

EXECUTIVE SUMMARY

The Department of Environment and Climate Change NSW (DECC), in collaboration with Pacific Air & Environment (Bawden et. al., 2006) has completed a three year air emissions inventory project for commercial sources. The base year of the commercial inventory represents activities that took place during the 2003 calendar year and is accompanied by emission projections in yearly increments up to the 2031 calendar year. The area included in the study covers greater Sydney, Newcastle and Wollongong regions, known collectively as the Greater Metropolitan Region (GMR).

The study region defined as the GMR measures 210 km (east-west) by 273 km (north-south). The study region is defined in Table ES1.1 and shown in Figure ES1.1.

Table ES1.1: Definition of Greater Metropolitan, Sydney, Newcastle and Wollongong Regions

Region	South-west corner MGA ¹ co-ordinates		North-east corner MGA ¹ co-ordinates	
	Easting (km)	Northing (km)	Easting (km)	Northing (km)
Greater Metropolitan	210	6159	420	6432
Sydney	261	6201	360	6300
Newcastle	360	6348	408	6372
Wollongong	279	6174	318	6201

¹ MGA = Map Grid of Australia based on the Geocentric Datum of Australia 1994 (GDA94) (ICSM, 2002).

Commercial businesses include ANZSIC classes that do not hold environment protection licences under the NSW POEO Act (Protection of the Environment Operations Act 1997). The commercial emissions inventory includes emissions from 5,056 businesses. A total of 22,951 emission sources have been included in the commercial emissions inventory, consisting of 314 point sources¹ and 22,637 fugitive sources². Table ES1.2 presents the number and type of emission sources included in the commercial emissions inventory for each area considered.

Table ES1.2: Emission Source Summary

Area	Point Sources	Fugitive Sources	Total Sources
Sydney	202	15,876	16,078
Newcastle	29	1,421	1,450
Wollongong	16	871	887
Non-Urban	67	4,469	4,536
GMR	314	22,637	22,951

The pollutants inventoried include criteria pollutants specified in the Air NEPM, air toxics associated with the National Pollutant Inventory and the Air Toxics NEPMs and any other pollutants associated with state specific programs, i.e. Load Based Licensing (Protection of the Environment (General) Regulation 1998 (DEC, 2002 & PCO, 1998)) and Protection of the Environment Operations (Clean Air) Regulation 2002 (PCO, 2005).

¹ Point source means air pollutant emissions, which are released via a stack or vent and are generally controlled (i.e. captured, treated and reduced in mass using control equipment and/or captured and discharged through a vent, chimney, stack, or other equivalent emission point).

² Fugitive source means air pollutant emissions that are not released via a stack or vent and are generally not controlled emissions.

Figure ES1.1 shows the location of all industrial emission sources that are included in the emissions inventory.

