Plug-in Vehicle Competitiveness (PVC) Software Analysis Tool

User Guide for Version 3.0x

(with Custom-Curves FASTSim & Support for MD/HD Commercial Vehicles)

Karim Hamza, Jean Chu & Ken Laberteaux

February 2021

Contents

Installation & System Requirements

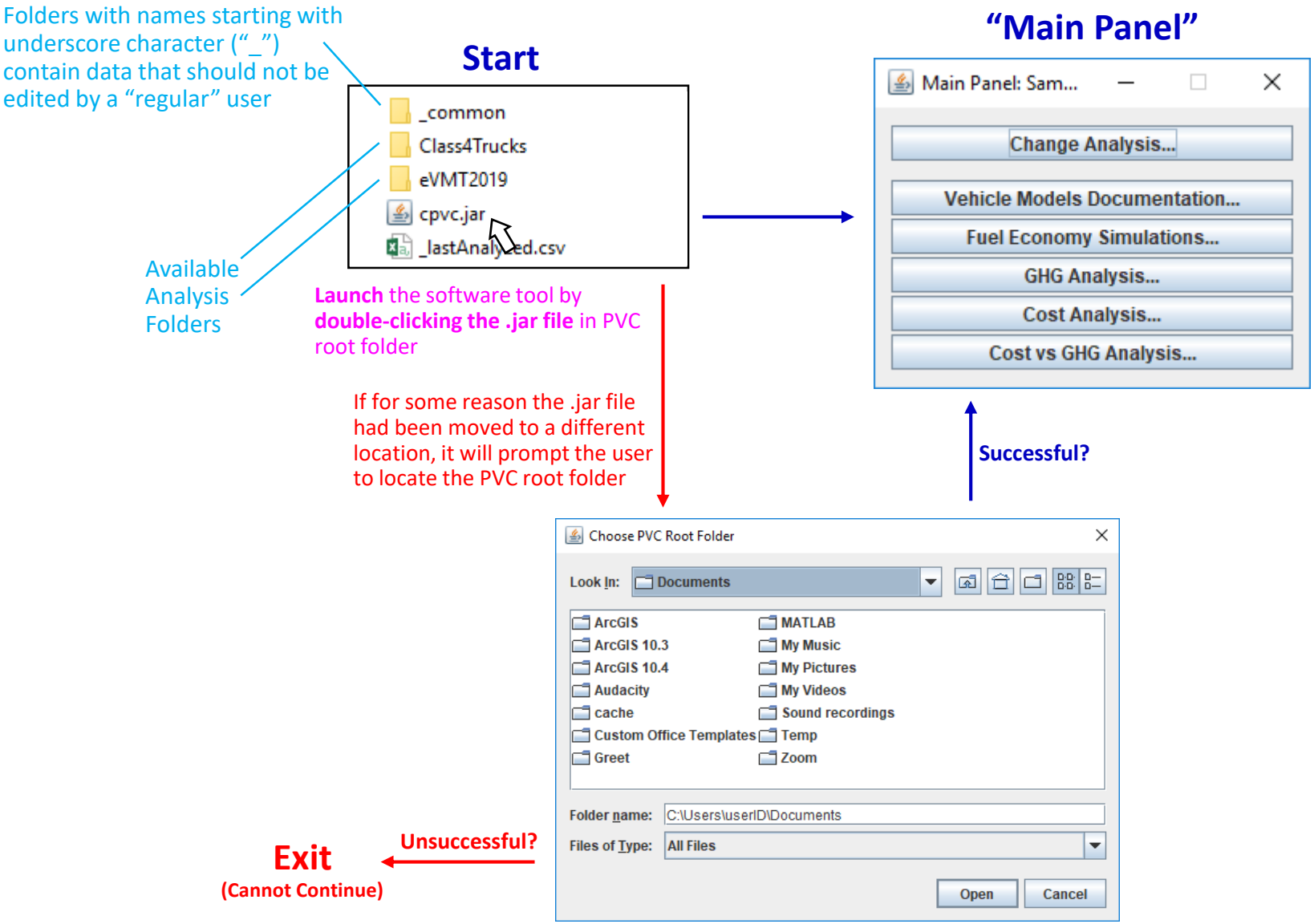
Installation

- Un-zip to a local drive, and wait for un-zipping to completely finish
  - Note: the un-zip folder location **…~\PVC-xxxx** will be referred to as ***"PVC Root Folder"***

