EMFAC2021 Volume I – User's Guide

EMFAC

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CALIFORNIA
AIR RESOURCES BOARD

Mobile Source Analysis Branch

Air Quality Planning & Science Division

CONTENTS

1 INTRODUCTION

1.1 THE MOTOR VEHICLE EMISSIONS INVENTORY

An emissions inventory is a critical element in the control of air pollution and the attainment of national and state ambient air quality standards. It is also an essential tool in developing regulations and control strategies to fulfill the California Air Resources Board's (CARB) mission to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state.

An emissions inventory (for any source category) can be calculated, at the most basic level as the product of an emission rate, expressed in grams of a pollutant emitted per some unit of source activity, and a measure of that source's activity. The following expression illustrates this basic relationship between the emissions rate and source activity used to calculate emissions:

Emission Factor X Source Activity = Emissions

For on-road motor vehicles, emissions rates are typically expressed as mass of pollutant emitted per mile driven, per vehicle per day, or per trip made, depending on the emissions process being analyzed. An emissions process for a motor vehicle is the physical mechanism that results in the emissions of a pollutant (e.g., the combustion of fuel, the evaporation of fuel, tire or brake wear, or the start of an engine).

CARB developed an EMission FACtors (EMFAC) model to calculate statewide or regional emissions inventories by multiplying emissions rates with vehicle activity data from all motor vehicles, including passenger cars to heavy-duty trucks, operating on highways, freeways, and local roads in California.

1.2 EMFAC2021

Over the years, tougher emissions standards have been met with technological solutions of increasing complexity. As a result, the emissions estimation models have also grown in size and complexity.

EMFAC2021 is the latest emissions inventory model that calculates emissions inventories for motor vehicles operating on roads in California. EMFAC2021 represents the next step forward in the ongoing improvement process for EMFAC, and reflects the CARB's current understanding of how vehicles travel and how much they pollute. The EMFAC2021 model is needed to support CARB's planning and policy development efforts and to meet the Federal Highway Administration's transportation conformity requirements.

The EMFAC2021 model can be used to show how California motor vehicle emissions have changed over time and are projected to change in the future. This information helps CARB evaluate prospective control programs and determine the most effective, science-based proposals for protecting the environment.

EMFAC2021 includes the latest data on California's car and truck population, activity, and emission testing. New forecasting frameworks have been incorporated to project zero-emission vehicle (ZEV) population, and to estimate heavy-duty vehicle miles traveled. New model features are added to reflect the more fuel and technologies, including modules to show emissions from Plug-in Hybrid Electric Vehicles (PHEV) and natural gas trucks, as well as energy consumption from ZEVs. Heavy-duty truck categories have been expanded to show more vocational types. A new pollutant, ammonia (NH_3) is added to support air quality modeling. EMFAC2021 also incorporates all the most recently adopted on-road mobile source regulations. More details about the updates in emissions calculation methodologies and data are available in the EMFAC2021 Technical Documentation.

Figure 1-1 displays a flow chart indicating the GUI selections necessary to generate the various outputs of EMFAC2021. The Emissions Mode can be used to estimate tons of emissions per day and the Emission Rate Mode can be used to estimate grams of emission per unit of activity. The Custom Activity (SG) mode can be used to estimate tons of emission per day with customized activity from the end-users.

Figure 1-1. EMFAC2021 Overall Flow
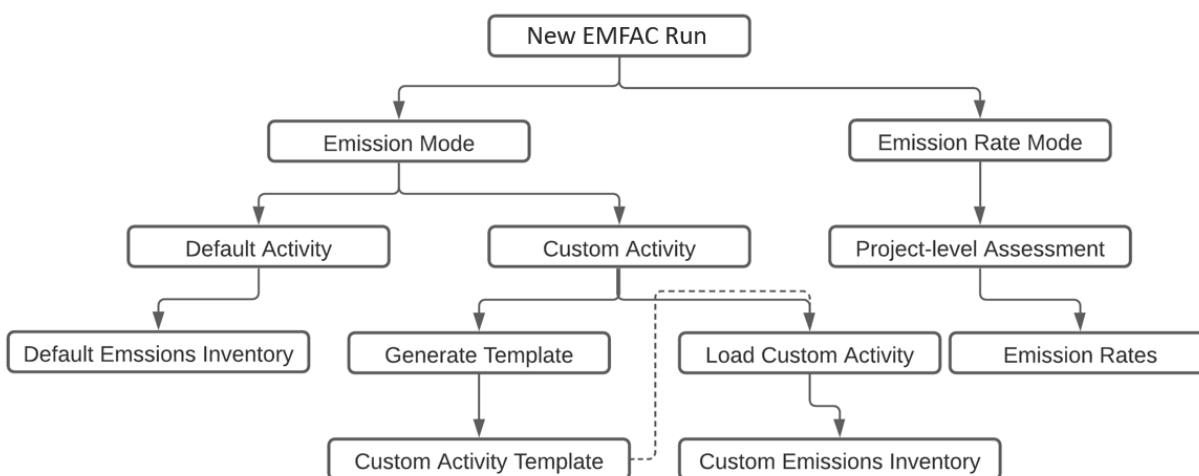
***IMPORTANT*!** – "Custom Activity (SG)" Mode

The Custom Activity Mode (discussed in detail in Chapter 5.2) provides the end-user flexibilities to input different level of vehicle activity and technology mix. Besides two specific types of assessments: conformity assessments and SB375 assessments, EMFAC2021 has extended the functionality of the SG mode. It allows users to develop emission scenarios by varying not only the total vehicle miles traveled by vehicle categories, but also changing the technology mix of different fuel types (e.g. natural gas, electric, and diesel). The SG mode of EMFAC2021 outputs all the available fuel types in the model, including gasoline, PHEV, diesel, natural gas, and electric.

For conformity assessments, emissions are estimated with all current on-road mobile source regulations (see EMFAC2021 Technical Documentation for details). For SB375 assessments, the Advanced Clean Cars (ACC)/Pavley/SAFE Vehicle rules are deactivated. Because the ACC regulation has certain assumptions about vehicle usage built into it, default data in custom activity templates produced for conformity assessments will not match the default data in templates for SB375 assessments. For the same reason, estimates of CO_2 will also differ.

1.3 ABOUT THIS DOCUMENT

The purpose of this EMFAC2021 User's Guide is to familiarize users with the features and controls in the EMFAC2021 model. More information regarding the methodologies and data used in EMFAC2021 to estimate emissions and emission rates will be made available in the EMFAC2021 Technical Documentation.

2 POLLUTANTS, ACTIVITIES, AND PROCESSES MODELED

This section describes the pollutants and emissions processes currently modeled in EMFAC2021.

2.1 POLLUTANTS

The model calculates emissions factors and emissions inventories for the following primary pollutants:

- Carbon monoxide (CO)
- Nitrogen oxides (NOx)
- Hydrocarbons (HC): HC can be expressed as TOG (total organic gases), ROG (reactive organic gases), THC (total hydrocarbon), or CH_4 (methane). The THC class includes compounds with H and C atoms only, carbonyls and halogens are not included in the class. The TOG class includes all organic gases emitted into the atmosphere. The ROG class is the same as EPA's Volatile Organic Compounds (VOC) definition and does not contain compounds exempt from regulations.
- Particulate matter (PM): Particulate matter estimates are provided for total suspended particulates (PM), with diameter 10 microns or less (PM_{10}), and with diameter 2.5 microns or less ($PM_{2.5}$).
- Sulfur oxides (SOx): Emissions of oxides of sulfur are a function of the sulfur content of fuel. The model calculates these emissions by multiplying the fuel consumption by the weight fraction of sulfur in a gallon of fuel.
- Fuel: Although fuel is not a pollutant, fuel consumption is calculated based on the tailpipe emissions of CO, CO_2 and THC using the carbon balance equation.
- Greenhouse Gases (GHG): GHG emissions consist of complete combustion CO_2, Nitrous Oxide (N_2O) and Methane (CH_4). These are the greenhouse gases that are included starting from EMFAC2017.
- Ammonia (NH_3): NH_3 is a newly added pollutant in EMFAC2021. Emission rates of NH_3 vary by vehicle class and model year.

2.2 ACTIVITIES

The model estimates and projects vehicle activities and outputs them for the following activities:

- Vehicle Miles Traveled (VMT): daily VMT is generated in three types, including total VMT, cVMT, and eVMT. The latter two are newly added in EMFAC2021. cVMT represents conventional VMT which is powered by conventional fuel, e.g. gasoline, diesel, or natural gas. eVMT represents electric VMT, which is

powered by battery or electricity. Total VMT is the sum of cVMT and eVMT. Only PHEV has both cVMT and eVMT, and the rest of fuel types have either cVMT (gasoline, diesel, and natural gas), or eVMT (electric)

- Trip: EMFAC defines a trip as an engine-on event. The total number of trips is estimated by number of starts per vehicle and vehicle population. Unlike internal combustion engine (ICE) vehicles, PHEVs can use energy from a battery, an ICE or a combination of the two to attain propulsion power, and they could invoke the engine at any moment within a given trip. The PHEV trip output only includes trips with engine-on events.
- Population
- Energy Consumption: Energy or electricity consumption is a newly added output in EMFAC2021 and is generated in a separate .csv file, similar to other activity outputs (e.g. VMT, trip, and population). It is estimated based on electricity consumption in kilowatt-hour (kWh) per mile.

2.3 EMISSIONS PROCESSES

Emissions (especially HC) emanate from a vehicle during all hours of the day. The magnitude of these emissions varies with what is happening with the vehicle, such as running on the road, idling at a loading zone, sitting outside in the sun, or just starting. Emissions processes account for all emissions of a vehicle across all hours of the day, regardless of whether the vehicle is in motion or whether or not it has been started. The types of emissions processes in the model are:

- Running Exhaust Emissions (RUNEX) that come out of the vehicle tailpipe while traveling on the road.
- Idle Exhaust Emissions (IDLEX) that come out of the vehicle tailpipe while it is operating but not traveling any significant distance. This process captures emissions from heavy-duty vehicles that idle for extended periods of time while loading or unloading goods. Idle exhaust is calculated only for heavy-duty trucks.
- Start Exhaust Tailpipe Emissions (STREX) that occur when starting a vehicle. These emissions are independent of running exhaust emissions and represent the emissions occurring during the initial time period when a vehicle's emissions after treatment system is warming up. The magnitude of these emissions is dependent on how long the vehicle has been sitting prior to starting. Please note that STREX is defined differently for heavy-duty diesel trucks than for other vehicles. More details can be found in the EMFAC2014 Technical Support Document.
- Diurnal Evaporative HC Emissions (DIURN) that occur when rising ambient temperatures cause fuel evaporation from vehicles sitting throughout the day.

These losses are from leaks in the fuel system, fuel hoses, connectors, as a result of the breakthrough of vapors from the carbon canister.

- Hot Soak Evaporative HC Emissions (HOTSOAK) that begin immediately from heated fuels after a car stops its engine operation and continue until the fuel tank reaches ambient temperature.
- Running Loss Evaporative HC Emissions (RUNLOSS) that occur as a result of hot fuel vapors escaping from the fuel system or overwhelming the carbon canister while the vehicle is operating.
- Tire Wear Particulate Matter Emissions (PMTW) that originate from tires as a result of wear.
- Brake Wear Particulate Matter Emissions (PMBW) that originate from brake usage.

3   INSTALLATION AND CONFIGURATION OF EMFAC2021

3.1 SYSTEM REQUIREMENTS

- Operating System: Microsoft Windows 10
- Disk Storage:
  - EMFAC2021 application itself requires 1 GB disk space.
  - The default MySQL database used by EMFAC2021 will require 5 GB disk space.
  - At least, 50 GB of free disk space is recommended for running EMFAC2021. The amount of space required varies depending on the level of detail in the output, the number of sub-areas and calendar years, and the number of runs.
  - The performance of EMFAC2021 depends on the performance of MySQL server. For fast EMFAC runs, we recommend running MySQL server on a computer with multiple CPU cores and a high-performance storage (e.g. Solid State Drives).
- EMFAC2021 was tested on the following system
  - Processor: Intel® Core™ i7-8665U
  - Memory (RAM): 16.00 GB
  - Windows Edition: Windows 10 Enterprise Version 1909

3.2 PRE-INSTALLATION NOTES

- EMFAC2021 requires MySQL Community Server 8.0. Other versions are not officially supported. You can find more information about getting and installing MySQL software at the official MySQL website: https://www.mysql.com

> **Note!**
>
> **Please do not make any changes to the EMFAC default database on the MySQL server. The model may fail or generate erroneous results if changes are made to the database.**

3.3 MODEL INSTALLATION

1. Extract the EMFAC2021 package to a folder of your choice on your local drive. This user's guide assumes the package is extracted or copied to the C: root directory.
2. Right click on "EMFAC.exe", in the installation directory ("C:\EMFAC2021\EMFAC.exe") to create a shortcut or pin it to the taskbar or the start menu.

3.4 MODEL CONFIGURATION

1. Double click "EMFAC.exe" within the installation directory, or click the icon on the taskbar or start menu, to start EMFAC2021. The program will display a page that asks users to configure MySQL settings first using the MySQL Configurator. You may safely ignore any Microsoft Windows security or antivirus warning related to the EMFAC2021 software package.
2. Click the "Configure MySQL" button to bring up the pop-up window shown below. This configuration is needed for the installation of an updated model or when the configuration of MySQL is changed.
3. Enter the "MySQL Username", "MySQL Password" of your MySQL.
4. Enter the "MySQL DB Prefix" with the prefixes that you would like to see in the names of schemas.
5. A suggested value of "# of parallel MySQL" is provided to avoid conflicts between existed schemas. User can change it based on the number of CPU cores in your MySQL server.
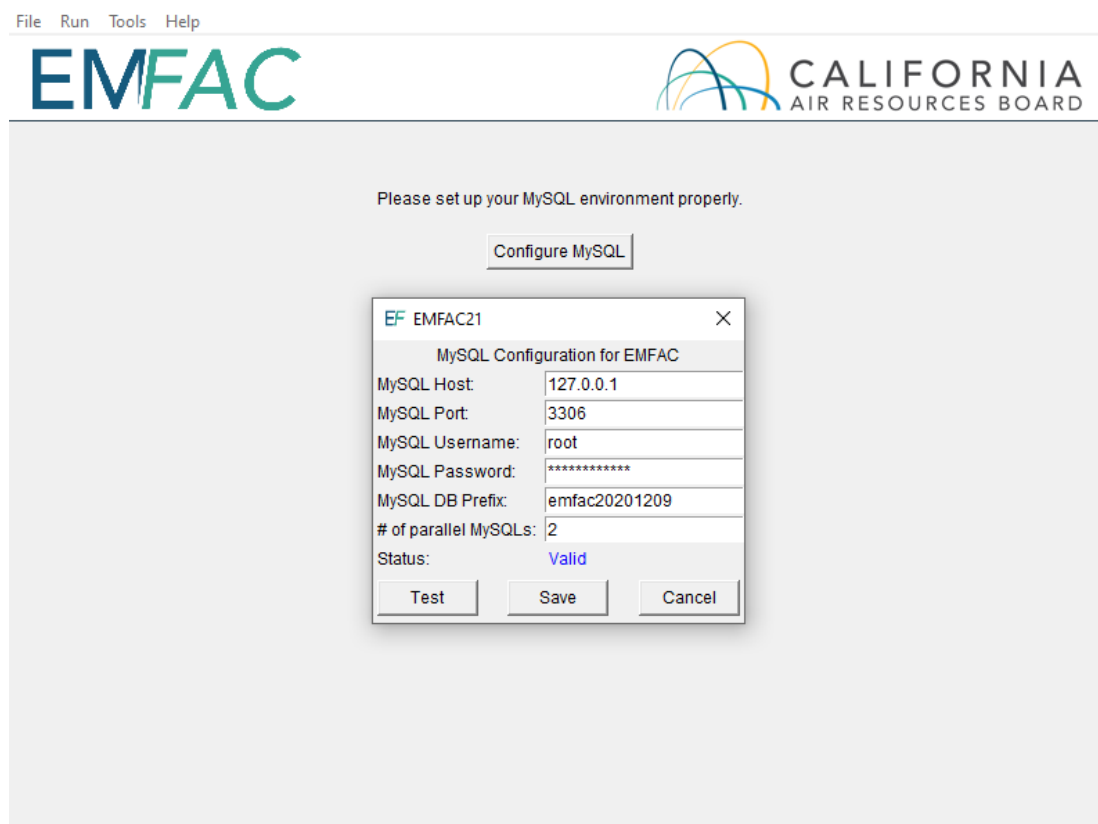
6. Keep "Host," "Port," and "Username" unchanged, and the "Password" will be the one you supplied upon installation of MySQL for the root account.
7. Click "Test" to test the configuration.

8. Click "Save" only when both the connection and directory are set correctly. Repeat the configuration steps if any mistake is made.