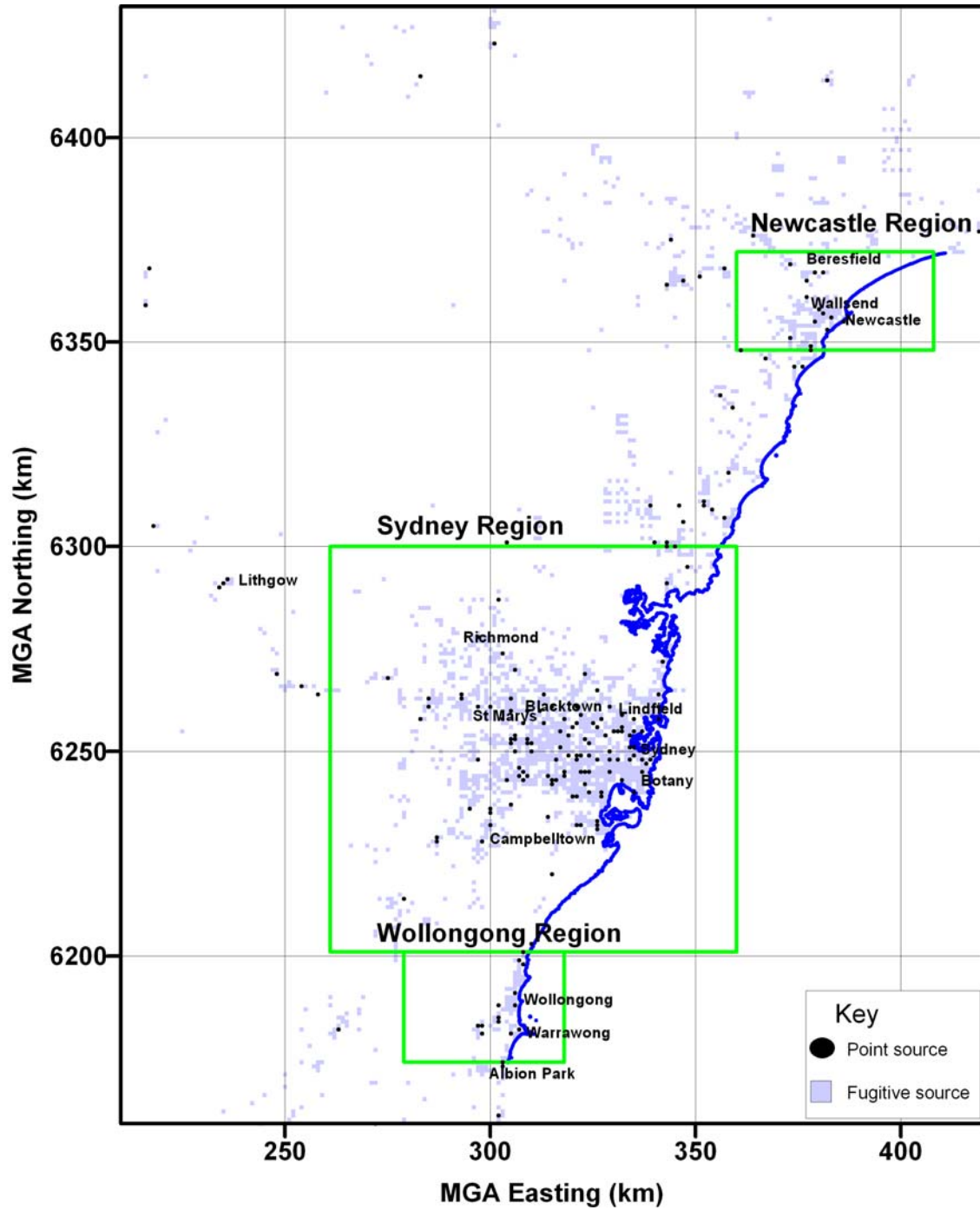


Figure ES1.1: Location of all Commercial Emission Sources

Table ES1.3 shows total estimated emissions (for selected substances) from commercial businesses in the study region (the GMR), Sydney, Newcastle and Wollongong. These substances have been selected since they are:

- ❑ The most common air pollutants found in airsheds according to the National Pollutant Inventory NEPM (NEPC, 2000);
- ❑ Referred to in National Environment Protection Measures (NEPMs) for criteria pollutants (NEPC, 2003) and air toxics (NEPC, 2004); and
- ❑ They have been classified as priority air pollutants (NEPC, 2005).

Total estimated emissions are also presented for the region defined as "Non-Urban". This region is the area of the GMR minus the combined areas of the Sydney, Newcastle and Wollongong regions.

Table ES1.3: Total Estimated Emissions from Commercial Businesses

Substance	Estimated Emissions (tonnes/year)				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR ^a
1,3 BUTADIENE	1.33	0.21	0.06	0.32	1.93
ACETALDEHYDE	0.35	0.00002	0	0.0009	0.35
BENZENE	51.1	3.98	3.26	14.3	72.7
CARBON MONOXIDE	1,260	68.4	103	368	1,800
FORMALDEHYDE	89.2	1.1	1.41	5.2	96.9
ISOMERS OF XYLENE	325	21.5	15.3	73.5	436
LEAD & COMPOUNDS	0.19	0.0008	0.0008	0.004	0.19
OXIDES OF NITROGEN	1,870	134	132	480	2,620
PARTICULATE MATTER 10µm	2,130	173	64.3	1,660	4,030
PARTICULATE MATTER 2.5µm	721	49.1	30.6	469	1,270
PERCHLOROETHYLENE	228	12.5	9.92	35	285
POLYCYCLIC AROMATIC HYDROCARBONS	0.02	0.001	0.0009	0.004	0.03
SULFUR DIOXIDE	48.1	0.86	1.22	21	71.1
TOLUENE	1,250	84.4	60.8	220	1,620
TOTAL SUSPENDED PARTICULATES (TSP)	5,300	394	146	4185	10,000
TOTAL VOCs	9,970	799	624	2,450	13,800
TRICHLOROETHYLENE (TCE)	2.82	0.0001	0	0.02	2.83

^a Totals may not appear additive due to rounding

Table ES1.4 shows the proportion of estimated emissions released in each region considered in the study.

