

Training Exercises

Exercise Setup

- Folders for each Exercise
- Save input/output to folders for each Exercise
- Exercises require MS Office 2007 or above (Excel).

Exercise Overview

Basic

1. Burden mode
2. Emfac mode
3. Exhaust Technology Group (TG) fraction
4. Vehicle Kilometer Travelled (VKT)
5. Trips
6. Speed fraction
7. Relative Humidity

Advanced

8. Alternate Base Year
9. Bus retirement
10. Link example

Basic Exercises

Exercise #1: Daily Emissions Inventory

- This exercise will generate an average daily emissions inventory for Hong Kong at calendar year 2030 using BURDEN output formats
- Require 1 scenario for calendar year 2030
- Save input file as: **HK_2030_Burden.inp**

Exercise #1: Scenario input data

- Geographic Area: **Hong Kong SAR** (default)
- Calendar Years: **2030**
- Alternate Baseline Year: **Inactive** (default)
- Season: **Annual** (default)
- Scenario Title for Reports: **Default Title**
- Model Years: **All** (default)
- Vehicle Classes: **Modify** (default)

Exercise #1: Scenario input data

– Scenario Type:

BURDEN – Area Emission Estimates

– Files and Reports:

1) Detailed Planning Inventory (CSV) (default)

2) Detailed Outputs (BDN)

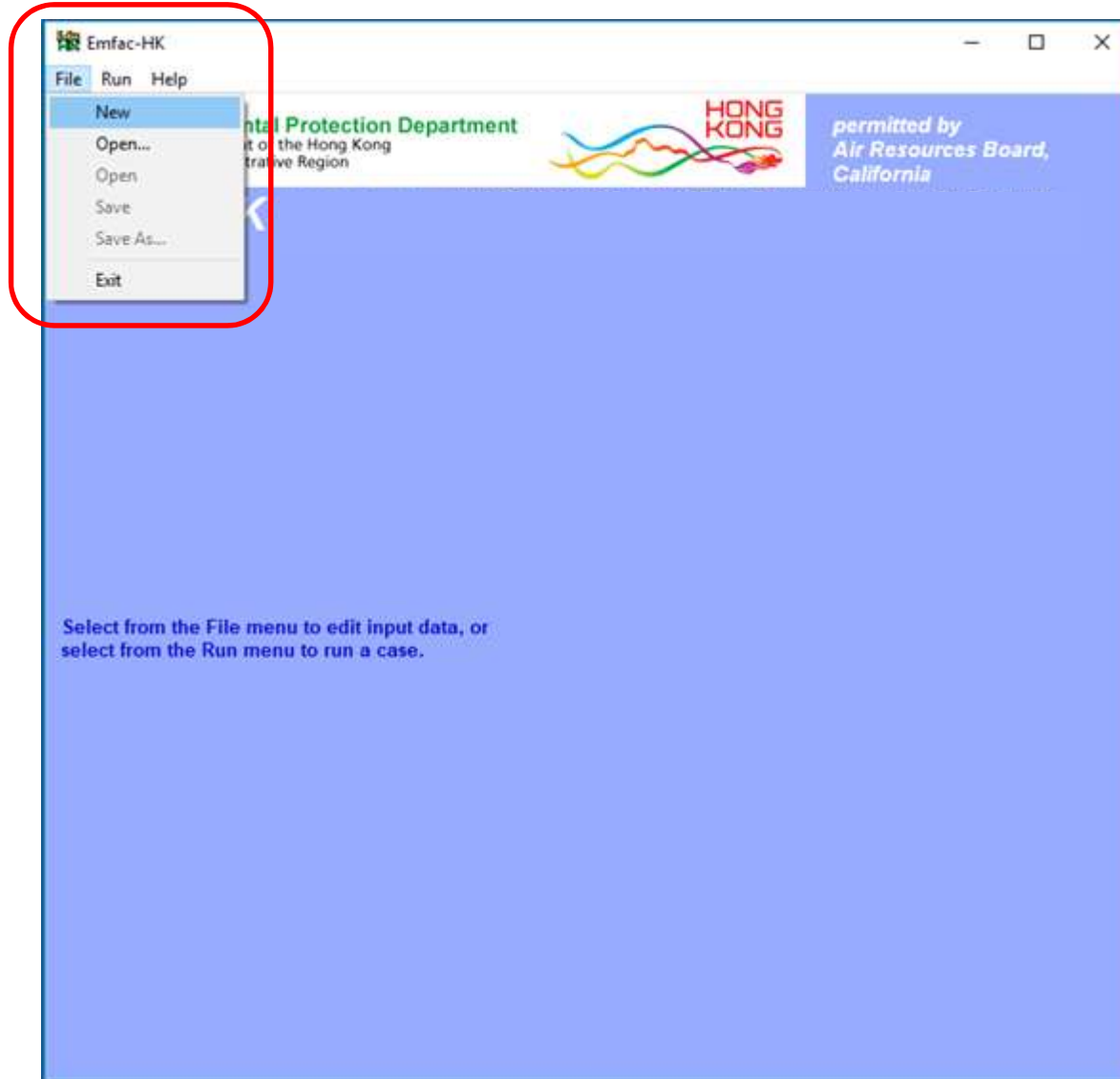
- check Model Yrs & Tech Groups

– Output Frequency: **Day** (default)

– Output Particulate: **PM₁₀ PM₂₅** (default)

– Output Hydrocarbons: **VOC** (default)


Exercise #1: New File




Exercise #1: Add New Scenario

Emfac-HK Editing data

File Run Help

 Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region



permitted by
Air Resources Board,
California

Emfac-HK

MAIN

List of Available Scenarios

No file or scenario

Current Scenario Data

Number: 0 of 0
Name:
Calendar Year:
Season:
Type:

IM Program Parameters

Save

Save As...

Run

Finish Editing

Cancel

Add New Scenario

Edit Scenario

Delete Scenario

Apply Regime Changes *

Category-Fuel	% Reduction		Start Year	Category-Fuel	% Reduction		Start Year
	Highs	Supers			Highs	Supers	
Private Car-Petrol:	0	0	2020	Medium Goods Vehicle 6.4-15t-Diesel:	0	0	2020
Taxi-LPG:	0	0	2020	Medium and Heavy Goods Vehicle >15t-Diesel:	0	0	2020
Public Light Bus-LPG:	0	0	2020	Non-Franchised Bus <=6.4t-Diesel:	0	0	2020
Private Light Bus >3.5t-LPG:	0	0	2020	Non-Franchised Bus 6.4-15t-Diesel:	0	0	2020
Public Light Bus-Diesel:	0	0	2020	Non-Franchised Bus >15t-Diesel:	0	0	2020
Light Goods Vehicle <=3.5t-Diesel:	0	0	2020	Motorcycle-Petrol:	0	0	2020
Light Goods Vehicle 3.5-5.5t-Diesel:	0	0	2020				

* The Model has taken into account the existing I/M Programs for PC-Petrol, Taxi-LPG, PLB-LPG and PrLB-LPB

Exercise #1: Input 1 Tab

The screenshot displays the Emfac-HK software interface. The main window is titled "Emfac-HK" and "Editing data". It features a menu bar with "File", "Run", and "Help". The header includes the Environmental Protection Department logo and the text "The Government of the Hong Kong Special Administrative Region", along with the "HONG KONG" logo and "permitted by Air Resources Board, California".

The main content area is titled "Input 1" and contains the following sections:

- Basic scenario data - Select Area, Calculation Method, Calendar Year, Alternate Base Year and Season**
- Step 1 - Geographic Area:** Area Type: SAR, SAR, SAR, Hong Kong
- Step 2a - Calendar Year:** Select, Select a Calendar Year, Scenario Year for Output
- Step 2b - Alternate Base Year:** Inactive, Alternate Base Data: Year INACTIVE, OPTIONAL: Selecting this option overrides EMFAC-HK default base year.
- Step 3 - Season or Month:** Annual

At the bottom, there are "Cancel", "Next >", and "Finish" buttons. A red arrow points from the "Select" button in Step 2a to a "Calendar Year Selection" dialog box.

The "Calendar Year Selection" dialog box has two columns: "Available" and "Included". The "Available" column lists years from 1997 to 2015. The "Included" column has the year 2030 highlighted with a red box. Below the columns are "All" buttons and a status message "Calendar year 2030 selected". At the bottom are "OK" and "Cancel" buttons. A green arrow points to the "OK" button.

Exercise #1: Input 2 Tab

Emfac-HK Editing data

File Run Help

Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

HONG KONG

permitted by
Air Resources Board,
California

Emfac-HK

Input 1 Input 2 Mode and Output

Basic scenario data - Select or Enter Scenario Title

Step 4 -- Scenario Title for Reports

Hong Kong SAR Annual CYr 2030 Default Title Default Title

In Emfac Impact Rate reports, titles over 48 characters will be truncated!

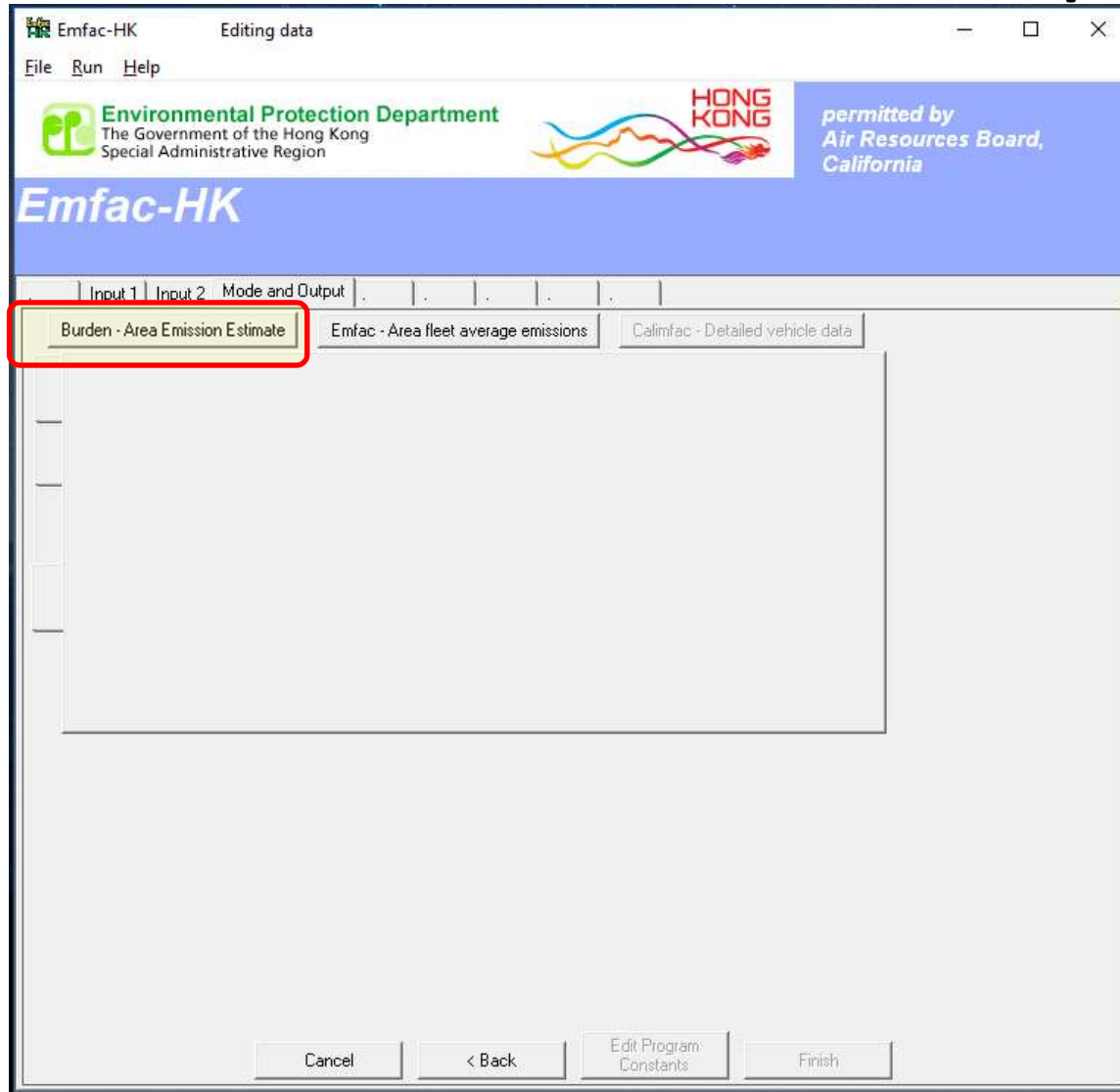
Step 5 - Model Years
All model years selected
All
Modify

Step 6 - Vehicle Classes
MODIFIED: All vehicle classes selected
All
Modify

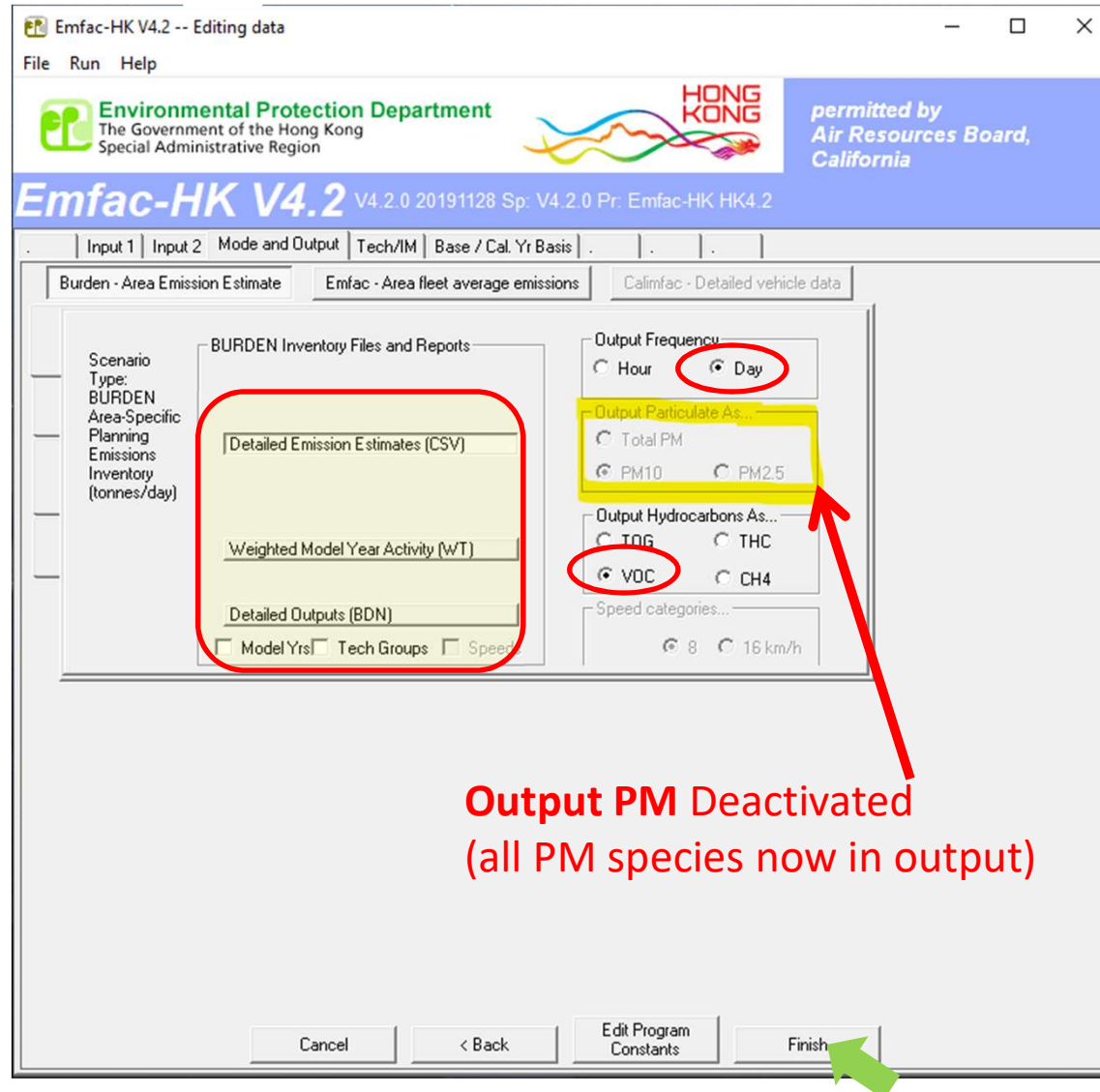
Step 7 - I/M Program Schedule
Standard I/M schedules
Default
Modify

