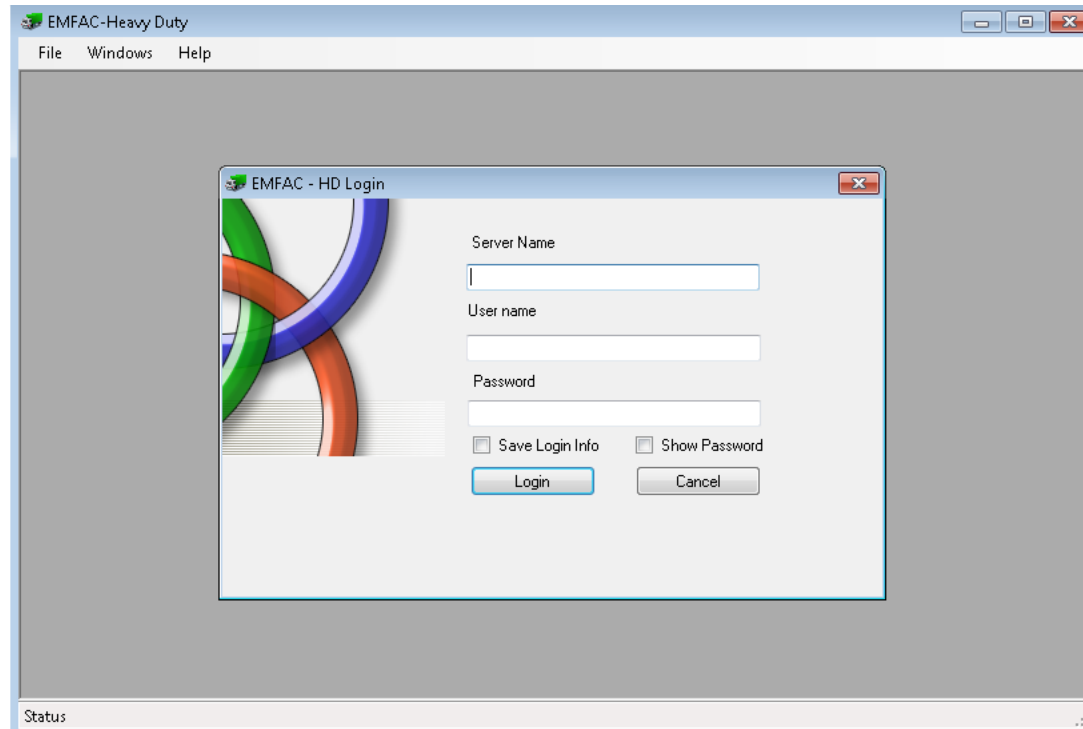


- v. The module will be available to run after the installation is completed.

