Malé Declaration 3rd emissions inventory workshop
AIT, Bangkok, 28th – 29th February 2007

Session 4 – Major changes made to Malé Workbook since last workshop

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Stockholm Environment Institute (SEI)

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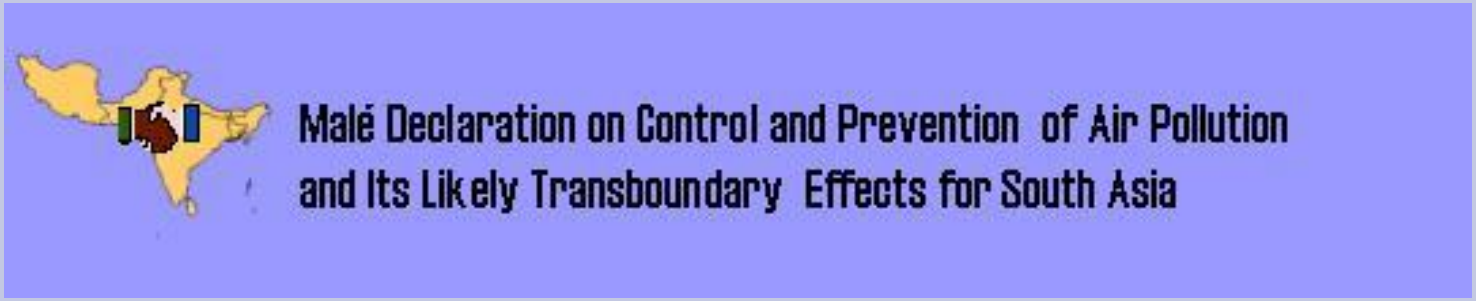

Updates/corrections to APINA workbook:

- **Added cautions re *'cut and paste'* and *'enable macros'* notes at bottom of Main Menu**
- **Updated FAOSTAT database website links**
- **Sheet 2.2: added note on conversion factors to be used for fertilizer *production* if 'as N' production data were used (e.g. from FAOSTAT)**
- **Sheet 9 (Summary sheet): Cell F36 should be ='1.4.2'!AC50/1000 (not Y50/1000)**

MENU OVERVIEW

GO	Menu1	Sectors 1. to 4. Fuel combustion activities
GO	Menu2	Sector 5. Fugitive emissions (non-combustion) for fuels
GO	Menu3	Sector 3. Fuel combustion activities. Sector: Transport (Detailed method)
GO	Menu4	Sector 6. Industrial processes (non-combustion) emissions
GO	Menu5	Sector 7. Solvent and other product use
GO	Menu6	Sector 8. Agriculture
GO	Menu7	Sector 9. Vegetation fires and Forestry.
GO	Menu8	Sector 10. Waste
GO	Menu9	Large Point sources
GO	Sheet 9	Summary sheet - Annual emissions of each pollutant by source sector
GO	References	

CAUTION: If you enter data into the wrong cell(s), do not use 'cut and paste' within the worksheets to shift data into correct cells as you will destroy the cell references for the linked green calculation cells.
So if you enter data into the wrong cell(s), you may 'copy and paste' into the correct cell(s) and then go back and delete the wrong data entries,
or simply type data into the correct cells and then delete the wrong data entries.

If the green 'GO' buttons do not work, it means your security level is set too high.
Click on Tools, Macro, Security and select 'Medium' as level of security.

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Sheet: 2.2 Process (non-combustion) emissions from the production of chemicals.

Sector: Industrial processes BACK TO MENU

Sub-sector: Chemical industry (ISIC[1] Division 24)

Chemical	A Activity rate (tonnes/yr)	B SO_2 emission factor (kg SO_2/t)		C SO_2 emissions (Tonnes)	D NO_x emission factor (kg NO_x/t)		E NO_x emissions (Tonnes)
			Default	(A x B)/1000		Default	(A x D)/1000
Ammonia			0.03 [a]	0			
Nitric acid						12[c]	0
Adipic acid						8.1[a]	0
Carbon black			3.1[e]	0		0.4[e]	0
Urea (uncontrolled)							
(wet scrubber controlled)							
Ammonium nitrate							
Ammonium phosphate			0.04[h]	0			
Sulphuric acid			Note[i]	0			
Titanium dioxide			14.6[e]	0			
Other (please specify)				0			0
Total emissions				0			0