Cancel < Back Next > Finish

Exercise #1: Mode and Output Tab

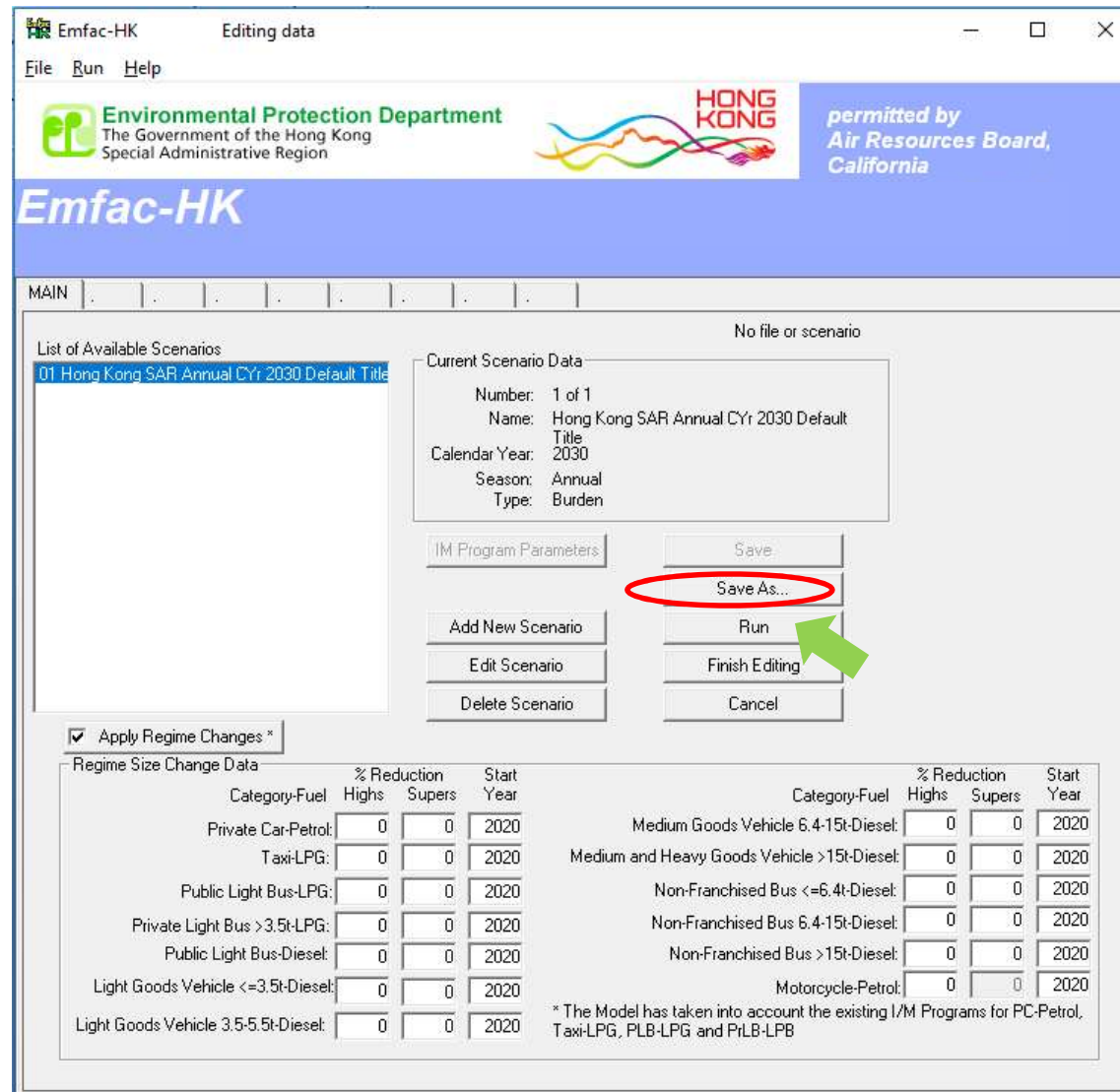


Exercise #1: Mode and Output Tab







Output PM Deactivated
(all PM species now in output)

Exercise #1: Main Screen



- Save input file as: **HK_2030_Burden.inp** and **Run**

Exercise #1: Output in Folder

Name	Type
 HK_2030_Burden.inp	INP File
 HK_2030_Burden.bdn.csv	Microsoft Office Excel Comma Separated Values File
 HK_2030_Burden.csv	Microsoft Office Excel Comma Separated Values File
 HK_2030_Burden.log	Text Document

Exercise #1: HK_2030_Burden.csv

HK_2030_Burden.csv - Microsoft Excel

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Clipboard Font Alignment Number Styles

Title : Hong Kong SAR Annual CYr 2030 Default Title

	PC-NCAT	PC-CAT	PC-DSL	PC-LPG	PC-TOT	TAXI-NCA	TAXI-CAT	TAXI-DSL	TAXI-LPG	TAXI-TOT	LGV<=2.5t	LGV<=2.5t	LGV<=2.5t	LGV<=2.5t	LGV<=2.5t	LGV2.5-3.5t	LGV2.5-3.5t	LGV2.5-3.5t	
1	Title : Hong Kong SAR Annual CYr 2030 Default Title																		
2	Version : Emfac-HK V4.2 V4.2.0 20191203 Sp: V4.2.0 Pr: Emfac-HK HK4.2																		
3	Run Date : 2019/12/18 12:43:19																		
4	Scen Year: 2030 -- All model years in the range 1986 to 2030 selected																		
5	Season : Annual																		
6	Area : Hong Kong SAR																		
7	I/M Stat : HK I/M CY2013+ program in effect																		
8	Emissions: Tonnes Per Day																		
9	*****																		
10																			
11	Vehicles	7	718582	7152	0	725741	0	8	0	18292	18300	1	13	576	0	590	0	1201	53610
12	VKT	121	20791740	206627	0	20998488	0	3292	0	7949133	7952424	29	890	41040	0	41959	11	80843	3805167
13	Trips	10	1077760	10727	0	1088500	0	30	0	73162	73193	2	53	2303	0	2359	1	4804	214442
14	VOC Emissions																		
15	Run Exh	0.00021	0.16093	0.00271	0	0.16385	0	0.00004	0	0.12772	0.12776	0.00005	0.00016	0.00069	0	0.00091	0.00002	0.00784	0.06455
16	Start Ex	0.00004	0.05557	0	0	0.05561	0	0	0	0.04124	0.04125	0.00001	0.00001	0	0	0.00002	0	0.00048	0
17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
18																			
19	Diurnal	0.00009	0.33849	0	0	0.33857	0	0	0	0	0.00001	0.00001	0	0	0.00002	0	0.00087	0	
20	Hot Soak	0.00005	0.18195	0	0	0.182	0	0.00001	0	0	0.00001	0.00001	0.00002	0	0	0.00003	0	0.00137	0
21	Running	0.00022	0.27886	0	0	0.27908	0	0.00003	0	0	0.00003	0.00007	0.00006	0	0	0.00012	0.00001	0.00431	0
22	Resting	0.00008	0.41921	0	0	0.41928	0	0	0	0	0.00001	0.00001	0.00001	0	0	0.00002	0	0.00097	0
23	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
24	Carbon Monoxide Emissions																		
25	Run Exh	0.00414	7.26815	0.03596	0	7.30825	0	0.00212	0	16.54084	16.54296	0.001	0.00836	0.01198	0	0.02134	0.00032	0.59819	1.11078
26	Start Ex	0.00042	1.76823	0	0	1.76865	0	0.00014	0	0.2308	0.23094	0.0001	0.00038	0	0	0.00048	0.00004	0.02957	0
27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
28	Oxides of Nitrogen Emissions																		
29	Run Exh	0.00043	0.18204	0.00729	0	0.18975	0	0.00009	0	2.55319	2.55329	0.0001	0.00012	0.01969	0	0.01991	0.00004	0.003	1.83656
30	Start Ex	0.00003	0.07195	0	0	0.07198	0	0.00001	0	0.07254	0.07255	0.00001	0.00001	0	0	0.00001	0	0.00023	0
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
32	Nitrogen Dioxide Emissions																		

Exercise #1: HK_2030_Burden.bdn.csv

HK_2030_Burden.bdn.csv - Microsoft Excel

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Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation Check Cell

A1 #Title :

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	#Title :	Hong Kong SAR Annual Cyr 2030 Default Title																	
2	# Version :	Emfac-HK V4.2 V4.2.0 20191203 Sp: V4.2.0 Pr: Emfac-HK HK4.2																	
3	# Run Date :	#####																	
4	# Scen Year :	2030 -- All model years in the range 1986 to 2030 selected																	
5	# Season :	Annual																	
6	# Area :	Hong Kong																	
7	# I/M Stat :	HK I/M CY2013+ program in effect																	
8	# Emission Tonnes Per Period :																		
9	RecType	ScenNum	CalYr	Area	Veh	MdlYr	Tech	Period	Pop	VKT	Trips	VOC_RUN	VOC_STRE	VOC_DIUF	VOC-HTS	VOC_RUN	VOC_REST	CO_RUNE	CO_STREXN
10	TG	1	2030	Hong Kong	PC	1985	Ex001	Day	0	0	0	0	0	0	0	0	0	0	0
11	TG	1	2030	Hong Kong	PC	1985	Ex171	Day	0	0	0	0	0	0	0	0	0	0	0
12	TG	1	2030	Hong Kong	PC	1985	Ex172	Day	0	0	0	0	0	0	0	0	0	0	0
13	TG	1	2030	Hong Kong	PC	1985	Ev001	Day	0	0	0	0	0	0	0	0	0	0	0
14	MY	1	2030	Hong Kong	PC	1985	GAS	Day	0	0	0	0	0	0	0	0	0	0	0
15	MY	1	2030	Hong Kong	PC	1985	DSL	Day	0	0	0	0	0	0	0	0	0	0	0
16	MY	1	2030	Hong Kong	PC	1985	LPG	Day	0	0	0	0	0	0	0	0	0	0	0
17	MY	1	2030	Hong Kong	PC	1985	TOT	Day	0	0	0	0	0	0	0	0	0	0	0
18	TG	1	2030	Hong Kong	PC	1986	Ex001	Day	0.521748	9.223951	0.782544	1.60E-05	3.21E-06	0	0	0	0	3.16E-04	3.31E-05
19	TG	1	2030	Hong Kong	PC	1986	Ex171	Day	0.126318	2.233167	0.189458	9.66E-07	0	0	0	0	0	1.96E-06	0
20	TG	1	2030	Hong Kong	PC	1986	Ex172	Day	5.49E-03	9.71E-02	8.24E-03	1.68E-08	0	0	0	0	0	3.41E-08	0
21	TG	1	2030	Hong Kong	PC	1986	Ev001	Day	0.521748	9.223951	0.782544	0	0	6.74E-06	3.53E-06	1.67E-05	5.99E-06	0	0
22	MY	1	2030	Hong Kong	PC	1986	GAS	Day	0.521748	9.223951	0.782544	1.60E-05	3.21E-06	6.74E-06	3.53E-06	1.67E-05	5.99E-06	3.16E-04	3.31E-05
23	MY	1	2030	Hong Kong	PC	1986	DSL	Day	0.13181	2.330261	0.197695	9.83E-07	0	0	0	0	0	2.00E-06	0
24	MY	1	2030	Hong Kong	PC	1986	LPG	Day	0	0	0	0	0	0	0	0	0	0	0
25	MY	1	2030	Hong Kong	PC	1986	TOT	Day	0.653558	11.55421	0.98024	1.70E-05	3.21E-06	6.74E-06	3.53E-06	1.67E-05	5.99E-06	3.18E-04	3.31E-05
26	TG	1	2030	Hong Kong	PC	1987	Ex001	Day	0.508041	9.024211	0.761985	1.56E-05	3.12E-06	0	0	0	0	3.09E-04	3.22E-05
27	TG	1	2030	Hong Kong	PC	1987	Ex171	Day	0.112304	1.994826	0.168439	8.63E-07	0	0	0	0	0	1.75E-06	0
28	TG	1	2030	Hong Kong	PC	1987	Ex172	Day	4.28E-02	0.759934	6.42E-02	1.31E-07	0	0	0	0	0	2.67E-07	0
29	TG	1	2030	Hong Kong	PC	1987	Ev001	Day	0.508041	9.024211	0.761985	0	0	6.57E-06	3.44E-06	1.63E-05	5.84E-06	0	0
30	MY	1	2030	Hong Kong	PC	1987	GAS	Day	0.508041	9.024211	0.761985	1.56E-05	3.12E-06	6.57E-06	3.44E-06	1.63E-05	5.84E-06	3.09E-04	3.22E-05
31	MY	1	2030	Hong Kong	PC	1987	DSL	Day	0.155086	2.754759	0.232606	9.94E-07	0	0	0	0	0	2.02E-06	0
32	MY	1	2030	Hong Kong	PC	1987	LPG	Day	0	0	0	0	0	0	0	0	0	0	0

HK_2030_Burden.bdn

Exercise #1a:

Determine total NO_x exhaust emissions from **CSV** output

- Hints:
 - Open CSV output file by Excel
 - Locate row “Run Exh” and “Start Ex” under “Oxides of Nitrogen Emissions”
 - Locate column “ALL-TOT”

Exercise #1b:

Determine Fleet-Average NO_x Emissions Factor (grams/km) for PC

- Hints:
 - Use CSV output
 - Summation of total VKT and NO_x (running exhaust)
 - Divide total NO_x by total VKT
 - Convert units to obtain grams/km

Exercise #1b: Solution

Oxides of Nitrogen Emissions	ALL-TOT	VKT			
Run Exh	13.88506	43801416	0.3170	g/km	

Exercise #2: EMFAC Mode

- This exercise will generate fleet-average emission factors (grams/hour or grams/km) for temperature 25°C and relative humidity 40% at calendar year 2030.
- Temperature, relative humidity and average speed combination as specified by the user.

