# **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**

#### <u>Basic</u>

- 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

#### <u>Advanced</u>

- 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) MVEI7G (BCD)
- 3) Detailed Outputs (BDN)
  - check Model Yrs & Tech Groups
- -Output Frequency: Day (default)
- -Output Particulate: PM<sub>10</sub> (default)
- -Output Hydrocarbons: VOC (default)

#### Exercise #1: New File



## Exercise #1: Add New Scenario

Emfac-HK Editing data		– 🗆 X
File Run Help		
Environmental Protection E The Government of the Hong Kong Special Administrative Region	epartment	permitted by Air Resources Board, California
Emfac-HK		
MAIN		
List of Augilable Scenarios	No file or	scenario
	Current Scenario Data	
	Number: 0 of 0	
	Calendar Year:	
	Season:	
	Туре:	
	IM Program Parameters Save	
	Save As	
	Add New Scenario Bun	
	Edit Scenario Finish Editing	3
	Delete Scenario Cancel	
Apply Regime Changes *		
Regime Size Change Data % Re	duction Start	% Reduction Start
	Supers Year (	Category-Fuel Highs Supers Year
Private Car-Petrol: 0	O 2020 Medium and Heavy Goods Vehicle	ble>15t-Diesel: 0 0 2020
Public Light Bus-I PG- 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 B	us >15t-Diesel: 0 0 2020
Light Goods Vehicle <=3.5t-Diesel: 0	0 2020 Mc	otorcycle-Petrol: 0 0 2020
Light Goods Vehicle 3.5-5.5t-Diesel: 0	0 2020 * The Model has taken into accour Taxi-LPG, PLB-LPG and PrLB-LPB	nt the existing I/M Programs for PC-Petrol,

New layout and additional vehicle classes since V3.4

# Exercise #1: Input 1 Tab



# Exercise #1: Input 2 Tab

R Emfac-HK Editing data	– 🗆 X
<u>File R</u> un <u>H</u> elp	
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	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 Emilae Impact Plate reporte, titlee over 40 characters vill be truncated!	
Step 5 - Model Years         All model years selected         All         Modify             Step 6 - Vehicle Classes         MODIFIED: All vehicle         classes selected         Modify             Step 6 - Vehicle Classes             Modify             Step 7 - I/M Program Sche             Modify             Default             Modify             Modify	dule
Cancel < Back Next > F	ïnish

# Exercise #1: Mode and Output Tab

🙀 Emfac-HK Editing data	3	- 🗆 X
<u>F</u> ile <u>R</u> un <u>H</u> elp		
Environmental Prote The Government of the Hor Special Administrative Region	ection Department	NG Dermitted by Air Resources Board, California
Emfac-HK		
. Input 1 Input 2 Mode and 0	utput	
Burden - Area Emission Estimate	Emfac - Area fleet average emissions Calimfac - Deta	iled vehicle data
	Cancel < Back Edit Program Constants	Finish

# Exercise #1: Mode and Output Tab

FIR Emfac-HK	Editing data		- 0	×
Eile Run Help Environme The Governme Special Admin	ental Protection Department ent of the Hong Kong istrative Region		permitted by Air Resources Board, California	
Emfac-H	K			
. Input 1 Input 2	Mode and Output Tech/IM Base / Cal. Yr Bas	is		
Burden - Area Emissi	on Estimate Emfac - Area fleet average emissio	ns Calimfac - Detailed vehi	icle data	
Scenario Type: BURDEN Area-Specific Planning Emissions Inventory (tonnes/day)	BURDEN Inventory Files and Reports          Detailed Emission Estimates (CSV)         MVEI7G (BCD)         Weighted Model Year Activity (WT)         Detailed Outputs (BDN)         Model Yrsl         Tech Groups         Speed	Output Frequency Hour Day Output Particulate As Total PM PM10 PM2.5 Output Hydrocarbons As TOG THC VOC CH4 Speed categories © 8 C 16 km	<b>&gt;</b> /h	
	Cancel < Back	Edit Program Constants	Finish	

#### Exercise #1: Main Screen

File Run Help       Environmental Protection Department       permitted by         The Government of the Hong Kong       Special Administrative Region       permitted by         Air Resources Board, California       California         Emfac-HK       No file or scenario         List of Available Scenarios       Current Scenario Data         Of Hong Kong SAR Annual CYr 2030 Default Title       Current Scenario Data	
Environmental Protection Department         The Government of the Hong Kong         Special Administrative Region         Emfac-HK         MAIN         List of Available Scenarios         Of Hong Kong SAR Annual CYr 2030 Default Title	
MAIN       .	
MAIN       .	
MAIN	
List of Available Scenarios Of Hong Kong SAR Annual CYr 2030 Default Title Current Scenario Data	
01 Hong Kong SAR Annual CYr 2030 Default Title	
Number 1 (1	
Number: 1 or 1	
Title Calender Vace 2020	
Season: Annual	
Type: Burden	
IM Program Parameters Save	
Save As	
Add New Scenario Bun	
Edit Scenario Finish Editing	
Regime Size Change Data % Reduction Start % Participants of the Start % Participants o	art
Category-Fuel Highs Supers Year Category-Fuel Highs Supers Year	ar
Private Car-Petrol: 0 0 2020 Medium Goods Vehicle 6.4-15t-Diesel: 0 0 20	020
Taxi-LPG: 0 0 2020 Medium and Heavy Goods Vehicle >15t-Diesel: 0 0 20	020
Public Light Bus-LPG: 0 0 2020 Non-Franchised Bus <=6.4t-Diesel: 0 0 20	020
Private Light Bus > 3.5t-LPG:         0         2020         Non-Franchised Bus 6.4-15t-Diesel:         0         20	320
Public Light Bus-Diesel: 0 0 2020 Non-Franchised Bus >15t-Diesel: 0 0 20	320
Light Goods Vehicle <=3.5t-Dieset: 0 0 2020 Motorcycle-Petrol: 0 0 20	320
Light Goods Vehicle 3.5-5.5t-Diesel: 0 0 2020 Taxi-LPG, PLB-LPG and PrLB-LPB	OI,

• Save input file as: HK\_2030\_Burden.inp and Run

# Exercise #1: Output in Folder



# Exercise #1: HK\_2030\_Burden.csv

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7	I/M Stat :	нк і/м су:	2013+ progr	am in effe	ct															
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10		PC-NCAT	PC-CAT	PC-DSL	PC-LPG	PC-TOT	TAXI-NCA	TAXI-CAT	TAXI-DSL	TAXI-LPG	TAXI-TOT	LG∨<=2.5t	LG∨<=2.5t	LG∨<=2.5t	LG∨<=2.5t	LG∨<=2.5t	LGV2.5-3.	LGV2.5-3.5	LGV2.5-3	s.sLG
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12	VKT	121	20791740	206627	0	20998488	0	3292	0	7949132	7952423	29	884	40729	0	41642	11	80498	378424	.8
13	Trips	10	1077760	10727	0	1088500	0	30	0	73162	73193	2	53	2303	0	2359	1	4804	21444	2
14	VOCEmi	sions																		
15	Run Exh	0.00019	0.1196	0.00246	0	0.12224	0	0.00003	0	0.11794	0.11797	0.00004	0.00017	0.00061	0	0.00083	0.00002	0.007	0.0572	5
16	Start Ex	0.00004	0.05811	0	0	0.05815	0	0	0	0.04204	0.04204	0.00001	0.00001	0	0	0.00002	0	0.00052		0
17																				
18																				
19	Diurnal	0.00009	0.34983	0	0	0.34992	0	0	0	0	0	0.00001	0.00001	0	0	0.00002	0	0.00092		0
20	Hot Soak	0.00005	0.18115	0	0	0.1812	0	0.00001	0	0	0.00001	0.00001	0.00002	0	0	0.00003	0	0.0014		0
21	Running	0.00021	0.27764	0	0	0.27785	0	0.00003	0	0	0.00003	0.00007	0.00006	0	0	0.00012	0.00001	0.00441		0
22	Resting	0.00008	0.4341	0	0	0.43418	0	0	0	0	0	0.00001	0.00001	0	0	0.00002	0	0.00103		0
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#### Exercise #1: HK\_2030\_Burden.bcd.csv