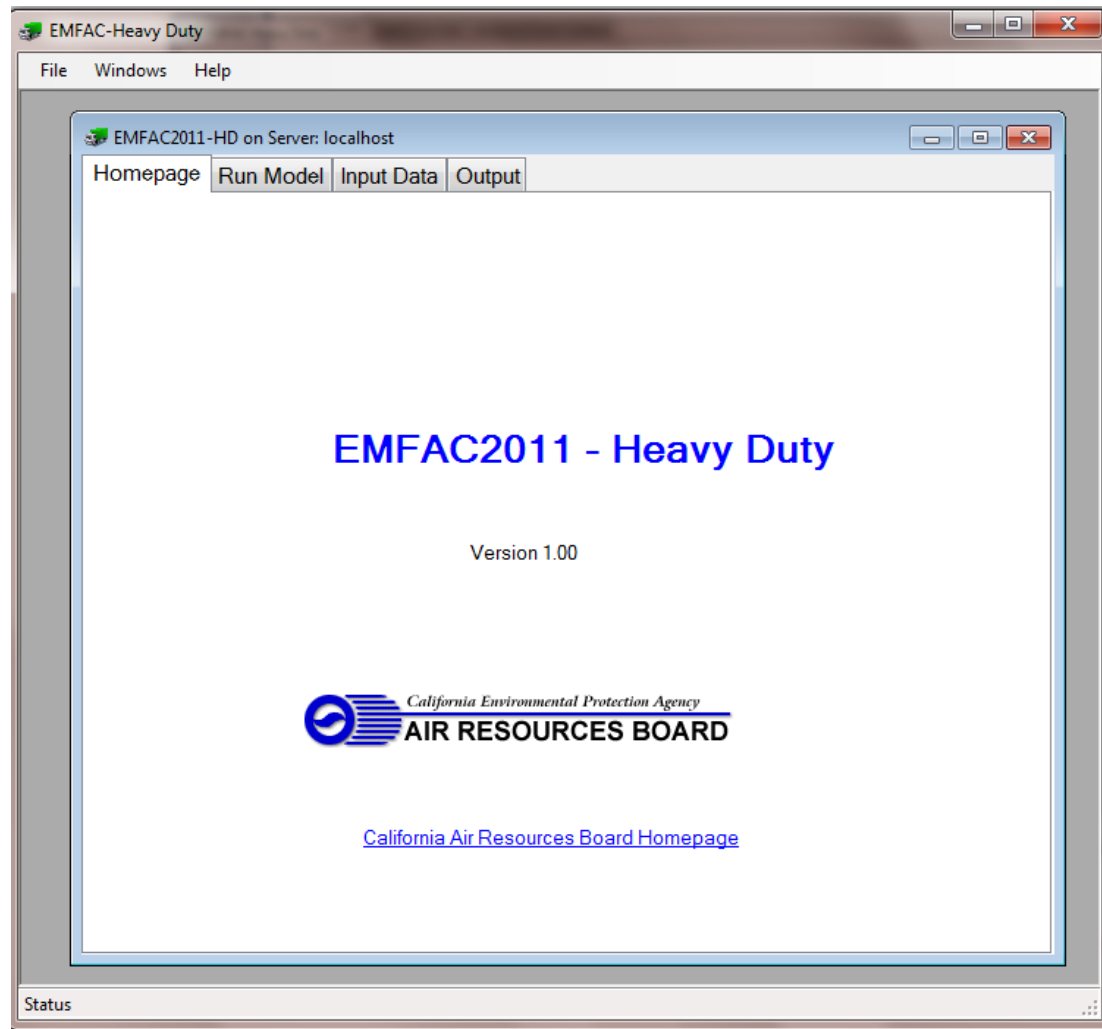
4. How to start the module
 - a. Find the program “EMFAC2011 – Heavy Duty” in the “California Air Resources Board” folder by clicking “All Programs” and scrolling down as needed. The program can be pinned to Taskbar or Start Menu for quick start by right clicking on the program name;



- b. Start the module by clicking program “EMFAC2011 – Heavy Duty”. The parent window of the module and the login window will show as below;



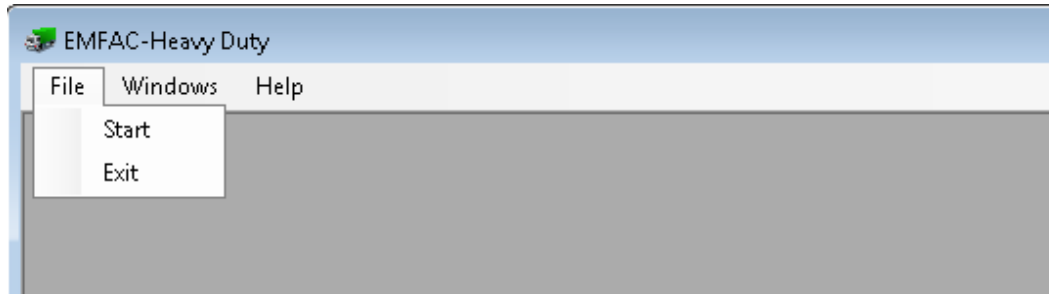
- c. Type in the server name of the MySQL server which was installed on the local drive which had the module data files imported into it. Type in the user name of the MySQL server and the password;
- d. Check the “Save login info” box to save the login information and the login information will be automatically filled in next time;
- e. Click the “Login” button to start the module and the module will display the homepage within the parent window;
- f. Click the “Cancel” button to cancel and a message box will pop-up and ask whether you want to quit the program. Click the “Yes” button to quit or click the “No” button to return to the login window.