9. Click "Import EMFAC Default Database" to import the databases to your MySQL server.
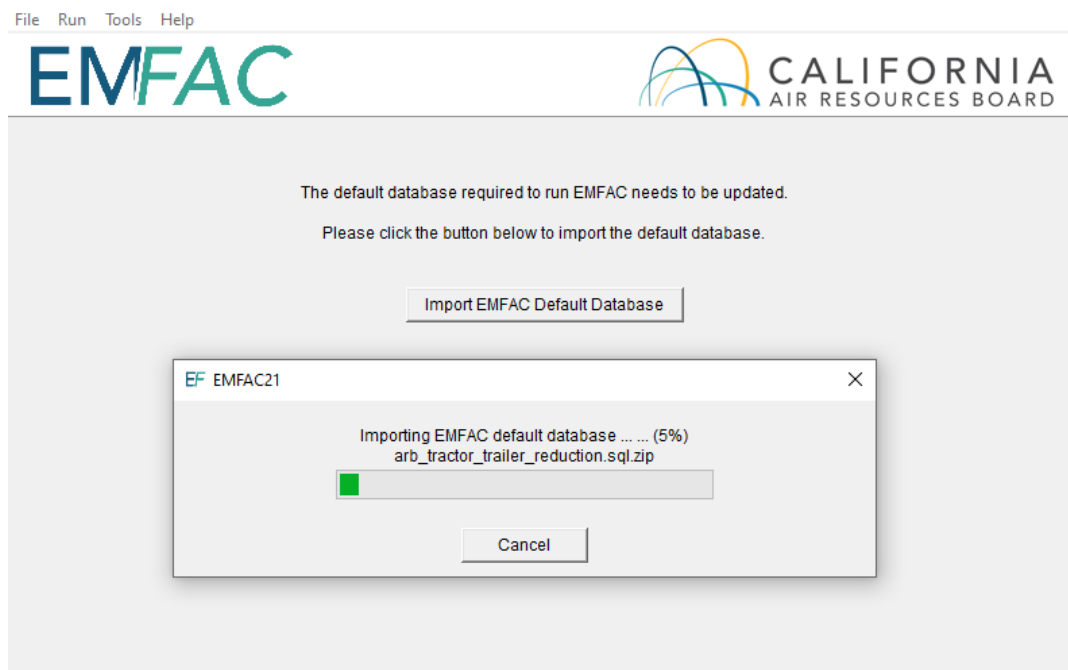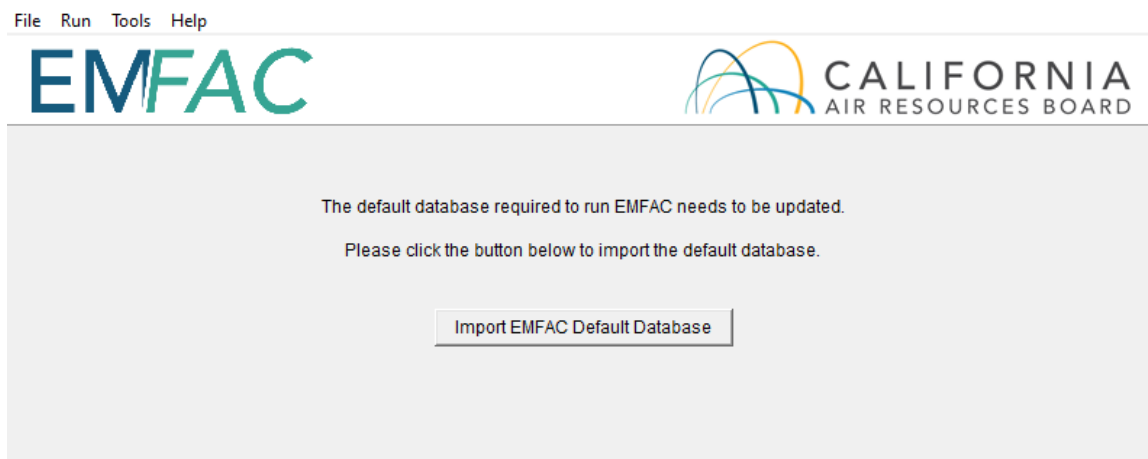
10. Please note that a user can reconfigure a previously configured EMFAC2021/MySQL connection by launching the MySQL Configurator from the Tools menu. This functionality could be used, for instance, to connect the model to a different MySQL server.

11. Once the import is finished, click "Click to Get Started" to enter the main menu of EMFAC2021.
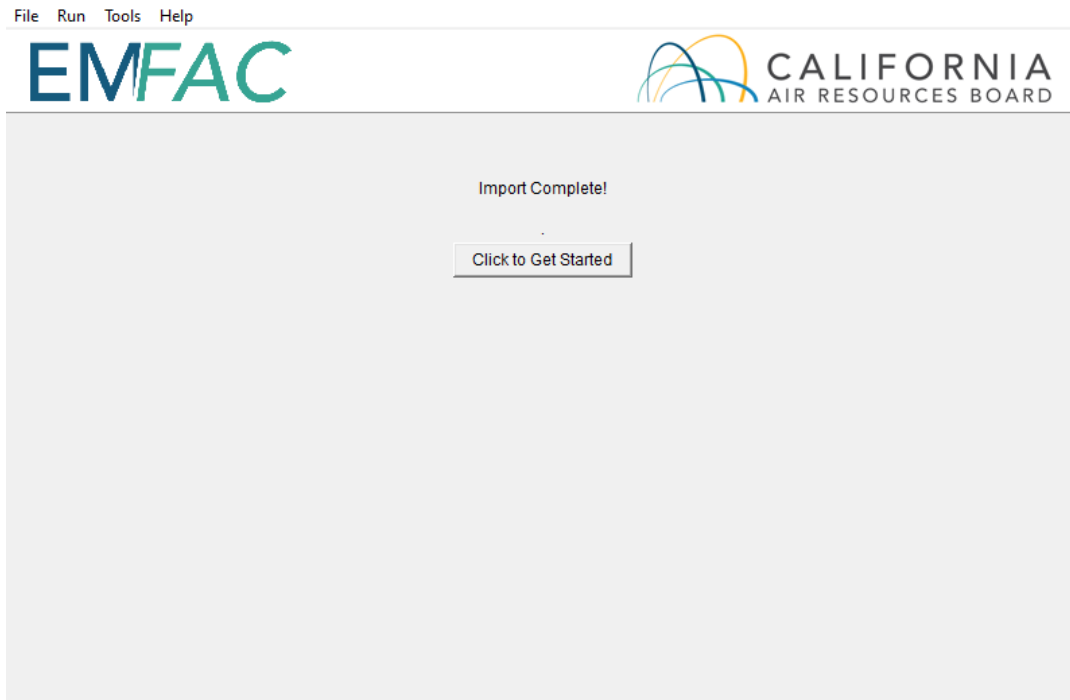
4   GETTING STARTED WITH EMFAC2021

4.1 GENERAL TIPS

- The console shows the status of the model and error messages, if any.
- Consecutive items can be selected by shift-clicking and non-consecutive items can be selected by control-clicking in the list boxes.
- The unit for fuel output is 1000 gallons/day. The fuel unit for natural gas vehicles is in diesel equivalent gallon (DEG).
- The unit for energy consumption is kWh per day.
- The unit for all pollutants in the emissions inventory is tons/day.
- The units for the output of the GHG module are detailed as follows. Column "emission": in tons/day (and in thousand gallons/day where the "pollutant" is Fuel). Column "emission_annualized": in tons/year (and in thousand gallons/year where the "pollutant" is Fuel). Column "CO2e": in tons/day. Basically, it is to be consistent with the EMFAC model's historical convention; e.g. ., all emissions are in short tons and fuel consumption is in thousand gallons. There is only one column which is special with the GHG module, e.g., column "CO2e_annualized" in metric tons per year. This is to facilitate comparison with existing literature which reports CO_2e using metric tons or even million metric tons such as those in Scoping Plan. Note that 1 ton = 0.907185 metric tons.
- In order to manage the size of the output files, some emissions and emission rates that are equal to zero are not included in the output files. Therefore, in instances when data are missing in the output file, the user can assume zero emissions or an emission rate of zero. The program is best viewed with "Smaller" text size on Windows. The "Smaller" text size is used by most people, and can be set within the Control Panel\Appearance and Personalization\Display
- When canceling a run, the program will try to terminate all the active queries, some may not stop immediately. But pressing the cancel will not remove the main GUI and the console. It only removes the running dialogue.
- Use the method described in Appendix 1 to estimate the disk space needed before starting a run to make sure there is enough free disk space to finish the run.

> **Note!**
> 1. **Do not close the console while the model is running.**
> 2. **Limit the number of areas and calendar years and level of details selected for one run to manage the run-time of the current run and the size of the output.**
> 3. **Splitting big runs into small runs is strongly recommended.**

4.2 GRAPHICAL USER INTERFACE

4.2.1 MENUS

- There are four menus in the parent, Home Screen window of EMFAC2021: "File", "Run", "Tools" and "Help".

- The File Menu has four actions: "New" (new run), "Open" (open a saved run specification), "Save" (save a run specification), and "Exit." Upon starting the program, the program automatically assumes the user is creating a new run and

thus the parent window displays the Home Screen. One may choose to open a previous run by selecting "Open" in the File Menu and then selecting the appropriate file.

- The Exit action of the File Menu will only work in EMFAC2021 if a calculation is not being made. If calculations are occurring, cancel the run first, and then exit.
- The Run Menu has one action: "Run EMFAC."
- The Tools Menu has one action: "MySQL Configurator."
- The Help Menu has an "About…" action that will tell the user which version of the model is running.

4.2.2 HOME SCREEN, RUN MODES AND TYPES

- The Home Screen (below) is automatically displayed after the model starts or when "New" is selected from the File Menu.

- "Run Mode" and "Run Type" are the selection options in this "New" tab. There are two different Run Modes: "Emissions" and "Emission Rates."
- Under the "Emissions" run mode, two Run Types are available. "Default Activity" runs use default EMFAC activity data, while the "Custom Activity (SG)" run type

allows the users to use their own activity data to run the model. The "Custom Activity (SG)" run type was formerly known as "SG" or "Scenario Generator". It can be used to generate an input activity data file template or to load custom activity data to produce an emissions inventory for transportation planning, a SB375 report, etc.

- Under the "Emission Rates" run mode, only one Run Type is available. The ''Project-Level Assessment (PL)" run type can be used to calculate emissions rates with inputs of meteorological conditions for project-level assessments.

5 GENERATING EMISSIONS INVENTORIES

For regional analyses (as opposed to project-level analyses), there are two different modes in EMFAC2021 dictated by the travel activity data that are used.

Default Activity Mode. EMFAC2021 uses historical fuel sales to estimate VMT as its default activity to facilitate fuel-based inventory analyses.

Custom Activity (SG) Mode. It is necessary to use the latest regional vehicle activity data developed by local planning agencies to generate the regional on-road emissions for State Implementation Plans (SIPs). Thus, for SIP criteria pollutant (planning inventory) analyses, EMFAC2021 allows the user to replace the fuel-based default data with user-supplied data from metropolitan and regional planning agencies.

5.1 USING DEFAULT ACTIVITY MODE

In this section, we explain how to accomplish a Emissions run with Default Activity, which is typically performed for fuel-based emissions inventory analyses, either from the Home Screen or by loading an EMFAC2021 ".ers" file, saved from a previous run. The run parameters for default emissions run are summarized in Appendix 2.

5.1.1 STARTING A DEFAULT ACTIVITY RUN

1. Go to the Home Screen by either restarting the model or clicking "New" in the File Menu.
2. Pick "Emissions" and "Default Activity" and click "Start".
   - This takes the user to a window with four tabs (next page); the Area Tab, the Time Tab, the Vehicles Tab, and the Output Tab.
   - Each tab presents options for the user to customize for the model run

5.1.2 AREA TAB

- The Area Tab's list boxes allow the user to choose different area types and areas for analysis (note the "Area" tab is highlighted below). The user may pick from one of six area types: Statewide, Air Basin, Air District, MPO, County, or Sub-Area. Please refer to Appendix 3 for area definitions.
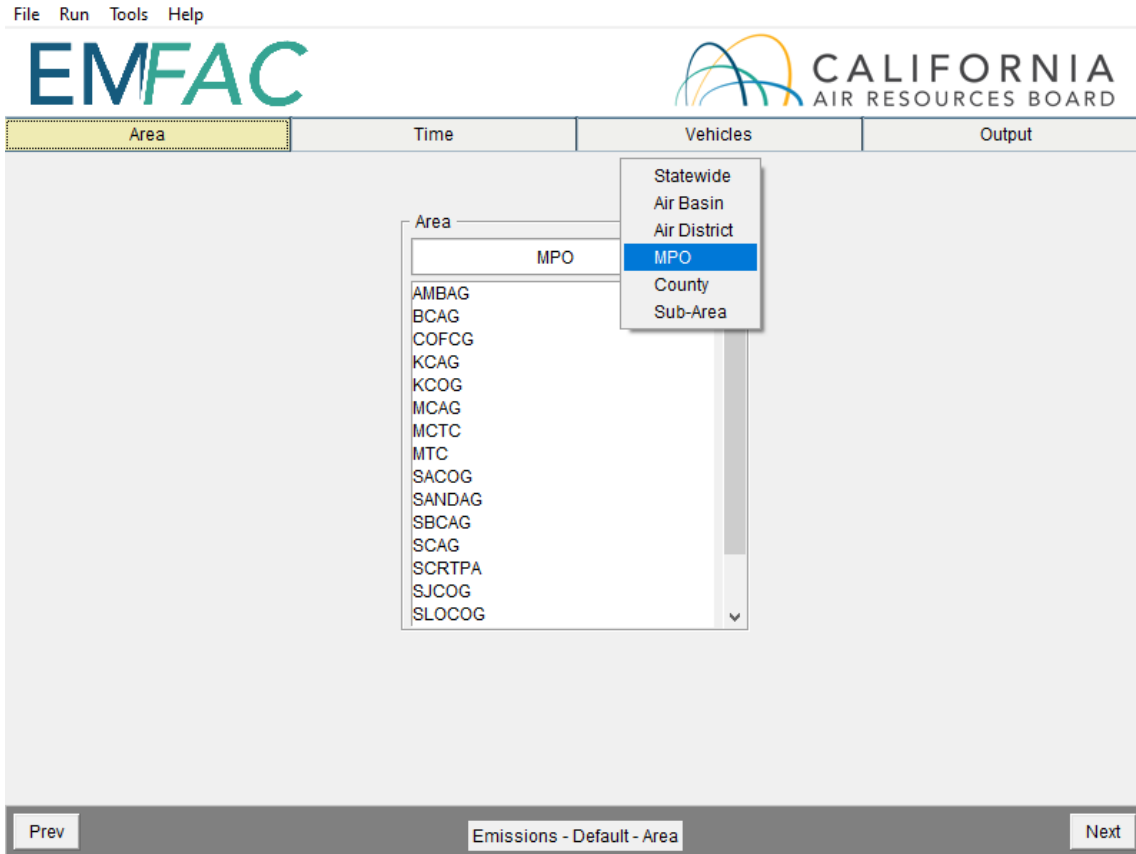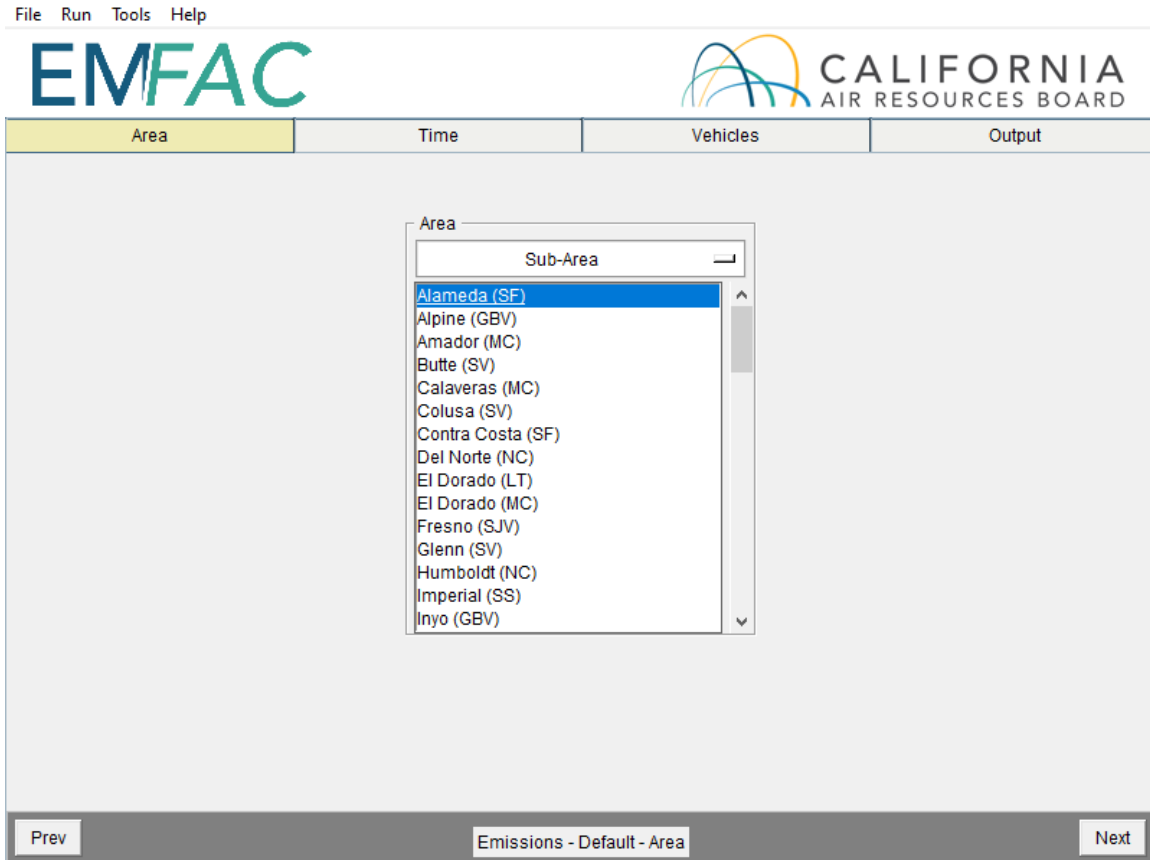
- The user may pick only one Area Type, but has the option of selecting multiple Areas within the chosen Area Type by holding the Ctrl key while clicking on an area.

- "Air Basin" has been selected in the following window, so multiple selections can be made (see figure).

5.1.3 TIME TAB

- In the "Time" tab, a single Calendar Year or multiple years may be selected; however, only one Season or Month may be selected for each run.

5.1.4 VEHICLES TAB

- In the Vehicle Class list box, the user can select the vehicle classes of interest. All vehicles can be selected by clicking "Select All". EMFAC202x, EMFAC2011 and EMFAC2007 Vehicle Classes are all available. Note that "EMFAC202X Vehicle Class" is newly added in this version of EMFAC. Please refer to Appendix 4 for definitions of vehicle categories.
- The data can be output in either "By Model Year" or "Aggregated" form.
  - Choosing "By Model Year" and selecting a large number of Model Years will increase the size of the output considerably.
- The user can choose to output the data "By Speed" (for output at each speed) or "Aggregated" (for combined output only).
  - Choosing "By Speed" will increase the size of the Output Table considerably.