Table ES1.4: Proportion of Estimated Emissions Released in Each Region Considered in the Study

Substance	Proportion of Estimated Emissions				
	Sydney	Newcastle	Wollongong	Non-Urban	GMR ^a
1,3 BUTADIENE	69%	11%	3%	17%	100%
ACETALDEHYDE	100%	0%	0%	0%	100%
BENZENE	70%	5%	4%	20%	100%
CARBON MONOXIDE	70%	4%	6%	20%	100%
FORMALDEHYDE	92%	1%	1%	5%	100%
ISOMERS OF XYLENE	75%	5%	4%	17%	100%
LEAD & COMPOUNDS	97%	0%	0%	2%	100%
OXIDES OF NITROGEN	72%	5%	5%	19%	100%
PARTICULATE MATTER 10µm	53%	4%	2%	41%	100%
PARTICULATE MATTER 2.5µm	57%	4%	2%	37%	100%
PERCHLOROETHYLENE	80%	4%	3%	12%	100%
POLYCYCLIC AROMATIC HYDROCARBONS	81%	3%	3%	13%	100%
SULFUR DIOXIDE	67%	1%	2%	30%	100%
TOLUENE	77%	5%	4%	14%	100%
TOTAL SUSPENDED PARTICULATES (TSP)	53%	4%	1%	42%	100%
TOTAL VOCS	72%	6%	5%	18%	100%
TRICHLOROETHYLENE (TCE)	99%	0%	0%	1%	100%

^a Totals may not appear additive due to rounding

Table ES1.5 shows the average emissions from commercial sources for a summer weekday (January weekday), summer weekend day (January weekend day), winter weekday (July weekday) and winter weekend day (July weekend day).

Table ES1.5: Total Estimated Emissions from Commercial Businesses

Substance	Estimated Emissions (kg/day)			
	Summer weekday	Summer weekend day	Winter weekday	Winter weekend day
1,3 BUTADIENE	7.26	1.03	5.75	0.23
ACETALDEHYDE	0.94	0.94	0.94	0.94
BENZENE	229	149	210	140
CARBON MONOXIDE	4,850	4,820	4,850	4,820
FORMALDEHYDE	296	154	297	155
ISOMERS OF XYLENE	1,320	711	1,360	738
LEAD & COMPOUNDS	0.67	0.13	0.68	0.14
OXIDES OF NITROGEN	7,140	7,000	7,180	7,000
PARTICULATE MATTER 10µm	11,100	9,940	11,200	9,970
PARTICULATE MATTER 2.5µm	3,520	3,060	3,550	3,080
PERCHLOROETHYLENE	884	473	884	473
POLYCYCLIC AROMATIC HYDROCARBONS	0.074	0.073	0.074	0.073
SULFUR DIOXIDE	190	187	180	177
TOLUENE	5,020	2,510	5,090	2,510
TOTAL SUSPENDED PARTICULATES (TSP)	29,500	19,800	29,800	19,900
TOTAL VOCS	44,200	22,700	42,400	21,800
TRICHLOROETHYLENE (TCE)	7.61	7.61	7.61	7.61

Figure ES1.2 shows the total emissions of each criteria pollutant (NO_x (oxides of nitrogen), Total VOCs (volatile organic compounds), PM₁₀ (particulate matter with an aerodynamic diameter of less than 10 µm), CO (carbon monoxide), SO₂ (sulfur dioxide)) and the proportion of total emissions in the GMR emitted in each region.