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2	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	со	Run Exh	0.003855	Day								
З	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	NOx	Run Exh	0.000432	Day								
4	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	PM	Run Exh	0.000004	Day								
5	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	VOC	Run Exh	0.000185	Day								
6	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	CO2	Run Exh	0.026478	Day								
7	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	со	Start Ex	0.000424	Day								
8	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	NOx	Start Ex	0.000029	Day								
9	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	PM	Start Ex	0.000001	Day								
10	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	VOC	Start Ex	0.000042	Day								
11	203	D 1986	2030	SAR Aver	a Hong Kon;	10	7	121	PC	NCAT	CO2	Start Ex	0.002032	Day								
12	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	со	Hot Soak	0	Day								
13	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	NOx	Hot Soak	0	Day								
14	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	PM	Hot Soak	0	Day								
15	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	VOC	Hot Soak	0.000045	Day								
16	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	CO2	Hot Soak	0	Day								
17	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	со	Running	0	Day								
18	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	NOx	Running	0	Day								
19	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	PM	Running	0	Day								
20	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	VOC	Running	0.000215	Day								
21	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	CO2	Running	0	Day								
22	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	со	PD Rest	0	Day								
23	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	NOx	PD Rest	0	Day								
24	203	D 1986	2030	SAR Aver	a Hong Kong	10	7	121	PC	NCAT	PM	PD Rest	0	Day								
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#### Exercise #1: HK\_2030\_Burden.bdn.csv

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4	# Scen Ye	a 2030 All n	nodel ye	ars in the r	ange 1986	5 to 2030 se	lected													
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7	#I/M Sta	t HK I/M CY20	013+ prog	gram in eff	ect															
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10	TG	1	2030	Hong Kon	PC	1985	5 Ex001	Day	0	0	0	0	0	0	0	0	0	0		0
11	TG	1	2030	Hong Kon	PC	1985	5 Ex171	Day	0	0	0	0	0	0	0	0	0	0		0
12	TG	1	2030	Hong Kon	PC	1985	5 Ex172	Day	0	0	0	0	0	0	0	0	0	0		0
13	TG	1	2030	Hong Kon	PC	1985	5 Ev001	Day	0	0	0	0	0	0	0	0	0	0		0
14	MY	1	2030	HongKon	PC	1985	5 GAS	Day	0	0	0	0	0	0	0	0	0	0		0
15	MY	1	2030	HongKon	PC	1985	5 DSL	Day	0	0	0	0	0	0	0	0	0	0		0
16	MY	1	2030	HongKon	PC	1985	5 LPG	Day	0	0	0	0	0	0	0	0	0	0		0
17	MY	1	2030	HongKon	PC	1985	5 TOT	Day	0	0	0	0	0	0	0	0	0	0		0
18	TG	1	2030	Hong Kon	PC	1986	5 Ex001	Day	0.521748	9.223951	0.782544	1.42E-05	3.27E-06	0	0	0	0	2.95E-04	3.31E-0	5 3.
19	TG	1	2030	Hong Kon	PC	1986	5 Ex171	Day	0.126318	2.233167	0.189458	8.82E-07	0	0	0	0	0	1.73E-06		0 2.
20	TG	1	2030	Hong Kon	PC	1986	5 Ex172	Day	5.49E-03	9.71E-02	8.24E-03	1.53E-08	0	0	0	0	0	3.01E-08		09.
21	TG	1	2030	Hong Kon	PC	1986	5 Ev001	Day	0.521748	9.223951	0.782544	. 0	0	6.97E-06	3.51E-06	1.67E-05	6.21E-06	0		0
22	MY	1	2030	HongKon	PC	1986	5 GAS	Day	0.521748	9.223951	0.782544	1.42E-05	3.27E-06	6.97E-06	3.51E-06	1.67E-05	6.21E-06	2.95E-04	3.31E-0	5 3.
23	MY	1	2030	Hong Kon	PC	1986	5 DSL	Day	0.13181	2.330261	0.197695	8.97E-07	0	0	0	0	0	1.76E-06		0 2.
24	MY	1	2030	Hong Kon	PC	1986	5 LPG	Day	0	0	0	0	0	0	0	0	0	0		
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Exercise #1a: Determine total NOx 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 #1a: Solution

1         Title           2         Versi           3         Run           4         Scen           5         Seas           6         Area           7         I/M           8         Emis           9         ****           10         14           14         VOC           15         Run           16         Start									01			00	00	00	<u> </u>
2 Versi 3 Run 4 Scen 5 Seas 6 Area 7 I/M 8 Emis 9 **** 10 14 VOC 15 Run 16 Start	: Hong Kong SAR Annual CYr 2030 Default Title														
3         Run           4         Scen           5         Seas           6         Area           7         I/M3           8         Emis           9         ****           10	ion: Emfac-HK V4.1 V4.1.0 20181210 Sp: V4.1 Release Version Pr: Emfac-HK HK4.1														
<ul> <li>4 Scen</li> <li>5 Seas</li> <li>6 Area</li> <li>7 I/MS</li> <li>8 Emis</li> <li>9 ****</li> <li>10</li> <li>14 VOC</li> <li>15 Run</li> <li>16 Start</li> </ul>	Date : 2018/12/24 10:54:46														
5 Seas 6 Area 7 I/M S 8 Emis 9 **** 10 10 14 VOC 15 Run 16 Start	Year: 2030 All model years in the range 1986 to 2030 selected														
6 Area 7 I/M 3 8 Emis 9 **** 10 14 VOC 15 Run 16 Start	son : Annual														
<ol> <li>7 I/MS</li> <li>8 Emis</li> <li>9 ****</li> <li>10</li> <li>14 VOC</li> <li>15 Run</li> <li>16 Start</li> </ol>	a : Hong Kong SAR														
8 Emis 9 **** 10 14 VOC 15 Run 16 Start	Stat : HK I/M CY2013+ program in effect														
9 **** 10 14 VOC 15 Run 16 Start	ssions: Tonnes Per Day														
10 14 VOC 15 Run 16 Start	************************														
14 VOC 15 Run 16 Start		FBSD-LPG	FBSD-TOT	FBDD-NC	FBDD-CAT	FBDD-DSL	FBDD-LPG	FBDD-TOT	MC-NCAT	MC-CAT	MC-DSL	MC-LPG	MC-TOT	ALL-TOT	
15 Run 16 Start	Emissions														
16 Start	Exh	0	0.00355	0	0	0.08244	0	0.08244	0.0708	0.24274	0	0	0.31354	1.18311	
	t Ex	0	0	0	0	0	0	0	0.0453	0.13344	0	0	0.17874	0.29056	
17															
18															
19 Dium	nal	0	0	0	0	0	0	0	0.17825	0.17735	0	0	0.3556	0.70663	
20 Hot	Soak	0	0	0	0	0	0	0	0.39527	0.13068	0	0	0.52595	0.70878	
21 Runr	ning	0	0	0	0	0	0	0	2.18452	0.35758	0	0	2.5421	2.82515	
22 Rest	ing	0	0	0	0	0	0	0	0.18754	0.13812	0	0	0.32566	0.76108	
23															
24 Carb	oon Monoxide Emissions														
25 Run	Exh	0	0.08418	0	0	2.48533	0	2.48533	0.63245	1.51667	0	0	2.14912	40.1044	
26 Start	t Ex	0	0	0	0	0	0	0	0.15595	0.9955	0	0	1.15145	3.32473	
27															
28 Oxid	les of Nitrogen Emissions														
29 Run	Exh	0	0.04982	0	0	2.97412	0	2.97412	0.01485	0.12725	0	0	0.1421	12.5444	
30 Start	t Ex	0	0.0107	0	0	0.86368	0	0.86368	0.0059	0.02932	0	0	0.03522	1.69443	
31															
32 Carb	on Dioxide Emissions (000)														
33 Run	Exh	0	0.07808	0	0	1.39972	0	1.39972	0.0023	0.14577	0	0	0.14807	14.5277	
34 Start	t Ex	0	0	0	0	0	0	0	0.00096	0.01251	0	0	0.01346	0.09996	
35															
36 PM1	0 Emissions														
37 Run	Exh	0	0.00334	0	0	0.21808	0	0.21808	0.00086	0.00303	0	0	0.00389	0.63107	
38 Start	t Ex	0	0	0	0	0	0	0	0.00039	0.00232	0	0	0.0027	0.00815	

Exercise #1b: Determine total NOx exhaust emissions from BCD output

- Hints:
  - -Open BCD output file by Excel
  - -Use Filter function on
    - POLLUTANT as "NOx"
    - PROCESS as "Run Exh" and "Start Ex"
  - Summation of total NOx