FAOSTAT (http://faostat.fao.org/site/422/default.aspx):- **Select 'production-tonnes' in the subject box on this FAOSTAT webpage**. Then, in the commodity box, select the fertilizer type (Ammonia, Ammonium nitrate, Ammonium phosphate (N), Urea) **. These "as nutrient N" values must then be converted into actual tonnes total product by multiplying by: 1.214 (for ammonia), 5.714 (ammonium nitrate), 3.550 (ammonium phosphate), 2.145 (for urea).**

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Malé Emissions Inventory Workbook Template - Version 2.4

BACK TO MENU

Prepared by:	Stockholm Environment Institute at York (SEI-Y), UNEP RRC-AP and SACEP
Date Last Modified:	17/01/2008

Inventory year:	2000
Region:	South Asia
Country:	Someland
Province:	Somestate (optional)

Sheet 9 Summary sheet - Annual emissions of each pollutant by source sector

Sector	Sub-sector	Total emissions (kilotonnes pollutant per year (kt/yr))						
		SO_2	NO_x	CO	NMVOC	NH_3	PM_{10}	$PM_{2.5}$
4. Combustion in Other Sectors	Commercial/Institutional	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Agriculture/Forestry/Fishing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Non-specified "Other sectors"	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Fugitive emissions from fuels	Production of coke				0.00	0.00	0.00	0.00
	Oil exploration and crude oil production and transport							
	Oil refining	0.00	0.00	0.00				
	Distribution and handling of gasoline							
	Production and distribution of natural gas.							
	Flaring during oil and gas extraction		0.00	0.00	0.00			
6. Industrial processes	Mineral products	0.00		0.00	0.00		0.00	0.00
	Chemicals	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Metals	0.00	0.00	0.00	0.00		0.00	0.00
	Pulp and paper	0.00	0.00	0.00	0.00		0.00	0.00
	Food and drink				0.00		0.00	0.00
	Major construction site activities (Fugitive PM only)						0.00	0.00
7. Solvent and other product use					0.00			
8. Agriculture	Manure management					0.00		
	Application of N-containing fertilizers		0.00			0.00		
	Burning of agricultural crop residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9. Vegetation fires and Forestry	On-site burning of forests and grasslands	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Waste	Waste incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Human excreta					0.00		
Total anthropogenic		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Formula should be **='1.4.2'!AC50/1000** (not ='1.4.2'!Y50/1000)

Updates/corrections to workbook (continued):

- **Sheets 1.6.1 and 1.6.4:**

  Added PM_{10} EFs for natural gas for industrial, commercial and domestic combustion

  Default PM_{10} and $PM_{2.5}$ emission factors now offered for gasoline and diesel used in road transport and diesel use in trains and navigation;

- Formula for converting natural gas activity data from Nm3 into TJ (as required by workbook) now added in Sheet 1.8.5

- Updated PM emission factors for aviation (Sheets 1.9.1 and 1.9.2)

Sheet: 1.6.1 Particulate matter (PM_{10}) combustion emission factors (kg/tonne fuel)

Sector: Energy - Fuel combustion a BACK TO MENU

	Sub-sector:	**Energy industries**													
	Sub-sub-sector:	Public Electricity and Heat Production		Petroleum refining		Manufacture of Solid Fuels and Other Energy									
						Coke ovens		Patent fuel, BKB		Gas works		Charcoal production		Other own use	
Fuel type		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]	
Gas	Gas Works Gas														
	Natural Gas	0.122[k]		0.104											0.104
Oil	Crude Oil														
	Natural Gas Liquids														
	Refinery Gas														
	Liquefied Petroleum Gases														
	Motor Gasoline														
	Aviation Gasoline														
	Gasoline type Jet Fuel														
	Kerosene type Jet Fuel														
	Kerosene														
	Gas/Diesel Oil	0.333[h]													
	Heavy Fuel Oil	0.9[f]													
	Petroleum coke	1.23 x A/100[j]													
	Other Petroleum Products														

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Sheet: 1.6.1 Particulate matter (PM_{10}) combustion emission factors (kg/tonne fuel)

