

# Exercises 7-8

# Exercise Setup

- Folders for each Exercise
- User to save input/output to folders for each Exercise

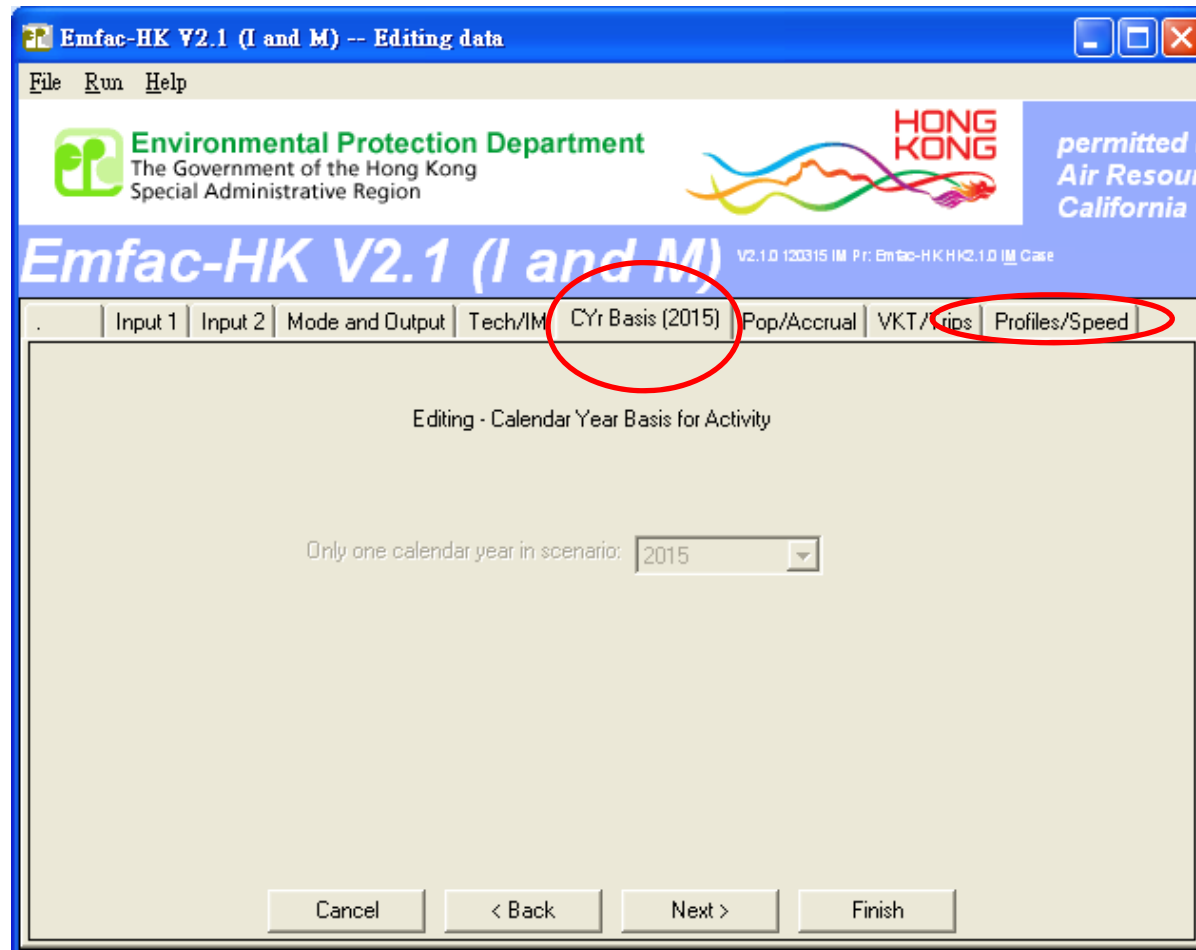
# Exercise #7: Speed Distributions

- Hong Kong has developed a TCM, which requires heavy goods vehicles (>5.5 tonne) to only travel between midnight (0-hr) and 8 a.m. and from 10 p.m. to midnight. 5% of the VKT occurs at average speed 1-8 km/hr (Speed Bin #1 in GUI); 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).
- What is the effect on NO<sub>x</sub> running exhaust emissions from this change?

# Exercise #7: Speed Distributions

- Problem: Determine change in emissions in 2015 for HGV7 (Vehicle Class 7) and HGV8 (Vehicle Class 8) given the revised speed distribution below.
- Scenario data:
  - Geographic Area: **Hong Kong SAR**
  - Calendar Years: **2015**
  - Season: **Annual**
  - Scenario Type: **BURDEN**
  - Output File types: **Text (CSV), BCD**
  - Output Frequency: **daily**
  - Pollutants: **PM<sub>10</sub>, VOC**
- **Speed Fractions: 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 #7: Profiles/Speed Tab



# Exercise #7: Editing Speed Fractions

## 2015 Speed Fractions (HGV7) Base Case

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1336
5	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0441
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3039
8	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0206
9	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.4978
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total 100.00 % OK Apply Cancel Done Apply to Others

## 2015 Speed Fractions (HGV7) About to Copy Edits from Spreadsheet

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1336
5	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0441
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3039
8	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0206
9	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.4978
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total 100.00 % OK Apply Cancel Done Apply to Others

Set the "Basis" tab to "8 KPH" and select the Heavy Goods Vehicles<15t. Then change the VKT speed distribution. Then apply this change to this hour and vehicle class. Then apply this change to other vehicle classes.