## Exercise #1b: Solution

	A	В	С	D	E	F	G	H	I	J	К	L	M	Ν	1
1	CALYR 🖃	START N	END MY	REGION 🖃	SAR 🖃	STARTS 🖃	POPULA	VKT 🖃	VEH TYPE	E 🔄 VEH TEC 🖬	POLLUTANT	JT PROCESS	EMISSIONS 🖃 BA	SIS 🖃	
3088	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	402599	67093	1129985	MC	CAT	NOx	PD Diurn	0 Da	y	
3093	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	402599	67093	1129985	MC	CAT	NOx	MD Diurn	0 Da	y	
3098	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	402599	67093	1129985	MC	CAT	NOx	Diurnal	0 Da	y	
3103	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	DSL	NOx	Run Exh	0 Da	y	
3108	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	DSL	NOx	Start Ex	0 Da	y	
3113	2030	1986	2030	SAR Avera	Hong Kon <sub>ł</sub>	0	0	0	MC	DSL	NOx	Hot Soak	0 Da	y	
3118	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	Running	0 Da	y	
3123	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	DSL	NOx	PD Rest	0 Da	y	
3128	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	MD Rest	0 Da	y	
3133	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	Resting	0 Da	γ	
3138	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	PD Diurn	0 Da	γ	
3143	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	MD Diurn	0 Da	γ	
3148	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	DSL	NOx	Diurnal	0 Da	γ	
3153	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	LPG	NOx	Run Exh	0 Da	y	
3158	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	LPG	NOx	Start Ex	0 Da	y	
3163	2030	1986	2030	SAR Avera	Hong Kon <sub>é</sub>	0	0	0	MC	LPG	NOx	Hot Soak	0 Da	y	
3168	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	LPG	NOx	Running	0 Da	у	
3173	2030	1986	2030	SAR Avera	Hong Kong	0	0	0	MC	LPG	NOx	PD Rest	0 Da	у	
3178	2030	1986	2030	SAR Avera	Hong Kon <sub>ł</sub>	0	0	0	MC	LPG	NOx	MD Rest	0 Da	у	
3183	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	LPG	NOx	Resting	0 Da	у	
3188	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	LPG	NOx	PD Diurn	0 Da	у	
3193	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	LPG	NOx	MD Diurn	0 Da	y	
3198	2030	1986	2030	SAR Avera	Hong Kon <sub>ế</sub>	0	0	0	MC	LPG	NOx	Diurnal	0 Da	y	
3202															
3203									Tota	ll Emissions (tonnes)	NOx	Run Exh	12.544365 Day	,	
3204									Tota	ll Emissions (tonnes)	NOx	Start Ex	1.694432 Day	/	
3205															

#### Exercise #1c:

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

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

# Exercise #1c: Solution



# 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: PM<sub>10</sub> (default)
- Output Hydrocarbons: VOC (default)
- Temperatures: 25°C
- Relative Humidity: 40%

# Exercise #2: Input 1 Tab

Remfac-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	
. 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	
Hong Kong 🗸	
SAR	
Step 2a - Calendar Year Step 2b - Alternate Base Year	
Select	
Calendar year 2030 Alternate Base Data	
Scenario Year for Dutput OPTIDNAL: Selecting this option overrides EMFAC-HK default base year.	
Step 3 - Season or Month	
Concel	Tiniala

# Exercise #2: Mode and Output Tab

Emfac-HK Editing data				—		$\times$
<u>F</u> ile <u>R</u> un <u>H</u> elp						
Environmental Protec The Government of the Hong Special Administrative Region	tion Department		permitted Air Resou California	by rces Boa	ırd,	
Emfac-HK						
. Input 1 Input 2 Mode and Outp	ut Tech/IM Base / Cal. Yr Basis					
Burden - Area Emission Estimate	Emfac - Area fleet average emissions	Calimfac - Detailed vehi	icle data			
Scenario Type: EMFAC Area-spec humidites, and speeds	tific fleet average emissions (g/activity)	for selected temperatures, re	alative			
Configure EMFAC Outputs	Emfac Rate Files	Output Particulate A:	s			
Temperatures		© PM10 C	PM2.5			
Relative Humidities		Output Hydrocarbon:	s As			
Speed	Detailed Impact Rates (RTL)		THC CH4			
C~	reel / Back	Edit Program	Finish			

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

🙀 Emfac-HK Editing data — 🗆 X	
<u>File Run H</u> elp	
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	Select/Edit temperature for Emfac calculations
Emfac-HK  I Input 1 Input 2 Mode and Output Tech/IM Base / Cal. Yr Basis Burden - Area Emission Estimate Emfac - Area fleet average emissions Calini/ac - Detailed vehicle data Scenario Type: EMFAC - Area-specific fleet average emissions (g/activity) for selected temperatures, relative Configure EMFAC Outputs Emfac Rate Files Output Particulate As C Total PM Pendia C PM25 Detailed Impact Rates (RTL) Output Hydrocarbons As C TOG C THC VOC C CH4	Enter data for temperature of speed and temperature            • Delete temperature 1         • Delete temperature 2         • Enter temperature 3         • Enter temperature 4         • Enter temperature 5         • Enter temperature 6         • Enter temperature 7         • Enter temperature 9         • Enter temperature 9         • Enter temperature 10         • Enter temperature 12         • Enter temperature 22         • Enter temperature 12         • Enter temperature 24         • Enter temperature 12         • Soft the array (done after exit)         • OK         • Cancel
Cancel < Back Constants Finish	

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

🗱 Emfac-HK Editing data — 🗆 X	
Eile Run Help         Environmental Protection Department The Government of the Hong Kong Special Administrative Region       permitted by Air Resources Board, California         Emfac-HK	Select/Edit rel hum for Emfac calculations
Input 1       Input 2       Mode and Output       Tech/IM       Base / Cal. Yr Basis       .       .         Burden - Area Emission Estimate       Emfac - Area fleet average emissions       Calimfac - Detailed vehicle data         Scenario Type: EMFAC - Area-specific fleet average emissions (g/activity) for selected temperatures, relative humidites, and speeds       Output Particulate Area         Configure EMFAC Outputs       Emfac Rate Files       Output Particulate Area         Temperatures       © PM10       C PM2.5         Relative Humidities       Detailed Impact Rates (RTL)       © VDC	Enter data for rel hum. Click button to enable new value.         Enter values of speed and temperature            • Delete rel hum 1         40         • Enter rel hum 13         • Enter rel hum 14         • Enter rel hum 14         • Enter rel hum 3         • Enter rel hum 15         • Enter rel hum 4         • Enter rel hum 16         • Enter rel hum 5         • Enter rel hum 7         • Enter rel hum 7         • Enter rel hum 8         • Enter rel hum 9         • Enter rel hum 20         • Enter rel hum 10         • Enter rel hum 21         • Enter rel hum 12         • Enter rel hum 21         • Enter rel hum 14         • Enter rel hum 23         • Enter rel hum 14         • Enter rel hum 24         •
Cancel < Back Edit Program Constants Finish	Sort the array (done after exit)

#### Exercise #2: Select/Edit Speed

(default)

🙀 Emfac-HK Editing data — 🗆 🗙	Select/Edit speed for Emfas calculations
<u>F</u> ile <u>R</u> un <u>H</u> elp	Select Eult speed for Enhac calculations
Environmental Protection Department The Government of the Hong Kong Special Administrative Region Permitted by Air Resources Board, California	Enter data for speed. Click button to enable new value. Enter values of speed and temperature
Emfac-HK	C Delete speed 2 C Delete speed 2 C Delete speed 3 C Delete speed 3 C Delete speed 14 C Delete speed 15 C Delete speed 15 C Delete speed 15 C Delete speed 16 C Delete speed 16 C Delete speed 17 C Delete speed 1
.   Input 1   Input 2   Mode and Output   Tech/IM   Base / Cal. Yr Basis   .   .   .	C Delete speed 4 30 C Enter speed 16
Burden - Area Emission Estimate Emfac - Area fleet average emissions Calimfac - Detailed vehicle data	C Delete speed 5 40 C Enter speed 17
	O Delete speed 6 50 O Enter speed 19
Scenario Type: EMFAC Area-specific fleet average emissions (g/activity) for selected temperatures, relative	O Delete speed 8 70 O Enter speed 20
humidites, and speeds	O Delete speed 9 00 O Enter speed 21
Configure EMFAC Outputs Emfac Rate Files Outputs articulate As	O Delete speed 10 90 C Enter speed 22
C Total PM	O Delete speed 11 C Enter speed 23
Temperatures © PM10 C PM2.5	C Delete speed 12 110 C Enter speed 24
Relative Humidities     Output Hydrocarbons As       Speed     C TOG C THC       © VOC C CH4	× Idling (0 km/hr) is not displayed in the output file     ✓ Sort the array (done after exit)     OK     Cancel
Cancel < Back Edit Program Constants Finish	