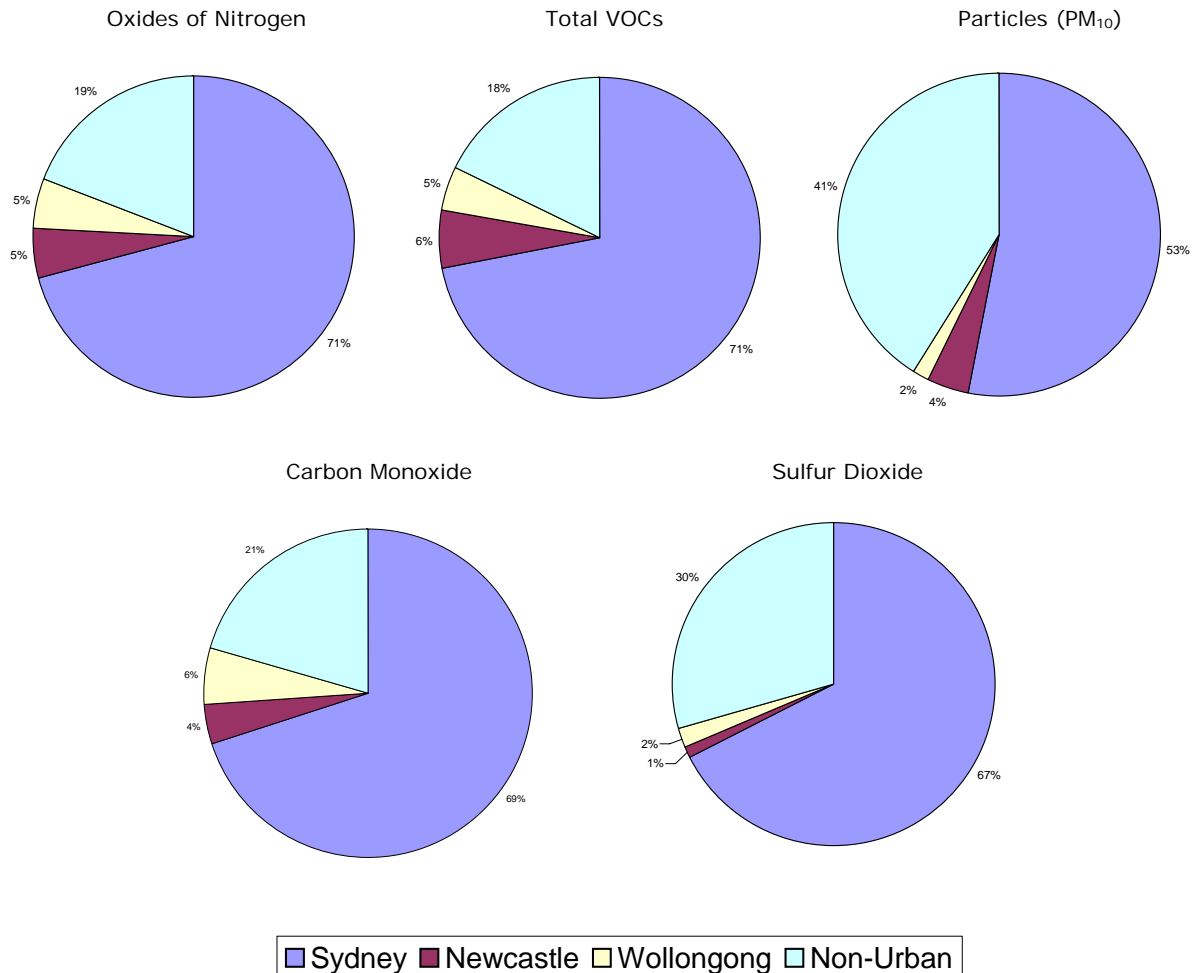
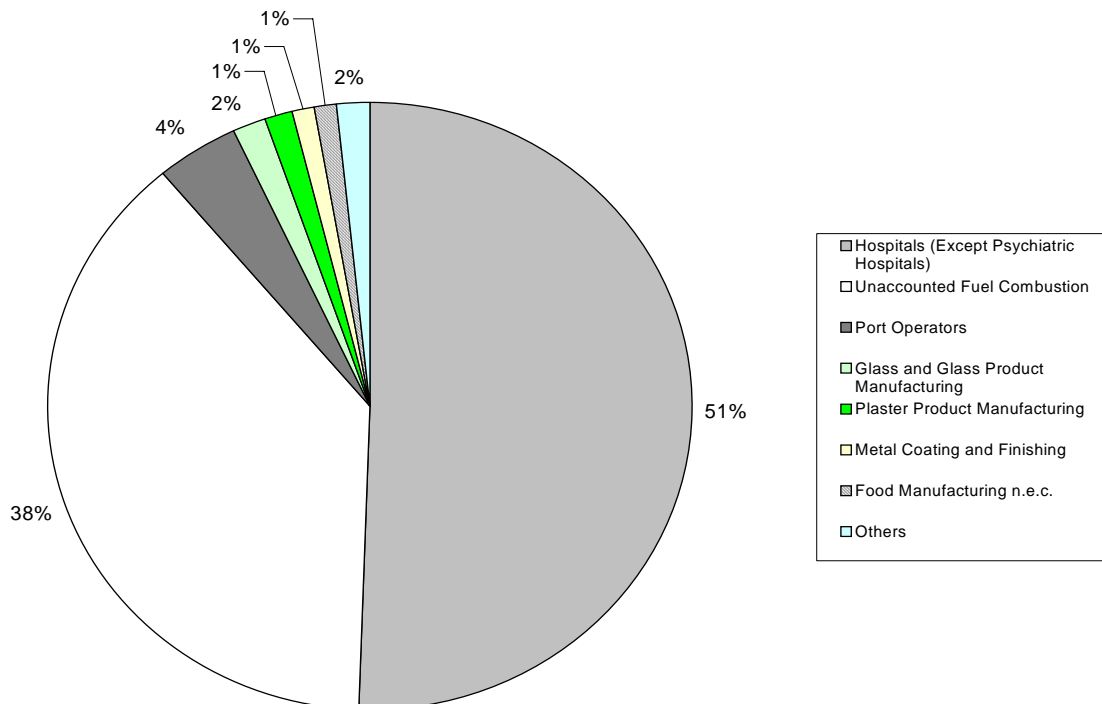