Exercise #2: Scenario input data

- Geographic Area: **Hong Kong SAR** (default)
- Calendar Years: **2030**
- Alternate Baseline Year: **Inactive** (default)
- Season: **Annual** (default)
- Scenario Title for Reports: **Default Title**
- Model Years: **All** (default)
- Vehicle Classes: **Modify** (default)

Exercise #2: Scenario input data

– Scenario Type:

EMFAC – Area fleet average emissions

– Files and Reports:

Detailed Impact Rates (RTL) (default)

– Output Particulate: **PM₁₀ PM₂₅** (default)

– Output Hydrocarbons: **VOC** (default)

– Temperatures: **25°C**

– Relative Humidity: **40%**

Exercise #2: Input 1 Tab

Emfac-HK Editing data

File Run Help

Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

HONG KONG

permitted by
Air Resources Board,
California

Emfac-HK

Input 1 | Input 2 | Mode and Output | Tech/IM | Base / Cal. Yr Basis

Basic scenario data - Select Area, Calculation Method, Calendar Year, Alternate Base Year and Season

Step 1 - Geographic Area

Area Type: SAR SAR

SAR Hong Kong

Step 2a - Calendar Year

Select

Calendar year 2030
selected

Scenario Year for Output

Step 2b - Alternate Base Year

Select

Alternate Base Data
Year INACTIVE

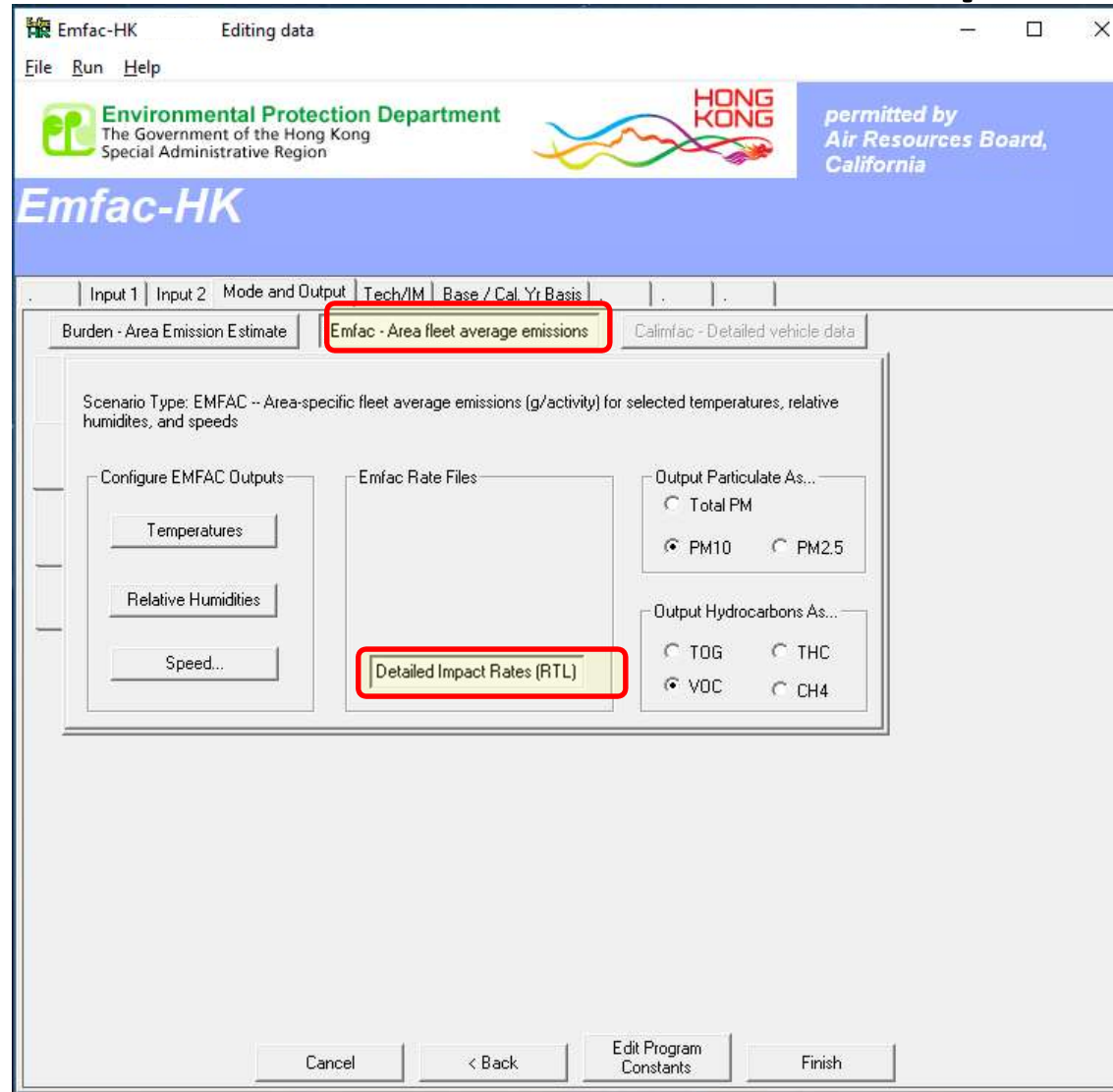
OPTIONAL: Selecting this
option overrides EMFAC-HK
default base year.

Step 3 - Season or Month

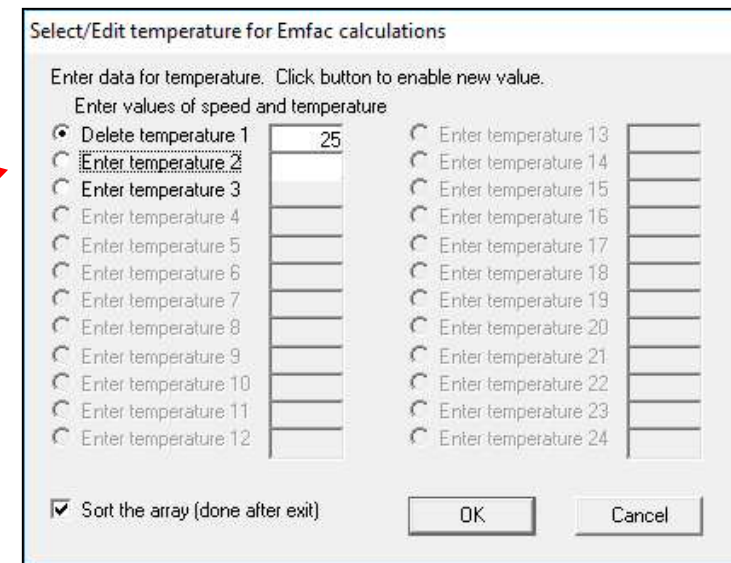
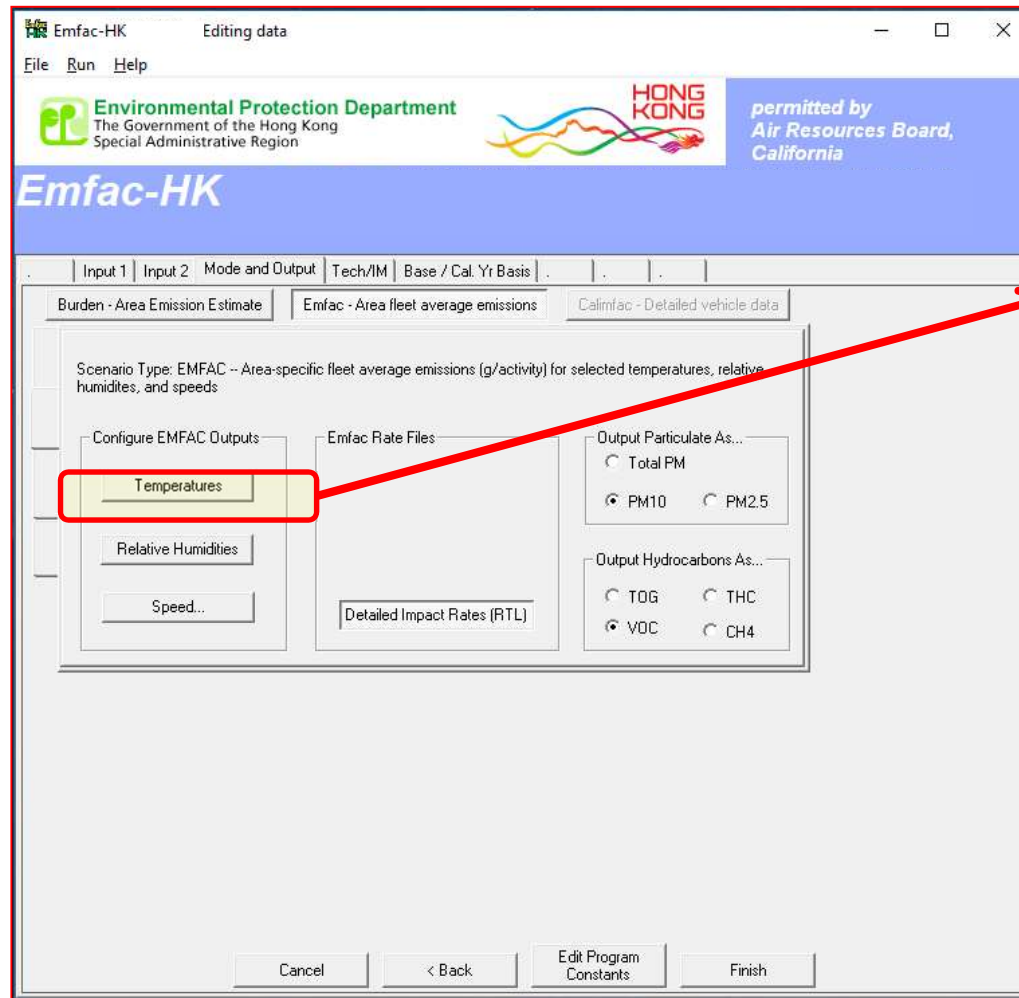
Annual

Cancel Next > Finish

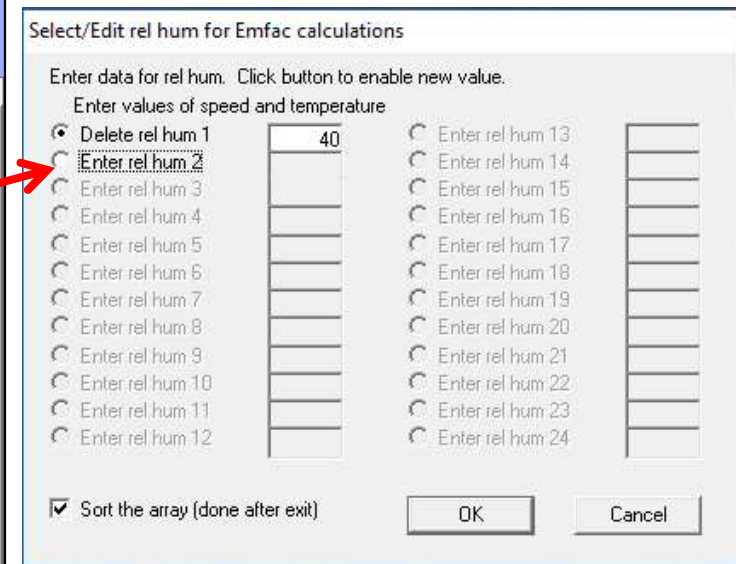
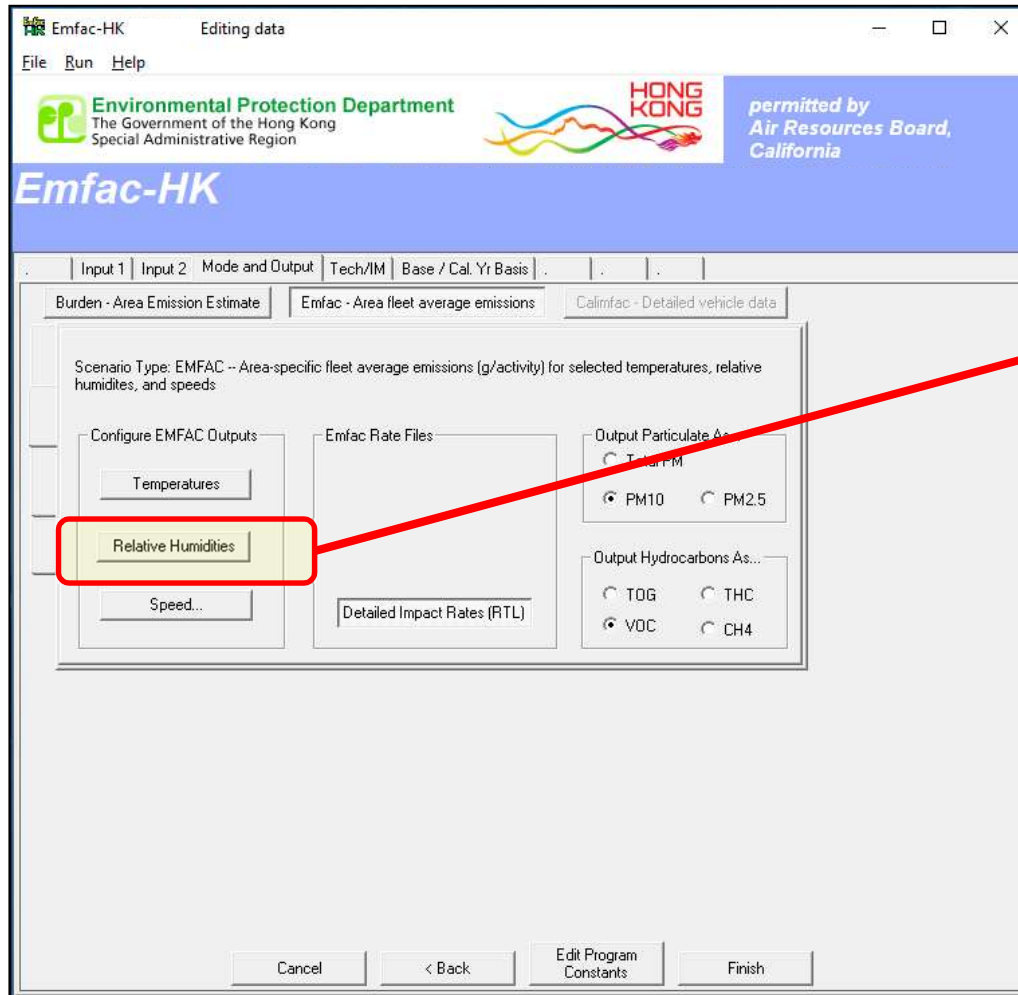
Exercise #2: Mode and Output Tab