Sector: Energy - Fuel combustion a BACK TO MENU

	Sub-sector:	**Manufacturing Industries and Construction**																			
	Sub-sub-sector:	Iron and Steel		Non-ferrous metals		Non-metallic minerals		Chemicals		Pulp, Paper and print		Mining and Quarrying		Construction		Other (Please specify in sheet 1.1.1a, 1.1.1b or 1.1.1c)		Autoproduction of electricity/heat		Remainder (Non-specified)	
Fuel type			Default[a]		Default[a]		Default[r]		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]		Default[a]
Gas	Gas Works Gas																				
	Natural Gas		0.104		0.104		0.104		0.104		0.104		0.104		0.104		0.104		0.104		0.104
Oil	Crude Oil																				
	Natural Gas Liquids																				
	Refinery Gas																				
	Liquefied Petroleum Gases																				
	Motor Gasoline																				
	Aviation Gasoline																				
	Gasoline type Jet Fuel																				
	Kerosene type Jet Fuel																				
	Kerosene		0.148[m]		0.148[m]		0.148[m] or 0		0.148[m]		0.148[m]		0.148[m]		0.148[m]		0.148[m]		0.148[m]		0.148[m]
	Gas/Diesel Oil		0.142[m]		0.142[m]		0.142[m] or 0		0.142[m]		0.142[m]		0.142[m]		0.142[m]		0.142[m]		0.142[m]		0.142[m]
	Heavy Fuel Oil		1.09[l]		1.09[l]		1.09[l] or 0		1.09[l]		1.09[l]		1.09[l]		1.09[l]		1.09[l]		1.09[l]		1.09[l]
	Petroleum coke		4.23[j]		4.23[j]		4.23[j] or 0		4.23[j]		4.23[j]		4.23[j]		4.23[j]		4.23[j]		4.23[j]		4.23[j]
	Other Petroleum Products																				

Sheet: 1.6.1 Particulate matter (PM_{10}) combustion emission factors (kg/tonne fuel)

Sector: Energy - Fuel combustion a BACK TO MENU

	Sub-sector:	Transport											Combustion in Other sectors			
	Sub-sub-sector:	Civil Aviation		Road transport		Railways		Navigation		Pipeline transport		Non-specified transport	Commercial/ Institutional		Residential	
Fuel type			Default[a]		Default[a]		Default[a]		Default[a]		Default[a]			Default[a]		Default[a]
Gas	Gas Works Gas															
	Natural Gas													0.104		0.104
Oil	Crude Oil															
	Natural Gas Liquids															
	Refinery Gas															
	Liquefied Petroleum Gases															0.51[g]
	Motor Gasoline				0.77[p]											
	Aviation Gasoline															
	Gasoline type Jet Fuel															
	Kerosene type Jet Fuel															
	Kerosene													0.16[n]		0.61[d]
	Gas/Diesel Oil				3.9[q]		5.14[t]		4.12[t]					0.15[n]		
	Heavy Fuel Oil													0.792		
	Petroleum coke													4.23[j]		
	Other Petroleum Products															

Updates/corrections to workbook (continued):

- **Sheets 1.6.1 and 1.6.4:**

  Added PM_{10} EFs for natural gas for industrial, commercial and domestic combustion

  Default PM_{10} and $PM_{2.5}$ emission factors now offered for gasoline and diesel used in road transport and diesel use in trains and navigation;

- Formula for converting natural gas activity data from Nm3 into TJ (as required by workbook) now added in Sheet 1.8.5

- Updated PM emission factors for aviation (Sheets 1.9.1 and 1.9.2)

Sheet: 1.6.1 Particulate matter (PM_{10}) combustion emission factors (kg/tonne fuel)

Sector: Energy - Fuel combustion activities

BACK TO MENU

	Sub-sector:	Transport								
	Sub-sub-sector:	Civil Aviation		Road transport		Railways		Navigation		
Fuel type			Default[a]		Default[a]		Default[a]		Default[a]	
Coal	Coking Coal									
	Other Bituminous Coal & Anthracite									
	Sub-Bituminous Coal									
	Lignite									
	Patent Fuel									
	Coke Oven Coke									
	Gas Coke									
	BKB									
	Coke Oven Gas									
	Blast Furnace Gas									
Gas	Gas Works Gas									
	Natural Gas									
Oil	Crude Oil									
	Natural Gas Liquids									
	Refinery Gas									
	Liquefied Petroleum Gases									
	Motor Gasoline				0.77 [p]					
	Aviation Gasoline									
	Gasoline type Jet Fuel									
	Kerosene type Jet Fuel									
	Kerosene									
	Gas/Diesel Oil				3.9 [q]		5.14 [t]		4.12 [t]	
	Heavy Fuel Oil									

Default EFs added

Sheet: 1.6.4 Particulate matter ($PM_{2.5}$) combustion emission factors (kg/tonne fuel).