• Save input file as: HK\_2030\_Emfac.inp and Run

# Exercise #2: Output Generated

ĥ	Name	Туре
	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 - Excel														<b>A</b> –		×					
F	ile Ho	ome In	sert Pag	ge Layout	Formulas	Data	Review	View	Add-Ins	Team	Qт	ell mer	what you wa	ant to do					Si	gn in 🙎	4 Share
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1	Title :Ho	ng Kong S	6AR Annua	l CYr 2030 D	efault Tit	e															
2	Version :	Emfac-HK	∨4.1∨4.1.	0 20181210	Sp: V4.1 F	lease Ver	sion Pr: En	nfac-HK HK	(4.1												
3	Run Date	2018/12/	31 09:37:53	3																	
4	Scen Year	2030 A	ll model ye	ears in the r	range 1986	5 to 2030 se	lected														
5	Season :	Annual																			
6	Area :H	ong Kong																			
7	******	******	******	******	******	*****	******	******	******	******	*										
8	Year:	2030	)	Model	Years	1986	to	2030	) Inclusiv	e			Annual								
9	Emfac-H	HK ∨4.1 En	nission Fac	tors: V4.1.0	0 20181210	) Sp: V4.1 Re	elease Ver	sion Pr: En	nfac-HK H	K4.1											
10																					
11	SAR Avera	age				Hong K	ong						SAR Avera	age							
12		-					0														
13					Table 1:	RunningEx	haust Emi	ssions (gra	ms/km)												
14																					
15	Pollutant	Name: Vo	latile Org (	Cods	Tempera	ture: 25C	Relative	- Humidity: 4	40%												
16																					
17	Speed	PC	PC	PC	PC	PC	ΤΔΧΙ	ΤΔΧΙ	ΤΔΧΙ	ΤΔΧΙ	ΤΔΧΙ	1	LGV3	LGV3	LGV3	LGV3	LGV3	LGV/4	LGV4	LGV4	IG
18	km/hr	NCAT	CAT	DSI	I PG	ALL	NCAT	CAT	DSI	LPG			NCAT	CAT	DSI	LEG	ALL	NCAT	CAT	DSL	LP(
19	,										==										
20	10	4.1314	4 0.0142	2 0.033	(	0.0144	0	0.0193	3	0 0.	044	0.044	4.1395	0.7162	0.0383		0 0.055	i6 3.8882	0.4074	0.03	84
21	20	2,7457	7 0.0089	9 0.0228		0.0091	0	0.0123	3	0 0.0	247 0	).0247	2.7512	0.4532	0.0287		0 0.039	6 2.583	0.2413	0.02	87
22	30	1.9549	9 0,006	5 0.0173		0,0062	0	0.0083	3	0 0.0	185 0	).0185	1.9588	0.3004	0.0222		0 0.029	4 1.8381	0.1474	0,02	22
23	40	1,4924	1 0.0054	4 0.0137	, (	0.0055	0	0.0074	1	0 0.0	151 0	).0151	1,4954	0.2141	0.0177		0 0.022	9 1.4025	0.098	0.01	78
24	50	1.2231	0.0048	3 0.0114		0,0049		0.0067	7	0 0.0	129 N	0.0129	1.2255	0.164	0.0147		0 0,018	7 1.1489	0.0715	0.01	47
		1 0 7 7	0.004			0.0010		0.0007					4 0707	0.1010	0.0100		0.01		0.0570		
	• • • • • • • • • • • • • • • • • • •	HK_20	30_EMFAC	.rtl (	÷								:	4							►
Rea	dy																	I II -	-	+	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: MVEI7G (BCD)
  - Pollutants: PM10, VOC
- Create a new case with same scenario data and edit TG fraction on NFB6
## Exercise #3: Update TG fraction on NFB6

Model Vear	TG 103	TG 104	Total Eraction
would real	Euro V	Euro VI	
2019-2020	100%	0%	100%
2019-2020	0%	100%	100%
	Model Year 2019-2020 2019-2020	TG 103         Model Year         Euro V         2019-2020         100%         2019-2020	TG 103         TG 104           Model Year         Euro V         Euro VI           2019-2020         100%         0%           2019-2020         0%         100%

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

### Exercise #3: Update TG fraction on NFB6

🙀 Emfac-HK V4.0.9B Editing data — 🗆 🗙	🎕 Emfac-HK V4.0.9B Editing data — 🗆 🗙
<u>F</u> ile <u>R</u> un <u>H</u> elp	<u>File R</u> un <u>H</u> elp
Environmental Protection Department The Government of the Hong Kong Special Administrative Region Permitted by Air Resources Board, California	Environmental Protection Department The Government of the Hong Kong Special Administrative Region
Emfac-HK	Emfac-HK
.   Input 1   Input 2   Mode and Output   Tech/IM   Base / Cal. Yr Basis   .   .   .	.   Input 1   Input 2   Mode and Output   Tech/IM   Base / Cal. Yr Basis   .   .   .
Burden - Area Emission Estimate Emfac - Area fleet average emissions Calimfac - Detailed vehicle data	Editing Program Constants - Technology Fractions and Interim I/M for scenario year 2030
Scenario Type: BURDEN Areas Specific Planning Inventory (tonnes/day)       BURDEN Inventory Files and Reports       Output Frequency         Dutput Frequency       C Hour       Day         Utput Particulate As       Output Particulate As       C Total PM         Weighted Model Year Activity (wT)       MVEI77G (BCD)       Output Hydrocarbons As       C TOG         Detailed Dutputs (BDN)       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM       Image: C Total PM         Image: C Total PM       Image: C Total PM       Image: C Total PM	Exh Tech Fraction       Edit the exhaust control technology fractions         Evap Tech Fractions       Edit the evap control technology fractions         Interim I/M       Edit the constants for Enhanced Interim I/M program
Cancel < Back Edit Program Finish	Cancel < Back Next > Finish

## Exercise #3: Update TG fraction on NFB6

🚹 Emfac-HK V4.1 Editing data	—	$\times$
File Run Help		
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	permitted by Air Resources Board, California	
Emfac LIC Exhaust Technology Fractions		
Input 1         Edit Exhaust Technology Fractions by         11: Non-franchised Buses (<6.4t) (NFB6)	-	
OP: Private Light Buses (<=3.5t) (PV4)     OP: Private Light Buses (<=3.5t) (PV4)     OP: Private Light Buses (<=3.5t) (PV5)     The Light Buses (<=3.5t) (PV5)     The Light Buses (<=3.5t) (PV5)     The Light Buses (<=3.5t) (PV7)		
# of Tech Groups 1 13: Non-franchised Buses (>15t) (NFB7)		
Group % Model year (5: Double Deck Franchised Buses (FBSD) 103 100.0 Euro V NF(16: Motor Cycles (MC) 103 100.0 Euro V NF(17: other studies (72))		
12: <placeholder (p1)=""> 18: <placeholder (p2)=""> 19: <placeholder (p3)=""> 19: <placeholder (p3)=""></placeholder></placeholder></placeholder></placeholder>		
20: <placeholder (p5)=""> 21: <placeholder (p6)=""></placeholder></placeholder>	~	
Return Co	py values to other years and	
Apply Cancel Done	Apply to Others	
Cancel < Back Next > Finish		



#### Click "Apply to Others"

### **Before Edit**

Apply to Range?	
Apply This Profile to a     Range of Values?	
Parameters	
Vehicle Class	
Model Year	
OK Cancel	
	J

### **After Edit**

Apply to Range?	
D Ap Ra	ply This Profile to a ange of Values?
Parame	ters
	ehicle Class
M V	lodel Year
ОК	Cancel

• "Apply to Others – Model Year Only"

#### **Before Edit**

11: Non-franchised Buses (<6.4t) (NFB6)

Exhaust Technology Fractions

Edit Exhaust Technology Fractions by

#### **After Edit**

Apply updated values for Tech Group Fractions



-

• 2019 TG fraction same as 2020

### 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       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1         1       1	
Apply Cancel Done Apply to	other years and Others