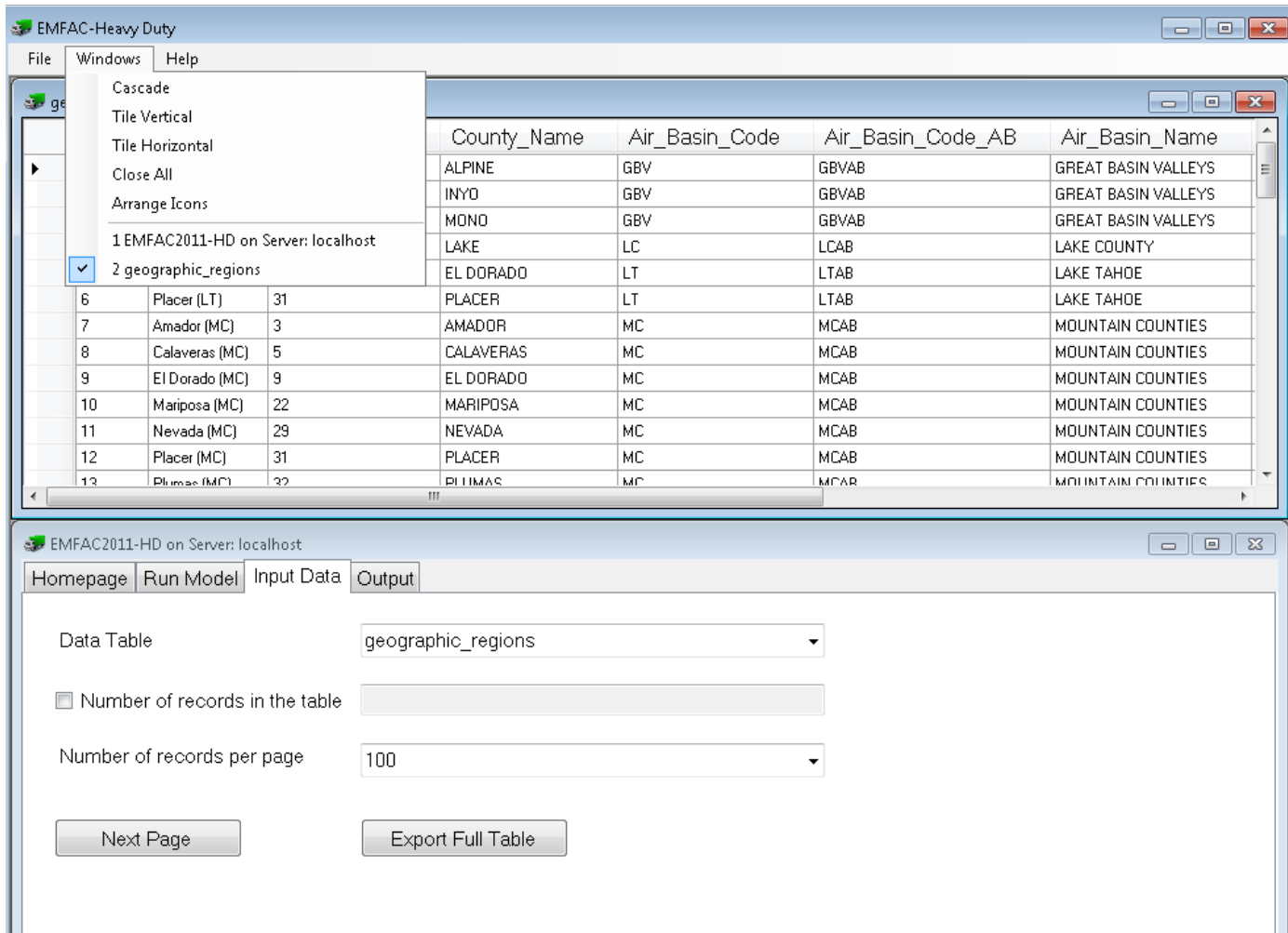
5. Module Menu

There are three menus in the parent window of the module: “File”, “Windows”, and “Help”.