Sector: Energy - Fuel combustion activities

BACK TO MENU

Fuel type	Sub-sector: / Sub-sub-sector:	Transport									
		Civil Aviation		Road transport		Railways		Navigation		Pipeline transport	
			Default[a]		Default[a]		Default[a]		Default[a]		Defa
Coal	Coking Coal										
	Other Bituminous Coal & Anthracite										
	Sub-Bituminous Coal										
	Lignite										
	Patent Fuel										
	Coke Oven Coke										
	Gas Coke										
	BKB										
	Coke Oven Gas										
	Blast Furnace Gas										
Gas	Gas Works Gas										
	Natural Gas										
Oil	Crude Oil										
	Natural Gas Liquids										
	Refinery Gas										
	Liquefied Petroleum Gases										
	Motor Gasoline				0.77 [r]						
	Aviation Gasoline										
	Gasoline type Jet Fuel										
	Kerosene type Jet Fuel										
	Kerosene										
	Gas/Diesel Oil				3.9 [s]		4.83 [t]		3.87 [t]		
	Residual Fuel Oil										

Updates/corrections to workbook (continued):

- Sheets 1.6.1 and 1.6.4:

  Added PM_{10} EFs for natural gas for industrial, commercial and domestic combustion

  Default PM_{10} and $PM_{2.5}$ emission factors now offered for gasoline and diesel used in road transport and diesel use in trains and navigation;

- **Formula for converting natural gas activity data from Nm3 into TJ (as required by workbook) now added in Sheet 1.8.5**

- Updated PM_{10} and $PM_{2.5}$ emission factors for aviation (Sheets 1.9.1 and 1.9.2)

Sheet: 1.8.5 Fugitive (non-combustion) emissions of NMVOC from production and distribution of natural gas.

Sector: Fugitive emissions from fuels

BACK TO MENU

Sub-sector: Oil and Natural gas

Sub-sub-sector: Natural gas

Activity	A Activity rate [a] (TJ gas/year)	B NMVOC emission factor (kg/TJ gas)		C Emissions (Tonnes)
			Default[b]	(A x B)/1000
Production			9	0.00
Distribution			109	0.00
Total				0

[a] If activity data are in Nm3 gas, use conversion rate of 1000 Nm3 natural gas = 0.03911 TJ

If activity data are in Nm³ gas, use conversion rate of 1000 Nm³ natural gas = 0.03911 TJ

[Where N means 'Normal' temperature and pressure]

Updates/corrections to workbook (continued):

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Sheet 1.9.1 Emissions for LTO[a] and cruise activities of domestic aircraft.

Old version

Sector: Transport (Detailed method)

Sub-sector: Civil aviation (Domestic)

BACK TO MENU

Domestic flights: aircraft type (* =old fleet)	A Total number of LTOs per aircraft type per year	V PM_{10} emission factor per LTO (kg/LTO)		W PM_{10} emission factor for cruise activities (kg/Tonnes)		X PM_{10} emissions (Tonnes)	Y $PM_{2.5}$ emission factor for LTO (kg/LTO)		Z $PM_{2.5}$ emission factor for cruise activities (kg/Tonnes)		AA $PM_{2.5}$ emissions (Tonnes)
			Default[d]		Default[j]	X = (A x V/1000) + (F x W/1000)		Default [e]		Default[i]	AA = (A x Y/1000) + (F x Z/1000)
Airbus A310			0.52		0.01	0.00		0.48		0.01	0.00
Airbus A320			0.52		0.01	0.00		0.48		0.01	0.00
Airbus A330			0.52		0.01	0.00		0.48		0.01	0.00
Airbus A340			0.52		0.01	0.00		0.48		0.01	0.00
BAe 111			0.52		0.01	0.00		0.48		0.01	0.00
BAe 146			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 727*			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 737-100			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 737-400			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 747 100-300			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 747-400			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 757			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 767 300 ER			0.52		0.01	0.00		0.48		0.01	0.00
Boeing 777			0.52		0.01	0.00		0.48		0.01	0.00
McDonnel Douglas DC-8*			0.52		0.01	0.00		0.48		0.01	0.00
McDonnel Douglas DC-9*			0.52		0.01	0.00		0.48		0.01	0.00
McDonnel Douglas DC-10			0.52		0.01	0.00		0.48		0.01	0.00
McDonnel Douglas M81-88			0.52		0.01	0.00		0.48		0.01	0.00
Fokker 28			0.52		0.01	0.00		0.48		0.01	0.00
Fokker 100			0.52		0.01	0.00		0.48		0.01	0.00
Type unknown (old fleet[h])			0.52		0.01	0.00		0.48		0.01	0.00
Type unknown (average fleet[g])			0.52		0.01	0.00		0.48		0.01	0.00
Other (Please specify)			0.52		0.01	0.00		0.48		0.01	0.00
Total	0					0.00					0.00