Figure ES1.2: Proportion of Total Commercial Emissions in Each Region

Total commercial emissions for each ANZSIC Class for each criteria pollutant in each region (i.e. the GMR, Sydney, Newcastle and Wollongong) are presented graphically as follows

- ❑ Figure ES1.3 to Figure ES1.7 present commercial emissions by ANZSIC Class for the entire GMR.
- ❑ Figure ES1.8 to Figure ES1.12 present commercial emissions by ANZSIC Class for the Sydney region.
- ❑ Figure ES1.13 to Figure ES1.17 present commercial emissions by ANZSIC Class for the Newcastle region
- ❑ Figure ES1.18 to Figure ES1.22 present commercial emissions by ANZSIC Class for the Wollongong region.



**Figure ES1.3: Commercial Emissions of Oxides of Nitrogen (NO_x) by ANZSIC Class in the GMR
(Total Emissions = 2,620 tonnes/year)**

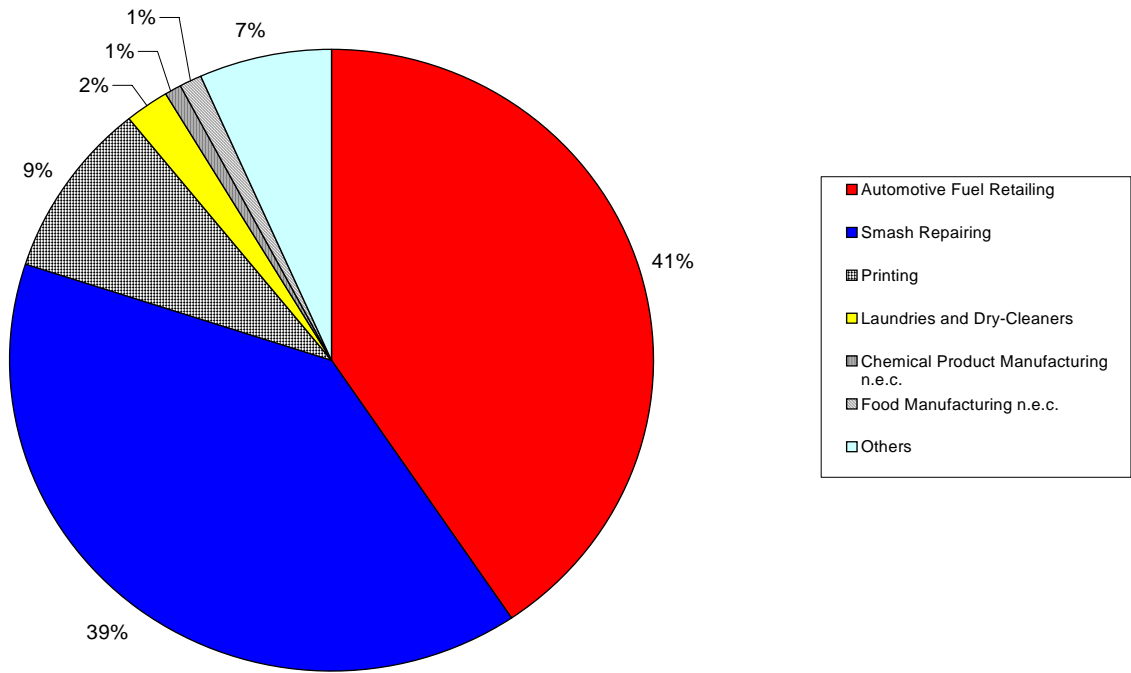


Figure ES1.4: Commercial Emissions of Total VOCs by ANZSIC Class in the GMR
 (Total Emissions = 13,800 tonnes/year)