• Save input file as: HK\_2030\_LGV6.inp and Run

### Exercise #3: Solution

ile	Home	Insert	Page Layout	Formulas	Data Reviev	w View	Add-Ins 7	Feam 🛛 🖓 Te	ll me what you	u want to do					
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1	CALYR	START M	END MYR	REGION	SAR	STARTS	POPULATI	VKT	VEH TYPE	E VEH TECH	I POLL	UTANPROCE	S EMISSIONS	BASIS	Case
	2030	1986	2030	SAR Avera	a Hong Kon	10945	2736	321328	NFB6	DSL	NOx	Run Ext	0.17977	5 Day	Base
	2030	1986	2030	SAR Avera	a Hong Kon	10945	2736	321328	NFB6	DSL	NOx	Run Exh	0.1542	6 Day	Euro VI
	2030	1986	2030	SAR Avera	a Hong Kong	0	0	0	NFB6	DSL	NOx	Run Ext	-0.02551	5 Day	Diff

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:
  - 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, 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

🙀 Emfac-HK V4.0.9B Editing data	- 🗆 X	🙀 Emfac-HK V4.0.9B Editing data — 🗌
<u>F</u> ile <u>R</u> un <u>H</u> elp		<u>F</u> ile <u>R</u> un <u>H</u> elp
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	permitted by Air Resources Board, California	Environmental Protection Department The Government of the Hong Kong Special Administrative Region
Emfac-HK		Emfac-HK
Input 1   Input 2   Mode and Output   Tech/IM Cal. Yr Basis (2030)   Pop/Accrual   VKT/Trips   Pr	ofiles/Speed	.   Input 1   Input 2   Mode and Dutput   Tech/IM   Cal. Yr Basis (2030)   Pot Accrual VKT/Trips   pofiles/Speed
Editing - Calendar Year Basis for Activity		Editing Program Constants - Trips (Starts) and Vehicle Kilometers Traveled (VKT) for scenario year 2030
Only one calendar year in scenario: 2030 (Calendar Year) Active 2030 (Calendar Year) Options		Trips Edit vehicle trips per day VKT Bidit the VKT
Cancel < Back Next > Finish		Cancel < Back Next > Finish
Lancei CBack Next> Finish		Lancel Kack Next Finish

• Click Next until VKT/Trips tab

### **Total VKT tab**

### **By Vehicle and Fuel tab**

diting VKT d	ata for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title	Editing VKT data for scenario 1: Hong Kong SAR Annual CYr 2030 Def	ault Title
Total VKT for	area Copy with Headings Paste Data Only	Total VKT for area	opy with Headings Paste Data Only
	Hong Kong SAR	Hong Kong SAR	
Editing Mode	Editing VKT (vehicle km traveled per weekday)	Editing Mode Editing VKT (	vehicle km traveled per weekday)
Total VKT	By Vehicle Class By Vehicle and Fuel By Vehicle/Fuel/Hour	Total VKT By Vehicle Class By Vehicle and Fuel By Vehicle/Fuel/Ho	ur]
		Feud	Diesel LPG
		01 - Private Cars (PC) 20791860	206627. 0.
		02 - Taxi 3292.	0. 7949132.
		03 - Light Goods Vehicles<=2.5t 888.	41053. 0.
		04 - Lt Goods Vehicles 2.5-3.5t 78039.	3840346. 0.
		05 - Light Goods Vehicles>3.5t 0.	2083233. 0.
		06 - Medium Heavy Goods Vehicles<=15t 0.	1081536. 0.
	Hevised Local VK.1 43772954	07 - Medium Heavy Goods Vehicles>15t 0.	2837768. 0.
		08 - Public Light Buses 0.	993919. 207253.
	Previous Totel VKT 43772964	09 - Private Light Bus <=3.5t 16318.	34793. 0.
		10 - Private Light Bus >3.5t 98.	268344. 17802.
		11 - Non-franchised Bus<=6.4t 0.	322358. 0.
		12 - Non-franchised Bus 6.4-15t 0.	223921. 0.
		13 - Non-franchised Bus >15t 0.	400613. 0.
		14 - Franchised Bus (SD) 0.	77969. 0.
		15 - Franchised Bus (DD) 0.	1240047. 0.
		16 - Motorcycles (MC) 1155100.	0. 0.
		17 - <placeholder (p1)=""> 0.</placeholder>	0. 0.
		18 - < Placeholder (P2)> 0.	0. 0.
		19 - <placeholder (p3)=""> 0.</placeholder>	0. 0.
		20 - < Placeholder (P4)> 0.	0. 0.
		21 - <placeholder (p5)=""> 0.</placeholder>	0. 0.
	Apply Cancel Done	Apply Cancel	Done

VKT adjustment factor is :
 1,609,000 ÷ 20,791,860 = 0.077386

#### **VKT/Trips tab**

#### Pop/Accural tab



• Back to Population  $\rightarrow$  By Vehicle and Fuel tab

#### 2030 Population (Base Case)

Editing Cal Pop data for scenario 1: Hong Kon	g SAR Annual CYr 2	030 Default Title	
Total Cal Pop for area		Copy with Heading	s Paste Data Only
Hong Kong SAR			
Editing Mode	Editing Cal Pop	(registered vehicles (	with adjustments)
Total Cal Pop By Vehicle Class v Vehicle a	nd Fuel By Vehicle/F	Fuel/Age	
		- 1	
	Petrol	Diesel	LPG
01 - Private Cars (PC)	718589	7152.	0.
02 - Taxi	8.	0.	18292.
03 - Light Goods Vehicles<=2.5t	13.	576.	0.
04 - Lt Goods Vehicles 2.5-3.5t	1142.	53670.	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.	3597.	750.
09 - Private Light Bus <=3.5t	209.	398.	0.
10 - Private Light Bus >3.5t	2.	3320.	349.
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)=""></placeholder>	0.	0.	0.
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.

#### 2030 Population (Edited for VKT Match)

al Cal Pop for area		opy with Headings	Paste Data On
Hong Kong SAR			
iting Mode	Editing Cal Pop (re	gistered vehicles with	adjustments)
Total Cal Pop By Vehicle Class By Vehicle and F	uel By Vehicle/Fue	I/Age	
	Petrol	Diesel	LPG
01 - Private Cars (PC)	55608.77	7152.	0.
02 - Taxi	<u>ð.</u>	0.	18292.
03 - Light Goods Vehicles<=2.5t	13.	576.	0.
04 - Lt Goods Vehicles 2.5-3.5t	1142.	53670.	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.	3597.	750.
09 - Private Light Bus <=3.5t	209.	398.	0.
10 - Private Light Bus >3.5t	2.	3320.	349.
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)=""></placeholder>	0.	0.	0.
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.

 Multiply population by factor: 718,589 \* 0.077386 = 55,608.77

### Exercise # 4a: Verify VKT Adjustment

#### 2030 VKT (Base Case)

otal VKT for area	0	Copy with Headings	Paste Data On
Hong Kong SAR			
diting Mode	Editing VKT	(vehicle km traveled)	per weekday)
Total VKT   By Vehicle Class		ourl	
	Petrol	Diesel	LPG
01 - Private Cars (PC)	20791860. 🜔	206627.	0.
02 - Taxi 📘	3232.	0.	7949132.
03 - Light Goods Vehicles<=2.5t	888.	41053.	0.
04 - Lt Goods Vehicles 2.5-3.5t	78039.	3840346.	0.
05 - Light Goods Vehicles>3.5t	0.	2083233.	0.
06 - Medium Heavy Goods Vehicles<=15t	0.	1081536.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	2837768.	0.
08 - Public Light Buses	0.	993919.	207253.
09 - Private Light Bus <=3.5t	16318.	34793.	0.
10 - Private Light Bus >3.5t	98.	268344.	17802.
11 - Non-franchised Bus<=6.4t	0.	322358.	0.
12 - Non-franchised Bus 6.4-15t	0.	223921.	0.
13 - Non-franchised Bus >15t	0.	400613.	0.
14 - Franchised Bus (SD)	0.	77969.	0.
15 - Franchised Bus (DD)	0.	1240047.	0.
16 - Motorcycles (MC)	1155100.	0.	0.
17 - <placeholder (p1)=""></placeholder>	0.	0.	0.
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.