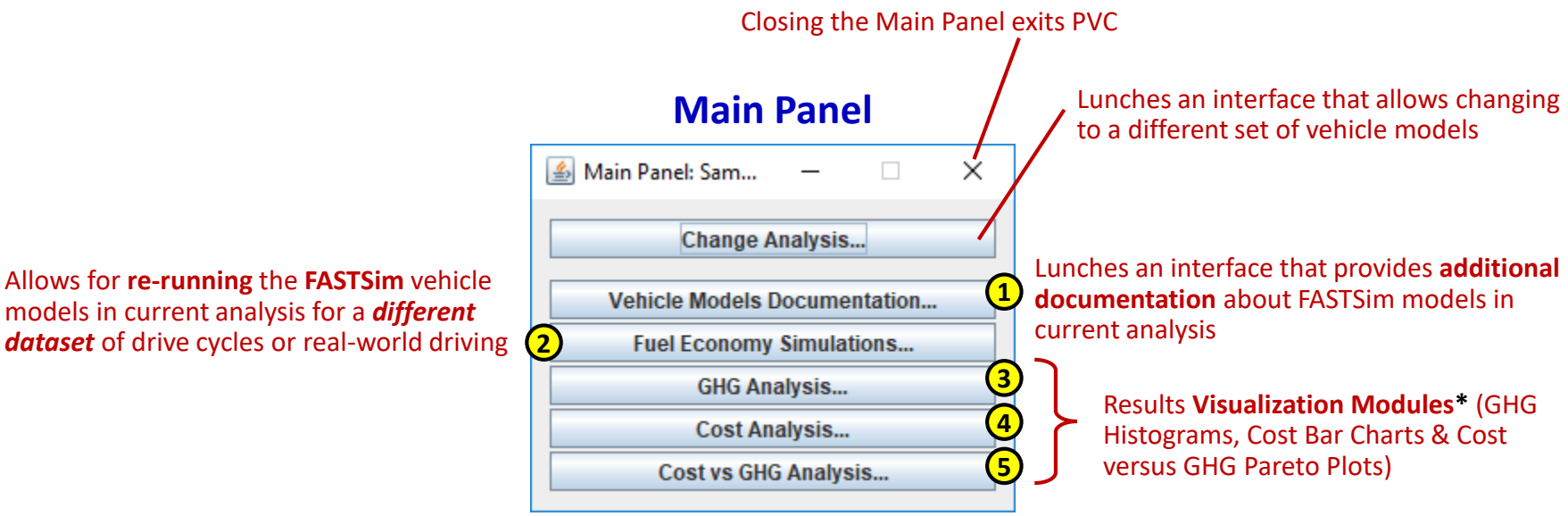
System Requirements

- **Java Run-Time Environment (JRE) 1.6** or a more recent version
  - Note: An easy way to check if JRE is already installed (JRE is not need for download/unzip) is:
    Check the Windows icon for the file "pvc_xxx_v3.0x.jar"…
    If "pvc_xxx_v3.0x.jar" looks like a **Coffee Cup**, JRE is already installed
  - Note: JRE 1.6 is pretty old, so any windows PC that had installed the JRE after 2012 will have 1.6 or more recent)
  - **If JRE is not yet installed, it needs to be downloaded**:
    https://www.oracle.com/technetwork/java/javase/downloads/jre8-downloads-2133155.html -- **for Windows 10** (recommended x64 .exe installer)
    https://www.oracle.com/technetwork/java/javase/install-windows-152927.html -- for **Windows 32 bit**
- **Adobe Reader** or any other software that can read PDF files
- **Free storage** space of at least **0.5 GB** (**1 GB** recommended), plus an additional **2-3 GB** if planning to download the full CHTS dataset (which is a separate download)

Launching the Software



Main Modules



* Notes

- The zip file for PVC software package typically comes with pre-generated fuel economy simulations. When/if there are no results to show, the three buttons for visualization modules will be grayed out

- To limit distribution file size, PVC software package includes pre-generated fuel economy simulations, plus *samples* of real-world driving trips. **Full California Household Travel Survey (CHTS)** set of trips is **available as a separate download**, which interested users are encouraged to obtain, unzip & place within the folder: **<PVC-root>_common\realWorldDriving**