5.1.5 OUTPUT TAB

- The "Pollutants" group box allows the user to choose the Pollutants to be included in the output. One new option in the "Pollutants" group box in EMFAC2021 is "NH$_3$".
- The "Activities" group box indicates which Activity data can be selected to be included in the output. One new option in the "Activities" group box in EMFAC2021 is "Energy Consumption". Once it is selected, the model will generate electricity consumption in the output.
- The "Options" group box allows the user to choose "Output by Process" to output data per emissions process (e.g., Running Exhaust Emissions, or Start Exhaust Tailpipe emissions) or to choose "Output by Cat-NonCat" for output per catalyst-equipped and non-catalyst equipped groupings.
- The "Save Data" group box selection will indicate whether the output data from the current run will be saved by the model INTERNALLY for reuse by eligible future runs. This does not affect model outputs.
- The "Output Options" group box allows users to: 1) split the model output into separate files based upon Sub-Area and Calendar Year to keep the size of the output files manageable; 2) specify a different directory to hold the output files

other than the default directory at "C:\emfac2021\Output" by clicking the "Change Directory" button.

- The standard output format for a Default run is "CSV" (comma-separated text files). The output files will have a numerical timestamp in the name of the files.

5.1.6 STARTING THE MODEL RUN

- Limiting the number of calendar years, areas, and the level of detail selected will reduce the free space required for a run. This requirement decreases considerably if you deselect some of the options such as "By Hour", "By Model Year", etc.
- Click "Run EMFAC", in the Run Menu, or the "Run" button at the lower right corner of the Output tab to start the model run.

5.1.7 SAVING THE RUN SPECIFICATION

- Save the "Run Specification" (as ".ers" files) for future use after all the run parameters have been determined. Click "Save" in the file menu or click "OK" in the pop-up window after the run button is clicked to save the .ers file.

EF EMFAC21   ×

? Please save the run spec first

OK   Cancel
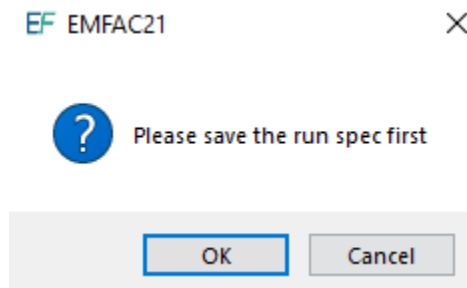
5.1.8 ONCE THE RUN HAS STARTED

- The time it takes to finish a run depends on how many sub-areas and calendar years were selected, the aggregation level specified for the output files, and the performance of the computer.
- The model run can be stopped by clicking "Cancel" in the EMFAC2021 Window.
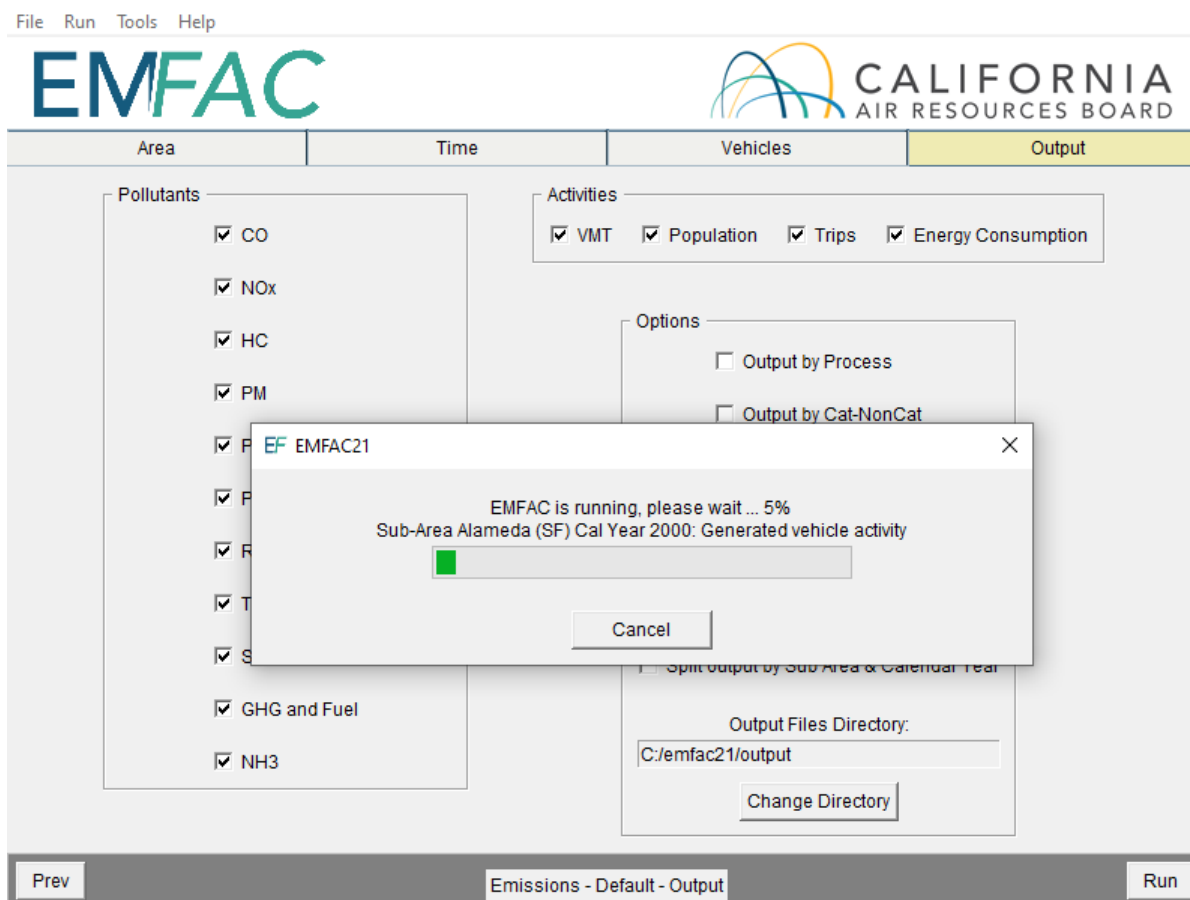
- Once the model run is done, the following window provides the names and locations of the output files generated after the run has finished.
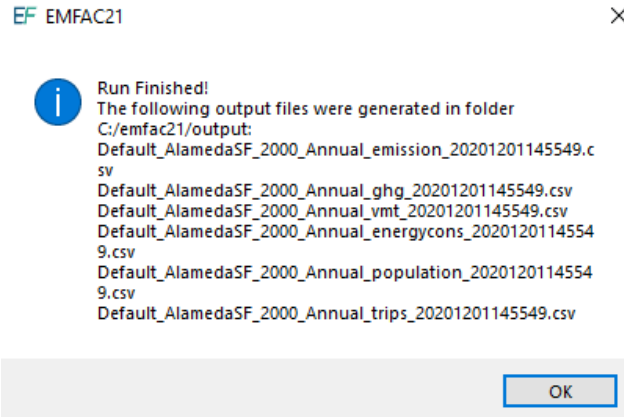
- A default emissions run file name will consist of the sub-area, the analysis year, the season, data type (emission, GHG, VMT, energy consumption, vehicle population, and trips), and the time when the output file was generated. The user has the option to modify the first half of the filenames to their own naming standards when saving the run specification. However, the data type and output file generation time will still be indicated at the end of filename.
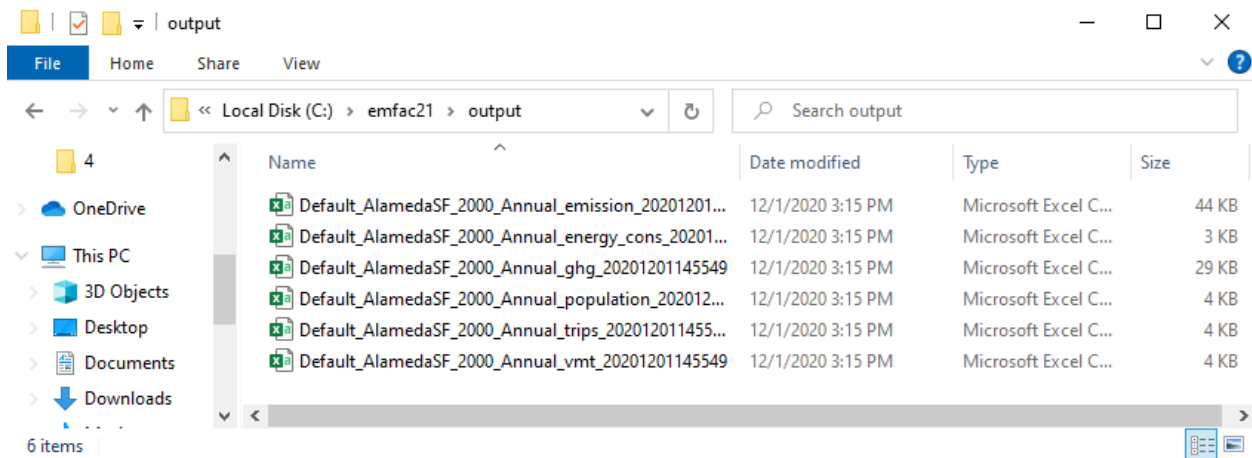
5.1.9 STARTING DEFAULT RUN USING A SAVED .ERS FILE

1. Click "Open" in the File Menu to load the file.
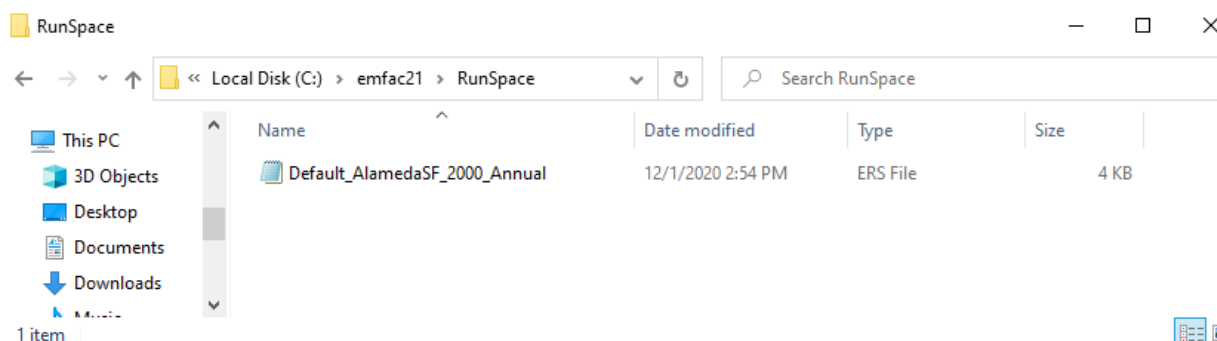
2. The run parameters will be loaded to the model and can be modified and saved as a new .ers file by clicking "Save" in the File Menu.

5.2 USING CUSTOM ACTIVITY MODE (SG)

5.2.1 BACKGROUND

The Custom Activity (SG) Mode of EMFAC2021 is designed to perform emissions assessments for determining conformity with the state implementation plan and for compliance with SB375 targets. Both types of assessments are most often done by various planning agencies and air districts throughout California. These assessments require the user to create custom activity data files containing vehicle miles travelled (VMT) and/or speed profile data. This customized activity data will then be used for scaling the default vehicle emissions produced by EMFAC2021.

In addition, EMFAC2021 has extended the functionality of the SG mode. It allows users to develop emission scenarios by varying not only the total VMT and VMT distribution by speed, but also changing the technology mix of different fuel types (e.g., natural gas, electric, and diesel). The SG mode of EMFAC2021 outputs all the available fuel types in the model, including gasoline, PHEV, diesel, natural gas, and electric.

5.2.2 SAVING OUTPUT DATA FROM A RUN FOR FUTURE USE

As a way to reduce computational time, the model allows the output data from the current run to be saved for future use if "Save data from this run for future use" is selected in the Output tab. This works for both Default Activity Runs as well as Custom Activity (SG) runs.

Data saved from previous runs can be used if one or more of the three criteria are met:

1. The current run has exactly the same run parameters as one of the previous runs that have output saved.
2. The run parameters (Calendar Years, Areas) of the current run are a subset of parameters of one of the previous runs that have output saved.
3. The current run has fewer details or is more aggregated than the previous runs with saved output.

Model run time is significantly reduced when the saved output from previous runs option is used for the current run. Extracting data already stored in the model database is much faster than recalculating it.

5.2.3 TYPES OF CUSTOM ACTIVITY DATA

There are two custom activity input formats supported by EMFAC2021 known as standard format:

- templates generated by EMFAC2017
- templates generated by EMFAC2021

For all types of SG templates, the names of the worksheets MUST be exactly the same as produced from either EMFAC2017 or EMFAC2021. EMFAC2021 uses these worksheet names to identify what type of data is present and worksheets with any other names will be ignored. The user must provide either daily total VMT or daily total VMT by vehicle-tech. Speed fraction profiles are optional.

EMFAC2021 can import multiple sets of activity data at one time. Also, EMFAC2021 can only process data for multiple scenarios with the same type of area and season. Files with different area types or seasons or SB375 settings cannot be loaded together. That is, one cannot run a scenario with the SCAG MPO and the Lake Tahoe Air Basin, since the first is an MPO and the second is an Air Basin. Also files with same area/calendar year combinations will be over-written. For example, loading two different template files for Alameda/CY2030 with different VMTs at the same time will only generate one emissions output (VMT data from the latter file will be used for emissions calculations)

Generally speaking, EMFAC2021 SG mode template generation is the same as EMFAC2017. It will produce a template with the default VMT and the optional hourly speed fraction profile data. The EMFAC2021 custom activity data template is always saved in the Excel format and the suffix is "*.xlsx". The table below summarizes the worksheets contained in the EMFAC2021-formatted Excel activity template file.

Worksheets in EMFAC2021 Format Activity Templates

Template File Format Type	Worksheet Name	Description of Worksheet Data Fields
EMFAC2021 And EMFAC2017 (*.xlsx)	Settings	Season/month and whether it is a SB375 template
	daily_total_vmt**	Daily total VMT
	daily_vmt_by_veh_tech**	Daily VMT by vehicle type and fuel
	hourly_fraction_veh_tech_speed*	Hourly speed profile calculated using default VMT by hour by speed

*Optional – may or may not be created based on user input;
**One, not both, will exist.

The "settings" worksheet is used for two purposes: to specify the season/month value for the desired emissions run, and to indicate whether the template is for SB375 or conformity purposes.

The table below summarizes the effect of selected GUI options in EMFAC2021 on which worksheets are generated (see ** in the table above) and how custom activity scaling is performed.

EMFAC2021 Templates: Effect of GUI Options on Worksheets and Scaling

User Select GUI Options		*Scaling Approach (Cannot be Modified)*	
VMT Data Type	Custom Hourly Speed Fractions	VMT Scaling Result	Speed Scaling?
Total Daily VMT	Unchecked	Scaling by VMT Total	No
VMT by Vehicle and Fuel Type	Unchecked	Scaling by VMT-Veh Tech	No
Total Daily VMT	Checked	Scaling by VMT Total	Yes
VMT by Vehicle and Fuel Type	Checked	Scaling by VMT-Veh Tech	Yes

IMPORTANT! If the user opts to generate an SB375 template (more details are provided in the next section), the Excel template will be 'hard coded' as an SB375 template. This is because SB375 runs require the Pavley and Advanced Clean Cars standards to be turned off in the calculations made for the emissions inventory that will be generated. The Advanced Clean Cars program assumes a different fleet mix and vehicle miles travelled, so output produced for SB375 purposes will not match output that was not produced for SB375 purposes.

5.2.4 GENERATING A CUSTOM ACTIVITY TEMPLATE

The run parameters for generating a custom activity template are summarized in Appendix 5.