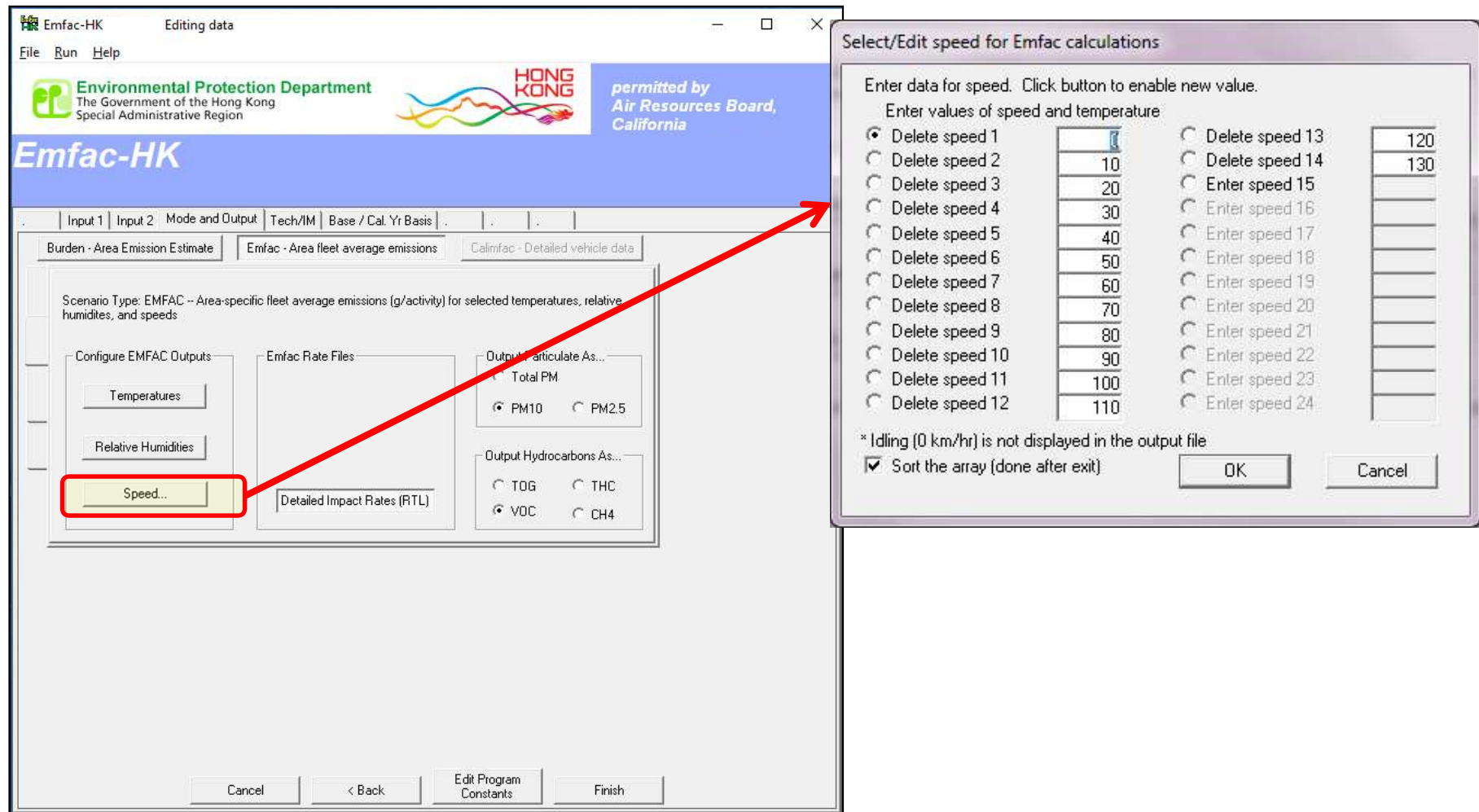
Exercise #2: Select/Edit Temperature (delete until just 1. set to 25°C)



Exercise #2: Select/Edit RH (delete until just 1. set to 40%)

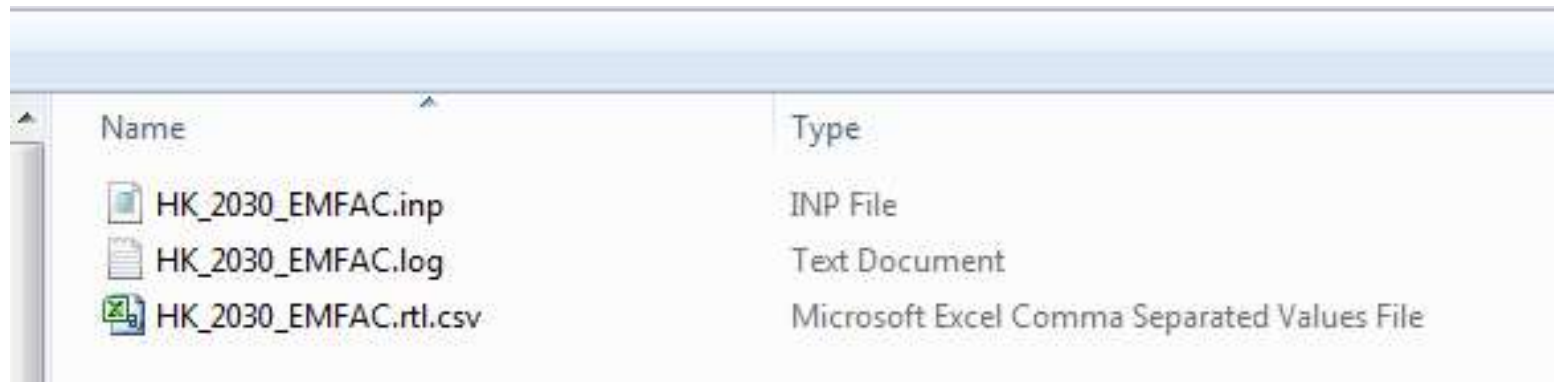


Exercise #2: Select/Edit Speed (default)






- Save input file as: **HK_2030_Emfac.inp** and **Run**

Exercise #2: Output Generated



A screenshot of a file explorer window showing a list of files. The window has a light blue header bar. Below the header, there is a table with two columns: 'Name' and 'Type'. The table contains three rows of files:

Name	Type
 HK_2030_EMFAC.inp	INP File
 HK_2030_EMFAC.log	Text Document
 HK_2030_EMFAC.rtl.csv	Microsoft Excel Comma Separated Values File

Exercise #2: HK_2030_EMFAC.rtl.csv

HK_2030_EMFAC.rtl.csv - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Developer Add-Ins QuickBooks Team

Normal Page Layout Page Break Preview Custom Views Full Screen

Workbook Views

Ruler Formula Bar

Gridlines Headings

Message Bar Show/Hide

Zoom 100% Zoom to Selection

New Window Arrange All Freeze Panes Unhide

View Side by Side Synchronous Scrolling Reset Window Position

Save Workspace Windows

Macros

A1 Title : Hong Kong SAR Annual Cvr 2030 Default Title

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X			
1	Title : Hong Kong SAR Annual Cvr 2030 Default Title																										
2	Version : Emfac-HK V4.2 V4.2.0 20191203 Sp: V4.2.0 Pr: Emfac-HK HK4.2																										
3	Run Date : 2019/12/18 12:43:49																										
4	Scen Year: 2030 -- All model years in the range 1986 to 2030 selected																										
5	Season : Annual																										
6	Area : Hong Kong																										
7	*****																										
8	Year:	2030	-- Model Years		1986 to	2030	Inclusive --		Annual																		
9	Emfac-HK V4.2 Emission Factors: V4.2.0 20191203 Sp: V4.2.0 Pr: Emfac-HK HK4.2																										
10																											
11	SAR Average												Hong Kong													SAR Average	
12																											
13	Table 1: Running Exhaust Emissions (grams/km)																										
14																											
15	Pollutant Name: Volatile Org Cpds					Temperature: 25C					Relative Humidity: 40%																
16																											
17	Speed	PC	PC	PC	PC	PC	TAXI	TAXI	TAXI	TAXI	TAXI	LGV3	LGV3	LGV3	LGV3	LGV3	LGV4	LGV4	LGV4	LGV4	LGV4	LGV6	LGV6	LGV6	LG		
18	km/hr	NCAT	CAT	DSL	LPG	ALL	NCAT	CAT	DSL	LPG	ALL	NCAT	CAT	DSL	LPG	ALL	NCAT	CAT	DSL	LPG	ALL	NCAT	CAT	DSL	LPG		
19																											
20	10	4.1087	0.0176	0.033	0	0.0178	0	0.0242	0	0.0434	0.0434	4.1167	0.5388	0.0383	0	0.0517	3.8704	0.3143	0.0384	0	0.0442	0	0	0.0656			
21	20	2.7504	0.0112	0.0228	0	0.0113	0	0.0154	0	0.0243	0.0243	2.7558	0.3488	0.0287	0	0.0373	2.5909	0.1952	0.0287	0	0.0322	0	0	0.0285			
22	30	1.9749	0.0075	0.0173	0	0.0077	0	0.0104	0	0.0182	0.0182	1.9787	0.237	0.0222	0	0.0281	1.8603	0.1263	0.0222	0	0.0244	0	0	0.0175			
23	40	1.521	0.0067	0.0137	0	0.0068	0	0.0093	0	0.0148	0.0148	1.5239	0.1727	0.0177	0	0.0221	1.4328	0.0888	0.0178	0	0.0193	0	0	0.0124			
24	50	1.2565	0.006	0.0114	0	0.0061	0	0.0084	0	0.0126	0.0126	1.259	0.1348	0.0147	0	0.0181	1.1836	0.0677	0.0147	0	0.0158	0	0	0.0095			
25	60	1.1134	0.006	0.0098	0	0.0061	0	0.0084	0	0.0111	0.0111	1.1156	0.1125	0.0126	0	0.0155	1.0488	0.0561	0.0126	0	0.0135	0	0	0.0091			
26	70	1.0583	0.0062	0.0086	0	0.0063	0	0.0087	0	0.01	0.01	1.0603	0.1005	0.0111	0	0.0138	0.9969	0.0505	0.0112	0	0.012	0	0	0.0091			
27	80	1.0789	0.0066	0.0079	0	0.0066	0	0.0092	0	0.0095	0.0095	1.081	0.0959	0.0102	0	0.0128	1.0163	0.0494	0.0102	0	0.0111	0	0	0.0091			
28	90	1.1799	0.0071	0.0074	0	0.0071	0	0.0099	0	0.0101	0.0101	1.1822	0.0981	0.0097	0	0.0124	1.1114	0.0524	0.0097	0	0.0106	0	0	0.0091			
29	100	1.384	0.0079	0.0071	0	0.0079	0	0.0109	0	0.0116	0.0116	1.3867	0.1077	0.0095	0	0.0125	1.3037	0.0604	0.0095	0	0.0106	0	0	0.0091			
30	110	1.5251	0.0082	0.0071	0	0.0082	0	0.0115	0	0.0128	0.0128	1.5281	0.1151	0.0097	0	0.0129	1.4367	0.0664	0.0097	0	0.0109	0	0	0.0091			
31	120	1.5251	0.0082	0.0073	0	0.0082	0	0.0115	0	0.0128	0.0128	1.5281	0.1151	0.0101	0	0.0134	1.4367	0.0664	0.0102	0	0.0113	0	0	0.0091			
32	130	1.5251	0.0082	0.0077	0	0.0082	0	0.0115	0	0.0128	0.0128	1.5281	0.1151	0.011	0	0.0143	1.4367	0.0664	0.011	0	0.0122	0	0	0.0091			

HK_2030_EMFAC.rtl

Ready

100%

Exercise #3: Changing Technology

Group Fractions

- This exercise evaluates emission changes in 2030 if the Gov't introduces a tax incentive program by implementing Euro VI in 1.1.2019 for Non-Franchised Buses < 6.4 tonnes (i.e. NFB6).
- Hints:
 - Changes % of Euro V/VI from model year 2019 to 2020 for NFB6

Exercise #3: Changing TG Fractions

- **Base Case** (similar to Ex1):
 - Calendar Years: **2030**
 - Scenario Type: **BURDEN**
 - Output File types: **BDN**
 - Pollutants: **VOC**
- Create a **new case** with same scenario data and edit TG fraction on NFB6

Exercise #3: Update TG fraction on NFB6

Case	Model Year	TG 103	TG 104	Total Fraction
		Euro V	Euro VI	
Base	2019-2020	100%	0%	100%
	2021	16.667%	83.333%	100%
New	2019-2021	0%	100%	100%

- Move 100% from TG103 to TG 104 for model year 2019
- Apply same fraction to 2020 and 2021.

Exercise #3: Update TG fraction on NFB6

The image displays two screenshots of the Emfac-HK V4.2 software interface, illustrating the steps to update the TG fraction on NFB6.

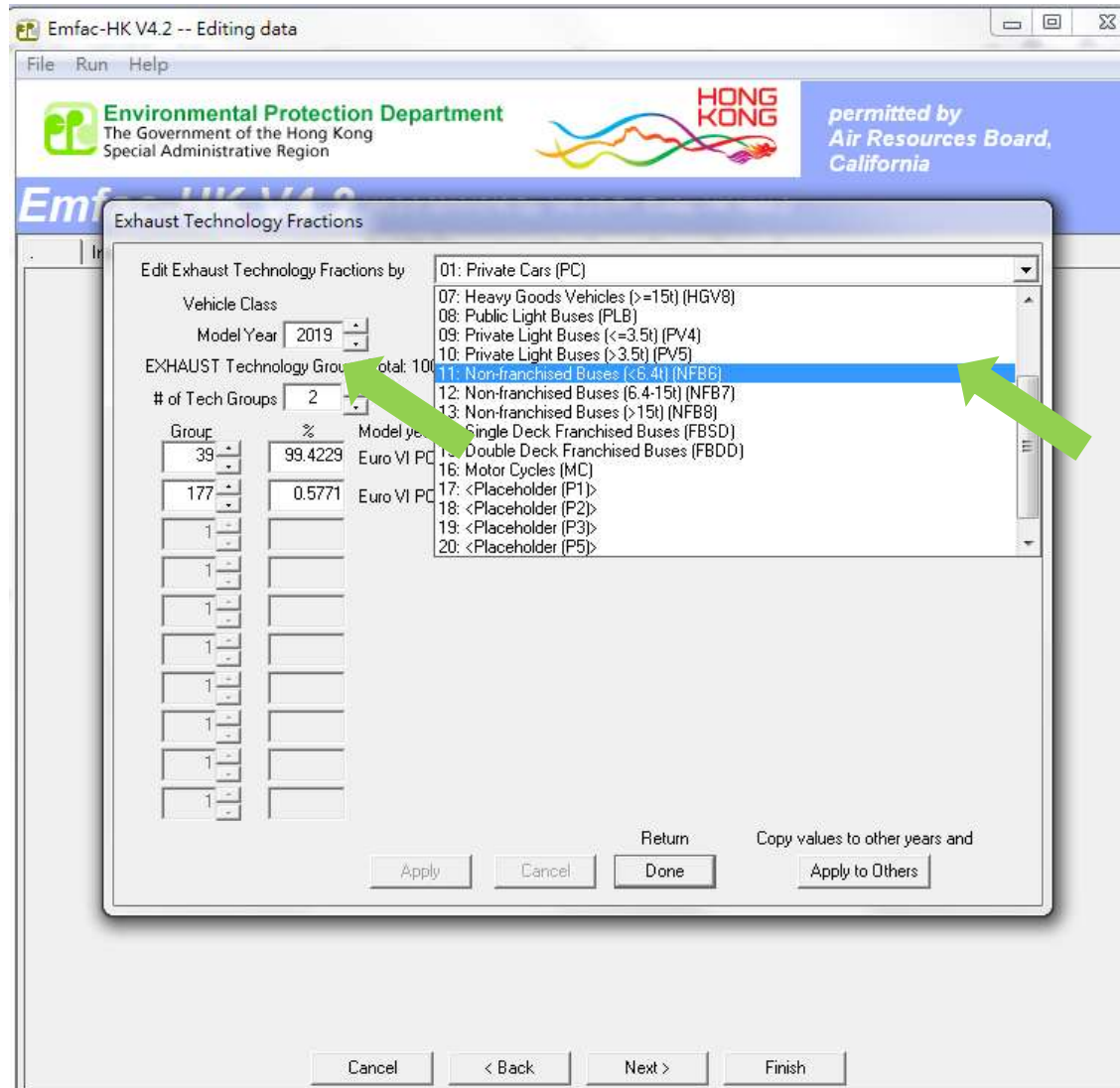
Left Screenshot: BURDEN - Area Emission Estimate

The interface shows the "BURDEN - Area Emission Estimate" window. The "Edit Program Constants" button at the bottom is highlighted with a green arrow.