What the Software Can & Cannot Do

Can Do

- View/visualize pre-analyzed fuel simulations under ***Many*** different adjustable scenario parameters, including: Cost of various powertrain technologies, Cost and Greenhouse Gas (GHG) of Electricity and other Fuels, as well as various aspects of vehicle owner behavior
- Save a "Snapshot" of any Scenario to .CSV File (exporting results to MS-Excel)
- Run fuel economy simulations via the existing FASTSim vehicle models for any set of drive cycles or real-world trips (not limited to CHTS or pre-analyzed results)
- Delete previous fuel simulations

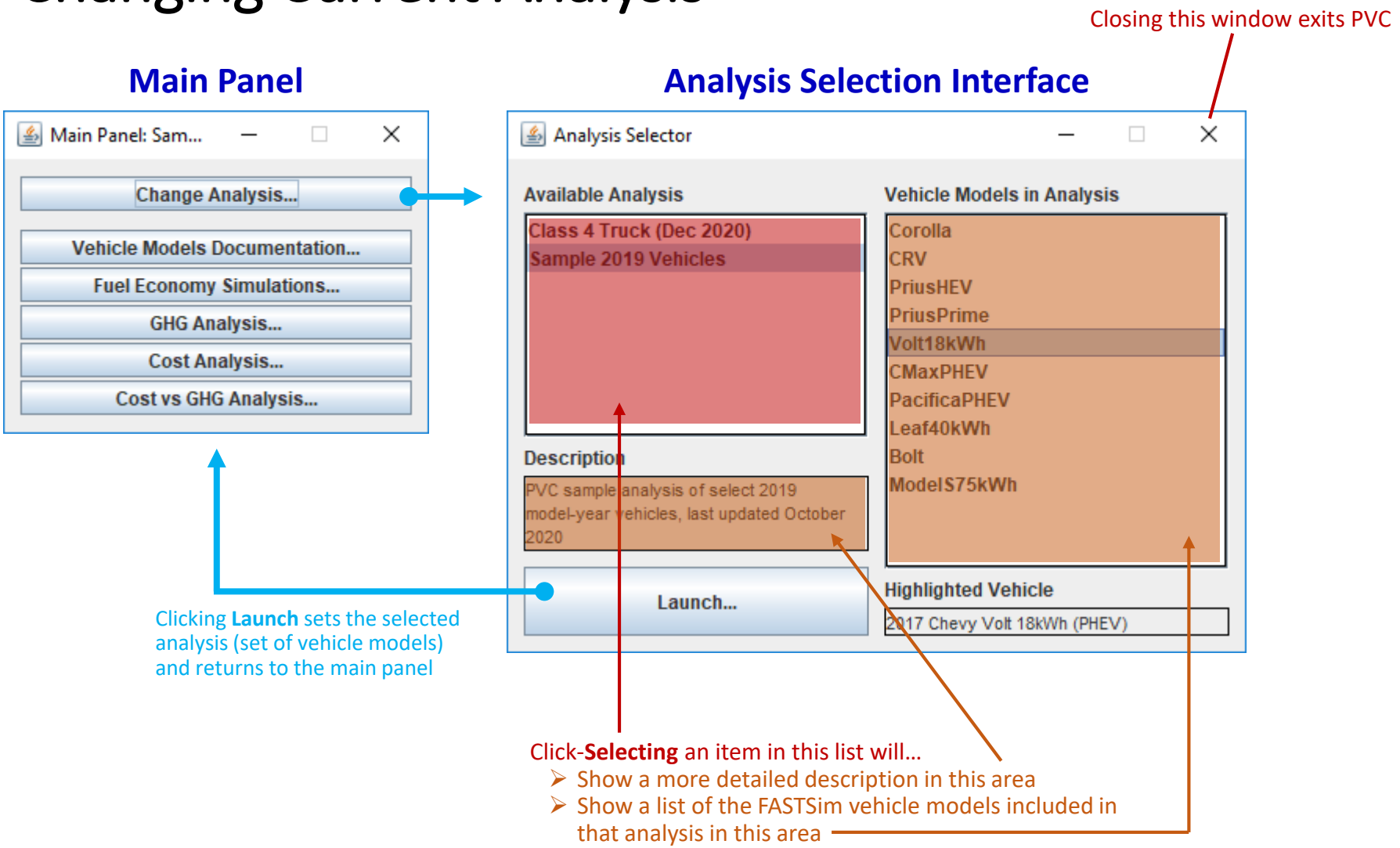
Cannot Do*

- Create New or Directly Edit the FASTSim Vehicle Models**
- Any adjustment to parameters that would invalidate or skew pre-analyzed results. Examples of this include: changing the charging behavior beyond default limits (e.g. 5-min duration charging events), or including a percentage of bio-fuel in Diesel or Gasoline… for those type of modeling edits, an Advanced User* should first delete all previous fuel economy simulations, make the change via text files, then re-run the fuel economy simulations