1. Select the "Custom Activity (SG)" Run Type, and then "Generate Custom Activity Template" in the pop-up dialog box that appears.
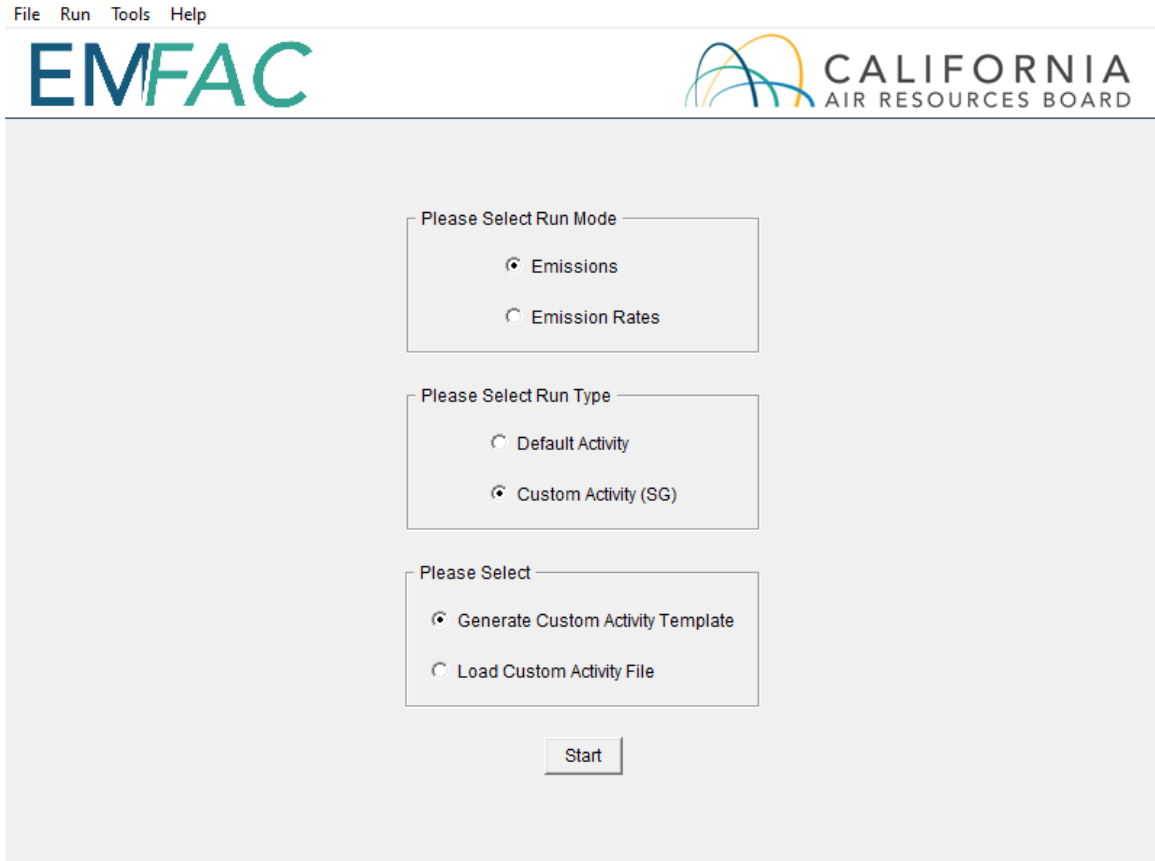
2. Click "Start". The following window will appear:
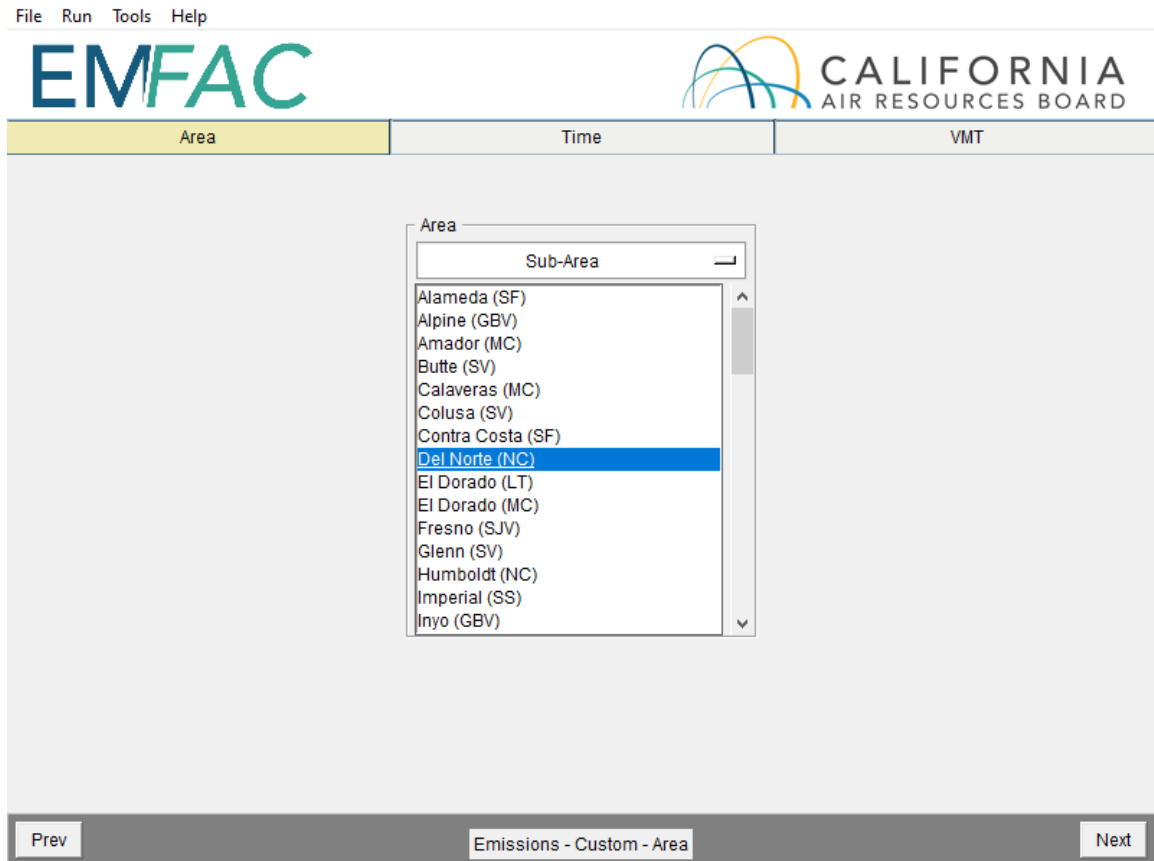
3. In the Area tab, you can change the area type by clicking where "Sub-Area" appears above.
4. Select one or more Areas. If you hold down either the shift or the control key while clicking, you can select multiple areas. Please note that the more areas selected, the longer the runtime will be.
5. Click "Next" or the Time tab.

6. On the Time tab, select one or more calendar years, however, the more years you select, the longer runtime will be.

7. Select "Season" or "Month" and then specify which Season or Month you would like to use.
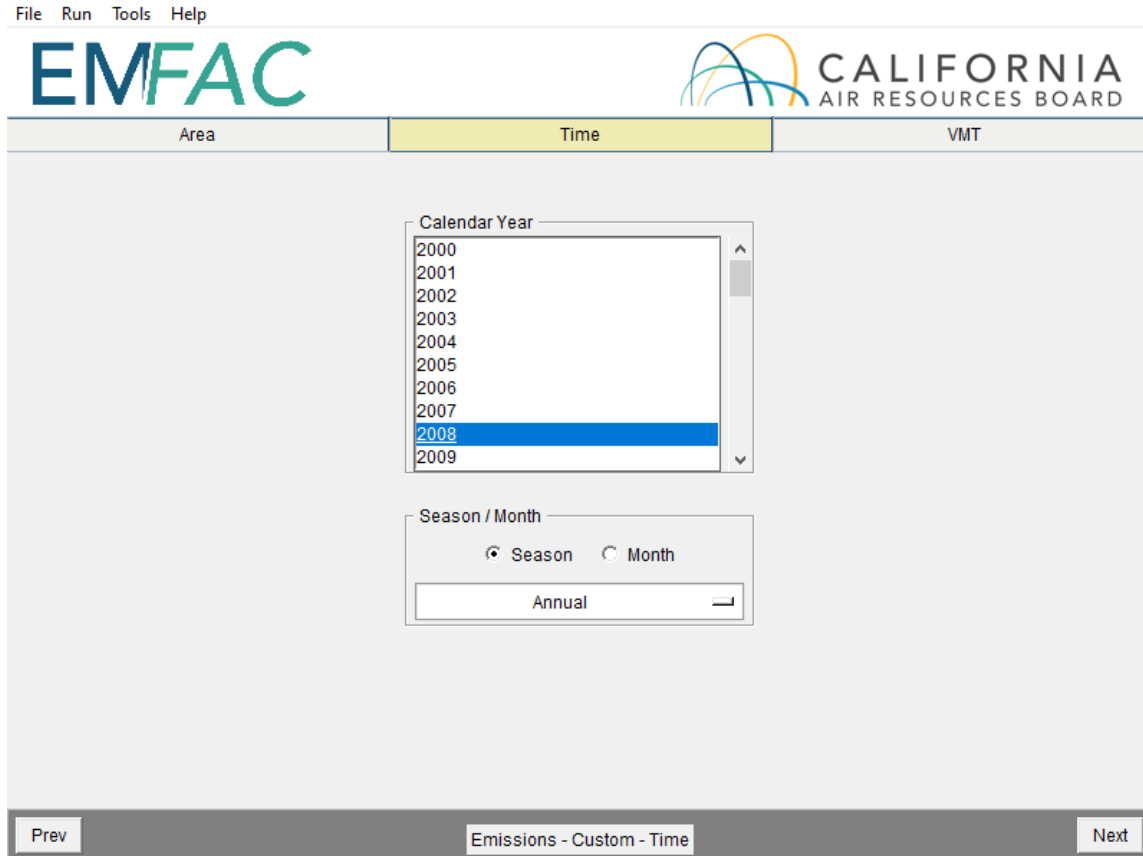
8. Click "Next" or the VMT tab.

9. On the VMT tab, select the VMT data type you would like for inputting the data into the template you will generate.

10. Select "Custom Hourly Speed Fractions" if your own speed profile will be used.

11. Choose whether or not the template will be for SB375.

12. Click the "Generate Template" button.
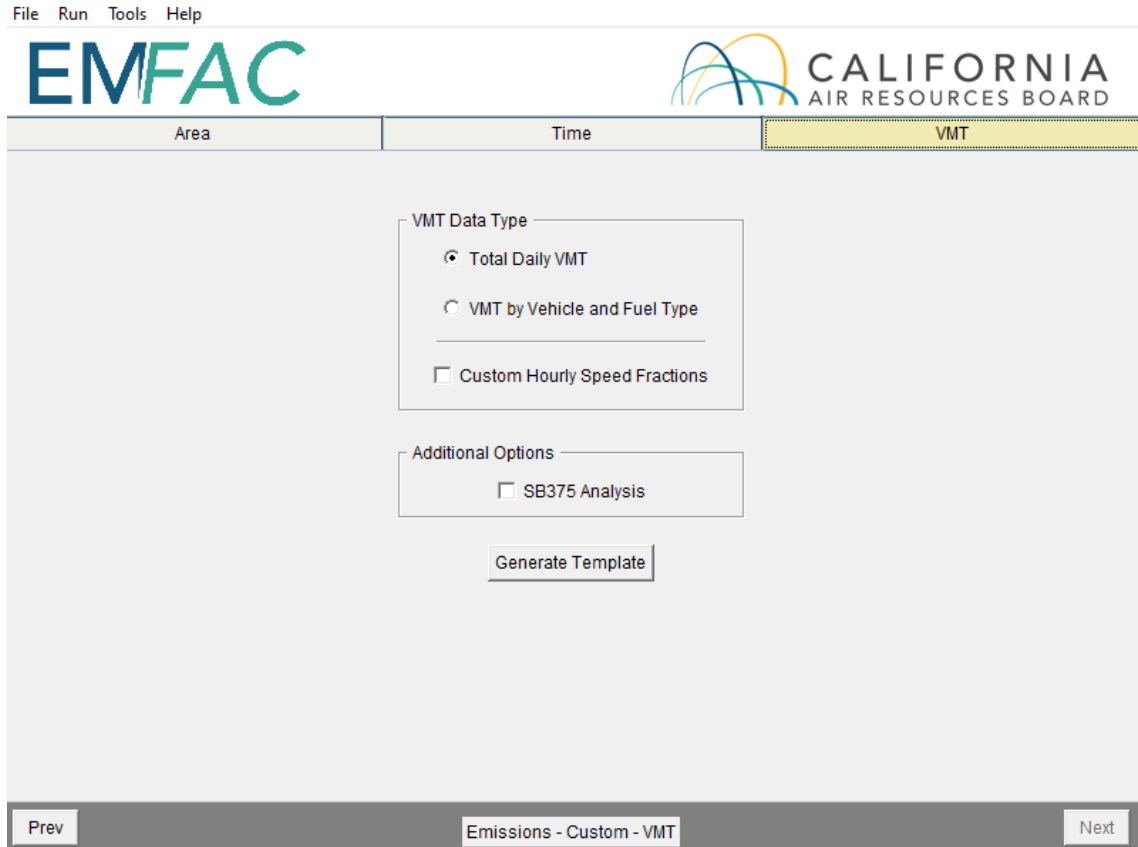
13. Select where the template will be saved, then click "Save" and the model will start generating the template.
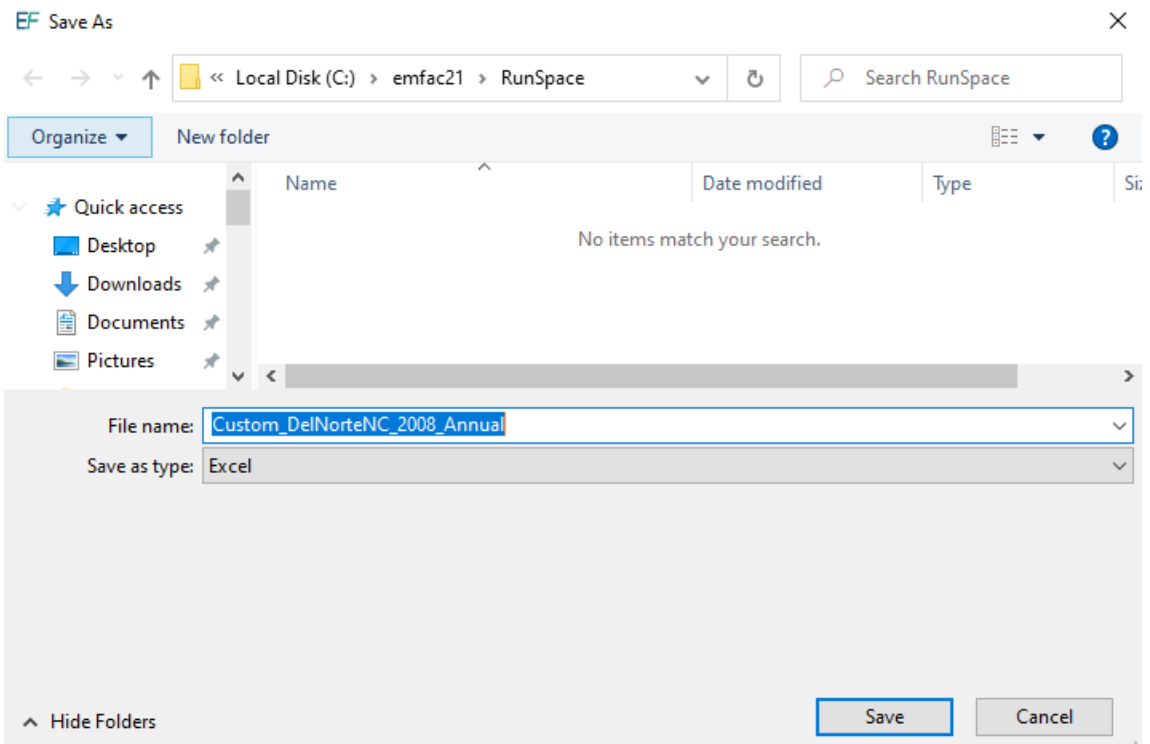
14. Click "Save" and the model will start generating the template.
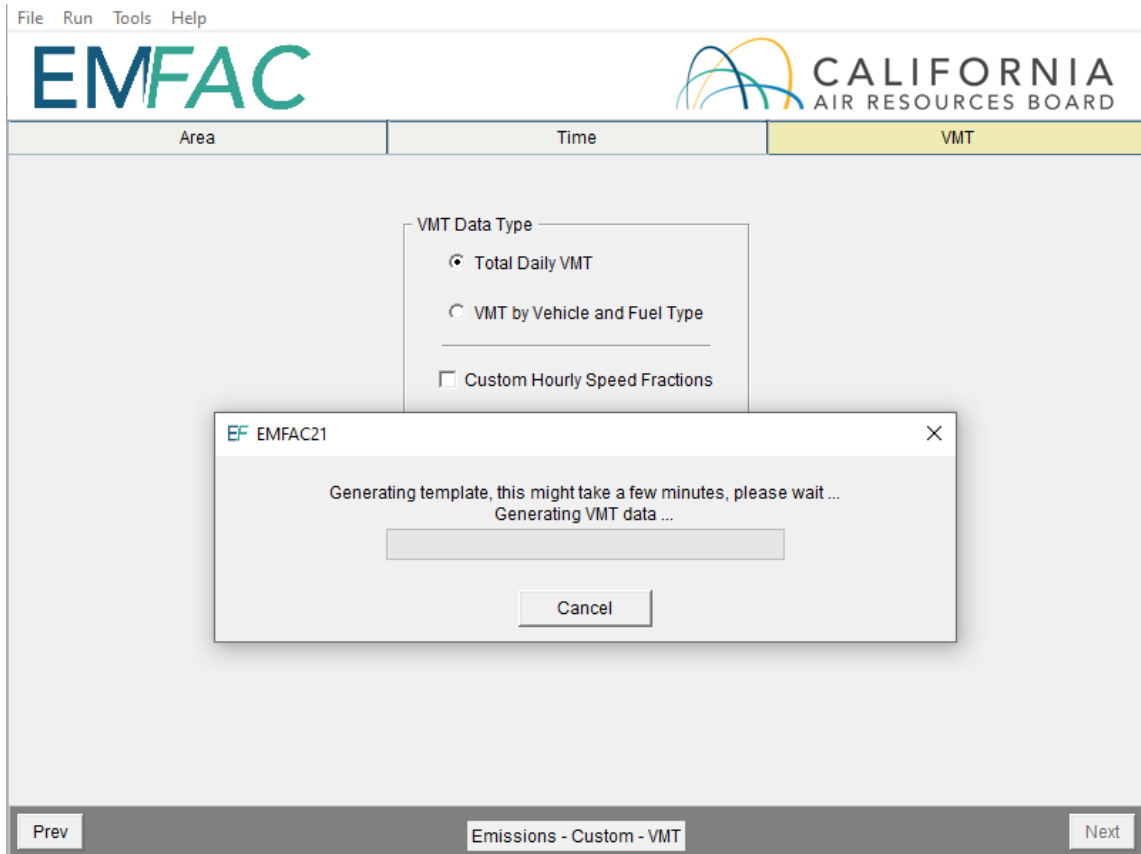
15. The following window will be shown after the template is generated.
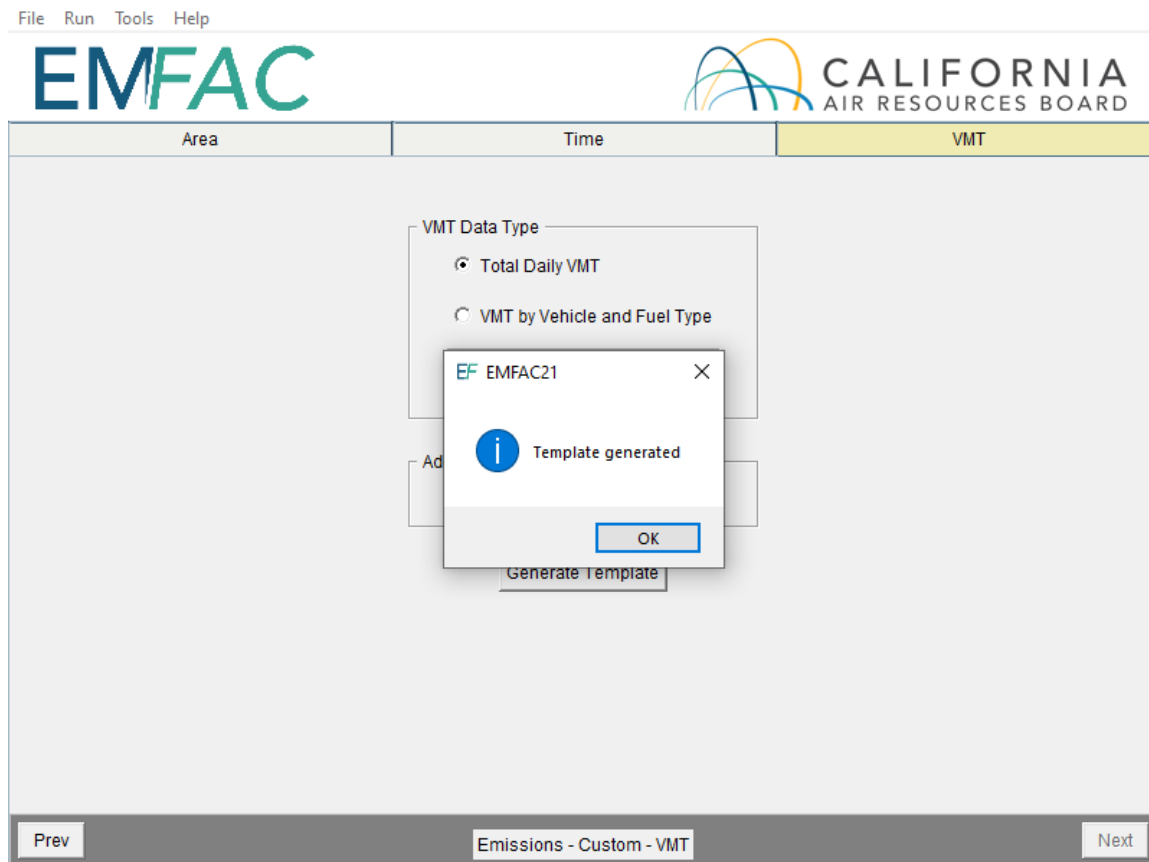
5.2.5 MODIFYING CUSTOM ACTIVITY TEMPLATES