# Exercise #7: Editing Speed Fractions

## 2015 Speed Fractions (HGV7) Base Case

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1958	0.1336
5	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0456	0.0441
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3968	0.3039
8	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0206
9	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.3550	0.4978
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total 100.00 % OK Apply Cancel Done Apply to Others

## 2015 Speed Fractions (HGV7) Edits Applied

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
1	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
8	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
9	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total 100.00 % OK Apply Cancel Done Apply to Others

# Exercise #7: Apply Speed Fraction Edits to Other Hours

## Apply Edit to Another Vehicle Class

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
1	0.0500	0					0.0500	0.0500
2	0.0000	0					0.0000	0.0000
3	0.0000	0					0.0000	0.0000
4	0.2000	0					0.2000	0.2000
5	0.0000	0					0.0000	0.0000
6	0.0000	0					0.0000	0.0000
7	0.2500	0					0.2500	0.2500
8	0.2500	0					0.2500	0.2500
9	0.2500	0					0.2500	0.2500
10	0.0000	0					0.0000	0.0000
11	0.0000	0					0.0000	0.0000
12	0.0000	0					0.0000	0.0000
13	0.0000	0					0.0000	0.0000
14	0.0000	0					0.0000	0.0000
15	0.0000	0					0.0000	0.0000
16	0.0000	0					0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Apply to Range?

Apply This Profile to a Range of Values?

Parameters

Vehicle Class

OK Cancel

Total 100.00 % OK Apply Cancel Done Apply to Others

## Apply Edit to HGV8

Speed Fractions by Scenario Year and Vehicle Class

Area: Hong Kong SAR Scenario Year: 2015 Copy with Headings Paste Data Only

Hong Kong SAR

VKT-Weighted Average Basis: 1.6 KPH 8 KPH 16 KPH Vehicle Class: 07: Medium & Heavy Goods Vehicle

Speed Bin (8,16,24,...) (1:18)	Hour (1 to 24)							
	1	2	3	4	5	6	7	8
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Apply updated values for Speed Fractions

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

Vehicle Classes

Selections Available

- 01: Private Cars (PC)
- 02: <Placeholder (P1)>
- 03: Taxi
- 04: Light Goods Vehicles<=2
- 05: Lt Goods Vehicles 2.5-3
- 06: Light Goods Vehicles>3.5
- 07: Heavy Goods Vehicles<=15
- 08: Heavy Goods Vehicles >15
- 09: <Placeholder (P2)>
- 10: <Placeholder (P3)>
- 11: Public Light Buses
- 12: Private Light Bus <=3.5t
- 13: Private Light Bus >3.5t
- 14: Max. Goods Vehicle >3.5t

Apply To:

08: Heavy Goods Vehicles >15

OK Cancel

Total 100.00 % OK Apply Cancel Done Apply to Others



# Exercise #7: Solution

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Ex7													
<b>CALYR</b>	<b>START MYR</b>	<b>END MYR</b>	<b>REGION</b>	<b>SAR</b>	<b>STARTS</b>	<b>POPULATION</b>	<b>VKT</b>	<b>VEH TYPE</b>	<b>VEH TECH</b>	<b>POLLUTANT</b>	<b>PROCESS</b>	<b>EMISSIONS</b>	<b>BASIS</b>
2015	1971	2015	SAR Average	Hong Kong SAR Average	43504	10875	1141345	HGV7	DSL	NOx	Run Exh	0.784739	Day
2015	1971	2015	SAR Average	Hong Kong SAR Average	123328	30829	3230292	HGV8	DSL	NOx	Run Exh	4.292101	Day
<b>BASE</b>													
<b>CALYR</b>	<b>START MYR</b>	<b>END MYR</b>	<b>REGION</b>	<b>SAR</b>	<b>STARTS</b>	<b>POPULATION</b>	<b>VKT</b>	<b>VEH TYPE</b>	<b>VEH TECH</b>	<b>POLLUTANT</b>	<b>PROCESS</b>	<b>EMISSIONS</b>	<b>BASIS</b>
2015	1971	2015	SAR Average	Hong Kong SAR Average	43504	10875	1141345	HGV7	DSL	NOx	Run Exh	3.197259	Day
2015	1971	2015	SAR Average	Hong Kong SAR Average	123328	30829	3230292	HGV8	DSL	NOx	Run Exh	17.508255	Day
							<b>DIFFERENCE</b>	<b>VEH TYPE</b>	<b>VEH TECH</b>	<b>POLLUTANT</b>	<b>PROCESS</b>	<b>EMISSIONS</b>	<b>BASIS</b>
								HGV7	DSL	NOx	Run Exh	2.41252	Day
								HGV8	DSL	NOx	Run Exh	13.216154	Day

# Exercise #8: Changing RH

- Context: This exercise shows how the user can change the relative humidity for an area of concern, say, area near a weather station, P, in 2015.
- Problem: Set up a base run for 2015 calendar year for Hong Kong. Include a second scenario, replacing the annual relative humidity values with the annual values provided on RH.XLS.

# Exercise #8: Entering Different Relative Humidity Values


- Scenario data:
  - Scenario #1
    - Geographic Area: Hong Kong SAR
    - Calendar Years: 2015
    - Season: Annual
    - Scenario Type: BURDEN
    - Output File types: Text (CSV), BCD
    - Output Frequency: daily
    - Pollutants: PM<sub>10</sub>, VOC
  - Scenario #2: Replace annual Relative Humidity Values with values from RH.XLS

# Exercise #8: Changing RH

## RH Annual (Default)

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
81.8	82.3	82.7	82.9	83.0	83.0	82.4	79.5	75.9	73.0	70.9	69.5
1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
68.8	68.8	69.5	70.6	72.8	75.7	78.1	79.5	80.2	80.7	81.2	81.6


Modify Values for Range of Hours  
[ ] to [ ] Constant Value for Range

Apply Cancel Done

## RH Annual from RH.XLS

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