Sheet 1.9.1 Emissions for LTO[a] and cruise activities of domestic aircraft.

Sector: Transport (Detailed method)

Sub-sector: Civil aviation (Domestic)

BACK TO MENU

New version

Domestic flights: aircraft type (* =old fleet)	A	V		W		X	Y		Z		AA
	Total number of LTOs per aircraft type per year	PM_{10} emission factor per LTO (kg/LTO)		PM_{10} emission factor for cruise activities (kg/Tonnes)		PM_{10} emissions (Tonnes)	$PM_{2.5}$ emission factor for LTO (kg/LTO)		$PM_{2.5}$ emission factor for cruise activities (kg/Tonnes)		$PM_{2.5}$ emissions (Tonnes)
			Default[d]		Default[d]	X = (A x V/1000) + (F x W/1000)		Default [e]		Default[e]	AA = (A x Y/1000) + (F x Z/1000)
Airbus A310			0.14		0.2	0.00		0.14		0.2	0.00
Airbus A320			0.09		0.2	0.00		0.09		0.2	0.00
Airbus A330			0.19		0.2	0.00		0.19		0.2	0.00
Airbus A340			0.21		0.2	0.00		0.21		0.2	0.00
BAe 111			0.17		0.2	0.00		0.17		0.2	0.00
BAe 146			0.08		0.2	0.00		0.08		0.2	0.00
Boeing 727*			0.22		0.2	0.00		0.22		0.2	0.00
Boeing 737-100			0.1		0.2	0.00		0.1		0.2	0.00
Boeing 737-400			0.07		0.2	0.00		0.07		0.2	0.00
Boeing 747 100-300			0.47		0.2	0.00		0.47		0.2	0.00
Boeing 747-400			0.32		0.2	0.00		0.32		0.2	0.00
Boeing 757			0.13		0.2	0.00		0.13		0.2	0.00
Boeing 767 300 ER			0.15		0.2	0.00		0.15		0.2	0.00
Boeing 777			0.2		0.2	0.00		0.2		0.2	0.00
McDonnel Douglas DC-8*			0.16		0.2	0.00		0.16		0.2	0.00
McDonnel Douglas DC-9*			0.16		0.2	0.00		0.16		0.2	0.00
McDonnel Douglas DC-10			0.32		0.2	0.00		0.32		0.2	0.00
McDonnel Douglas M81-88			0.12		0.2	0.00		0.12		0.2	0.00
Fokker 28			0.15		0.2	0.00		0.15		0.2	0.00
Fokker 100			0.14		0.2	0.00		0.14		0.2	0.00
Type unknown (old fleet[h])			0.1		0.2	0.00		0.1		0.2	0.00
Type unknown (average fleet[g])			0.07		0.2	0.00		0.07		0.2	0.00
Other (Please specify)					0.2	0.00				0.2	0.00
Total	0					0.00					0.00