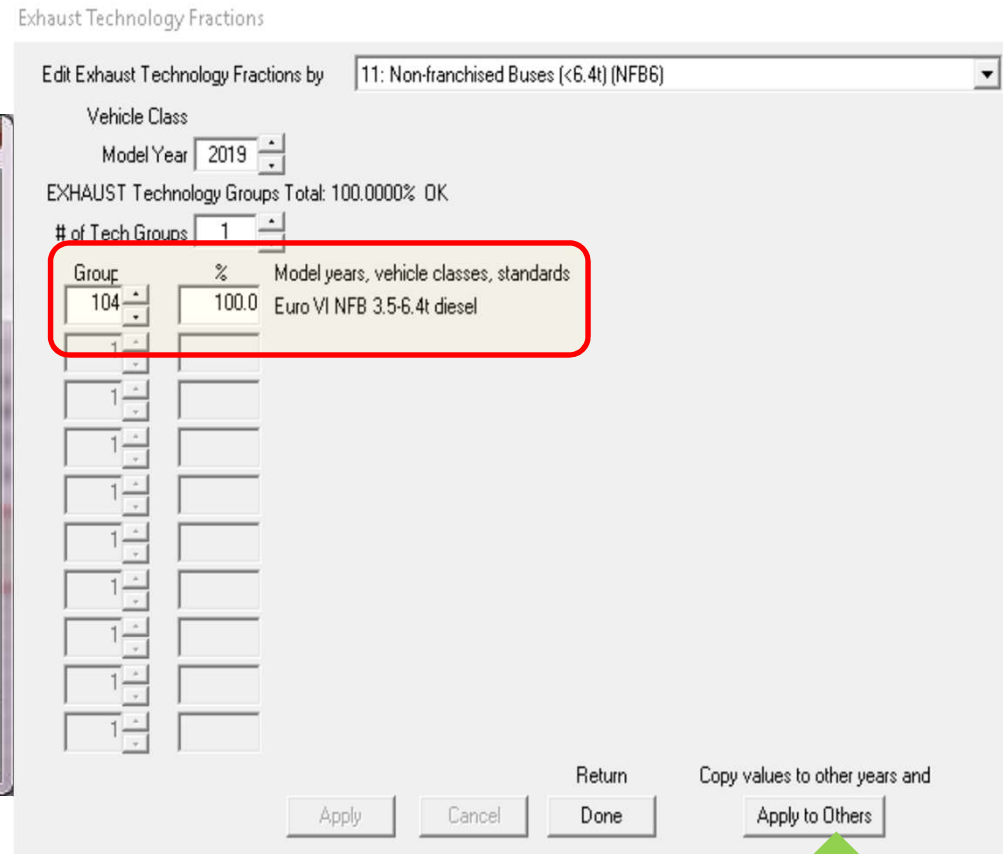
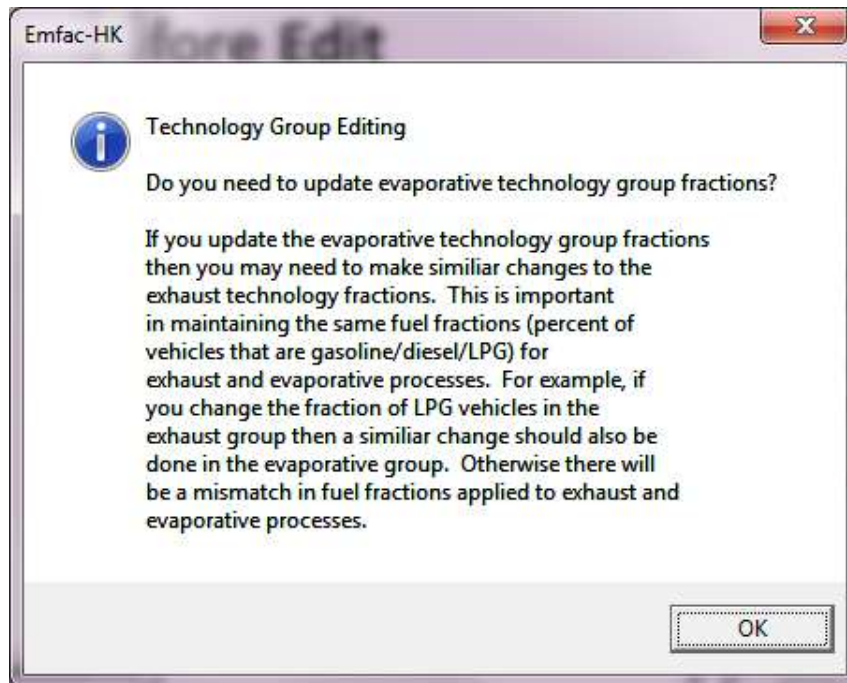
Right Screenshot: Editing Program Constants - Technology Fractions and Interim I/M for scenario year 2030

The interface shows the "Editing Program Constants - Technology Fractions and Interim I/M for scenario year 2030" window. The "Exh Tech Fractions" button is highlighted with a green arrow, indicating the next step in the process.

Exercise #3: Update TG fraction on NFB6



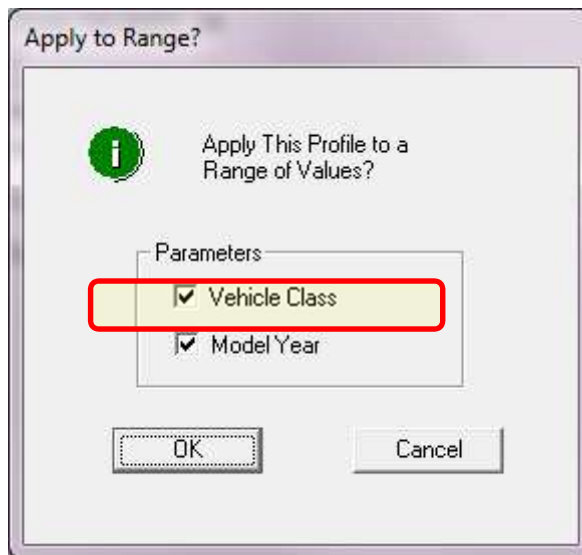
Exercise #3:



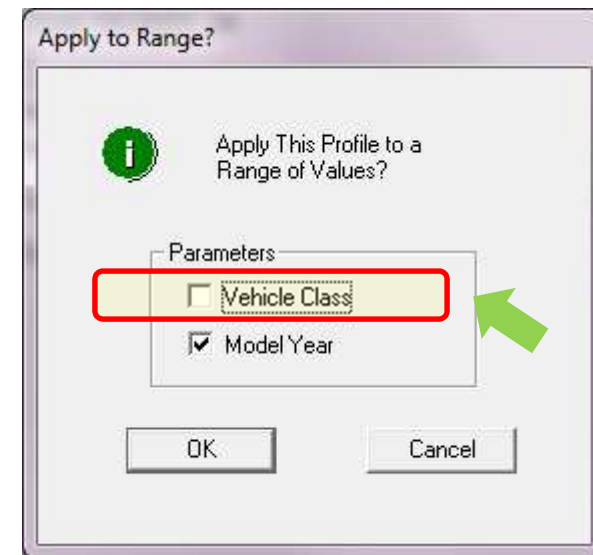
Click "Apply to Others"

Exercise #3:

Before Edit



After Edit



- “Apply to Others – **Model Year Only**”

Exercise #3:

Before Edit

Exhaust Technology Fractions

Edit Exhaust Technology Fractions by: 11: Non-franchised Buses (<6.4t) (NFB6)

Vehicle Class

Apply updated values for Tech Group Fractions

Updates Will Be Applied to Selections in "Apply To:" Column.

Model Years	Apply To:
1965	2019
1966	
1967	
1968	
1969	
1970	
1971	
1972	
1973	
1974	
1975	
1976	
1977	

OK Cancel

Return Copy values to other years and
Apply Cancel Done Apply to Others

After Edit

Apply updated values for Tech Group Fractions

Updates Will Be Applied to Selections in "Apply To:" Column.

Model Years	Apply To:
1965	2019
1966	2020
1967	2021
1968	
1969	
1970	
1971	
1972	
1973	
1974	
1975	
1976	
1977	

OK Cancel

- 2019 TG fraction same as 2020/2021

Exercise #3:

Verify that the TG fraction is changed correctly.

Exhaust Technology Fractions

Edit Exhaust Technology Fractions by 11: Non-franchised Buses (<6.4t) (NFB6)

Vehicle Class

Model Year 2020

EXHAUST Technology Groups Total: 100.0000% OK

of Tech Groups 1

Group	%	Model years, vehicle classes, standards
104	100.0	Euro VI NFB 3.5-6.4t diesel
1		
1		
1		
1		
1		
1		
1		
1		
1		
1		
1		

Return Copy values to other years and

Apply Cancel Done Apply to Others

- Save input file as: **HK_2030_NFB6.inp** and **Run**

Exercise #4: Changing Vehicle Kilometer Travelled (VKT)

- This exercise estimates emissions for an area with known VKT of specific vehicle class.
- Two approaches to change VKT:
 - 1) adjust the population to match desired VKT
(conformity adjustment: model will alter VKT and Trips)
 - 2) directly alter the VKT

Exercise #4: Changing VKT

- At year 2030, petrol private cars (Vehicle Class 1) has *forecasted* VKT of **1,609,000 km/day**.
- This Exercise will be conducted in three phases:
 - 4 : base case
 - 4a: conformity adjustment
 - 4b: direct VKT adjustment

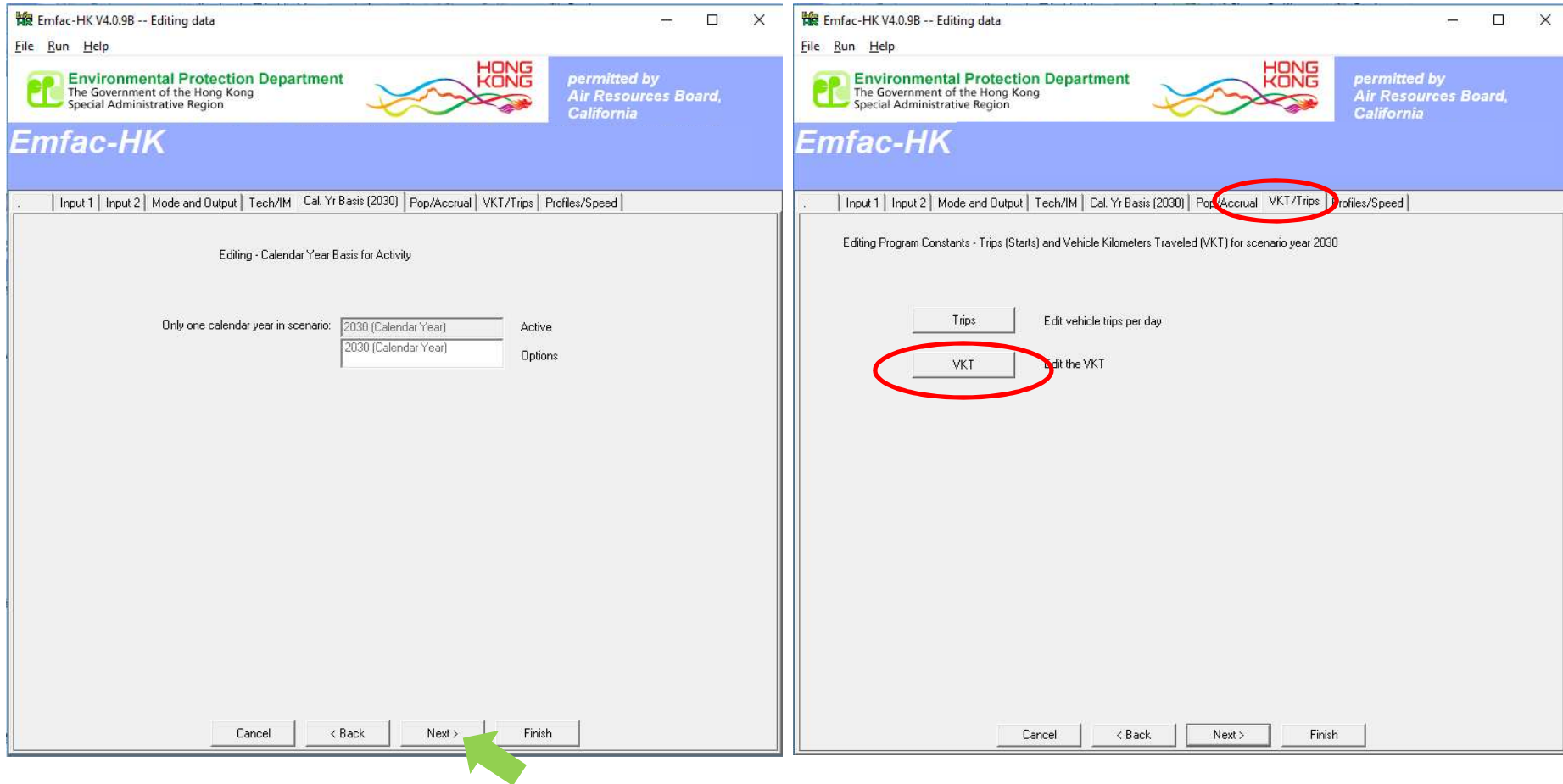
Exercise # 4: Base Case

- Scenario data:
 - Calendar Years: 2030
 - Scenario Type: BURDEN
 - Output File types: Detailed Estimates (CSV)
 - Output Frequency: Day
 - Pollutants: PM₁₀, PM_{2.5}, VOC

Exercise # 4a: Conformity Adjustment

- Create a **new case** with same scenario data as base case
- Determine **VKT adjustment factor**
- Multiply **population** by above factor

Exercise # 4a:



- Click Next until VKT/Trips tab

Exercise # 4a:

Total VKT tab

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | By Vehicle and Fuel | By Vehicle/Fuel/Hour

Revised Total VKT: 43801412

Previous Total VKT: 43801412

Apply Cancel Done

By Vehicle and Fuel tab

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | By Vehicle and Fuel | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (P1)	20791866	206627	0
02 - Taxi	3292	0	7949132
03 - Light Goods Vehicles<=2.5t	918	41040	0
04 - Lt Goods Vehicles 2.5-3.5t	80854	3805167	0
05 - Light Goods Vehicles>3.5t	0	2050126	0
06 - Medium Heavy Goods Vehicles<=15t	0	1079541	0
07 - Medium Heavy Goods Vehicles>15t	0	2833910	0
08 - Public Light Buses	0	969345	231828
09 - Private Light Bus <=3.5t	16558	34676	0
10 - Private Light Bus >3.5t	98	268864	17760
11 - Non-franchised Bus<=6.4t	0	322209	0
12 - Non-franchised Bus 6.4-15t	0	223896	0
13 - Non-franchised Bus >15t	0	400597	0
14 - Franchised Bus (SD)	0	77969	0
15 - Franchised Bus (DD)	0	1240047	0
16 - Motorcycles (MC)	1155099	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Apply Cancel Done

- VKT adjustment factor is :

$$1,609,000 \div 20,791,860 = 0.077386$$

Exercise # 4a:

VKT/Trips tab

Pop/Accrual tab

The image displays two side-by-side screenshots of the Emfac-HK software interface. Both windows are titled 'Emfac-HK V4.0.9B -- Editing data' and feature a header with the Environmental Protection Department logo and 'permitted by Air Resources Board, California'. The left window is on the 'VKT/Trips' tab, showing options for 'Trips' and 'VKT', with 'VKT' circled in red. The right window is on the 'Pop/Accrual' tab, showing options for 'Population' and 'Accrual', with 'Population' circled in red. Both windows have a navigation bar at the bottom with 'Cancel', '< Back', 'Next >', and 'Finish' buttons. A green arrow points to the '< Back' button in the left window.