* An "Advanced User" can do any of the tasks listed as "Cannot do via the software graphical user interface (GUI)" via editing text files within PVC folder structure (a separate manual for advanced users will eventually become available)

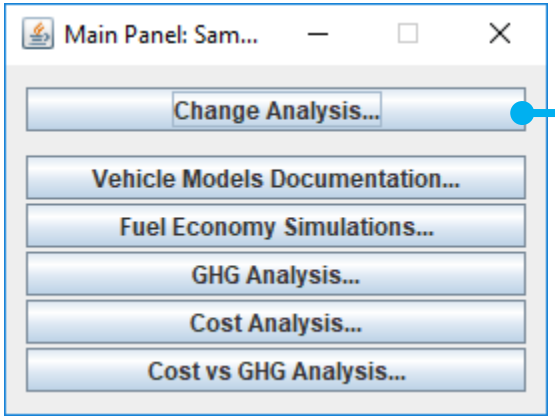
** Though a GUI functionality for editing FASTSim model parameters was available in versions 2.0x of PVC, research activity by the authors revealed that it takes expertise, time, and a non-trivial amount of data in order to create validated FASTSim vehicle models that closely resemble real-world vehicle performance. As such, this modeling capability is now reserved for advanced users.

Changing Current Analysis

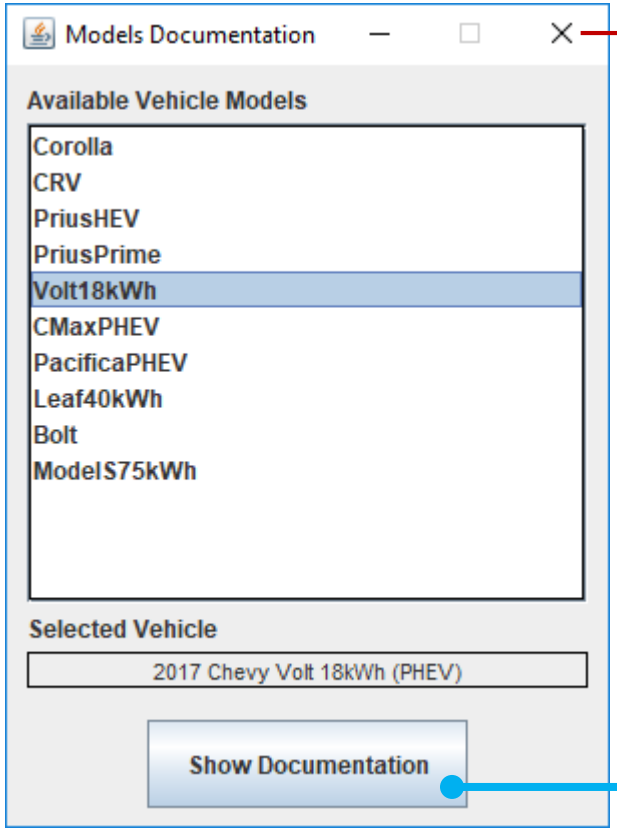


Module #1: Vehicle Models Documentation

Main Panel



Models Documentation Module

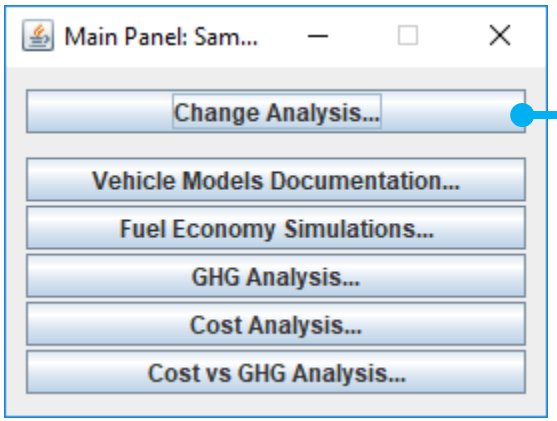


Closing this window returns to Main Panel

PDF Document Reader

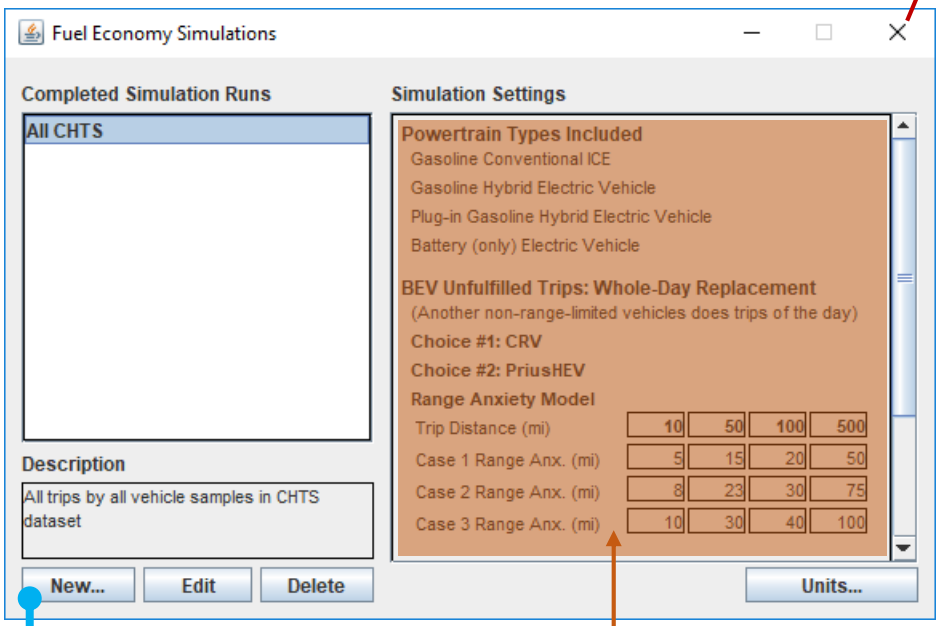
Module #2: Fuel Economy Simulations

Main Panel



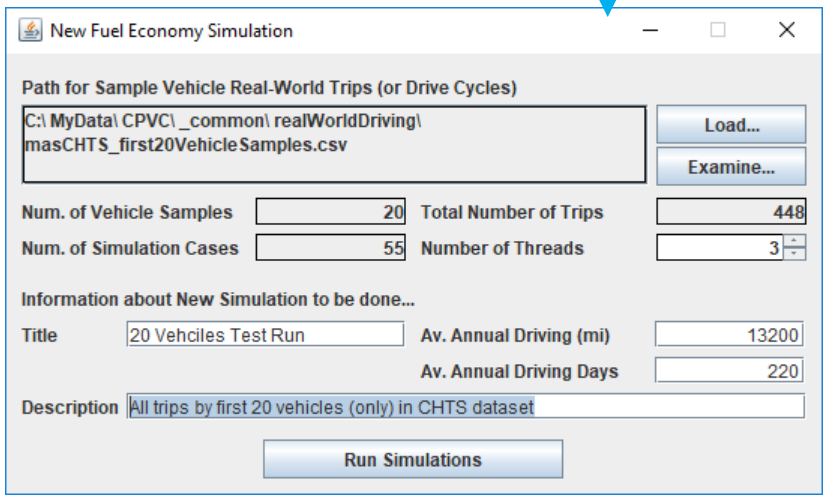
Fuel Economy Simulations Manager

Closing this window returns to Main Panel



This area provides a summary of simulation settings for current analysis (visible but not editable except for Advanced Users)

Dialog for New Fuel Economy Simulations Run



Results Visualization (Modules 3-5)

Closing this window returns to Main Panel

Graph Visualization Area

Any of (Modules 3-5)

Toggles the slides bars between discrete values and continuous interpolation

Scenario Parameters (Slider Bars) Area

There can be ***many*** adjustable parameters that affect the cost and/or GHG performance of a vehicle. Thus, to keep things more tractable:

- Only relevant adjustable parameters for vehicle models within current analysis will be visible. For example, since there are no Diesel vehicles in the current set, there will be no slider bars for cost of a Diesel Engine nor the cost and GHG od Diesel fuel
- Only adjustable parameters will have slider bars, thus when not considering variations in the GHG of Gasoline, there will be no slider bar for its GHG

- The **user has additional control** to adjust the min/max limit values, number of discrete choices, re-ordering and/or turning off slider bars via this button

Allows saving the data of currently shown results (in Graphics Visualization Area) to .CSV file (for exporting to MS-Excel)

Results Visualization (Modules 3-5)