#### 2030 VKT (After Pop Edit)

Total VKT for area	1	Copy with Headings	Paste Data Only
Hong Kong SAR			
Editing Mode	Editing VKT	(vehicle km traveled p	er weekday)
Total VKT By Vehicle Class By Vehicle and Fu	By Vehicle/Fuel/H	lour	
	Petrol	Diesel	LPG
01 - Private Cars (PC)	1609001	206627.	0.
02 - Taxi		0.	7949132.
03 - Light Goods Vehicles<=2.5t	888.	41053.	0.
04 - Lt Goods Vehicles 2.5-3.5t	78039.	3840346.	0.
05 - Light Goods Vehicles>3.5t	0.	2083233.	0.
06 · Medium Heavy Goods Vehicles<=15t	0.	1081536.	0.
07 - Medium Heavy Goods Vehicles>15t	0.	2837768.	0.
08 - Public Light Buses	0.	993919.	207253.
09 - Private Light Bus <=3.5t	16318.	34793.	0.
10 - Private Light Bus >3.5t	98.	268344.	17802.
11 - Non-franchised Bus<=6.4t	0.	322358.	0.
12 - Non-franchised Bus 6.4-15t	0.	223921.	0.
13 - Non-franchised Bus >15t	0.	400613.	0.
14 - Franchised Bus (SD)	0.	77969.	0.
15 - Franchised Bus (DD)	0.	1240047.	0.
16 · Motorcycles (MC)	1155100.	0.	0.
17 - <placeholder (p1)=""></placeholder>	0.	0.	0.
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.

### • 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)

otal VKT for	area	_0	Copy with Headings	Paste Data Only			
	Hong Kong SAR						
diting Mode		Editing VKT	(vehicle km traveled j	per weekday)			
Total VKT	By Vehicle Class By Vehicle and Fue	By Vehicle/Fuel/H	our				
		r euor	Diesel	LPG			
	U1 - Private Cars (PC)	20791860.	206627.	0.			
		3202.	0.	7949132.			
	U3 - Light Goods Vehicles<=2.5t	888.	41053.	0.			
	U4 - Lt Goods Vehicles 2.5-3.5t	78039.	3840346.	0.			
	U5 - Light Goods Vehicles>3.5t	0.	2083233.	0.			
U6 - Mea	dium Heavy Goods Vehicles<=15t	0.	1081536.	0.			
07 - Me	edium Heavy Goods Vehicles>15t	0.	2837768.	0.			
	08 - Public Light Buses	0.	993919.	207253.			
	09 - Private Light Bus <=3.5t	16318.	34793.	0.			
	10 - Private Light Bus >3.5t	98.	268344.	17802.			
	11 - Non-franchised Bus<=6.4t	0.	322358.	0.			
	12 - Non-franchised Bus 6.4-15t	0.	223921.	0.			
	13 - Non-franchised Bus >15t	0.	400613.	0.			
	14 - Franchised Bus (SD)	0.	77969.	0.			
	15 - Franchised Bus (DD)	0.	1240047.	0.			
	16 - Motorcycles (MC)	1155100.	0.	0.			
	17 - <placeholder (p1)=""></placeholder>	0.	0.	0.			
	18 - <placeholder (p2)=""></placeholder>	0.	0.	0.			
	19 - <placeholder (p3)=""></placeholder>	0.	0.	0.			
	20 - <placeholder (p4)=""></placeholder>	0.	0.	0.			
	21 - <placeholder (p5)=""></placeholder>	0.	0.	0.			
	Annlu	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 Copy with Headings Paste Data Only								
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	3232.	0.	7949132.					
03 - Light Goods Vehicles<=2.5t	914.	40772.	0.					
04 - Lt Goods Vehicles 2.5-3.5t	80568.	3787858.	0.					
05 - Light Goods Vehicles>3.5t	0.	2043798.	0.					
06 - Medium Heavy Goods Vehicles<=15t	0.	1078872.	0.					
07 - Medium Heavy Goods Vehicles>15t	0.	2832228.	0.					
08 - Public Light Buses	0.	977404.	223768.					
09 - Private Light Bus <=3.5t	16543.	34637.	0.					
10 - Private Light Bus >3.5t	95.	268596.	17298.					
11 - Non-franchised Bus<=6.4t	0.	321311.	0.					
12 - Non-franchised Bus 6.4-15t	0.	223818.	0.					
13 - Non-franchised Bus >15t	0.	400456.	0.					
14 - Franchised Bus (SD)	0.	77969.	0.					
15 - Franchised Bus (DD)	0.	1240047.	0.					
16 - Motorcycles (MC)	1155099.	0.	0.					
17 - <placeholder (p1)=""></placeholder>	0.	0.	0.					
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.					
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.					
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.					
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.					
<u>-</u>								
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	20,791,860	1,609,000	1,609,000
Trips	1,077,775	83,405	1,077,775
NOx Run Exhaust (tonne/day)	0.1715	0.0133	0.0133
NOx Start Exhaust (tonne/day)	0.07198	0.00557	0.07198

#### 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		Copy with Headings	Paste Data Only					
Hong Kong SAR								
Editing Mode Editing Trips-per-Day (starts per weekday)								
Total Tripsper Day   Bu Vehicle Class   60 Vehicle and Fuel   Pu Vehicle/Euel/Hour								
Petrol Diesel LPG								
01 - Private Cars (PC)	<u> </u> 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)=""></placeholder>	0.	0.	0.					
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.					
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.					
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.					
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.					
	1		1					
Apply	Cancel	Done						

### Factor = 250,000 ÷ 1,077,775 = 0.231959

### Exercise # 5a: Population Edits

#### 2030 Population (Base Case)

#### 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		Copy with Headings	Paste Data Only					
Hong Kong SAR								
Editing Mode Editing Cal Pop (registered vehicles with adjustments)								
Total Cal Pop   By Vehicle Classe By Vehicle and Fuel Ry Vehicle/Fuel/Age								
	Petrol	Diesel	LPG -					
01 - Private Cars (PC)	718589	7152.	0.					
02 - Taxi	8.	0.	18292.					
03 - Light Goods Vehicles<=2.5t	13.	576.	0.					
04 - Lt Goods Vehicles 2.5-3.5t	1142.	53670.	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.	3597.	750.					
09 - Private Light Bus <=3.5t	209.	398.	0.					
10 - Private Light Bus >3.5t	2.	3320.	349.					
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)=""></placeholder>	0.	0.	0.					
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.					
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.					
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.					
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.					

<u> </u>	Copy with Headings	Paste Data
Editing Cal Pop (re	gistered vehicles with	adjustments)
uel By Vehicle/Fue	l/Age	
Petrol	Diesel	LPG
h 66683.	7152.	0.
8.	0.	18292.
14.	576.	0.
1201.	53610.	0.
0.	21614.	0.
0.	12598.	0.
0.	33063.	0.
0.	3537.	810.
213.	394.	0.
2.	3329.	340.
0.	2736.	0.
0.	1898.	0.
0.	3403.	0.
0.	313.	0.
0.	5590.	0.
69786.	0.	0.
0.	0.	0.
0.	0.	0.
0.	0.	0.
0.	0.	0.
		0
	Editing Cal Pop (re By Vehicle/Fue Petrol 166683, 8 14, 1201, 1 0, 1 0, 1 0, 1 1 1 0, 1 1 1 1 1 1 1 1 1 1 1 1 1	Editing Cal Pop (registered vehicles with leb By Vehicle/Fuel/Age           Petrol         Diesel           [166683]         7152           8         0           14         576           1201         53610           1201         53610           0         21614           0         21614           0         33063           0         333063           0         3403           0         23329           0         2736           0         3403           0         3403           0         3537           0         3403           0         5590           69786         0           0         0           0         0           0         0

Multiply population by factor: 718,589 \* 0.231959 = 166,683 vehicles

## Exercise # 5a: Verify Trips Adjustment

#### 2030 Trips (Base Case)

ing Mode			
ing Mode			
	Editing	Trips-per-Day (starts p	per weekday)
otal Trips-per-Day   By Vehicle Class_ By Vehicle an	nd Fuel By Vehicle	e/Fuel/Hour	
	Petrel	Diesel	LPG
01 - Private Cars (PC)	h077775.	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)=""></placeholder>	0.	0.	0.
18 - <placeholder (p2)=""></placeholder>	0.	0.	0.
19 - <placeholder (p3)=""></placeholder>	0.	0.	0.
20 - <placeholder (p4)=""></placeholder>	0.	0.	0.
21 - <placeholder (p5)=""></placeholder>	0.	0.	0.