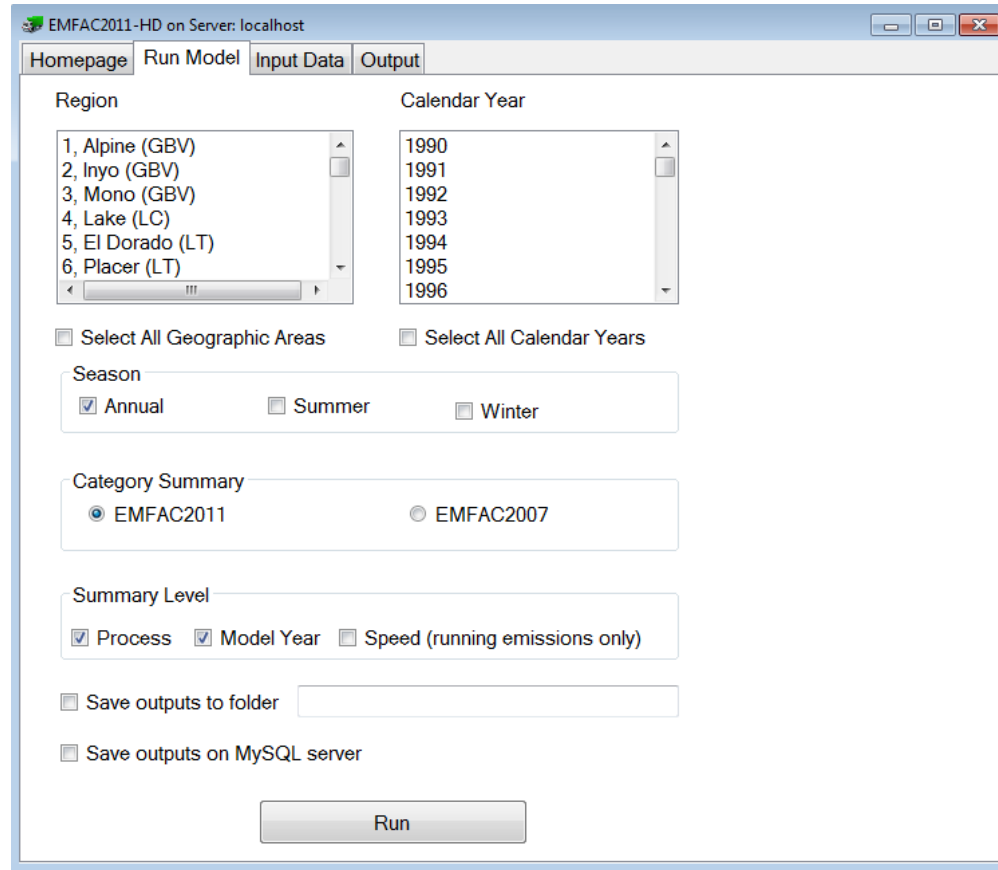
- a. The “Start” menu under “File” will be enabled after the module window is closed. Clicking the “Start” menu will bring up the login window.
- b. Clicking the “Exit” menu under “File” will close the module and the parent window. Click “Exit” to stop ongoing calculation.



- c. Menus under “Windows” can be used to arrange the windows when more than one window are open.
- d. The “User’s Guide” under “Help” is linked to the “EMFAC2011-HD User’s Guide” webpage.