Custom activity templates are generated in a Microsoft Excel format. Users can use Excel to edit the data to meet their needs. Before using the activity templates, there are several things to know:

- Standard custom activity templates are in Microsoft Excel worksheet (.xlsx) format.
- The worksheet names for either of these types of custom activity template must not be changed. These names are used to identify what type of data is present. Worksheets with any other names will be ignored.
- The order and names of columns should not be changed on worksheets and data rows should not be deleted.
- Standard custom activity Templates have a worksheet named "Settings" (below). This is primarily used to define the season or month being analyzed and whether the custom activity template contains activity for a conformity assessment or an SB375 assessment. The field indicating the season/month can be changed; the field with the SB375 setting cannot be changed.
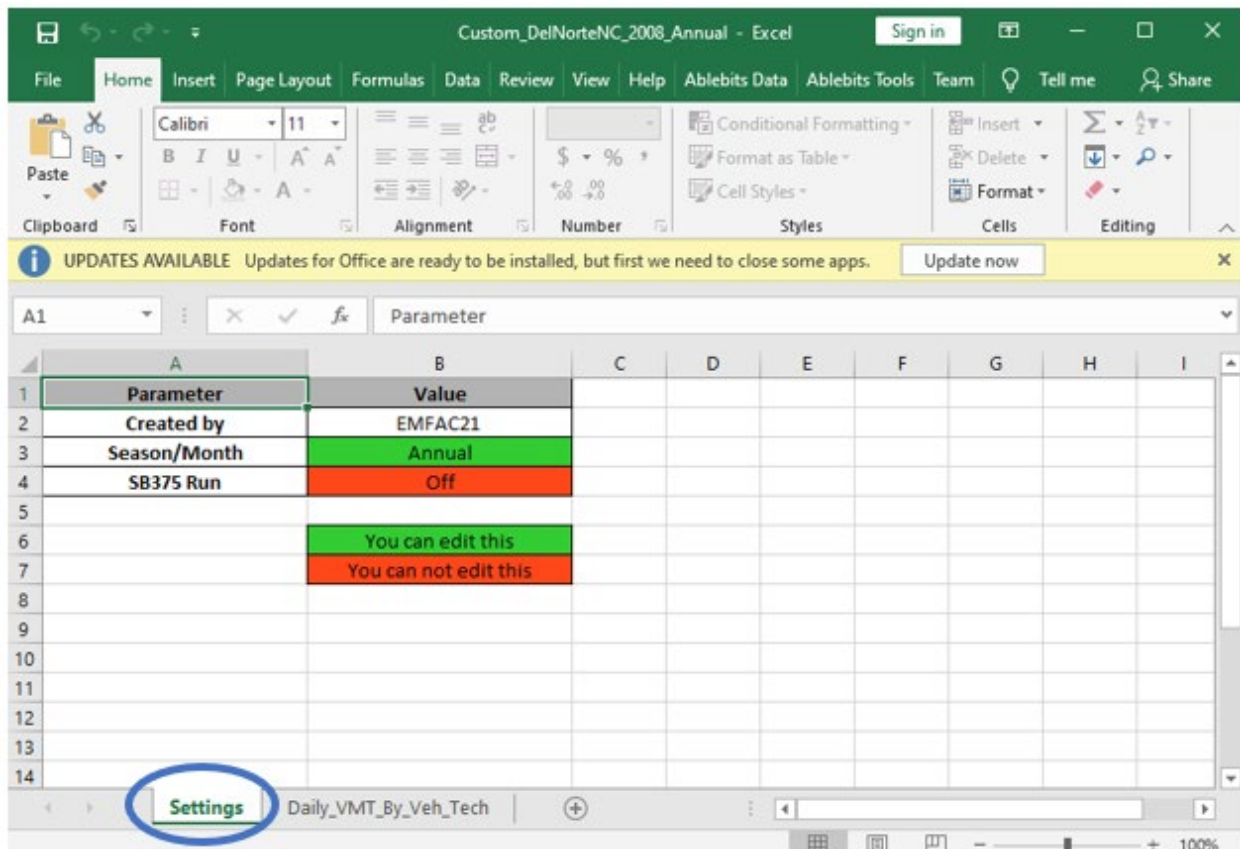
- For worksheets broken out by vehicle-tech, all vehicle-tech types must be present. If you generate a standard custom activity template, all necessary combinations of vehicle-tech's should be provided.
- If "Custom Hourly Speed Fractions" is selected, the speed fractions should add up to one for each hour in the "Hourly_Fraction_Veh_Tech_Speed" tab.
- The EMFAC default speed profile will always be used for the following vehicle types with all fuel types for all regions:
  - PTO
  - UBUS
  - SWCV
- The EMFAC default speed profile will always be used for drayage trucks with all fuel types for Alameda (SF), Los Angeles (MD), Los Angeles (SC), San Bernardino (MD), and San Bernardino (SC):
  - T7 Other Port
  - T7 POAK
  - T7 POLA

5.2.6 RUNNING EMFAC WITH A CUSTOM ACTIVITY TEMPLATE

The run parameters for generating a customized activity inventory are summarized in Appendix 6.

1. Return to the Home Screen by selecting "File", "New" from the menu and select "Custom Activity (SG)".
2. Select "Load Custom Activity File" and click the "Start" button.

3. Click the "Load Custom Activity" button and find the file. You can hold down either the shift or control keys during selection to load more than one file at a time.

> *** IMPORTANT ***
>
> **Files with different area types or seasons or SB375 settings cannot be loaded together. Also files with same area/calendar year combinations will be over-written. For example, loading two different template files for Alameda/CY2030 with different VMTs <u>at the same time</u> will only generate one emissions output (VMT data from the latter file will be used for emissions calculations)**

4. Select the desired file and then click "Open". Click "Ok".
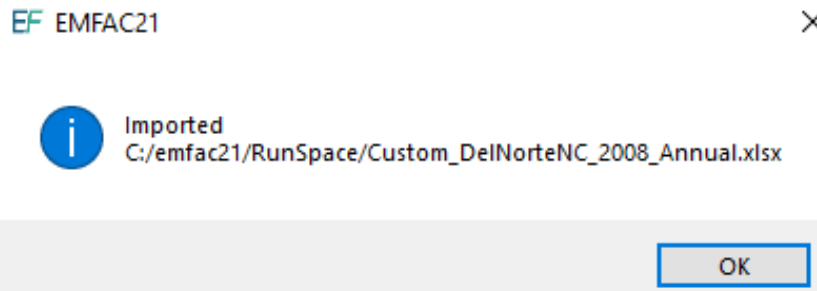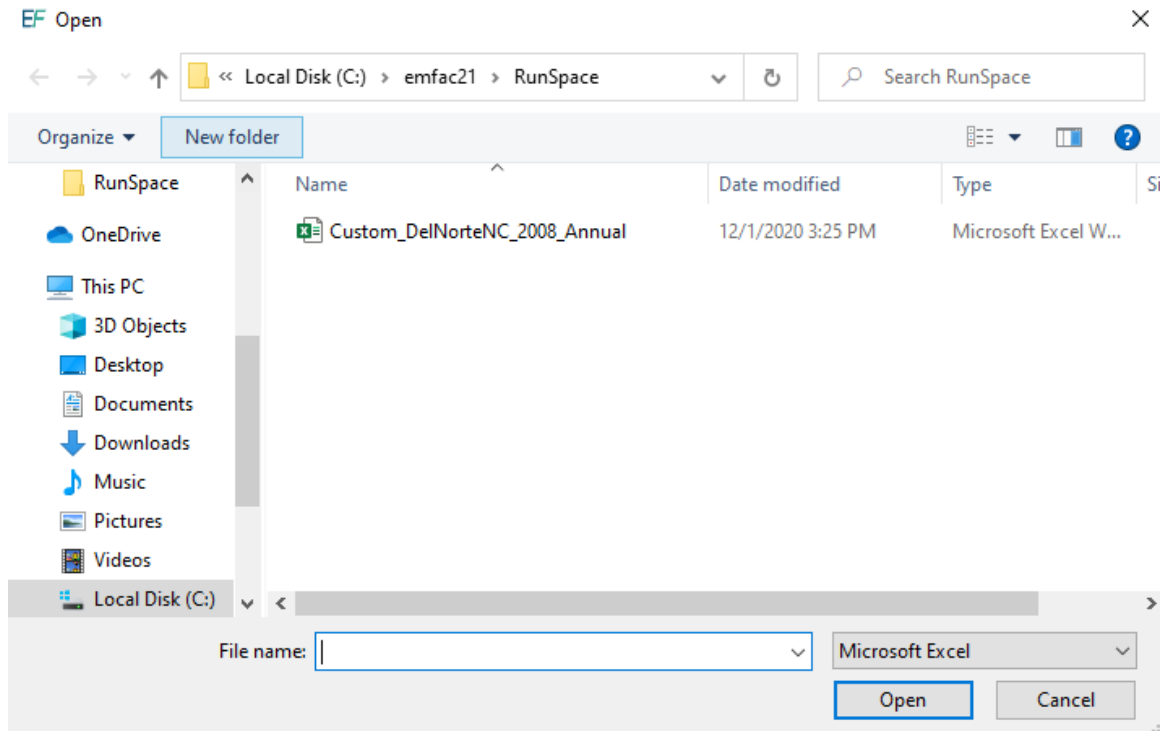
5. Information about the loaded file is displayed on the window. Make sure the correct file has been selected.
6. In the output tab, pick the Report Type, choose whether or not to save the output data for future use, and change the output location if desired. (See Chapter 7 for a description of the Output Files generated by EMFAC2021).
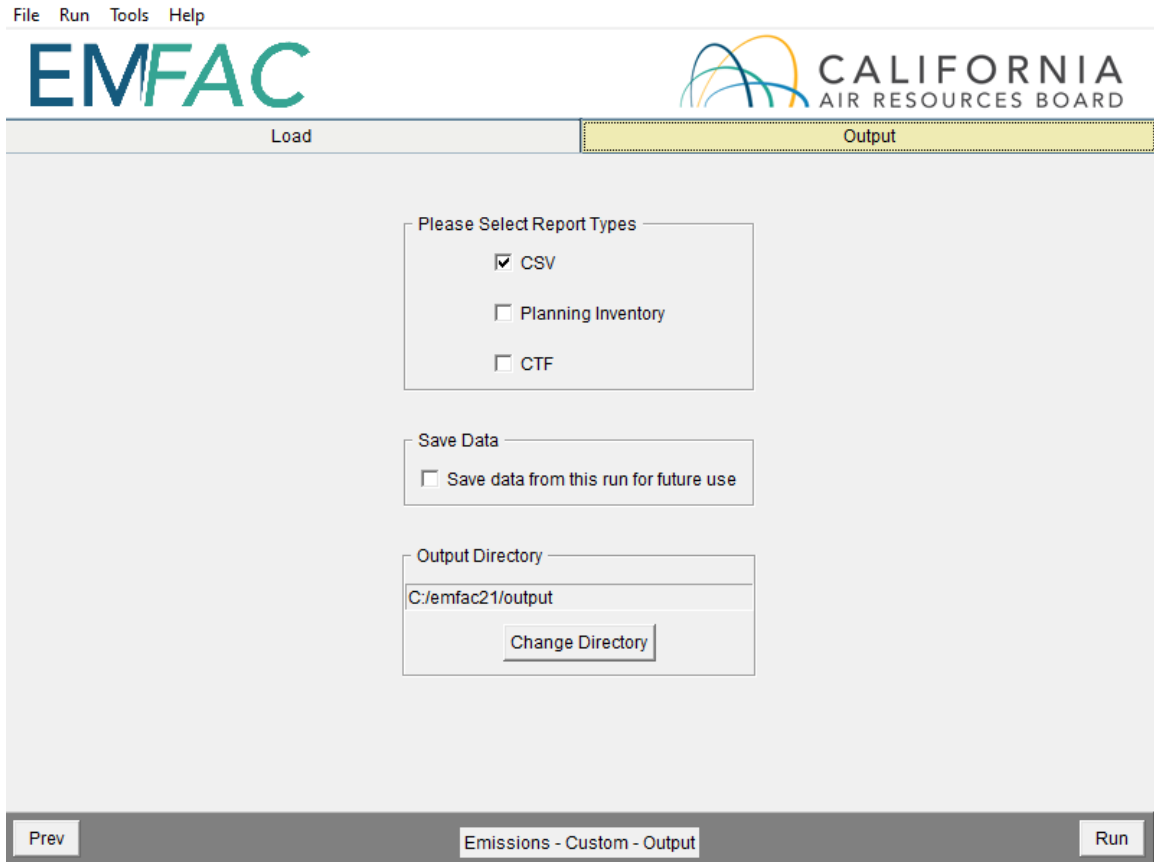
7. If the SB375 file was loaded, the output tab will be like the following screen shot.

8. Click "Run" to start the calculation.
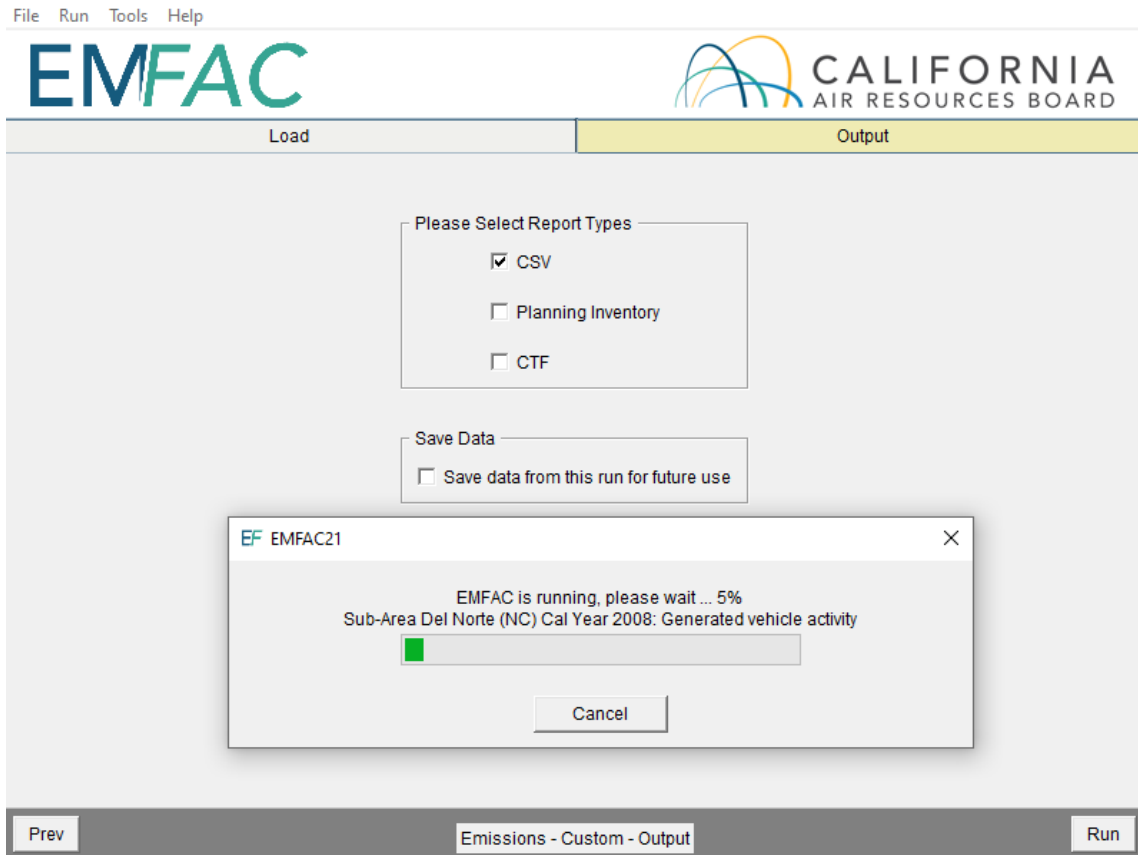
9. After the run completes, a window will show the Output File location and file name.