#### 2030 Trips

#### (After Pop Edit)

tal Trips-per-Day for area		Copy with Headings	Paste Data On
Hong Kong SAR			
iting Mode	Editing	Trips-per-Day (starts	per weekday)
Total Trips-per-Day By Vehicle Class By Vehicle	and Fuel By Vehicl	e/Fuel/Hour	
	Datal	Distal	LPC
01 - Private Care (PC)	b40000	10727	
	¥49999.	10727.	.0.
02 Light Goods (/shisles / -2 Et	30.	0.	73162.
03 - Light Goods Vehicles 2.5t	36.	2303.	0.
05 Light Goods Vehicles 2.5-3.5(	4603.	214442.	0.
06 - Medium Heavy Goods Vehicles/3.5t	0.	60440. E0200	0.
07 Medium Heavy Goode ) (chicless 15)	0.	100356.	0.
02 - Public Light Ruses	0.	14149	2220
09 Private Light Pue (=2.5t	500	14143.	3233.
10 - Private Light Bus <= 3.5t		0004	0.
11 Non franchised Buse-E-4t	3.	10045	
12 Non-franchised Bus C 4.15t	0.	7502	0.
12 Non-franchised Bus 3.15	0.	10010	0.
14 - Franchised Bus (SD)	0.	13013.	0.
15 Franchised Bus (DD)	0.	50000	0.
16 - Motorcucles (MC)	410750	0,00000	0.
17 (Placeholder (P1))	410753.	0.]	0.
18 - (Placeholder (P2))	0.	0.	0.
19 - (Placeholder (P2))	0.1	0.]	0.
20 - (Placeholder (P4))	0.	0.	0.
20 - Chiaceholder (F4)/	0.	0.	0.
	0. ]	0. ]	0.

• 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 2030 Trips

(Base Case) (After Trips Edit) Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title Editing Trips-per-Day data for scenario 1: Hong Kong SAR Annual CYr 2030 Default Title Total Trips-per-Day for area Paste Data Only Total Trips-per-Day for area Copy with Headings Paste Data Only Hong Kong SAR Hong Kong SAR Editing Mode Editing Trips-per-Day (starts per weekday) Editing Mode Editing Trips-per-Day (starts per weekday) Total Trips-per-Day By Vehicle Class By Vehicle and Fuel D Vehicle/Fuel/Hour Total Trips-per-Day By Vehicle Class Vehicle and Fuel By Vehicle/Fuel/Hour Diesel LPG. LPG Diesel 01 - Private Cars (PC) 250000 10727 01 - Private Cars (PC) 1077775. 10727 0. 02 - Taxi β0. 73162 02 - Taxi 73162. 0. 03 - Light Goods Vehicles<=2.5t 03 - Light Goods Vehicles<=2.5t 56. 2303. 0. 56. 2303. 04 - Lt Goods Vehicles 2.5-3.5t 04 - Lt Goods Vehicles 2.5-3.5t 4805. 214442. 4805. 214442 0. Π 05 - Light Goods Vehicles>3.5t 86446. 0. 05 - Light Goods Vehicles>3.5t 0. 86446. 0. 0. 06 - Medium Heavy Goods Vehicles<=15t 0. 50396. 0. 06 - Medium\_Heavy Goods Vehicles<=15t 0. 50396. 0. 07 - Medium Heavy Goods Vehicles>15t 0. 0. 132265. 07 - Medium \_ Heavy Goods Vehicles>15t 0. 132265 0. 08 - Public Light Buses 0. 14149. 3239. 08 - Public Light Buses 0. 14149 3239. 09 - Private Light Bus <=3.5t 598. 1102 0. 09 - Private Light Bus <=3.5t 598. 1102 0 10 - Private Light Bus >3.5t 5. 9324 953. 10 - Private Light Bus >3.5t 5. 9324. 953. 11 - Non-franchised Bus<=6.4t 0. 10945. 11 - Non-franchised Bus<=6.4t 0. 10945. 0. Π 12 - Non-franchised Bus 6.4-15t 0. 7593 0. 12 - Non-franchised Bus 6.4-15t 0. 7593. 0. 13 - Non-franchised Bus >15t 13 - Non-franchised Bus >15t 0. 13613. 0. 0. 13613. 0. 14 - Franchised Bus (SD) 3340 0. 14 - Franchised Bus (SD) 0. 3340 Π 15 - Franchised Bus (DD) 0. 59633 0. 15 - Franchised Bus (DD) 0. 59633. 0. 16 - Motorcycles (MC) 418759. 0. 0. 16 - Motorcycles (MC) 418759. 0. 0. 17 - < Placeholder (P1)> 17 - < Placeholder (P1)> 0. 0. Ο. Ο. 0. 18 - < Placeholder (P2)> 0. 0. 0. 18 - < Placeholder (P2)> 0. Ο. 0. 19 - < Placeholder (P3)> 19 - < Placeholder (P3)> 0. 0. 0. 0. 0. 20 - < Placeholder (P4)> 0. 0. 0. 20 - < Placeholder (P4)> 0. 0. 0 21 - < Placeholder (P5)> 0. 0. 0. 21 - < Placeholder (P5)> 0. 0. 0 Cancel Apply 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 Trips	#5b: Trips direct
Vehicles	718,589	166,683	718,589
VKT	20,791,860	4,822,855	20,791,861
Trips	1,077,775	249,999	250,000
NOx Run Exhaust	0.1715	0.0398	0.1715
NOx Start Exhaust	0.07198	0.01670	0.01670

#### 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

R Emfac-HK Editing data	– 🗆 X					
<u>F</u> ile <u>R</u> un <u>H</u> elp						
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	permitted by Air Resources Board, California					
Emfac-HK						
Input 1   Input 2   Mode and Output   Tech/IM   Cal. Yr Basis (2030)   Pop/Accrual   VKT/Trips 🔇	Profiles/Speed					
Editing Program Constants - RVP, Temperature, Humidity, Speed Fractions, and Idle Time for scenario year 2030 and month/season Annual						
RVP Edit the petrol Reid Vapor Pressure (RVP) for the calendar year and se	eason					
Temperature Profile Edit the hourly temperature profile for the season *						
RH Profile Edit the hourly relative humidity (RH) 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						
Idle Time Edit idle times for vehicles						
Info * Temperature and RH are the same in respect to the change of calendar year						
Cancel < Back Finis	h					

		Constant Francisco de la Constanti-	Verse al Vel Sela C	1		
		Speed Fractions by Scenario	o year and vehicle C	lass		
		Area: Hong Kong SAR		Scenario Year: 2030	Copy with Headings	Paste Data Only
		Hong Kong SAR				
		VKT-Weighted Average Bas	sis: 8 KPH	Vehicle Class:	06: Heavy Goods Ve	ehicles (5.5-15t) 💌
					01: Private Cars (PC)	
1.	Select Vehicle				02: Taxi (Taxi) 03: Light Goods Vehi	icles (<=2.5t) (LGV:
	Classe				04: Light Goods Vehi	icles (2.5-3.5t) (LG
	Class;				05: Elgrit Goods Ve 06: Heavy Goods Ve	hicles (5.5-15t) (H0
		Grid Control Remove	ed/Deactivated	(Replaced with 5-step	07: Heavy Goods Ve	hicles (>=15t) (HG)
					09: Private Light Bus	es (<=3.5t) (PV4)
		-> 1. Press "Copy wit	th Headings" bu	tton to copy data to a	10: Private Light Bus	es (>3.5t) (PV5)
		-> 2. Open spreadshe	eet and paste c	ipboard contents to s	12: Non-franchised B	uses (6.4-15t) (NFE
		for viewing/edi	ting.		13: Non-franchised B	luses (>15t) (NFB8]
		-> 3. Perform edits.			15: Double Deck Fra	inchised Buses (FB
		-> 4. Highlight <u>Data</u>	Only portion in	spreadsheet and copy	16: Motor Cycles (MC	n i
		-> 5. Press "Paste Da	ata Only" to pas	te edits back into pro	18: <placeholder (p2<="" th=""><th></th></placeholder>	
					19: <placeholder (p3<="" th=""><th></th></placeholder>	
					20: < Placeholder (P6 21: < Placeholder (P6	j>
		Total 100 % in each	Apply	Cancel	Done A	Apply to Others
		hour				

	Speed Fractions by Scer	nario Year and Ve	hicle Class					
	Area: Hong Kong SAR			Scenario Year: 2030	Copy with 1 Adings	(PasterData:frotu)		
	Hong Kong SAR							
	VKT-Weighter Verage	Basis:	8 KPH	Vehicle Class:	06: Heavy Goods Ve	ehicles (5.5-15t)		
elect Vehicle Class;								
Click button "Copy with Headings". Open Excel worksheet and baste values	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 Total 100 % in ex hour	ach <u>Appl</u>	y	its back into pro	Done	Apply to Others		

2.

3.