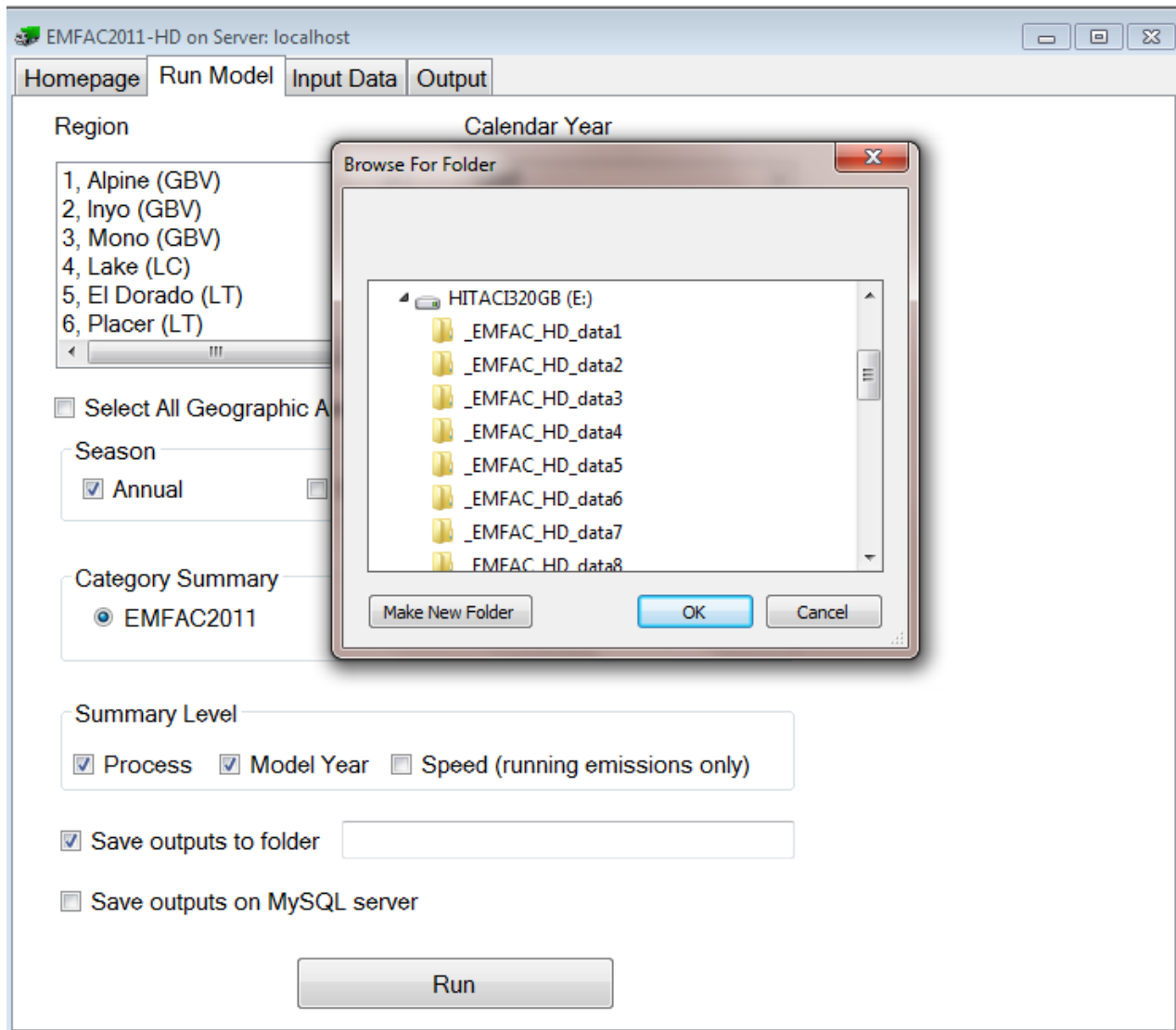
- 6. How to use the module
 - a. The “Run Model” Tab