6 GENERATING EMISSIONS RATES

This section describes how to run EMFAC for a Project-Level (PL) Assessment to generate emission rates using project-specific data. This mode generates emission rates based on meteorological input (temperature and relative humidity) that users provide.

6.1 SETTING UP A PROJECT-LEVEL ASSESSMENT EMISSIONS RATES RUN

The run parameters for generating emissions rates are summarized in Appendix 7.

1. Start the model or clicking "New" in the File menu.
2. Select Emission Rates as the Run Mode, and Project-Level Assessment (PL) as the Run Type and click "Start".
   - This takes the user to a window with four tabs; the Area Tab, the Time Tab, the Vehicles Tab, the Meteorology Tab, and the Output Tab. Each tab presents options for the user to customize the PL run.

6.1.1 AREA TAB

- Pick one Area Type and select one or more areas of the chosen Area Types. Hold down the Shift key and click areas to select multiple areas.
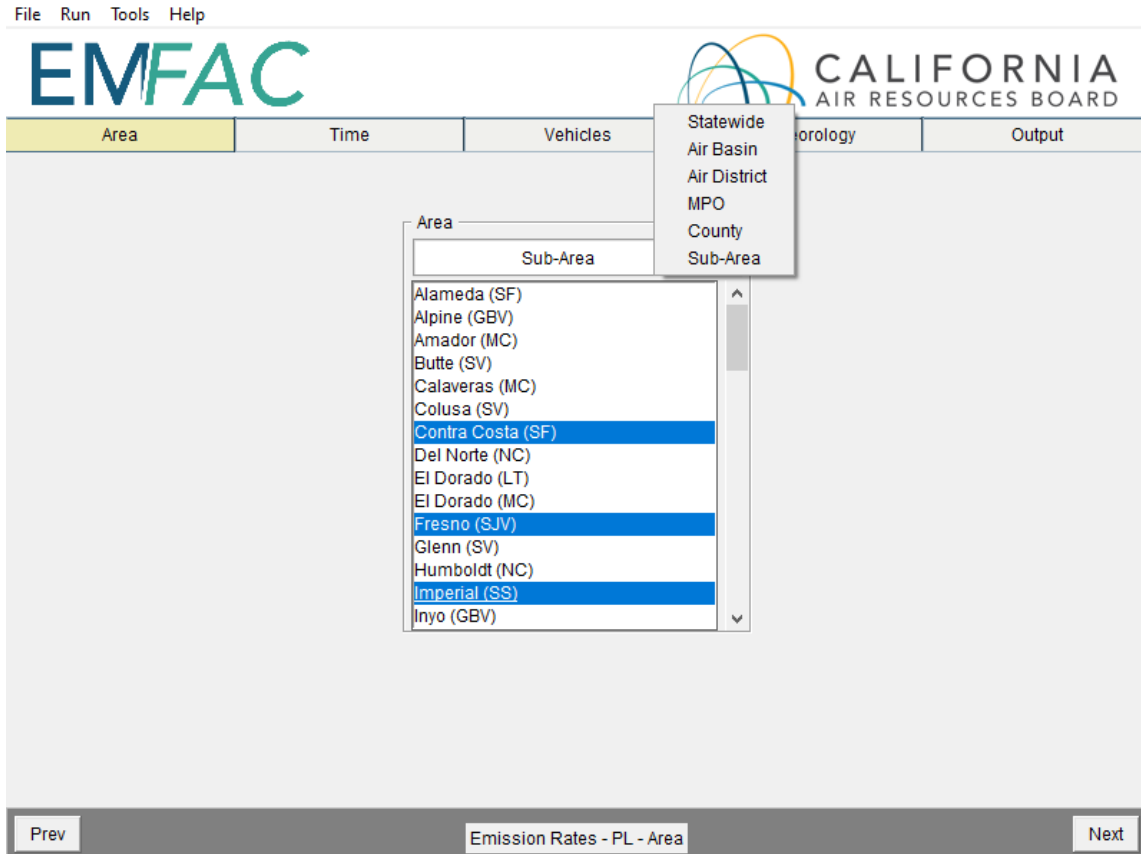
6.1.2 TIME TAB

- In the "Time" tab, a single Calendar Year or multiple years may be selected; however, only one Season or Month may be selected for each run.
- Emissions rates vary by season or month as a result of variation in the fuel Reid Vapor Pressures (RVP) by month or season due to fuel composition differences.
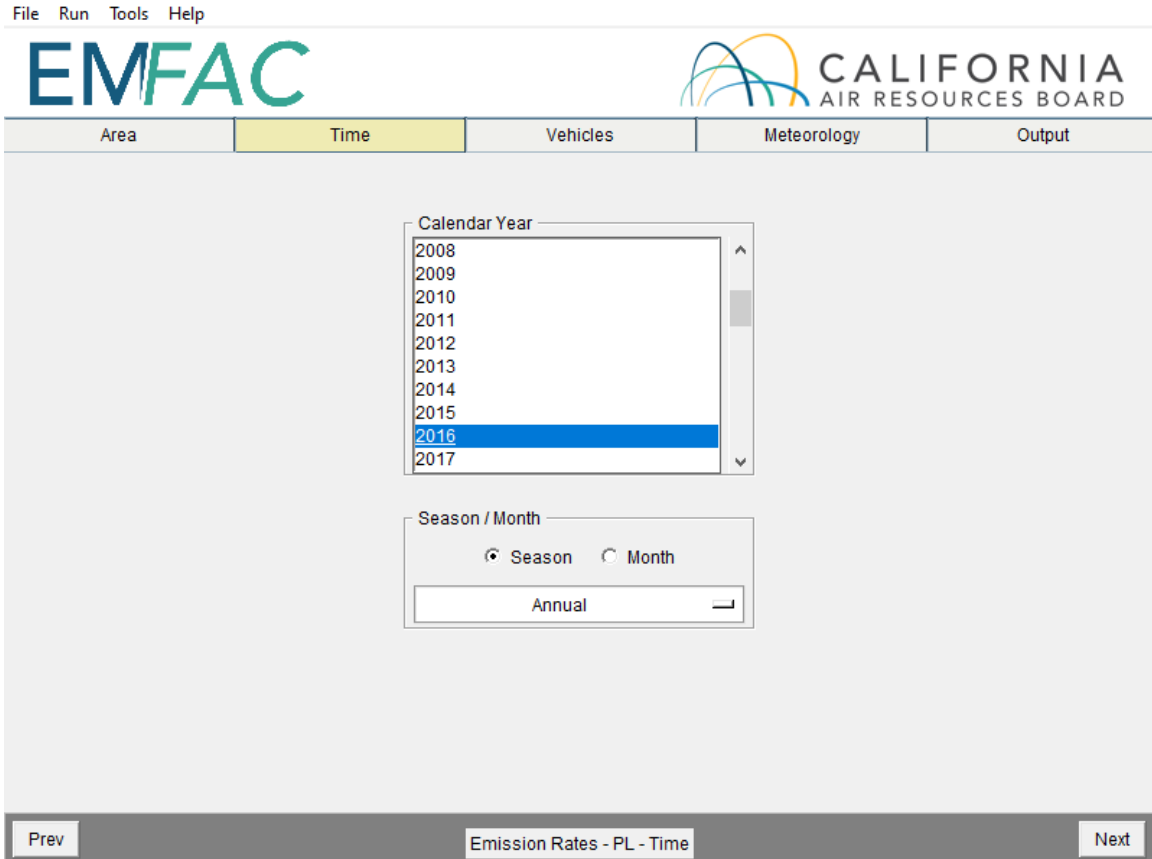
6.1.3 VEHICLES TAB

- The user can select the vehicle classes of interest. All vehicles can be selected by clicking "select all." Emissions rates can also be provided at various sub-levels using the EMFAC202x, EMFAC2011 or EMFAC2007 vehicle classes and selections such as truck/non-truck, or truck1/truck2/non-truck levels. Please refer to the definitions of vehicle categories in Appendix 4.
- The data can be output in either the "By Model Year" or the "Aggregated" format.
  - The "By Model Year" option is for projects in which the activity data by model year are used.
  - The "Aggregated" option is for projects in which only the aggregated total activity, but not the activity by model year, is used.
- The user can choose to output the data "By Fuel" (for output by each fuel type) or "Aggregated" (for aggregated output only).
- In a PL Run, speed bins must be selected.

6.1.4 METEOROLOGY TAB

- PL Runs require users to meteorological conditions
- Each pair of temperature (in Fahrenheit) and relative humidity (in percentage without % sign) must be provided in each row. See the example in the following screen shot.
  - The number of pairs of temperature and relative humidity will be limited to 24 for each PL run; that is one pair for each hour of the day
  - The user may either type the temperatures and relative humidity pairs into the meteorology box or copy the data from an Excel File.
- The allowed input temperature range is from -20°F to 120°F and the allowed input relative humidity range is from 0% to 100%.
  - These input ranges are broader than the corresponding default ranges, used in EMFAC2021. The default ranges are 16.7°F to 106.9°F and 13% to 100%, and these are based upon real meteorology data
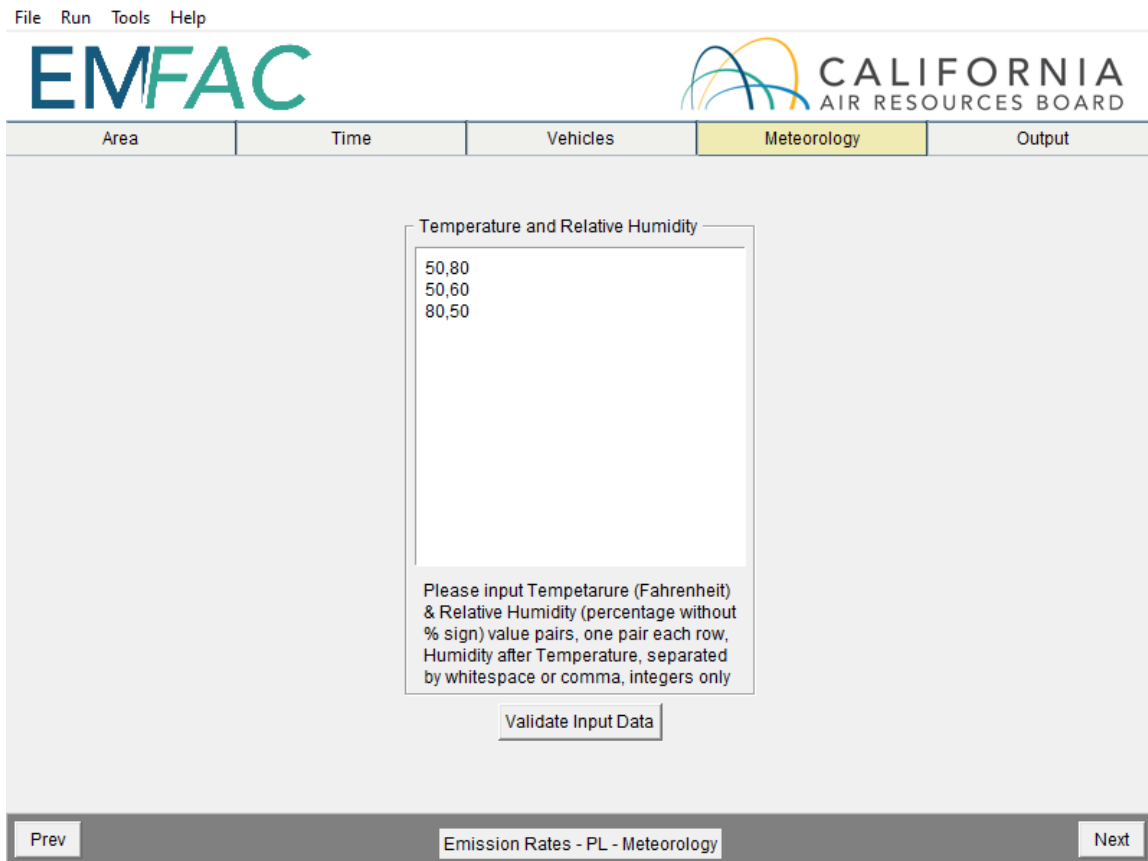
6.1.5 OUTPUT TAB

- The Pollutants group box allows the user to choose the Pollutants for which data are to be included in the output.

> **_IMPORTANT_** – CO_2 emission rates from PL tool are tailpipe CO_2 and are **not** the same as the "complete combustion CO_2" under the "emission" mode.

- The Output Options group box allows users to specify a different directory to hold the output files by clicking the "Change Directory" button.
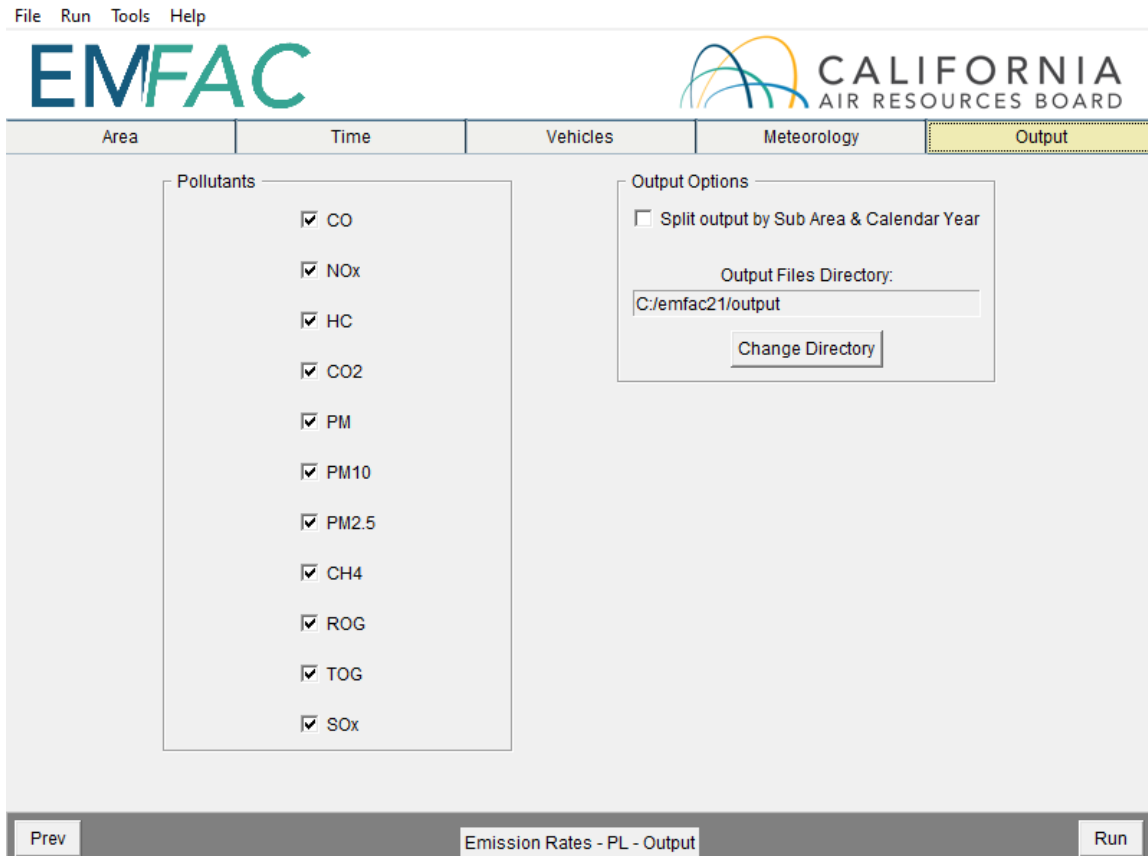
6.2 STARTING THE PROJECT LEVEL MODEL RUN

- Click "Run EMFAC", in the Run Menu, or the "Run" button at the lower right corner of the Output tab to start the model run.
- Save the "Run Specification" (as .ers file) for future use after all run parameters have been determined. Click "Save" in the File menu or click "OK" in the pop-up window after the run button is clicked to save the .ers file.
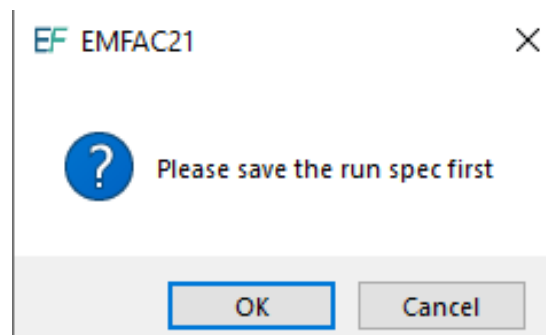
- The model run can be stopped by clicking "Cancel" in the EMFAC2021 Window.
- The pop-up window provides the names and locations of the output files generated after the run has finished.

7   DESCRIPTION OF OUTPUT

By default, the output files are saved in the "output" folder under the EMFAC installation directory. Users can specify another folder to hold these files. Output file names, which are generated automatically, start with the name of .ers files or the names of the custom activity input files, followed by output type and a timestamp suffix.

For example, the default names for the output files for the default activity emissions run specification file "Default_AlamedaSF_2012_Annual.ers" will be:

- "Default_AlamedaSF_2012_Annual_emission_20201208193758.csv" for the emissions inventory file;
- "Default_AlamedaSF_2012_Annual_ghg_20201208193758.csv" for the ghg emissions inventory file;
- "Default_AlamedaSF_2012_Annual_population_20201208193758.csv" for the vehicle population file;
- "Default_AlamedaSF_2012_Annual_trips_20201208193758.csv" for the trips file;
- "Default_AlamedaSF_2012_Annual_vmt_20201208193758.csv" for the vehicle miles traveled file.
- "Default_AlamedaSF_2012_Annual_energycons_20201208193758.csv" for the energy consumption file.