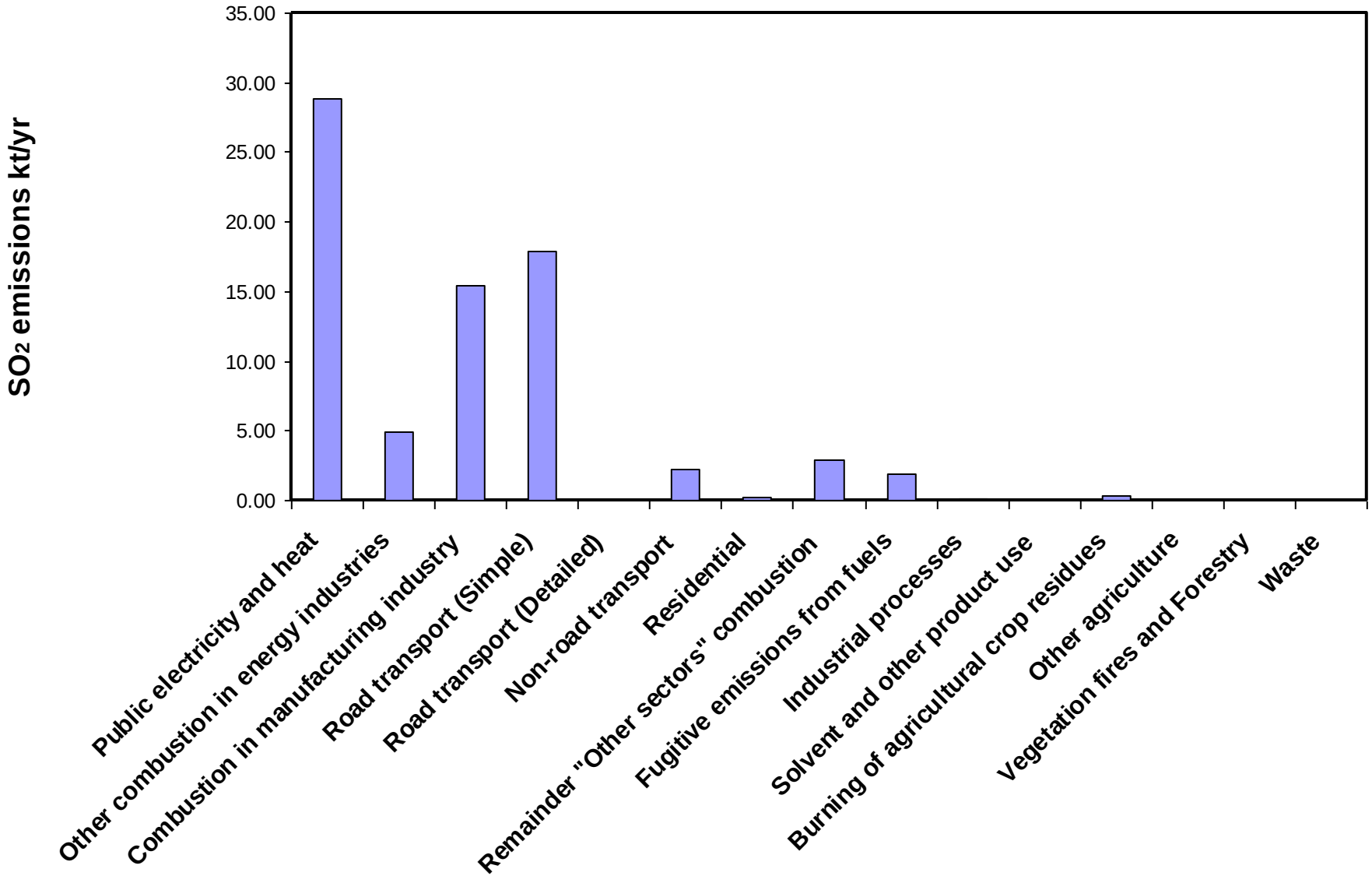
Updates/corrections to workbook (continued):