- i. Select the region(s) and calendar year(s) to calculate emissions for. Hold the “Ctrl” key to select multiple regions and multiple calendar years. Hold the “shift” key to select multiple continuous regions and continuous years. To select all regions, check the “Select All Geographic Areas”. To select all calendar years, check “Select All Calendar Years”. Uncheck “Select All Geographic Areas” or “Select All Calendar Years” will deselect all selections. Note that it takes the module about 26 seconds to calculate detailed emissions for one region and one calendar year when running the module on the desktop used to test the module. The more regions and calendar years selected, the longer it will take to finish the run.
- ii. Select the season(s) by checking the check boxes.
- iii. Select the vehicle category summary for the output files. The module can generate output files using the EMFAC2011 vehicle category or the EMFAC2007 vehicle category. The relationship between the EMFAC2011 category and the EMFAC2007 category is in the input data table “Vehicle inventory category and fleet relationship”.
- iv. Select the output summary level. The module can generate output files by “Process” and/or by “Model Year” and/or “Speed”. Note that output by “speed” only has running emission estimations. The more detailed the output selection is, the more disk space will be needed to save the outputs.
- v. Select the location to save the output files. The results can be saved on the local drive (on which the MySQL server is installed for the module) in the designated folder in the CSV (Comma Separated Value) file format and/or on the MySQL server. Check the “Save outputs to folder” to save the results on a local drive specified in the designated folder box and check the “Save outputs on MySQL server” to save the output files on a MySQL server.
 1. Save results on local drive
 - a. After checking the check box next to “Save outputs to folder”, a message box will show that the module can only save the results to a local drive when the module runs on a local MySQL (vs. remote server). Click “No” to cancel and click “Yes” to continue and select the folder to save the output files. A new folder to save the output files can be created in the folder browser. It is recommended to keep the name of the folder simple. Special characters in the path of the folder may generate errors. The path of the folder will show in the box next to “Save outputs to folder”.

- b. Make sure enough disk space is available for the output files. The module will or may generate two CSV files for each region and calendar year pair selected. One CSV file is for running emissions by speed, and one CSV file is summary for all processes. The summary CSV file will be generated if “Save outputs to folder” is checked. The running emissions by speed file will be generated when both “Save outputs to folder” and “Speed” summary level are selected. Depending on the region, calendar year, and summary level selected, the file for running emissions by speed can be as large as 14 MB and the summary files can be 3 MB per file.
 - c. The file for the running emission by speed is named like “emfac_hd_output_gai_XX_cy_XXXX_by_spd.csv” and the summary file is named like “emfac_hd_output_gai_XX_cy_XXXX_summary.csv”.
2. Save results on the MySQL server
- a. If “Save outputs on MySQL server” is checked, results will be saved in MySQL data tables on the MySQL server.
 - b. If “Save outputs on MySQL server” is checked, results of previous runs will be deleted from the server before new results are saved.
 - c. The module will create two MySQL data tables for each GAI selected, each with all selected calendar years. One table for running emissions by speed named like “emfac_hd_ei_output_by_spd_gai_XX”. And one table for all emission processes named like “emfac_hd_ei_output_summary_gai_XX”.
 - d. If the results are saved on the MySQL server, CSV files can be generated and saved into a designated folder from the “Output” tab. See the output tab section for more details.

- vi. Click the “Run” button.
 - 1. The first time the “Run” button is clicked after the input data files are imported, the module needs to run a process to allocate activity from air basin to geographic regions. This process will take several minutes to finish. A message box will be displayed to remind the users of this process. Click “Yes” to continue and wait until the process is finished. Do not click any other module buttons, including buttons in the message box while the module is allocating the activity to geographic regions.
 - 2. A message box will be displayed with a warning to limit the number of regions and calendar years selected due to the time and free disk space needed on the test computer. It took about 22 hours to calculate emissions for all 69 regions and the calendar years 1990 through 2035. When “save outputs to folder” was checked, the module generated 3174 CSV files for running emissions by speed, and 3174 CSV summary files, which used more than 33 GB disk space. When “Save outputs on server” was checked, the module generated about 37 GB of output data. So about 70 GB of free disk space was needed for all detailed outputs (saved as both CSV files and MySQL tables) that included all the 69 regions and the calendar years 1990 through 2035.