The default names for the output files for the custom activity emissions input file "Custom_KernSJV_2020_Annual.xlsx" will be:

- "Custom_KernSJV_2020_Annual_ emission_20201208231949.csv" for the emissions inventory file;
- "Custom_KernSJV_2020_Annual_ population_20201208231949.csv" for the vehicle population file;
- "Custom_KernSJV_2020_Annual_ trips_20201208231949.csv" for the tips file;
- "Custom_KernSJV_2020_Annual_ vmt_20201208231949.csv" for the vehicle miles traveled file;
- "Custom_KernSJV_2020_Annual_planning_20201208231949.xlsx" for the planning inventory file;
- "Custom_KernSJV_2020_Annual_ctf_20201208231949.csv" for the CEIDARS Transaction Format (CTF) file.

The default names for the output files for the run specification file for the emission rates input file "PL_AlamedaSF_2012_Annual.ers" will be:

- "PL_AlamedaSF_2012_Annual_2020120812621.csv" for the emissions rate file

7.1 CSV (COMMA SEPARATED VALUES)

The standard output format from EMFAC2021 is CSV (comma-separated values), the same as previous versions of EMFAC. CSV is a common, relatively simple file format that is widely used by consumers, businesses, and scientific applications.

For emissions runs, both EMFAC default and custom activity type, the model may output up to four CSV files per Sub-Area and Calendar Year. Typically, emissions data, VMT, energy consumption, trips, and vehicle population data are reported in separate output files.

Please note that the speed_time column in the emissions rates report from a PL run contains different values for different processes. It indicates speed bin for running exhaust and it indicates the time, in minutes, that the vehicle has been sitting prior to starting for start emissions.

Table 7-1 provides descriptions of the columns in the emissions, activity, and emission rates CSV output files. Table 7-2 lists the emissions processes in the emissions rates output files.

As stated in Section 4.1, in order to manage the size of the output files, emissions and emission rates that are equal to zero are not included in the output files. Therefore, in instances when data are missing in the output file, the user can interpret them as zero emissions or an emission rate of zero.

Table 7-1: Summary of Columns in CSV output Files

Column Name	Description
calendar_year	Calendar Year between 2000 -2050
season_month	Annual, summer, winter or one of the twelve months
sub_area (GAI)	Sub Area as defined in Appendix 3
vehicle_class	Vehicle class as defined in Appendix 4
fuel	Gasoline, PHEV, diesel, natural gas, and electric
model_year	Model year
hour	One of the 24 hour
speed	Speed bin from 5 to 90 with 5 incremental
process	Emission process
cat_ncat	With or without catalytic converter
pollutant	Pollutants
emission	Amount of emissions
vmt	Vehicle-miles traveled
trips	Number of trips
population	Vehicle population
temperature	Temperature in Fahrenheit
relative_humidity	Relative humidity in percentage
speed_time	For running exhaust (RUNEX), the "speed_time" column provides the speed bin ranging from 5 mph to 90 mph. For the start process, this field provides the soak time prior to vehicle starting in minutes, ranging from 5 minutes to 720 minutes. For other processes, where emissions rates do not depend on speed bin or soak time, this field is blank.
emission_rate	Emissions per unit of activity

Table 7-2: Emissions Processes in Emissions Rates Files

Emission Process	Description
RUNEX	Running Exhaust
IDLEX	Idle Exhaust
STREX	Start Exhaust
RUNLOSS	Running Loss Evaporative
HOTSOAK	Hot Soak Evaporative
DIURN	Diurnal Evaporative
PMTW	PM Tirewear
PMBW	PM Brakewear

7.2 PLANNING INVENTORY REPORT

The Planning Inventory Report generated from the Custom Activity type is a Microsoft Excel Workbook that contains emissions and activities which are summed by area, calendar year, and vehicle-tech type. It provides a column for every pollutant and process, with sub-total columns at the appropriate places. It provides a summary worksheet for a given area and another worksheet entitled "By Sub-Area" in which the data are broken out by the sub-areas within the area specified by the user (if selected). If a run is only for a single sub-area, or if an area only has one sub-area (such as the Lake County Air Basin), only one data worksheet will be produced. This report includes a "Read_me" tab and a "Glossary tab" which provides information on the report type, the date and time the report was generated, and an explanation of the columns.

IMPORTANT! The Planning Inventory Report generated from the Custom Activity type does not correspond to official GHG emissions. However, the EMFAC2021 default runs employ a methodology consistent with CARB's official GHG inventory estimation.

7.3 SB375 REPORT

The SB375 report generated from the Custom Activity type is a Microsoft Excel Workbook that is a sub-set of the Planning Inventory Report described above. It is limited to four light-duty vehicle types (LDA, LDT1, LDT2, and MDV), CO_2 emissions, and related activity. The only vehicle-tech types included in this SB375 report are:

- LDA - DSL
- LDA - ELEC
- LDA - GAS
- LDA - PHE
- LDT1 - DSL
- LDT1 - ELEC
- LDT1 - GAS
- LDT1 - PHE
- LDT2 - DSL
- LDT2 - ELEC
- LDT2 - GAS
- LDT2 - PHE
- MDV - DSL
- MDV - ELEC
- MDV - GAS
- MDV - PHE

IMPORTANT! – Note again that, for SB375 analyses, ACC/Pavley are deactivated. Also, because the ACC regulation has certain assumptions about vehicle usage built into it, default data in custom activity templates produced for conformity assessments will not match the default data in templates for SB375 assessments (differences will result and affect any comparisons between the two). As a result, CO_2 emissions in an SB375 report will not equal CO_2 emissions from a standard planning inventory report.

7.4 CTF REPORT

The CEIDARS Transaction Format (CTF) generated from the Custom Activity type is a report used internally by CARB to import emissions inventory data into an internal emissions inventory database and forecasting system. The area and sub-area fields, produced by EMFAC, are replaced with the County-Air Basin-District coding system, and the Emissions Inventory Code (EIC) system replaces the vehicle-tech type and the processes. Appendix 8 describes the fields in a CTF file.

APPENDIX 1 DISK SPACE REQUIREMENTS FOR RUNNING EMFAC2021

The disk space needed to perform EMFAC2021 runs consists of two parts: the disk space needed to run the model, e.g. . to perform database operations (on the system drive); and the disk space needed on the user specified drive for saving output files. Both vary significantly based on the specifications of the run. If the output drive is the same as the system drive, the two parts will need to be added up. This appendix provides estimates for some typical runs that can be used to help estimate the space needed for a particular run.

- Default Runs
  - o The disk space needed for database operations for default runs can be up to about 3 GB if "By Speed" is selected;
  - o If speed is not selected, it usually should not take more than 1 GB;
  - o The disk space estimates for the output files for ONE sub-area, ONE calendar year, ALL vehicle classes, ALL pollutants, ALL activities (size may vary slightly by sub-area and calendar year):

Vehicle Class Type	By Hour	By Speed	By Model Year	By Fuel	By Process	Output Size
202x	No	No	No	No	No	0.09 MB
202x	No	No	No	Yes	Yes	0.23 MB
202x	Yes	No	No	Yes	Yes	3.8 MB
202x	Yes	Yes	No	Yes	Yes	26.3 MB
202x	Yes	Yes	Yes (All)	Yes	Yes	816 MB
2011	Yes	Yes	Yes (All)	Yes	Yes	533 MB
2007	Yes	Yes	Yes (All)	Yes	Yes	912 MB

- SG Runs:
  - The disk space needed for database operations for SG runs can be up to about 3GB if "Hourly_Fraction_Veh_Tech_Speed" is included in the template;
  - If "Hourly_Fraction_Veh_Tech_Speed" is not included, it should not take more than 1GB;
  - The disk space estimates for ONE sub-area and ONE calendar year for EMFAC2021 input templates:

SG Run with EMFAC2021 Custom Activity File	Custom Speed Fraction	CSV Template Size	CSV Output Size	Planning Inventory Output Size	CTF Output Size	SB375 Output Size
Total daily VMT	Yes	0.24MB	36.97MB	0.05 M	0.24 M	0.009MB
	No	0.007MB	0.25MB			
VMT by vehicle and fuel type	Yes	0.24MB	36.97MB			
	No	0.009MB	0.25MB			

APPENDIX 2 SUMMARY OF RUN PARAMETERS FOR GENERATING DEFAULT EMISSIONS INVENTORY

Tab	Run Parameters	Description
Area	Area Type	One of the area types can be picked.
	Area	One or more areas can be selected for one run.
Time	Calendar Year	Between 2000 and 2050. One or more calendar years can be selected for one run.
	Season/Month	One of the three seasons (annual, summer, winter) or one of the 12 months can be selected for one run.
	Day or Hour Aggregation	Output emissions by day or by hour.
Vehicles	Vehicle Class type	Output by EMFAC202x, EMFAC2011, or EMFAC2007 vehicle class.
	Vehicle Class	One or more vehicle classes can be picked for one run.
	Model Year	Aggregated or by model year in output. One or more model years can be selected if by model year is picked.
	Speed	Aggregated or by speed in output.
Output	Pollutants	Pollutants in output.
	Activities	Pick one or more of the activities (VMT, vehicle population, trips, or energy consumption) to be included in output files.
	Output by process	Whether to output by process.
	Output by Cat/NonCat	Whether to output by Cat/NonCat.
	Save data for future use	Users can get results faster in the future if data from previous runs are saved and used.
	Output Options	Whether to split output by Sub Area & Calendar Year Where to save output files.

APPENDIX 3 DEFINITION OF AREAS

Sub-Area	County Name	Air Basin Name	Air District Name	MPO	MPO Name
Alameda (SF)	ALAMEDA	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Alpine (GBV)	ALPINE	GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD		
Amador (MC)	AMADOR	MOUNTAIN COUNTIES	AMADOR COUNTY APCD		
Butte (SV)	BUTTE	SACRAMENTO VALLEY	BUTTE COUNTY AQMD	BCAG	Butte County Association of Governments
Calaveras (MC)	CALAVERAS	MOUNTAIN COUNTIES	CALAVERAS COUNTY APCD		
Colusa (SV)	COLUSA	SACRAMENTO VALLEY	COLUSA COUNTY APCD		
Contra Costa (SF)	CONTRA COSTA	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Del Norte (NC)	DEL NORTE	NORTH COAST	NORTH COAST UNIFIED AQMD		
El Dorado (LT)	EL DORADO	LAKE TAHOE	EL DORADO COUNTY APCD	TMPO	Tahoe Metropolitan Planning Organization
El Dorado (MC)	EL DORADO	MOUNTAIN COUNTIES	EL DORADO COUNTY APCD	SACOG	Sacramento Area Council of Governments
Fresno (SJV)	FRESNO	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	COFCG	Fresno Council of Governments
Glenn (SV)	GLENN	SACRAMENTO VALLEY	GLENN COUNTY APCD		
Humboldt (NC)	HUMBOLDT	NORTH COAST	NORTH COAST UNIFIED AQMD		
Imperial (SS)	IMPERIAL	SALTON SEA	IMPERIAL COUNTY APCD	SCAG	Southern California Association of Governments
Inyo (GBV)	INYO	GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD		
Kern (MD)	KERN	MOJAVE DESERT	KERN COUNTY APCD	KCOG	Kern Council of Governments
Kern (SJV)	KERN	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	KCOG	Kern Council of Governments
Kings (SJV)	KINGS	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	KCAG	Kings County Association of Governments
Lake (LC)	LAKE	LAKE COUNTY	LAKE COUNTY AQMD		
Lassen (NEP)	LASSEN	NORTHEAST PLATEAU	LASSEN COUNTY APCD		
Los Angeles (MD)	LOS ANGELES	MOJAVE DESERT	ANTELOPE VALLEY AQMD	SCAG	Southern California Association of Governments
Los Angeles (SC)	LOS ANGELES	SOUTH COAST	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
Madera (SJV)	MADERA	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	MCTC	Madera County Transportation Commission
Marin (SF)	MARIN	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission

Sub-Area	County Name	Air Basin Name	Air District Name	MPO	MPO Name
Mariposa (MC)	MARIPOSA	MOUNTAIN COUNTIES	MARIPOSA COUNTY APCD		
Mendocino (NC)	MENDOCINO	NORTH COAST	MENDOCINO COUNTY AQMD		
Merced (SJV)	MERCED	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	MCAG	Merced County Association of Governments
Modoc (NEP)	MODOC	NORTHEAST PLATEAU	MODOC COUNTY APCD		
Mono (GBV)	MONO	GREAT BASIN VALLEYS	GREAT BASIN UNIFIED APCD		
Monterey (NCC)	MONTEREY	NORTH CENTRAL COAST	MONTEREY BAY UNIFIED APCD	AMBAG	Association of Monterey Bay Governments
Napa (SF)	NAPA	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Nevada (MC)	NEVADA	MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD		
Orange (SC)	ORANGE	SOUTH COAST	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
Placer (LT)	PLACER	LAKE TAHOE	PLACER COUNTY APCD	TMPO	Tahoe Metropolitan Planning Organization
Placer (MC)	PLACER	MOUNTAIN COUNTIES	PLACER COUNTY APCD	SACOG	Sacramento Area Council of Governments
Placer (SV)	PLACER	SACRAMENTO VALLEY	PLACER COUNTY APCD	SACOG	Sacramento Area Council of Governments
Plumas (MC)	PLUMAS	MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD		
Riverside (MD/MDAQMD)	RIVERSIDE	MOJAVE DESERT	MOJAVE DESERT AQMD	SCAG	Southern California Association of Governments
Riverside (MD/SCAQMD)	RIVERSIDE	MOJAVE DESERT	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
Riverside (SC)	RIVERSIDE	SOUTH COAST	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
Riverside (SS)	RIVERSIDE	SALTON SEA	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
Sacramento (SV)	SACRAMENTO	SACRAMENTO VALLEY	SACRAMENTO METROPOLITAN AQMD	SACOG	Sacramento Area Council of Governments
San Benito (NCC)	SAN BENITO	NORTH CENTRAL COAST	MONTEREY BAY UNIFIED APCD	AMBAG	Association of Monterey Bay Governments
San Bernardino (MD)	SAN BERNARDINO	MOJAVE DESERT	MOJAVE DESERT AQMD	SCAG	Southern California Association of Governments
San Bernardino (SC)	SAN BERNARDINO	SOUTH COAST	SOUTH COAST AQMD	SCAG	Southern California Association of Governments
San Diego (SD)	SAN DIEGO	SAN DIEGO	SAN DIEGO COUNTY APCD	SANDAG	San Diego Association of Governments
San Francisco (SF)	SAN FRANCISCO	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
San Joaquin (SJV)	SAN JOAQUIN	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	SJCOG	San Joaquin Council of Governments

Sub-Area	County Name	Air Basin Name	Air District Name	MPO	MPO Name
San Luis Obispo (SCC)	SAN LUIS OBISPO	SOUTH CENTRAL COAST	SAN LUIS OBISPO COUNTY APCD	SLOCOG	San Luis Obispo Council of Governments
San Mateo (SF)	SAN MATEO	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Santa Barbara (SCC)	SANTA BARBARA	SOUTH CENTRAL COAST	SANTA BARBARA COUNTY APCD	SBCAG	Santa Barbara County Association of Governments
Santa Clara (SF)	SANTA CLARA	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Santa Cruz (NCC)	SANTA CRUZ	NORTH CENTRAL COAST	MONTEREY BAY UNIFIED APCD	AMBAG	Association of Monterey Bay Governments
Shasta (SV)	SHASTA	SACRAMENTO VALLEY	SHASTA COUNTY AQMD	SCRTPA	Shasta Regional Transportation Agency
Sierra (MC)	SIERRA	MOUNTAIN COUNTIES	NORTHERN SIERRA AQMD		
Siskiyou (NEP)	SISKIYOU	NORTHEAST PLATEAU	SISKIYOU COUNTY APCD		
Solano (SF)	SOLANO	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Solano (SV)	SOLANO	SACRAMENTO VALLEY	YOLO/SOLANO AQMD	MTC	Metropolitan Transportation Commission
Sonoma (NC)	SONOMA	NORTH COAST	NORTHERN SONOMA COUNTY APCD	MTC	Metropolitan Transportation Commission
Sonoma (SF)	SONOMA	SAN FRANCISCO BAY AREA	BAY AREA AQMD	MTC	Metropolitan Transportation Commission
Stanislaus (SJV)	STANISLAUS	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	StanCOG	Stanislaus Council of Governments
Sutter (SV)	SUTTER	SACRAMENTO VALLEY	FEATHER RIVER AQMD	SACOG	Sacramento Area Council of Governments
Tehama (SV)	TEHAMA	SACRAMENTO VALLEY	TEHAMA COUNTY APCD		
Trinity (NC)	TRINITY	NORTH COAST	NORTH COAST UNIFIED AQMD		
Tulare (SJV)	TULARE	SAN JOAQUIN VALLEY	SAN JOAQUIN VALLEY UNIFIED APCD	TCAG	Tulare County Association of Governments
Tuolumne (MC)	TUOLUMNE	MOUNTAIN COUNTIES	TUOLUMNE COUNTY APCD		
Ventura (SCC)	VENTURA	SOUTH CENTRAL COAST	VENTURA COUNTY APCD	SCAG	Southern California Association of Governments
Yolo (SV)	YOLO	SACRAMENTO VALLEY	YOLO/SOLANO AQMD	SACOG	Sacramento Area Council of Governments
Yuba (SV)	YUBA	SACRAMENTO VALLEY	FEATHER RIVER AQMD	SACOG	Sacramento Area Council of Governments