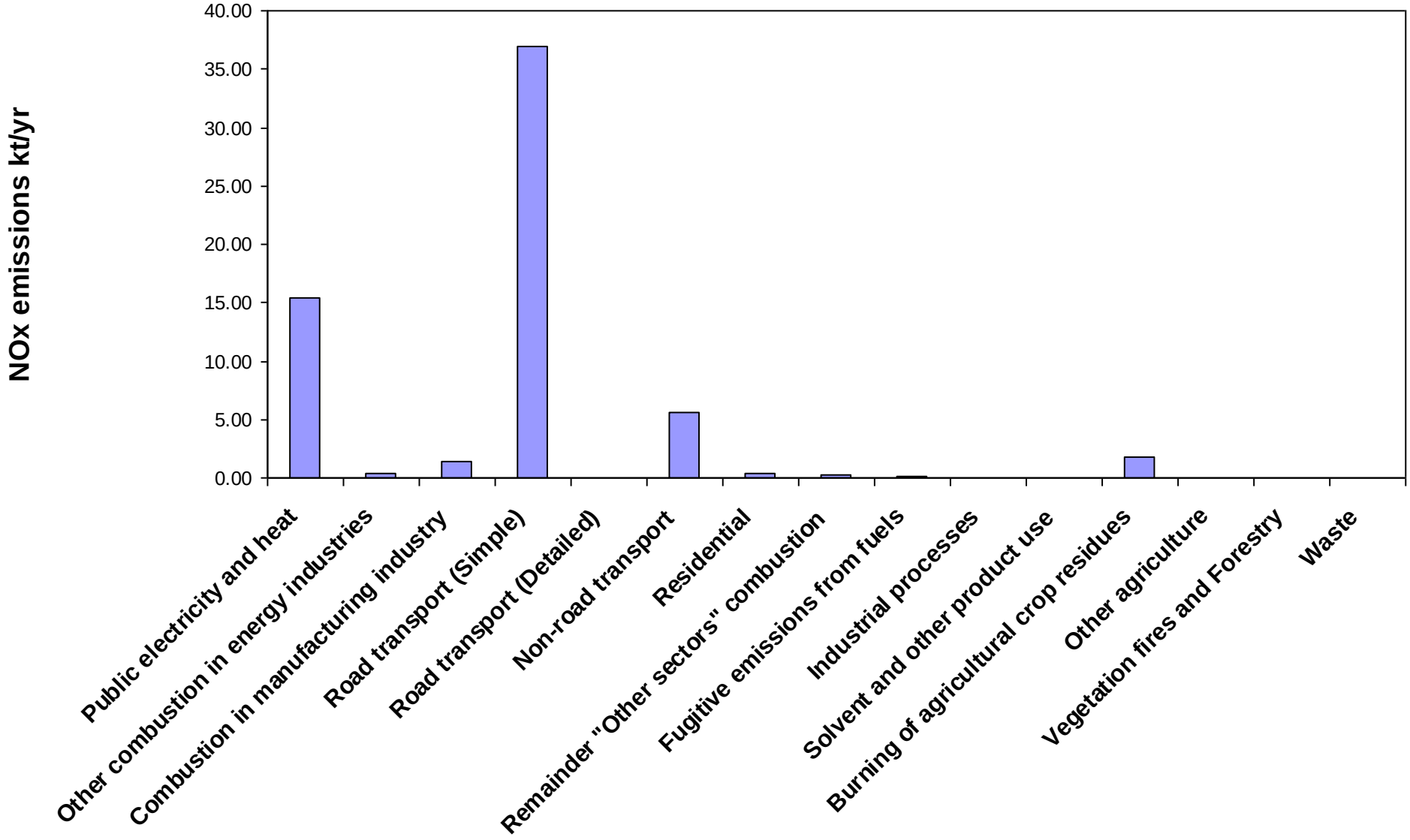
- The new workbook now automatically generates graphs of emissions by pollutant and by major source category

- These can be used in your inventory reports

  (Use *Copy* from workbook then transfer to Word document using *Edit/Paste-special/Picture (Enhanced Metafile*)

- A stand alone version of the graph-generating part of workbook is also available – just *copy* emissions data from your summary table and *paste special (values)* into the input table.


SO2 emissions kt/yr
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Public electricity and heat
Other combustion in energy industries
Combustion in manufacturing industry
Road transport (Simple)
Road transport (Detailed)
Non-road transport
Residential
Remainder "Other sectors" combustion
Fugitive emissions from fuels
Industrial processes
Solvent and other product use
Burning of agricultural crop residues
Other agriculture
Vegetation fires and Forestry
Waste


NOx emissions kt/yr
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Public electricity and heat
Other combustion in energy industries
Combustion in manufacturing industry
Road transport (Simple)
Road transport (Detailed)
Non-road transport
Residential
Remainder "Other sectors" combustion
Fugitive emissions from fuels
Industrial processes
Solvent and other product use
Burning of agricultural crop residues
Other agriculture
Vegetation fires and Forestry
Waste

Action points

- **The new PM emission factors should now be entered into your existing workbook to improve your 2000 inventory** *(copy and paste from the new version 2.4 of Malé Inventory workbook)*
- **When your inventory is updated - transfer your summary data into the stand-alone 'graph' workbook** *(and give a copy to Pwint to put into the IIAS)*
- **You should use the new version (2.4) of the Malé Inventory Workbook for any future inventories** *(e.g. for 2005)*