Closing this window returns to Main Panel

Graph Visualization Area

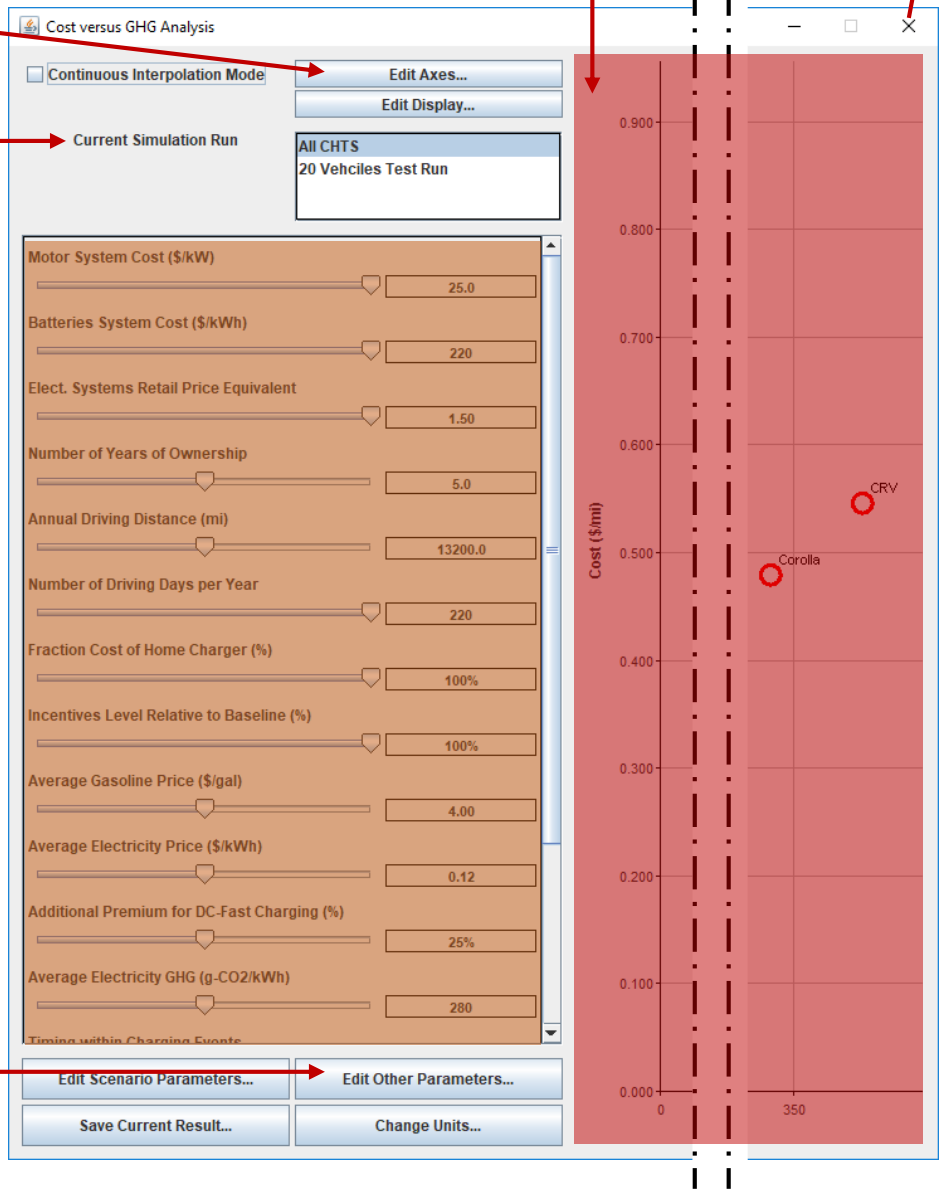
Any of (Modules 3-5)

Displays a dialog for editing axis/axes options such as range and grid density

Allows for quick & seamless switching in showing results for different drive cycles or sets of real-world driving

Scenario Parameters (Slider Bars) Area

Allows for editing other model parameters that aren't adjustable via sliders bars (such as vehicle depreciation)



Results Visualization (Modules 3-5)

Closing this window returns to Main Panel

Graph Visualization Area

Any of (Modules 3-5)

Displays a dialog for editing other graphing options (such as color and size of symbols)

If Manufacturing GHG information is included, a Check-Box appears here that allows toggling between including Manufacturing GHG (so GHG result becomes LCA) or leaving it out (so GHG result becomes Well-to-Wheels)

Scenario Parameters (Slider Bars) Area

Allows changing the display units (e.g. kilometers instead of miles)