- Back to Population → By Vehicle and Fuel tab

Exercise # 4a:

2030 Population (Base Case)

Editing Cal Pop data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Cal Pop for area: Hong Kong SAR

Editing Mode: Editing Cal Pop (registered vehicles with adjustments)

Total Cal Pop | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Age

	Petrol	Diesel	LPG
01 - Private Cars (PC)	718589	7152	0
02 - Taxi	8	0	18292
03 - Light Goods Vehicles<=2.5t	14	576	0
04 - Lt Goods Vehicles 2.5-3.5t	1201	53610	0
05 - Light Goods Vehicles>3.5t	0	21614	0
06 - Medium Heavy Goods Vehicles<=15t	0	12598	0
07 - Medium Heavy Goods Vehicles>15t	0	33063	0
08 - Public Light Buses	0	3508	839
09 - Private Light Bus <=3.5t	213	394	0
10 - Private Light Bus >3.5t	2	3321	348
11 - Non-franchised Bus<=6.4t	0	2736	0
12 - Non-franchised Bus 6.4-15t	0	1898	0
13 - Non-franchised Bus >15t	0	3403	0
14 - Franchised Bus (SD)	0	313	0
15 - Franchised Bus (DD)	0	5590	0
16 - Motorcycles (MC)	69786	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Apply Cancel Done

2030 Population (Edited for VKT Match)

Editing Cal Pop data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Cal Pop for area: Hong Kong SAR

Editing Mode: Editing Cal Pop (registered vehicles with adjustments)

Total Cal Pop | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Age

	Petrol	Diesel	LPG
01 - Private Cars (PC)	55608.77	7152	0
02 - Taxi	8	0	18292
03 - Light Goods Vehicles<=2.5t	14	576	0
04 - Lt Goods Vehicles 2.5-3.5t	1201	53610	0
05 - Light Goods Vehicles>3.5t	0	21614	0
06 - Medium Heavy Goods Vehicles<=15t	0	12598	0
07 - Medium Heavy Goods Vehicles>15t	0	33063	0
08 - Public Light Buses	0	3508	839
09 - Private Light Bus <=3.5t	213	394	0
10 - Private Light Bus >3.5t	2	3321	348
11 - Non-franchised Bus<=6.4t	0	2736	0
12 - Non-franchised Bus 6.4-15t	0	1898	0
13 - Non-franchised Bus >15t	0	3403	0
14 - Franchised Bus (SD)	0	313	0
15 - Franchised Bus (DD)	0	5590	0
16 - Motorcycles (MC)	69786	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Apply Cancel Done

- Multiply population by factor:

$$718,589 * 0.077386 = 55,608.77$$

Exercise # 4a: Verify VKT Adjustment

2030 VKT
(Base Case)

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	20791952	206627	0
02 - Taxi	3292	0	7949132
03 - Light Goods Vehicles<=2.5t	918	41040	0
04 - Lt Goods Vehicles 2.5-3.5t	80854	3805167	0
05 - Light Goods Vehicles>3.5t	0	2050126	0
06 - Medium Heavy Goods Vehicles<=15t	0	1079541	0
07 - Medium Heavy Goods Vehicles>15t	0	2833910	0
08 - Public Light Buses	0	969345	231828
09 - Private Light Bus <=3.5t	16558	34676	0
10 - Private Light Bus >3.5t	98	268864	17760
11 - Non-franchised Bus<=6.4t	0	322209	0
12 - Non-franchised Bus 6.4-15t	0	223896	0
13 - Non-franchised Bus >15t	0	400597	0
14 - Franchised Bus (SD)	0	77969	0
15 - Franchised Bus (DD)	0	1240047	0
16 - Motorcycles (MC)	1155099	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Buttons: Apply, Cancel, Done

2030 VKT
(After Pop Edit)

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	1609001	206627	0
02 - Taxi	3292	0	7949132
03 - Light Goods Vehicles<=2.5t	918	41040	0
04 - Lt Goods Vehicles 2.5-3.5t	80854	3805167	0
05 - Light Goods Vehicles>3.5t	0	2050126	0
06 - Medium Heavy Goods Vehicles<=15t	0	1079541	0
07 - Medium Heavy Goods Vehicles>15t	0	2833910	0
08 - Public Light Buses	0	969345	231828
09 - Private Light Bus <=3.5t	16558	34676	0
10 - Private Light Bus >3.5t	98	268864	17760
11 - Non-franchised Bus<=6.4t	0	322209	0
12 - Non-franchised Bus 6.4-15t	0	223896	0
13 - Non-franchised Bus >15t	0	400597	0
14 - Franchised Bus (SD)	0	77969	0
15 - Franchised Bus (DD)	0	1240047	0
16 - Motorcycles (MC)	1155099	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Buttons: Apply, Cancel, Done

- Save input file as

HK_2030_Burden_by_Hour_edit VKT (conformity).inp and Run

Exercise # 4b: Direct VKT adjustment

- Create a **new case** with same scenario data as base case
- **Direct entry of new VKT** for petrol private cars as **1,609,000 km/day**

Exercise # 4b: Editing VKT Screen

2030 VKT (Base Case)

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	20791860	206627.	0.
02 - Taxi	3292.	0.	7949132.
03 - Light Goods Vehicles<=2.5t	918.	41040.	0.
04 - Lt Goods Vehicles 2.5-3.5t	80854.	3805167.	0.
05 - Light Goods Vehicles>3.5t	0.	2050126.	0.
06 - Medium Heavy Goods Vehicles<=15t	0.	1079541.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	2833910.	0.
08 - Public Light Buses	0.	969345.	231828.
09 - Private Light Bus <=3.5t	16558.	34676.	0.
10 - Private Light Bus >3.5t	98.	268864.	17760.
11 - Non-franchised Bus<=6.4t	0.	322209.	0.
12 - Non-franchised Bus 6.4-15t	0.	223896.	0.
13 - Non-franchised Bus >15t	0.	400597.	0.
14 - Franchised Bus (SD)	0.	77969.	0.
15 - Franchised Bus (DD)	0.	1240047.	0.
16 - Motorcycles (MC)	1155099.	0.	0.
17 - <Placeholder (P1)>	0.	0.	0.
18 - <Placeholder (P2)>	0.	0.	0.
19 - <Placeholder (P3)>	0.	0.	0.
20 - <Placeholder (P4)>	0.	0.	0.
21 - <Placeholder (P5)>	0.	0.	0.

Apply Cancel Done

2030 VKT (After VKT Edit)

Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total VKT for area: Hong Kong SAR

Editing Mode: Editing VKT (vehicle km traveled per weekday)

Total VKT | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	1609000	206627.	0.
02 - Taxi	3292.	0.	7949132.
03 - Light Goods Vehicles<=2.5t	918.	41040.	0.
04 - Lt Goods Vehicles 2.5-3.5t	80854.	3805167.	0.
05 - Light Goods Vehicles>3.5t	0.	2050126.	0.
06 - Medium Heavy Goods Vehicles<=15t	0.	1079541.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	2833910.	0.
08 - Public Light Buses	0.	969345.	231828.
09 - Private Light Bus <=3.5t	16558.	34676.	0.
10 - Private Light Bus >3.5t	98.	268864.	17760.
11 - Non-franchised Bus<=6.4t	0.	322209.	0.
12 - Non-franchised Bus 6.4-15t	0.	223896.	0.
13 - Non-franchised Bus >15t	0.	400597.	0.
14 - Franchised Bus (SD)	0.	77969.	0.
15 - Franchised Bus (DD)	0.	1240047.	0.
16 - Motorcycles (MC)	1155099.	0.	0.
17 - <Placeholder (P1)>	0.	0.	0.
18 - <Placeholder (P2)>	0.	0.	0.
19 - <Placeholder (P3)>	0.	0.	0.
20 - <Placeholder (P4)>	0.	0.	0.
21 - <Placeholder (P5)>	0.	0.	0.

Apply Cancel Done

- Save input file as

HK_2030_Burden_by_Hour_edit VKT (directly).inp and Run

Exercise # 4: Solution

PC-NCAT & PC-CAT	Base	#4a: Pop-adjusted VKT	#4b: VKT direct
Population	718,589	55,609	718,589
VKT	20,791,861	1,609,001	1,608,999
Trips	1,077,770	83,405	1,077,770
NOx Run Exhaust (tonne/day)	0.1825	0.0141	0.01412
NOx Start Exhaust (tonne/day)	0.0720	0.0056	0.0720

Notes:

Results show how the model adjusted trips in Exercise #4a, thus, starting exhaust as well. Running exhaust emissions do not differ.

Exercise #4b shows it is possible to directly input VKT into EMFAC-HK; however, it is generally not recommended to do this independent of vehicle population because of the desire to properly estimate start and evaporative emissions tied to the size of the vehicle fleet.

Exercise #5: Changing Trips

- This exercise estimates the emission reduction when reduces trips for petrol Private Cars in 2030 to 250,000 trips per day.
- There are two potential methods:
 - 1) Ex 5a: Adjust the population to match desired Trips (i.e., “conformity” approach)
 - 2) Ex 5b: Directly alter the Trips

Exercise # 5a: Conformity Adjustment

- Base Case (2030, Burden, CSV outputs)
- New case with same scenario data as base case
- Determine Trips adjustment factor
- Multiply population by above factor

Exercise # 5a: Trips adjustment factor

2030 Trips by Vehicle and Fuel of petrol PC

Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Trips-per-Day for area

Editing Mode Editing Trips-per-Day (starts per weekday)

	Petrol	Diesel	LPG
01 - Private Cars (PC)	1077775	10727	0
02 - Taxi	30	0	73162
03 - Light Goods Vehicles<=2.5t	56	2303	0
04 - Lt Goods Vehicles 2.5-3.5t	4805	214442	0
05 - Light Goods Vehicles>3.5t	0	86446	0
06 - Medium_Heavy Goods Vehicles<=15t	0	50396	0
07 - Medium_Heavy Goods Vehicles>15t	0	132265	0
08 - Public Light Buses	0	14149	3239
09 - Private Light Bus <=3.5t	598	1102	0
10 - Private Light Bus >3.5t	5	9324	953
11 - Non-franchised Bus<=6.4t	0	10945	0
12 - Non-franchised Bus 6.4-15t	0	7593	0
13 - Non-franchised Bus >15t	0	13613	0
14 - Franchised Bus (SD)	0	3340	0
15 - Franchised Bus (DD)	0	59633	0
16 - Motorcycles (MC)	418759	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

$$\text{Factor} = 250,000 \div 1,077,775 = 0.231959$$

Exercise # 5a: Population Edits

2030 Population (Base Case)

Editing Cal Pop data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Cal Pop for area: Hong Kong SAR

Editing Mode: Editing Cal Pop (registered vehicles with adjustments)

Total Cal Pop | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Age

	Petrol	Diesel	LPG
01 - Private Cars (P1)	718589	7152	0
02 - Taxi	8	0	18292
03 - Light Goods Vehicles<=2.5t	14	576	0
04 - Lt Goods Vehicles 2.5-3.5t	1201	53610	0
05 - Light Goods Vehicles>3.5t	0	21614	0
06 - Medium Heavy Goods Vehicles<=15t	0	12598	0
07 - Medium Heavy Goods Vehicles>15t	0	33063	0
08 - Public Light Buses	0	3508	839
09 - Private Light Bus <=3.5t	213	394	0
10 - Private Light Bus >3.5t	2	3321	348
11 - Non-franchised Bus<=6.4t	0	2736	0
12 - Non-franchised Bus 6.4-15t	0	1898	0
13 - Non-franchised Bus >15t	0	3403	0
14 - Franchised Bus (SD)	0	313	0
15 - Franchised Bus (DD)	0	5590	0
16 - Motorcycles (MC)	69786	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Buttons: Apply, Cancel, Done

2030 Population (Edited for Trips Match)

Editing Cal Pop data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Cal Pop for area: Hong Kong SAR

Editing Mode: Editing Cal Pop (registered vehicles with adjustments)

Total Cal Pop | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Age

	Petrol	Diesel	LPG
01 - Private Cars (PC)	166683	7152	0
02 - Taxi	8	0	18292
03 - Light Goods Vehicles<=2.5t	14	576	0
04 - Lt Goods Vehicles 2.5-3.5t	1201	53610	0
05 - Light Goods Vehicles>3.5t	0	21614	0
06 - Medium Heavy Goods Vehicles<=15t	0	12598	0
07 - Medium Heavy Goods Vehicles>15t	0	33063	0
08 - Public Light Buses	0	3537	810
09 - Private Light Bus <=3.5t	213	394	0
10 - Private Light Bus >3.5t	2	3329	340
11 - Non-franchised Bus<=6.4t	0	2736	0
12 - Non-franchised Bus 6.4-15t	0	1898	0
13 - Non-franchised Bus >15t	0	3403	0
14 - Franchised Bus (SD)	0	313	0
15 - Franchised Bus (DD)	0	5590	0
16 - Motorcycles (MC)	69786	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Buttons: Apply, Cancel, Done

Multiply population by factor:

$$718,589 * 0.231959 = 166,683 \text{ vehicles}$$

Exercise # 5a: Verify Trips Adjustment

2030 Trips (Base Case)

Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Trips-per-Day for area: Hong Kong SAR

Editing Mode: Editing Trips-per-Day (starts per weekday)

Total Trips-per-Day | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	1027775	10727.	0.
02 - Taxi	30.	0.	73162.
03 - Light Goods Vehicles<=2.5t	56.	2303.	0.
04 - Lt Goods Vehicles 2.5-3.5t	4805.	214442.	0.
05 - Light Goods Vehicles>3.5t	0.	86446.	0.
06 - Medium Heavy Goods Vehicles<=15t	0.	50396.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	132265.	0.
08 - Public Light Buses	0.	14149.	3239.
09 - Private Light Bus <=3.5t	598.	1102.	0.
10 - Private Light Bus >3.5t	5.	9324.	953.
11 - Non-franchised Bus<=6.4t	0.	10945.	0.
12 - Non-franchised Bus 6.4-15t	0.	7593.	0.
13 - Non-franchised Bus >15t	0.	13613.	0.
14 - Franchised Bus (SD)	0.	3340.	0.
15 - Franchised Bus (DD)	0.	59633.	0.
16 - Motorcycles (MC)	418759.	0.	0.
17 - <Placeholder (P1)>	0.	0.	0.
18 - <Placeholder (P2)>	0.	0.	0.
19 - <Placeholder (P3)>	0.	0.	0.
20 - <Placeholder (P4)>	0.	0.	0.
21 - <Placeholder (P5)>	0.	0.	0.