b. The “Input Data” Tab

- i. This tab is used to browse and export input data files that are used in the module;
- ii. Select an input data table from the dropdown list, a new window will open showing data records for the selected table;
- iii. The number of records in the table will be displayed in the box below the dropdown list if the checkbox before “Number of records in the table” is checked;
- iv. Change the number of records per page in the dropdown list if more or fewer records are to be shown per page. It takes longer time to open the table, if a greater number of records is selected;
- v. Click on the “Next Page” button to show more data records. The button will be disabled at the end of table and a message box will show the end of the table has been reached. Reopen the table to restart the browsing;
- vi. To copy selected data to the clipboard, right click on selected data and then left click on “Copy data to clipboard” on menu.
- vii. All records of the selected table can be exported by clicking on the “Export Full Table” button. Select a folder for the destination.
- viii. The “input data table list” table contains the name of the tables (column “table_name”) used in the coding of the module and the description of each table (column “table_description”) used in the input data table drop down list. The “table_name” column may also be used to join with the “input data table data dictionary” table which contains the information for each column of each input table.

EMFAC2011-HD on Server: localhost

Homepage Run Model Input Data Output

Data Table Accrual rate for deterioration

Number of records in the table

Number of records per page 100

Next Page Export Full Table

EMFAC-Heavy Duty

File Windows Help

EMFAC2011-HD on Server: localhost

Homepage Run Model Input Data Output

Data Table Geographic area definition

Number of records in the table

Number of records per page 100

Next Page Export Full Table

Geographic area definition

| | gai | Area | County_Code | County_Name | Air_Basin_Code | Air_Basin_Code_AB |
|----|-----|----------------|-------------|-------------|----------------|-------------------|
| 1 | | Alpine (GBV) | 2 | ALPINE | GBV | GBVAB |
| 2 | | Inyo (GBV) | 14 | INYO | GBV | GBVAB |
| 3 | | Mono (GBV) | 26 | MONO | GBV | GBVAB |
| 4 | | Lake (LC) | 17 | LAKE | LC | LCAB |
| 5 | | El Dorado (LT) | 9 | EL DORADO | LT | LTAB |
| 6 | | Placer (LT) | 31 | PLACER | LT | LTAB |
| 7 | | Amador (MC) | 3 | AMADOR | MC | MCAB |
| 8 | | Calaveras (MC) | 5 | CALAVERAS | MC | MCAB |
| 9 | | El Dorado (MC) | 9 | EL DORADO | MC | MCAB |
| 10 | | Mariposa (MC) | 22 | MARIPOSA | MC | MCAB |
| 11 | | Nevada (MC) | 29 | NEVADA | MC | MCAB |
| 12 | | Placer (MC) | 31 | PLACER | MC | MCAB |
| 13 | | Plumas (MC) | 32 | PLUMAS | MC | MCAB |

Status

- c. The “Output” Tab
- i. If the “Save outputs on MySQL server” is checked when running the module, the results can be exported as CSV files from the “Output” tab;
 - ii. The “Regions Available ” list shows the regions that have emission estimations saved on the MySQL server;
 - iii. When a region is selected from the “Regions Available” list, the calendar years that have emission estimations saved on the MySQL server for the selected region will show in the list “Calendar Year Available”;
 - iv. Select a region for which the emissions estimation results are to be exported. Only one region can be selected at one time;
 - v. Select a calendar year for which the results are to be exported. Hold the “Ctrl” key to select multiple calendar years. Hold the “shift” key to select multiple continuous years. To select all calendar years, check the box “Select All Calendar Years”.
 - vi. Click “Export Full Table...” button to export results for the selected region and selected calendar years;
 - vii. A message box will ask whether to export the results to a local drive. Click “No” to cancel and click “Yes” to continue and select the folder to save the output files. You may also create a new folder in the folder browser.
 - viii. Make sure enough disk space is available for the output files. The module generates two CSV files for each calendar year pair selected. One file is for running emissions by speed, and one file is for all processes. Depending on the region, calendar year, and summary level selected, the file for running emissions by speed can be as large as 14 MB and the summary can be 3 MB per file.
 - ix. The file for the running emission by speed is named like “emfac_hd_output_gai_XX_cy_XXXX_by_spd.csv” and the file for the summary file is named like “emfac_hd_output_gai_XX_cy_XXXX_summary.csv”