APPENDIX 4   VEHICLE CATEGORIES

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non-Truck Category	Truck 1 / Truck 2 /Non-Truck
LDA - Dsl	LDA	Passenger Cars	LDA	LDA	LDA	Non-Truck	Non-Truck
LDA - Gas							
LDA - Elec							
LDA - Phe							
LDT1 - Dsl	LDT1	Light-Duty Trucks (GVWR* <6000 lbs and ETW** <= 3750 lbs)	LDT1	LDT1	T1	Non-Truck	Non-Truck
LDT1- Gas							
LDT1 - Elec							
LDT1 - Phe							
LDT2 - Dsl	LDT2	Light-Duty Trucks (GVWR <6000 lbs and ETW 3751-5750 lbs)	LDT2	LDT2	T2	Non-Truck	Non-Truck
LDT2 - Gas							
LDT2 - Elec							
LDT2 - Phe							
MDV - Dsl	MDV	Medium-Duty Trucks (GVWR 6001-8500 lbs)	MDV	MDV	T3	Non-Truck	Non-Truck
MDV - Gas							
MDV - Elec							
MDV - Phe							
MH - Dsl	MH	Motor Homes	MH	MH	MH	Non-Truck	Non-Truck
MH - Gas							
MCY - Gas	MCY	Motorcycles	MCY	MCY	MC	Non-Truck	Non-Truck
LHD1 – Dsl	LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	LHDT1	LHDT1	T4	Truck	Truck1
LHD1 - Gas							
LHD1 - Elec							
LHD2 – Dsl	LHD2	Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	LHDT2	LHDT2	T5	Truck	Truck1
LHD2 - Gas							
LHD2 - Elec							
T6 Public Class 4 - Dsl	T6 Public Class 4	Medium-Heavy Duty Public Fleet Truck (GVWR 14001-16000 lbs)	T6 Public	MHDT	T6	Truck	Truck2
T6 Public Class 4 - Elec							
T6 Public Class 4 - NG							

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non-Truck Category	Truck 1 / Truck 2 /Non-Truck
T6 Public Class 5 - Dsl	T6 Public Class 5	Medium-Heavy Duty Public Fleet Truck (GVWR 16001-19500 lbs)	T6 Public	MHDT	T6	Truck	Truck2
T6 Public Class 5 - Elec							
T6 Public Class 5 - NG							
T6 Public Class 6 - Dsl	T6 Public Class 6	Medium-Heavy Duty Public Fleet Truck (GVWR 19501-26000 lbs)	T6 Public	MHDT	T6	Truck	Truck2
T6 Public Class 6 - Elec							
T6 Public Class 6 - NG							
T6 Public Class 7 - Dsl	T6 Public Class 7	Medium-Heavy Duty Public Fleet Truck (GVWR 26001-33000 lbs)	T6 Public	MHDT	T6	Truck	Truck2
T6 Public Class 7 - Elec							
T6 Public Class 7 - NG							
T6 Utility Class 5 - Dsl	T6 Utility Class 5	Medium-Heavy Duty Utility Fleet Truck (GVWR 16001-19500 lbs)	T6 Utility	MHDT	T6	Truck	Truck2
T6 Utility Class 5 - Elec							
T6 Utility Class 5 - NG							
T6 Utility Class 6 - Dsl	T6 Utility Class 6	Medium-Heavy Duty Utility Fleet Truck (GVWR 19501-26000 lbs)	T6 Utility	MHDT	T6	Truck	Truck2
T6 Utility Class 6 - Elec							
T6 Utility Class 6 - NG							
T6 Utility Class 7 - Dsl	T6 Utility Class 7	Medium-Heavy Duty Utility Fleet Truck (GVWR 26001-33000 lbs)	T6 Utility	MHDT	T6	Truck	Truck2
T6 Utility Class 7 - Elec							
T6 Utility Class 7 - NG							
T6 Instate Tractor Class 6 - Dsl	T6 Instate Tractor Class 6	Medium-Heavy Duty Tractor Truck (GVWR 19501-26000 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Tractor Class 6 - Elec							
T6 Instate Tractor Class 6 - NG							
T6 Instate Delivery Class 4 - Dsl	T6 Instate Delivery Class 4	Medium-Heavy Duty Delivery Truck (GVWR 14001-16000 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Delivery Class 4 - Elec							
T6 Instate Delivery Class 4 - NG							
T6 Instate Delivery Class 5 - Dsl	T6 Instate Delivery Class 5	Medium-Heavy Duty Delivery Truck (GVWR 16001-19500 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Delivery Class 5 - Elec							

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non- Truck Category	Truck 1 / Truck 2 /Non- Truck
T6 Instate Delivery Class 5 - NG							
T6 Instate Delivery Class 6 - Dsl	T6 Instate Delivery Class 6	Medium-Heavy Duty Delivery Truck (GVWR 19501-26000 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Delivery Class 6 - Elec							
T6 Instate Delivery Class 6 - NG							
T6 Instate Other Class 4 - Dsl	T6 Instate Other Class 4	Medium-Heavy Duty Other Truck (GVWR 14001-16000 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Other Class 4 - Elec							
T6 Instate Other Class 4 - NG							
T6 Instate Other Class 5 -Dsl	T6 Instate Other Class 5	Medium-Heavy Duty Other Truck (GVWR 16001-19500 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Other Class 5 - Elec							
T6 Instate Other Class 5 - NG							
T6 Instate Other Class 6 – Dsl	T6 Instate Other Class 6	Medium-Heavy Duty Other Truck (GVWR 19501-26000 lbs)	T6 Instate small	MHDT	T6	Truck	Truck2
T6 Instate Other Class 6 - Elec							
T6 Instate Other Class 6 - NG							
T6 Instate Tractor Class 7 - Dsl	T6 Instate Tractor Class 7	Medium-Heavy Duty Tractor Truck (GVWR 26001-33000 lbs)	T6 Instate heavy	MHDT	T6	Truck	Truck2
T6 Instate Tractor Class 7 – Elec							
T6 Instate Tractor Class 7 - NG							
T6 Instate Delivery Class 7 -Dsl	T6 Instate Delivery Class 7	Medium-Heavy Duty Delivery Truck (GVWR 26001-33000 lbs)	T6 Instate heavy	MHDT	T6	Truck	Truck2
T6 Instate Delivery Class 7 - Elec							
T6 Instate Delivery Class 7 -NG							
T6 Instate Other Class 7 - Dsl	T6 Instate Other Class 7	Medium-Heavy Duty Other Truck (GVWR 26001-33000 lbs)	T6 Instate heavy	MHDT	T6	Truck	Truck2
T6 Instate Other Class 7 - Elec							
T6 Instate Other Class 7 - NG							
T6 CAIRP Class 4 - Dsl	T6 CAIRP Class 4	Medium-Heavy Duty CA International Registration Plan Truck (GVWR 14001-16000 lbs)	T6 CAIRP small	MHDT	T6	Truck	Truck2
T6 CAIRP Class 4 - Elec							
T6 CAIRP Class 5 - Dsl				MHDT	T6	Truck	Truck2

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non-Truck Category	Truck 1 / Truck 2 /Non-Truck
T6 CAIRP Class 5 - Elec	T6 CAIRP Class 5	Medium-Heavy Duty CA International Registration Plan Truck (GVWR 16001-19500 lbs)	T6 CAIRP small				
T6 CAIRP Class 6 - Dsl	T6 CAIRP Class 6	Medium-Heavy Duty CA International Registration Plan Truck (GVWR 19501-26000 lbs)	T6 CAIRP small	MHDT	T6	Truck	Truck2
T6 CAIRP Class 6 - Elec							
T6 CAIRP Class 7- Dsl	T6 CAIRP Class 7	Medium-Heavy Duty CA International Registration Plan Truck (GVWR 26001-33000 lbs)	T6 CAIRP heavy	MHDT	T6	Truck	Truck2
T6 CAIRP Class 7 - Elec							
T6 CAIRP Class 7 - NG							
T6 OOS Class 4 - Dsl	T6 OOS Class 4	Medium-Heavy Duty Out-of-state Truck (GVWR 14001-16000 lbs)		MHDT	T6	Truck	Truck2
T6 OOS Class 5 - Dsl	T6 OOS Class 5	Medium-Heavy Duty Out-of-state Truck (GVWR 16001-19500 lbs)	T6 OOS small	MHDT	T6	Truck	Truck2
T6 OOS Class 6 - Dsl	T6 OOS Class 6	Medium-Heavy Duty Out-of-state Truck (GVWR 19501-26000 lbs)		MHDT	T6	Truck	Truck2
T6 OOS Class 7 - Dsl	T6 OOS Class 7	Medium-Heavy Duty Out-of-state Truck (GVWR 26001-33000 lbs)	T6 OOS heavy	MHDT	T6	Truck	Truck2
T6TS - Gas	T6TS	Medium-Heavy Duty Truck	T6TS	MHDT	T6	Truck	Truck2
T6TS - Elec							
T7 Public Class 8 - Dsl	T7 Public Class 8	Heavy-Heavy Duty Public Fleet Truck (GVWR 33001 lbs and over)	T7 Public	HHDT	T7	Truck	Truck2
T7 Public Class 8 - Elec							
T7 Public Class 8 - NG							
T7 CAIRP Class 8 - Dsl	T7 CAIRP Class 8	Heavy-Heavy Duty CA International Registration Plan Truck (GVWR 33001 lbs and over)	T7 CAIRP	HHDT	T7	Truck	Truck2
T7 CAIRP Class 8 - Elec							
T7 CAIRP Class 8 - NG							
T7 Utility Class 8 - Dsl	T7 Utility Class 8	Heavy-Heavy Duty Utility Fleet Truck (GVWR 33001 lbs and over)	T7 Utility	HHDT	T7	Truck	Truck2
T7 Utility Class 8 - Elec							
T7 NNOOS Class 8 - Dsl	T7 NNOOS Class 8	Heavy-Heavy Duty Non-Neighboring Out-of-state Truck (GVWR 33001 lbs and over)	T7 NNOOS	HHDT	T7	Truck	Truck2
T7 NOOS Class 8 - Dsl	T7 NOOS Class 8	Heavy-Heavy Duty Neighboring Out-of-state Truck (GVWR 33001 lbs and over)	T7 NOOS	HHDT	T7	Truck	Truck2

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non-Truck Category	Truck 1 / Truck 2 /Non-Truck
T7 Other Port Class 8 - Dsl	T7 Other Port Class 8	Heavy-Heavy Duty Drayage Truck at Other Facilities (GVWR 33001 lbs and over)	T7 Other Port	HHDT	T7	Truck	Truck2
T7 Other Port Class 8 - Elec							
T7 POAK Class 8 - Dsl	T7 POAK Class 8	Heavy-Heavy Duty Drayage Truck in Bay Area (GVWR 33001 lbs and over)	T7 POAK	HHDT	T7	Truck	Truck2
T7 POAK Class 8 - Elec							
T7 POAK Class 8 - NG							
T7 POLA Class 8 - Dsl	T7 POLA Class 8	Heavy-Heavy Duty Drayage Truck near South Coast (GVWR 33001 lbs and over)	T7 POLA	HHDT	T7	Truck	Truck2
T7 POLA Class 8 - Elec							
T7 POLA Class 8 - NG							
T7 Single Concrete/Transit Mix Class 8 - Dsl	T7 Single Concrete/Transit Mix Class 8	Heavy-Heavy Duty Single Unit Concrete/Transit Mix Truck (GVWR 33001 lbs and over)	T7 Single	HHDT	T7	Truck	Truck2
T7 Single Concrete/Transit Mix Class 8 - Elec							
T7 Single Concrete/Transit Mix Class 8 - NG							
T7 Single Dump Class 8 - Dsl	T7 Single Dump Class 8	Heavy-Heavy Duty Single Unit Dump Truck (GVWR 33001 lbs and over)	T7 Single	HHDT	T7	Truck	Truck2
T7 Single Dump Class 8 - Elec							
T7 Single Dump Class 8 - NG							
T7 Single Other Class 8 - Dsl	T7 Single Other Class 8	Heavy-Heavy Duty Single Unit Other Truck (GVWR 33001 lbs and over)	T7 Single	HHDT	T7	Truck	Truck2
T7 Single Other Class 8 - Elec							
T7 Single Other Class 8 - NG							
T7 Tractor Class 8 - Dsl	T7 Tractor Class 8	Heavy-Heavy Duty Tractor Truck (GVWR 33001 lbs and over)	T7 Tractor	HHDT	T7	Truck	Truck2
T7 Tractor Class 8 - Elec							
T7 Tractor Class 8 - NG							
T7 SWCV Class 8 - Dsl	T7 SWCV Class 8	Heavy-Heavy Duty Solid Waste Collection Truck (GVWR 33001 lbs and over)	T7 SWCV	HHDT	T7	Truck	Truck2
T7 SWCV Class 8 - Elec							
T7 SWCV Class 8 - NG							
T7IS - Gas	T7IS	Heavy-Heavy Duty Truck	T7IS	HHDT	T7	Truck	Truck2
T7IS - Elec							
PTO - Dsl	PTO	Power Take Off	PTO	HHDT	T7	Truck	Truck2
PTO - Elec							
SBUS - Gas	SBUS	School Buses	SBUS	SBUS	SB		

EMFAC202x veh & fuel	EMFAC202x Vehicle Class	Description	EMFAC2011 Vehicle Class***	EMFAC2007 Vehicle Class	EMFAC2007 Vehicle Code	Truck / Non-Truck Category	Truck 1 / Truck 2 /Non-Truck
SBUS - Dsl						Non-Truck	Non-Truck
SBUS - Elec							
SBUS - NG							
UBUS - Dsl	UBUS	Urban Buses	UBUS	UBUS	UB	Non-Truck	Non-Truck
UBUS - Gas							
UBUS - Elec							
UBUS - NG							
Motor Coach - Dsl	Motor Coach	Motor Coach	Motor Coach	OBUS	OB	Non-Truck	Non-Truck
Motor Coach - Elec							
OBUS - Gas	OBUS	Other Buses	OBUS	OBUS	OB	Non-Truck	Non-Truck
OBUS - Elec							
All Other Buses - NG	All Other Buses	All Other Buses	All Other Buses	OBUS	OB	Non-Truck	Non-Truck
All Other Buses - Dsl							

* GVWR: gross vehicle weight rating

** ETW: equivalent test weight

*** Some of the EMFAC2011 vehicle classes, including T6 Ag, T6 Instate Construction Heavy, T6 Instate Construction Small, T7 Ag, T7 Single Construction and T7 Tractor Construction, are reallocated to other EMFAC202x vehicle classes. Details are discussed in the technical documentation.

APPENDIX 5 SUMMARY OF RUN PARAMETERS FOR GENERATING CUSTOM ACTIVITY TEMPLATE

Tab	Run Parameters	Description
Area	Area Type	One of the area types can be picked.
	Area	One or more areas can be selected for one run.
Time	Calendar Year	Between 2000 and 2050. One or more calendar years can be selected for one run.
	Season/Month	One of the three seasons (annual, summer, winter) or one of the 12 months can be selected for one run.
VMT	VMT Type	Whether input VMT is by daily total or by vehicle and fuel type.
	Hourly Speed Fractions	Whether to include custom hourly speed fractions.
	SB375	Whether it is a SB375 template.

APPENDIX 6 SUMMARY OF RUN PARAMETERS FOR GENERATING CUSTOM ACTIVITY EMISSIONS INVENTORY

Tab	Run Parameters	Description
Load	Template File Type	Whether it is EMFAC2021 format or EMFAC2017 Format.
	SB375	Whether it is a SB375 run
	Custom Activity File	The custom activity file in EMFAC2021 or EMFAC2017 format.
Output	Report Type	One or more of the reports (csv, planning inventory, or CTF) can be generated for a non-SB375 run.
	Report Type (SB375)	Only SB375 planning inventory report will be generated.
	Save data for future use	Users can get results faster in the future if data from previous runs are saved and used.
	Output Directory	Where to save output files.

APPENDIX 7 SUMMARY OF RUN PARAMETERS FOR GENERATING EMISSION RATES

Tab	Run Parameters	Description
Area	Area Type	One of the area types can be picked.
	Area	One or more areas can be selected for one run.
Time	Calendar Year	Between 2000 and 2050. One or more calendar years can be selected for one run.
	Season/Month	One of the three seasons (annual, summer, winter) or one of the 12 months can be selected for one run.
Vehicles	Vehicle Class type	Output by EMFAC202x vehicle class, EMFAC2011 vehicle class, EMFAC2007 vehicle class, Truck/non-Truck or Truck1/Truck2/non-Truck.
	Vehicle Class	One or more vehicle classes can be picked for one run.
	Model Year	Aggregated or by model year in output. One or more model years can be selected if by model year is selected.
	Fuel	Aggregated or by fuel in output.
	Speed	One or more speeds can be selected.
Meteorology	Temperature	Temperature in Fahrenheit.
	Relative Humidity	Relative humidity.
Output	Pollutants	Pollutants in output.
	Output Directory	Where to save output files.

APPENDIX 8 FIELDS IN CTF FILE

FIELD NAME	FIELD TYPE	LENGTH	FIELD DESCRIPTION
YEAR	NUMERIC	4	CAL YEAR OF THE RUN DATA
DIS	CHAR	3	DISTRICT ID
AB	CHAR	3	AIR BASIN ID
CO	NUMERIC	2	COUNTY ID
EIC	NUMERIC	14	EIC CODE
PR	NUMERIC (11,2)	11	ANNUAL PROCESS RATE
HPDY	NUMERIC	2	HOURS PER DAY
DPWK	NUMERIC	2	DAY PER WEEK
JANT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR JANUARY - RANGE 0-100
FEBT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR FEBRUARY - RANGE 0-100
MART	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR MARCH - RANGE 0-100
APRT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR APRIL - RANGE 0-100
MAYT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR MAY - RANGE 0-100
JUNT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR JUNE - RANGE 0-100
JULT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR JULY - RANGE 0-100
AUGT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR AUGUST - RANGE 0-100
SEPT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR SEPTEMBER - RANGE 0-100
OCTT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR OCTOBER - RANGE 0-100
NOVT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR NOVEMBER - RANGE 0-100
DECT	NUMERIC(4,1)	5	PERCENT ACTIVITY FOR DECEMBER - RANGE 0-100
POL	NUMERIC	9	POLLUTANT CODE
EMFACT	NUMBER (10,4)	11	EMISSION FACTOR (LBS PER EIC UNIT)
SEASON	CHAR	14	SEASON
EMS	NUMERIC(10,4)	11	EMISSIONS (TONS/DAY)
VERSION	CHAR	15	EMFAC VERSION
OPERATOR	CHAR	3	OPERATOR INITIALS
TDATE	DATE	8	TRANSACTION DATE