Apply Cancel Done

2030 Trips (After Pop Edit)

Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Trips-per-Day for area: Hong Kong SAR

Editing Mode: Editing Trips-per-Day (starts per weekday)

Total Trips-per-Day | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	249999.	10727.	0.
02 - Taxi	30.	0.	73162.
03 - Light Goods Vehicles<=2.5t	56.	2303.	0.
04 - Lt Goods Vehicles 2.5-3.5t	4805.	214442.	0.
05 - Light Goods Vehicles>3.5t	0.	86446.	0.
06 - Medium Heavy Goods Vehicles<=15t	0.	50396.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	132265.	0.
08 - Public Light Buses	0.	14149.	3239.
09 - Private Light Bus <=3.5t	598.	1102.	0.
10 - Private Light Bus >3.5t	5.	9324.	953.
11 - Non-franchised Bus<=6.4t	0.	10945.	0.
12 - Non-franchised Bus 6.4-15t	0.	7593.	0.
13 - Non-franchised Bus >15t	0.	13613.	0.
14 - Franchised Bus (SD)	0.	3340.	0.
15 - Franchised Bus (DD)	0.	59633.	0.
16 - Motorcycles (MC)	418759.	0.	0.
17 - <Placeholder (P1)>	0.	0.	0.
18 - <Placeholder (P2)>	0.	0.	0.
19 - <Placeholder (P3)>	0.	0.	0.
20 - <Placeholder (P4)>	0.	0.	0.
21 - <Placeholder (P5)>	0.	0.	0.

Apply Cancel Done

- Save input files as **HK_2030_Burden_edit Trips (conformity).inp** and Run

Exercise # 5b: Changing Trips (Directly)

- Create new case with scenario data same as base case

**2030 Trips
(Base Case)**

Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Trips-per-Day for area: Hong Kong SAR

Editing Mode: Editing Trips-per-Day (starts per weekday)

Total Trips-per-Day | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	1077775	10727	0
02 - Taxi	30	0	73162
03 - Light Goods Vehicles<=2.5t	56	2303	0
04 - Lt Goods Vehicles 2.5-3.5t	4805	214442	0
05 - Light Goods Vehicles>3.5t	0	86446	0
06 - Medium_Heavy Goods Vehicles<=15t	0	50396	0
07 - Medium_Heavy Goods Vehicles>15t	0	132265	0
08 - Public Light Buses	0	14149	3239
09 - Private Light Bus <=3.5t	598	1102	0
10 - Private Light Bus >3.5t	5	9324	953
11 - Non-franchised Bus<=6.4t	0	10945	0
12 - Non-franchised Bus 6.4-15t	0	7593	0
13 - Non-franchised Bus >15t	0	13613	0
14 - Franchised Bus (SD)	0	3340	0
15 - Franchised Bus (DD)	0	59633	0
16 - Motorcycles (MC)	418759	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Apply Cancel Done

**2030 Trips
(After Trips Edit)**

Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Trips-per-Day for area: Hong Kong SAR

Editing Mode: Editing Trips-per-Day (starts per weekday)

Total Trips-per-Day | By Vehicle Class | **By Vehicle and Fuel** | By Vehicle/Fuel/Hour

	Petrol	Diesel	LPG
01 - Private Cars (PC)	250000	10727	0
02 - Taxi	30	0	73162
03 - Light Goods Vehicles<=2.5t	56	2303	0
04 - Lt Goods Vehicles 2.5-3.5t	4805	214442	0
05 - Light Goods Vehicles>3.5t	0	86446	0
06 - Medium_Heavy Goods Vehicles<=15t	0	50396	0
07 - Medium_Heavy Goods Vehicles>15t	0	132265	0
08 - Public Light Buses	0	14149	3239
09 - Private Light Bus <=3.5t	598	1102	0
10 - Private Light Bus >3.5t	5	9324	953
11 - Non-franchised Bus<=6.4t	0	10945	0
12 - Non-franchised Bus 6.4-15t	0	7593	0
13 - Non-franchised Bus >15t	0	13613	0
14 - Franchised Bus (SD)	0	3340	0
15 - Franchised Bus (DD)	0	59633	0
16 - Motorcycles (MC)	418759	0	0
17 - <Placeholder (P1)>	0	0	0
18 - <Placeholder (P2)>	0	0	0
19 - <Placeholder (P3)>	0	0	0
20 - <Placeholder (P4)>	0	0	0
21 - <Placeholder (P5)>	0	0	0

Apply Cancel Done

- Save input files as

HK_2030_Burden_edit Trips (directly).inp and Run

Exercise # 5c: Solution

PC-NCAT & PC-CAT	Base	#5a: Pop-adjusted	#5b: Directly alter the Trips
Population	718,589	166,683	718,589
VKT	20,791,860	4,822,856	20,791,861
Trips	1,077,775	249,999	250,000
NOx Run Exhaust (tonne/day)	0.1820	0.0423	0.1820
NOx Start Exhaust (tonne/day)	0.0720	0.0167	0.0167

Notes:

Results show how altering trips via population (#5a) also alters VKT; thus, running exhaust is altered, as well.

Exercise #5b shows altering trips only reduces starting exhaust.

Exercise #6: Speed Distributions

- This exercise estimates NOx running exhaust emissions change when average speed of specific vehicle class at different time zone is altered.
- A new policy propose medium and heavy goods vehicles (HGV7 & HGV8) only travel at specific time zone and speed profile.
- 2 periods:
 - from midnight to 8 a.m.; and
 - from 10 p.m. to midnight

Exercise #6: Speed Distributions

- limited speed distribution:
 - 5% of the VKT occurs at average speed 1-8 km/hr (Speed Bin #1);
 - 25% at 24-32 km/hr (Speed Bin #4);
 - 20% at 48-56 km/hr (Speed Bin #7);
 - 25% at 56-64 km/hr (Speed Bin #8) and
 - 25% at 64-72 km/hr (Speed Bin #9).

Exercise # 6: Speed Distributions

- Base Case (2030, Burden, CSV outputs)
- New case with same scenario data as base case
- Edit Speed Fractions for HGV7
- Apply same Speed Fraction for HGV8

Exercise # 6: Profiles/Speed Tab

The screenshot shows the Emfac-HK software interface. The window title is "Emfac-HK" and the current view is "Editing data". The menu bar includes "File", "Run", and "Help". The header area features the Environmental Protection Department logo for the Government of the Hong Kong Special Administrative Region, the HONG KONG logo, and a note: "permitted by Air Resources Board, California". Below the header is the "Emfac-HK" logo. A navigation bar contains several tabs: "Input 1", "Input 2", "Mode and Output", "Tech/IM", "Cal. Yr Basis (2030)", "Pop/Accrual", "VKT/Trips", and "Profiles/Speed". The "Profiles/Speed" tab is highlighted with a red circle. The main content area is titled "Editing Program Constants - RVP, Temperature, Humidity, Speed Fractions, and Idle Time for scenario year 2030 and month/season Annual". It contains several buttons: "RVP" (Edit the petrol Reid Vapor Pressure (RVP) for the calendar year and season), "Temperature Profile" (Edit the hourly temperature profile for the season *), "RH Profile" (Edit the hourly relative humidity (RH) profile for the season *), "Speed Fractions" (Edit the speed fractions for the calendar year), and "Idle Time" (Edit idle times for vehicles). The "Speed Fractions" button is highlighted with a red circle. An "Info" button is also present, with a note: "* Temperature and RH are the same in respect to the change of calendar year". At the bottom of the window are three buttons: "Cancel", "< Back", and "Finish".

Exercise # 6: Editing Speed Fractions

1. Select Vehicle Class;

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030

Hong Kong SAR

VKT-Weighted Average Basis: 8 KPH Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t) ▼

- 01: Private Cars (PC)
- 02: Taxi (Taxi)
- 03: Light Goods Vehicles (<=2.5t) (LGV)
- 04: Light Goods Vehicles (2.5-3.5t) (LGV)
- 05: Light Goods Vehicles (3.5-5.5t) (LGV)
- 06: Heavy Goods Vehicles (5.5-15t) (HGV)
- 07: Heavy Goods Vehicles (>=15t) (HGV)
- 08: Public Light Buses (PLB)
- 09: Private Light Buses (<=3.5t) (PV4)
- 10: Private Light Buses (>3.5t) (PV5)
- 11: Non-franchised Buses (<6.4t) (NFB8)
- 12: Non-franchised Buses (6.4-15t) (NFB8)
- 13: Non-franchised Buses (>15t) (NFB8)
- 14: Single Deck Franchised Buses (FB8)
- 15: Double Deck Franchised Buses (FB8)
- 16: Motor Cycles (MC)
- 17: <Placeholder (P1)>
- 18: <Placeholder (P2)>
- 19: <Placeholder (P3)>
- 20: <Placeholder (P5)>
- 21: <Placeholder (P6)>

Grid Control Removed/Deactivated (Replaced with 5-step process)

- > 1. Press "Copy with Headings" button to copy data to clipboard.
- > 2. Open spreadsheet and paste clipboard contents to spreadsheet for viewing/editing.
- > 3. Perform edits.
- > 4. Highlight Data Only portion in spreadsheet and copy to clipboard.
- > 5. Press "Paste Data Only" to paste edits back into program.

Total 100 % in each hour

Exercise # 6: Editing Speed Fractions

1. Select Vehicle Class;
2. Click button "Copy with Headings".
3. Open Excel worksheet and paste values

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030

Hong Kong SAR

VKT-Weighted Average Basis: 8 KPH Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t)

Grid Control Removed/Deactivated (Replaced with 5-step process).
Data Copied to Clipboard.. Perform STEPS 2 thru 5.

-> 2. Open spreadsheet and paste clipboard contents to spreadsheet for viewing/editing.
-> 3. Perform edits.
-> 4. Highlight Data Only portion in spreadsheet and copy to clipboard.
-> 5. Press "Paste Data Only" to paste edits back into program.

Grade

Total 100 % in each hour

Exercise # 6: Editing Speed Fractions

Speed Bin:
1-8 km/hr
9-16
16-24
24-32
32-40
40-48
48-56
56-64
64-72

Hour	00	01	02	03	04	05	06	07	08	09	10			
Vehicle Class 06 Speed Fractions	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400
Spd008	0	0	0	0	0	0	0	0	1.88E-03	1.88E-03	0	0	0	0	0
Spd016	0	0	0	0	0	0	0	0	6.64E-02	6.64E-02	0	0	0	0	0
Spd024	0	0	0	0	0	0	0	0	6.88E-02	6.88E-02	0	0	0	0	0
Spd032	0.268248	0.268248	0.268248	0.268248	0.268248	0.268248	0.268248	0.191458	0.173041	0.173041	0.191458	0.191458	0.191458	0.191458	0.191458
Spd040	3.74E-02	3.74E-02	3.74E-02	3.74E-02	3.74E-02	3.74E-02	3.74E-02	4.01E-02	8.15E-02	8.15E-02	4.01E-02	4.01E-02	4.01E-02	4.01E-02	4.01E-02
Spd048	0	0	0	0	0	0	0	0	0.192936	0.192936	0	0	0	0	0
Spd056	0.327716	0.327716	0.327716	0.327716	0.327716	0.327716	0.327716	0.257926	8.75E-02	8.75E-02	0.257926	0.257926	0.257926	0.257926	0.257926
Spd064	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	3.10E-02	0.113836	0.113836	3.10E-02	3.10E-02	3.10E-02	3.10E-02	3.10E-02
Spd072	0.346919	0.346919	0.346919	0.346919	0.346919	0.346919	0.346919	0.479484	0.214092	0.214092	0.479484	0.479484	0.479484	0.479484	0.479484
Spd080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd088	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spd144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- From hour 00 to 07 (midnight to 8 a.m.) and hour 22 to 23 (10 p.m. to midnight)
- Speed Fractions:
 - 5% at Spd008 (1-8 km/hr); 25% at Spd032 (24-32 km/hr);
 - 20% at Spd056 (48-56 km/hr); 25% at Spd064 (56-64 km/hr) and
 - 25% at Spd072 (64-72 km/hr).

Exercise # 6: Editing Speed Fractions

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030 [Copy with Headings](#) [Paste Data Only](#)

Hong Kong SAR


VKT-Weighted Average Basis: 8 KPH Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t)

Grade
Flat
High
Low

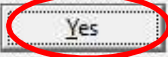

Grid Control Removed/Deactivated (Replaced with 5-step process).
Data Copied to Clipboard.. Perform STEPS 2 thru 5.

- > 2. Open spreadsheet and paste clipboard contents to spreadsheet for viewing/editing.
- > 3. Perform edits.
- > 4. Highlight Data Only.
- > 5. Press "Paste Data Only".

Editing speed fractions

 Paste 24 hours of speed fractions data?

Total 100 % in each hour



Exercise # 6: Editing Speed Fractions

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030

Hong Kong SAR

VKT-Weighted Average Basis: Vehicle Class:

Grid Control Removed/Deactivated (Replaced with 5-step process).

- > 1. Press "Copy with Headings" button to copy data to clipboard.
- > 2. Open spreadsheet and paste clipboard contents to spreadsheet for viewing/editing.
- > 3. Perform edits.
- > 4. Highlight Data Only portion in spreadsheet and copy to clipboard.
- > 5. Press "Paste Data Only" to paste edits back into program.
- > 6. **PASTE SUCCESSFUL.**

Grade

Successful Paste.
Apply Changes

Total 100 % in each hour

Exercise # 6: Apply Speed Fraction Edits to Other Vehicle Class

Apply to Others

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 8 KPH Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t)

Grid Control Removed

-> 1. Press "Copy with Headings" button.

-> 2. Open spreadsheet for viewing/editing.

-> 3. Perform edits.

-> 4. Highlight Data Only column.

-> 5. Press "Paste Data Only" button.

Apply to Range?

Apply This Profile to a Range of Values?

Parameters:

Vehicle Class

OK Cancel

Grade: Flat High Low

Total 100 % in each hour

Apply Cancel Done **Apply to Others**

Apply Edit to HGV8

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2030 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 8 KPH Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t)

Apply updated values for Speed Fractions

Updates Will Be Applied to Selections in "Apply To:" Column.

Vehicle Classes:

Selections Available	Apply To:
01: Private Cars (PC)	
02: Taxi	
03: Light Goods Vehicles<=2.5t	
04: Lt Goods Vehicles 2.5-3.5t	
05: Light Goods Vehicles>3.5t	
06: Medium & Heavy Goods Vehicles<=	
08: Public Light Buses	
09: Private Light Bus <=3.5t	
10: Private Light Bus >3.5t	
11: Non-franchised Bus<=6.4t	
12: Non-franchised Bus 6.4-15t	
13: Non-franchised Bus >15t	
14: Franchised Bus (60)	

07: Medium & Heavy Goods Vehicles>15t

OK Cancel

Total 100 % in each hour

Apply Cancel Done **Apply to Others**

Exercise # 6: Solution

Vehicle	Run Exhaust	Base	#6
HGV7	NOx	0.796	0.812
	PM	0.030	0.031
HGV8	NOx	2.523	2.604
	PM	0.171	0.173

Exercise #7: Changing Relative Humidity (RH)

- This exercise shows how to change the annual RH for individual month by editing the input file (INP).
- Monthly average RH of each hour is provided on **RH.XLS**.