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	A1	- Hou	: 00	01	02	03	04	05	06	07	08	09	10	•••••		Editing		*
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	1 Vehicle Class 06	Speed Fractions	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	
1-8 km/ nr	2 Spd008		0	0	0	0	0	0	0	0	1.88E-03	1.88E-03	0	0	0	0	0	
9-16	3 Spd016		0	0	0	0	0	0	0	0	6.88E-02	6.99E-02	0	0	0	0	0	
16-24	5 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	0
21-22	6 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	2
24-32	7 Spd048		0	0	0	0	0	0	0	0	0.192936	0.192936	0	0	0	0	0	
32-40	8 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	0
40-48	9 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	3
48-56	10 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	0
	11 Spd080		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
50-04	12 Sp0088		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
64-72	14 Spd104		0	0	0	0	0	0	Ő	0	0	0	0	0	0	0 0	0	
	15 Spd112		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	16 Spd120		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	17 Spd128		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
•	18 Spd136		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	19 Spd144		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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	Ready									Average:	60.57894737	Count: 47	75 Sum: 27	624 🖽 🗆	100%	Θ	0	Ð:

- 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).

Speed Fractions by Scenario	/ear and Vehicle Class			
Area: Hong Kong SAR		Scenario Year: 2030	Copy with Headings	Paste Data Ori
Hong Kong SAR				
VKT-Weighted Average Basis	: 8 KPH	Vehicle Class:	06: Heavy Goods Ve	hicles (5.5-15t) 💌
				r- Grade
Grid Control Removed Data Copied to Cli	d/Deactivated (Rej pboard Perform :	placed with 5-ste STEPS 2 thru 5.	p process).	Flat High
-> 2. Open spreadshee	t and paste clipbo	pard contents to a	spreadsheet	Low
for viewing/editi -> 3. Perform edits. -> 4. Highlight <u>Data O</u> -> 5. Press "Paste Dat	r Editing speed fractio	ns hours of speed fractic	× d. ons data?	
		Yes	No	
Total 100 % in each hour	Apply	Cancel	Done A	Apply to Others


# 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: 203	Copy with Headings Paste Data Only
Hong Kong SAR		
VKT-Weighted Average Basi	s: 8 KPH Vehicle Cla	ss: 06: Heavy Goods Vehicles (5.5-15t 💌
Grid Control Remove	g Apply to Range?	is). Grade
-> 1. Press "Copy with -> 2. Open spreadshe for viewing/edit -> 3. Perform edits.	Apply This Profile to a Range of Values?	rd. neet
-> 4. Highlight <u>Data (</u> -> 5. Press "Paste Dat	Vehicle Class	board.
	OK Cance	
Total 100 % in each hour	Apply Cancel	Done Apply to Others

#### **Apply Edit to HGV8**

Area: Ho	na Kona SAR	Scenario Year: 2030 Copy with Headings Paste Data 0
Hong	Kong SAR	
VKT-Wei	ighted Average Basis: 8 KPH	Vehicle Class: 06: Heavy Goods Vehicles (5.5-15t)
Ар	ply updated values for Speed Fractions	5
Gr	Updates Will Be App	blied 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 3.3.5t 06: Medum & Heavy Goods Vehicles <br 08: Public Light Buses 08: Private Light Bus <= 3.5t 10: Private Light Bus <= 3.5t 11: Non-franchised Bus <= 6.4t 12: Non-franchised Bus <= 15t 13: Non-franchised Bus <= 15t 14: Foundancies (CD)	07: Medium & Heavy Goods Vehicles>15t
L	OK	Cancel
	Total 100 % in each Apply hour	Cancel Done Apply to Others

### Exercise # 6: Solution

Vehicle	Run Exhaust	Base	#6
HGV7	NOx	0.766	0.778
	PM	0.030	0.030
HGV8	NOx	2.352	2.419
	PM	0.168	0.170

# 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.

- 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

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

and trip.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 0 0 2020 0 0 2020			
HKUNITS Y			
End-Header			
Begin-Scenario 1			
Title Hong Kong SAR Annual CYr 2015 Default Title			
Program-Mode Bunden			
Area-Method One-County			
Area-Type SAR			
Area-Number 38 [Hong Kong SAR]			
HC-Mode VOC			
PM-Mode PM10			
CYr 2015			- 1
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			
Bunden-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 8	1. 81.100	01 83	3.1
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	L
End-Real-Array			
End-Data-Item			
< C			>

• Update data row for each month from RH.XLS

IHK\_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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 0 2020 0 0 0 2020 
         HKUNTTS Y
End-Header
Begin-Scenario 1
         Title Hong Kong SAR Annual CYr 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
         CYr 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-Dailv
          Bunden-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

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
T Modify Values for Range of Hours to Constant Value for Range
Apply Cancel Done

## **Advance Exercises**

- 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; PM<sub>10</sub>; VOC;
- Alter alternate base year population by 2018\_Pop.XLS

#### • Alternate Base Year Selection: 2018

配 Emfac-HK Editing data	- 🗆 X
File Run Help	
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	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	Alternate Base Year Selection
Step 1 - Geographic Area	Available Included
Area Type: SAR SAR SAR Hong Kong SAR SAR Hong Kong SAR SAR SAR SAR SAR SAR SAR SA	2002 ▲ 2003 2004 2005 2006 2008 2009 2010 2011 2011 2012 2013 2014 2015 2016 2016 2017 2019 2020 2020 2021 ↓
Scenario Year for Output OPTIONAL: Selecting this option overrides EMFAC-HK default base year.	All All No Alternate base data year
Step 3 - Season or Month Annual Cancel Next > Fi	DK Cancel

🛃 Emfac-HK Editing data	- 🗆 X
File Run Help	
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	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	
Hong Kong 🗨	
J SAN	
Step 2a - Calendar Year Step 2b - Alternate Base Year	
Select ACTIVATED	
Calendar year 2030 Alternate Base data	
selected year 2018 selected	
Scenario Year for Output OPTIONAL: Selecting this option overrides EMFAC-Hy	
default base year.	
– Step 3 Season or Month –––	
Cancel Next >	Finish

🔁 Emfac-HK1 Editing data	- 🗆 X
File Run Help	
Environmental Protection Department The Government of the Hong Kong Special Administrative Region	permitted by Air Resources Board, California
Emfac-HK	
. Input 1 Input 2 Mode and Output Tech/IM Base Yr Basis (2018) Population .	
Editing - Calendar Year Basis for Activity	
Select the calendar year basis for editing activity data: 2018 (Alt. Base Pop) Active 2030 (Calendar Year) 2018 (Alt. Base Pop) Options	
Cancel < Back Next > Finish	

• Select "2018 (Alt. Base Pop)"

🔁 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	
.   Input 1   Input 2   Mode and Output   Tech/IM   Base Yr Basis (2018)   Population   .   .	
Editing Program Constant - Population for Alternate Base year 2018	
Population Edit the vehicle population	
Accrual Eult the odometer accrual *	
Info * Accrual rates are the same in respect to the	
change of calendar year	
Cancel < Back Next > Finish	

	Hong Kong SAR		Lopy with	Headings	Paste Data Only
diting Mode		Editing E	lase Pop (registered	vehicles with adjustm	ents)
Total Base I	Pop│ByVehicle Clas	s By Vehicle and Fue B.	y Vehicle/Fuel/Age		
Grid Co	ontrol Removed	/Deactivated (Repla	ced with 5-ste	p process).	Fuel Type
-> 1. Pi	ess "Copy with	Headings" button to	o copy data to	clipboard.	Petrol
-> 2. O	pen spreadshee	t and paste clipboar	d contents to a	preadsheet	Diesel
fo	r viewing/editii erform edits	ng.			LPG
-> 4. Hi	ghlight Data Or	nly portion in spread	lsheet and cop	y to clipboard.	
-> 5. Pı	ess "Paste Data	Only" to paste edit	s back into pro	ogram.	

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

Editing Base Pop data for scenario 1:	long Kong SAR Annual CYr 2030 Default Title
Total Base Pop for area Hong Kong SAR	Copy with Headings Paste Data Only
Editing Mode	Editing Base Pop (registered vehicles with adjustments)
Total Base Pop   By Vehicle Class   B	v Vehicle and Fuel By Vehicle/Fuel/Age
Grid Control Removed/De -> 1. Press "Copy with Hea -> 2. Open spreadsheet ar for viewing/editing. -> 3. Perform edits. -> 4. Highlight <u>Data Only</u> -> 5. Press "Paste Data On -> 6. PASTE SUCCESSFUL.	activated (Replaced with 5-step process). dings" button to copy data to clipboard. d paste clipboard contents to spreadsheet Diesel LPG
	Successful Paste.
Apply	Cancel Done

- 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 (2020, 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 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