Exercise # 7: Changing RH

- Create a new case
 - Calendar Years: 2015
 - Scenario Type: BURDEN
 - Output File types: Detailed Emission Estimates (CSV)
 - Pollutants: PM10, VOC
- Alter one of the RH **hour** value in GUI and save as “HK_2015_Burden_edit RH.INP”
- Update RH for **each month** in INP

Exercise # 7: Changing RH

Diurnal Relative Humidity Profile

Area: Hong Kong SAR
Month: Annual
VKT-Weighted Average of 1 Sub-areas



Hong Kong SAR

Copy with Headings Paste Data Only

Relative Humidity (%)

Hour											
0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
84.4	84.6	85.4	86.1	85.8	86.2	85.9	85.4	83.0	79.0	75.5	73.7
1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
71.8	72.5	72.0	72.7	73.8	75.6	78.6	80.4	81.9	83.2	83.4	83.9

Modify Values for Range of Hours

to Constant Value for Range

Apply Cancel Done

- **Alter RH to 90% at hour 0000**

Exercise # 7: Changing RH

```
tmp.inp - Notepad
File Edit Format View Help
Emfack41-Header
Version 4 1 0 0
Scenario-Count 1
HK-IM Y 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020
HKUNITS Y
End-Header
Begin-Scenario 1
Title Hong Kong SAR Annual CYN 2015 Default Title
Program-Mode Burden
Area-Method One-County
Area-Type SAR
Area-Number 38 [Hong Kong SAR]
HC-Mode VOC
PM-Mode PM10
CYN 2015
BYR -1
MYR All
Vehicles PC TAXI LGV3 LGV4 LGV6 HGV7 HGV8 PLB PV4 PV5 NFB6 NFB7 NFB8 FBSD FBDD MC
Season Annual
Burden-Reports CSV_Standard Detail_ModelYear Detail_TechGroup
Burden-Daily
Burden-Speeds 5
End-Scenario
Begin-Scenario-ProgData 12
Begin-Data-Item
DataType 3 RelativeHumidity
Applies-To Season January
Applies-To Area-Method One-County
Applies-To Area-Type SAR
Applies-To Area-Number 38 [Hong Kong SAR]
Begin-Real-Array
Dims 24 1 1 1
Data
87.25001 81.40001 82.99999 84.2 82.00001 85.1 82.5 83.9 83.89999 82.49999 78.5 77.3 73.8 76.1 74. 75.1 75.09999 78.3 82.1 81. 81.10001 83.1
End-Real-Array
End-Data-Item
Begin-Data-Item
DataType 3 RelativeHumidity
Applies-To Season February
Applies-To Area-Method One-County
Applies-To Area-Type SAR
Applies-To Area-Number 38 [Hong Kong SAR]
Begin-Real-Array
Dims 24 1 1 1
Data
82.75001 74.2 77.5 78.2 76.80001 75.80001 76.4 73.6 76.09999 69.6 64.8 63.7 63.4 61.5 61.5 62.3 64. 65.99999 70.5 71.6 73.5 74.5 74. 74.1
End-Real-Array
End-Data-Item
```

- Update data row for each month from RH.XLS

Exercise # 7: Changing RH


```
HK_2015_Burden_edit RH.inp - Notepad
File Edit Format View Help
EmfachK41-Header
Version 4 1 0 0
Scenario-Count 1
HK-IM Y 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020 0 0 2020
HKUNITS Y
End-Header
Begin-Scenario 1
Title Hong Kong SAR Annual Cvr 2015 Default Title
Program-Mode Burden
Area-Method One-County
Area-Type SAR
Area-Number 38 [Hong Kong SAR]
HC-Mode VOC
PM-Mode PM10
Cvr 2015
BYr -1
MYr All
Vehicles PC TAXI LGV3 LGV4 LGV6 HGV7 HGV8 PLB PV4 PV5 NFB6 NFB7 NFB8 FBSD FBDD MC
Season Annual
Burden-Reports CSV_Standard
Burden-Daily
Burden-Speeds 5
End-Scenario
Begin-Scenario-ProgData 12
Begin-Data-Item
DataType 3 RelativeHumidity
Applies-To Season January
Applies-To Area-Method One-County
Applies-To Area-Type SAR
Applies-To Area-Number 38 [Hong Kong SAR]
Begin-Real-Array
Dims 24 1 1 1
Data
80.2 80.3 80.8 80.4 79.9 81. 80.5 78.2 75.4 72.9 70.1 68.6 67.4 67. 67.5 68.6 72.6 76.3 77.6 78.4 79.1 79.3 79.5 80.
End-Real-Array
End-Data-Item
Begin-Data-Item
DataType 3 RelativeHumidity
Applies-To Season February
Applies-To Area-Method One-County
Applies-To Area-Type SAR
Applies-To Area-Number 38 [Hong Kong SAR]
Begin-Real-Array
Dims 24 1 1 1
Data
81.6 82.1 82. 82.1 83.2 83.5 83. 81.1 77.4 71.5 68.2 66.2 64.7 66.6 67.6 68. 70.5 75.2 77.8 78.1 79.6 81. 80.4 81.2
End-Real-Array
```

- Copy each RH values for each month from Excel and paste into INP file accordingly
- Save the INP and run

Exercise # 7: Changing RH

Diurnal Relative Humidity Profile

Area: Hong Kong SAR
Month: Annual
VMT-Weighted Average of 1 Sub-areas



Hong Kong

Relative Humidity (%)

Hour											
0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
80.6	80.8	81.1	81.2	80.9	81.1	80.2	77.3	74.2	71.1	68.8	67.6
1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
66.9	67.1	68.2	69.4	72.1	75.2	77.3	78.3	79.1	79.6	80.0	80.3

Modify Values for Range of Hours

to Constant Value for Range

Apply Cancel Done

Advance Exercises

Exercise #8: Alternate Base Year

- This exercise shows how to change the alternate base year with new population; then, perform a forecast of these data.
- Scenario data:
 - Calendar year : 2030
 - **Alternate base year : 2018**
 - Burden; CSV output; Day; PM₁₀; VOC;
- Alter alternate base year population by 2018_Pop.XLS

Exercise # 8: Alternate Base Year

- Alternate Base Year Selection: **2018**

The screenshot shows the Emfac-HK software interface. The main window is titled "Emfac-HK Editing data" and includes logos for the Environmental Protection Department and the Air Resources Board. The main content area is titled "Basic scenario data - Select Area, Calculation Method, Calendar Year, Alternate Base Year and Season".

The main window is divided into three steps:

- Step 1 - Geographic Area:** Area Type: SAR, Area: SAR, Region: Hong Kong.
- Step 2a - Calendar Year:** Select button, Calendar year 2030 selected, Scenario Year for Output.
- Step 2b - Alternate Base Year:** Select button, Alternate Base Data Year INACTIVE, OPTIONAL: Selecting this option overrides EMFAC-HK default base year.
- Step 3 - Season or Month:** Annual.

An "Alternate Base Year Selection" dialog box is open, showing a list of years from 2002 to 2021. The "Included" column contains the year 2018, which is circled in red. A red arrow points from the "Select" button in Step 2b to the "Included" column. The dialog box also has "All" buttons for both columns and "OK" and "Cancel" buttons at the bottom.

Exercise # 8: Alternate Base Year

Emfac-HK Editing data

File Run Help

Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

HONG KONG

permitted by
Air Resources Board,
California

Emfac-HK

Input 1 Input 2

Basic scenario data - Select Area, Calculation Method, Calendar Year, Alternate Base Year and Season

Step 1 - Geographic Area

Area Type: SAR SAR

SAR Hong Kong

Step 2a - Calendar Year

Select

Calendar year 2030
selected

Scenario Year for Output

Step 2b - Alternate Base Year

ACTIVATED

Alternate Base data
year 2018 selected

OPTIONAL: Selecting this
option overrides EMFAC-HK
default base year.

Step 3 -- Season or Month

Annual

Cancel Next > Finish

Exercise # 8: Alternate Base Year

The screenshot shows the Emfac-HK software interface. The window title is "Emfac-HK - Editing data". The menu bar includes "File", "Run", and "Help". The header area contains the Environmental Protection Department logo (The Government of the Hong Kong Special Administrative Region), the HONG KONG logo, and a note: "permitted by Air Resources Board, California". The main window title is "Emfac-HK". The navigation tabs are: "Input 1", "Input 2", "Mode and Output", "Tech/IM", "Base Yr Basis (2018)", "Population", and "Options". The current screen is titled "Editing - Calendar Year Basis for Activity". It contains the text "Select the calendar year basis for editing activity data:" followed by a list of options: "2018 (Alt. Base Pop)" (Active), "2030 (Calendar Year)", and "2018 (Alt. Base Pop)" (Options). The "2018 (Alt. Base Pop)" option is highlighted in blue. At the bottom, there are four buttons: "Cancel", "< Back", "Next >", and "Finish".

- Select “2018 (Alt. Base Pop)”

Exercise # 8: Alternate Base Year

The screenshot shows the Emfac-HK software interface. The window title is "Emfac-HK Editing data". The menu bar includes "File", "Run", and "Help". The header area features the Environmental Protection Department logo (The Government of the Hong Kong Special Administrative Region) and the HONG KONG logo. A blue banner on the right states "permitted by Air Resources Board, California".

The main interface has a blue header with "Emfac-HK" and a tabbed menu with options: "Input 1", "Input 2", "Mode and Output", "Tech/IM", "Base Yr Basis (2018)", and "Population". The "Population" tab is selected.

The main content area is titled "Editing Program Constants - Population for Alternate Base year 2018". It contains two buttons: "Population" and "Accrual". A green arrow points to the "Population" button, and a red circle highlights the text "Population for Alternate Base year 2018".

Below the buttons, there is an "Info" box with the text: "* Accrual rates are the same in respect to the change of calendar year".

At the bottom of the window, there are four buttons: "Cancel", "< Back", "Next >", and "Finish".

Exercise # 8: Alternate Base Year

Editing Base Pop data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title

Total Base Pop for area: Hong Kong SAR

Editing Mode: Editing Base Pop (registered vehicles with adjustments)

Total Base Pop | By Vehicle Class | By Vehicle and Fuel | **By Vehicle/Fuel/Age**

Grid Control Removed/Deactivated (Replaced with 5-step process).

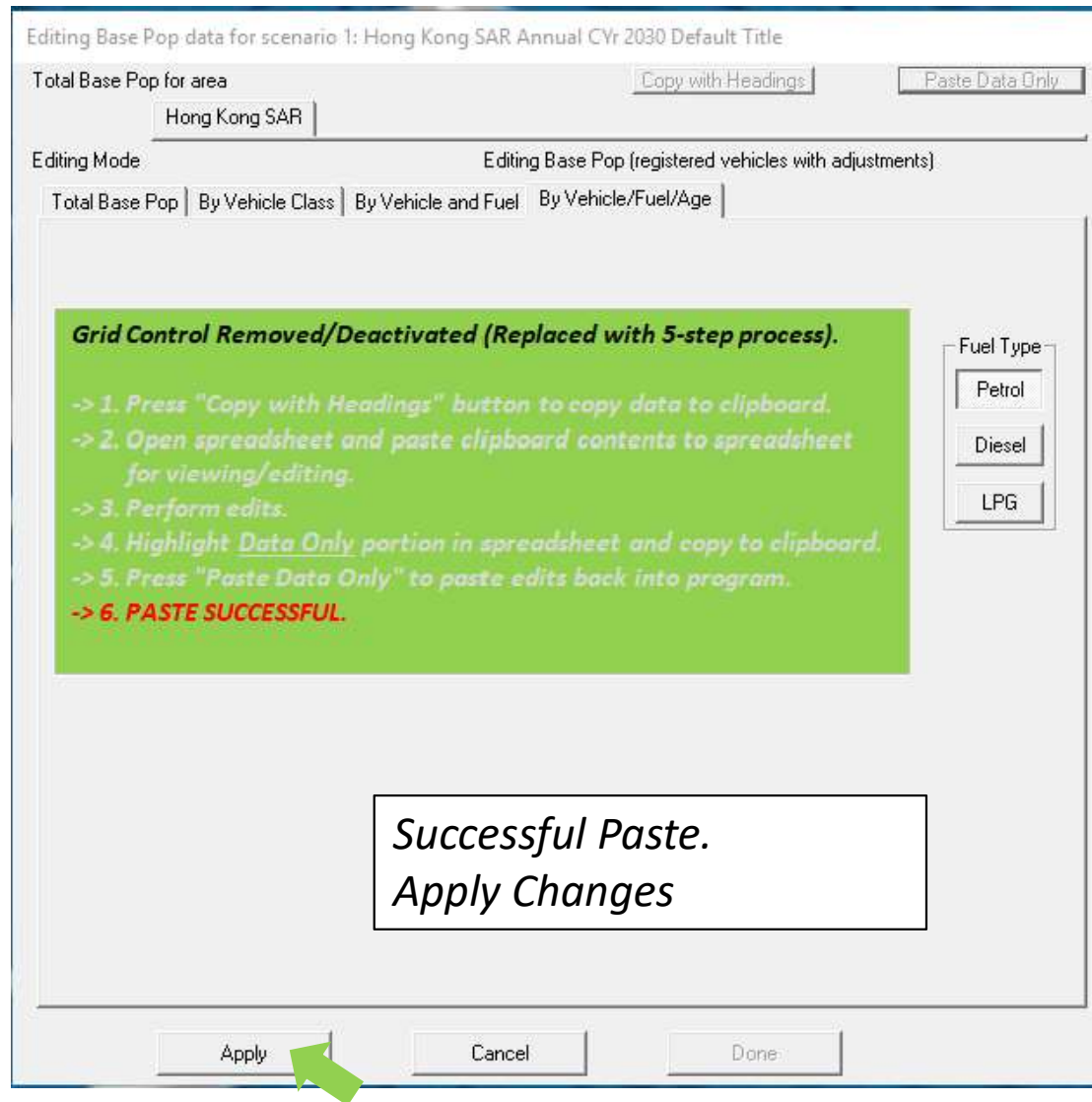
- > 1. Press "Copy with Headings" button to copy data to clipboard.
- > 2. Open spreadsheet and paste clipboard contents to spreadsheet for viewing/editing.
- > 3. Perform edits.
- > 4. Highlight Data Only portion in spreadsheet and copy to clipboard.
- > 5. Press "Paste Data Only" to paste edits back into program.

Fuel Type: Petrol, Diesel, LPG

Apply, Cancel, Done

- Select Fuel Type, Click “Copy with Headings”
- Paste value from 2018_Pop.XLS by individual fuel type

Exercise # 8: Alternate Base Year



- Repeat for the rest fuel type
- Save as HK_2030_AltBYr_2018_Burden_edit Pop.inp and run

Exercise #9: Buses Retirement

- This exercise evaluates emission changes franchised double-deck buses older than 15 years are retired from the fleet and replaced with newer buses.
- Two policies to replace retired buses:
 1. All buses older than 15 years old are replaced with brand new
 2. All buses older than 15 years old replaced with 1-5 yr-old buses

Exercise #9: Buses Retirement

- Base Cases (2035, Burden, CSV outputs)
- Copy out FBDD populations by fuel/age from GUI to worksheet and calculate the bus no. for replacement
- 2 New cases with same scenario data as base cases
- Implement different policies

Exercise #10: Link Example

- This exercise compile NOx running exhaust emission for a road using EMFAC mode.
- Create a Base case at 2030 using EMFAC mode
 - Output File types: RTL
 - Temperature: 20°C
 - Relative Humidity: 70%

Exercise #10: Link Example

- Given the link information obtained for two links:
 - Compile NOx running exhaust emission factor for each vehicle class at target speed bin from RTL output;
 - Calculate the emission in gram;

Note that in this example, only running exhaust emission is calculated for simplicity. In similar fashion, other types of emissions e.g. start emissions and evaporative emissions can also be calculated with the emission factors in RTL output.

Thank you