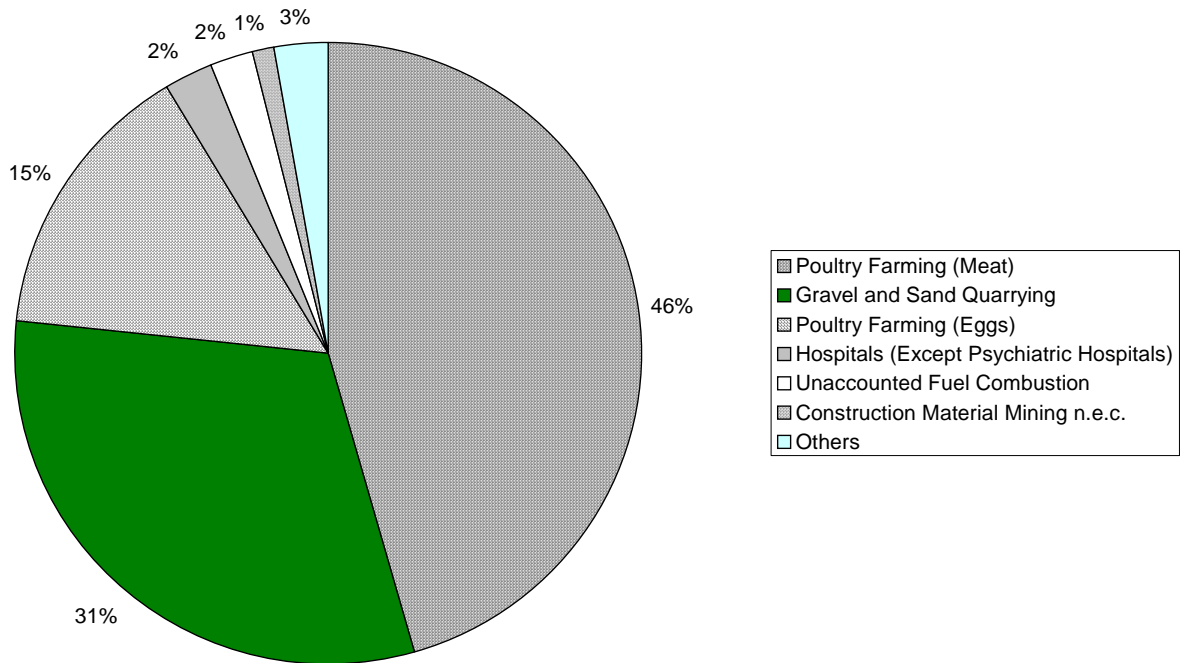
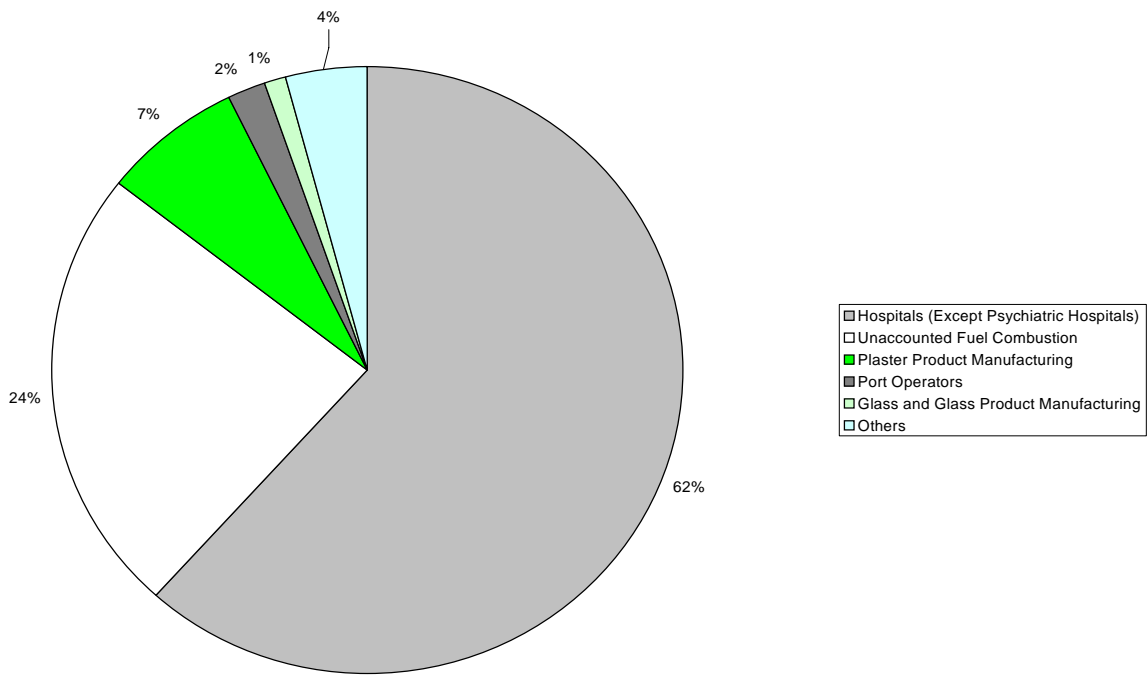
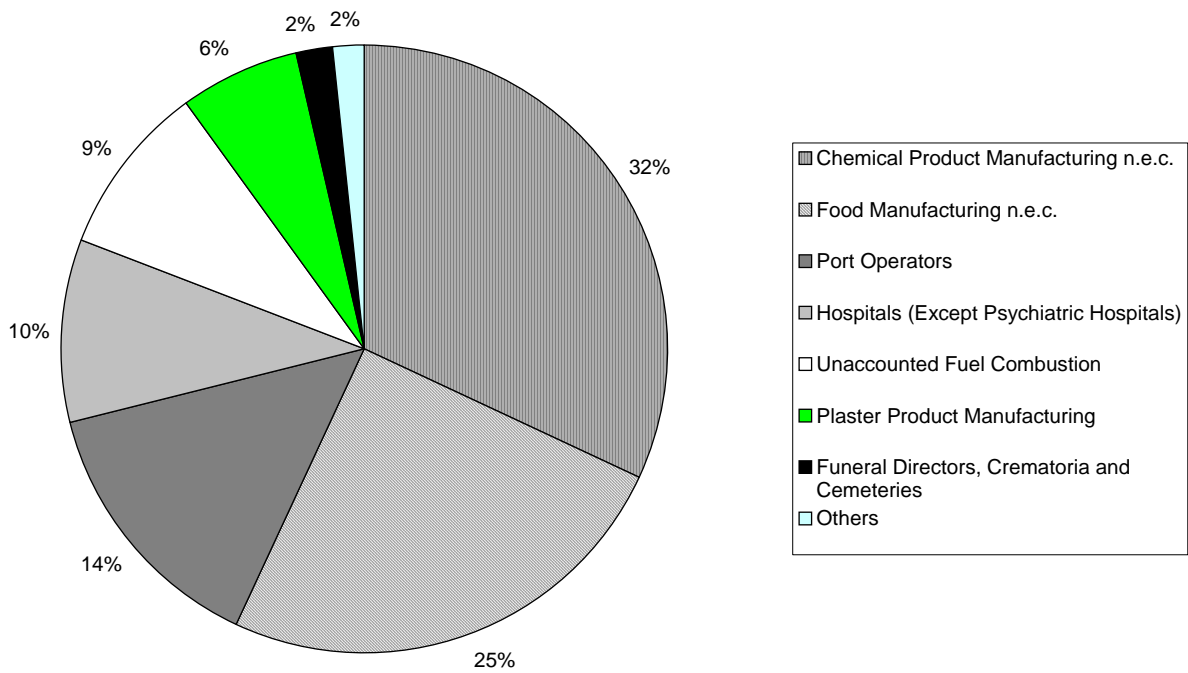


Figure ES1.5: Commercial Emissions of Particles (PM₁₀) by ANZSIC Class in the GMR
 (Total Emissions = 4,030 tonnes/year)



**Figure ES1.6: Commercial Emissions of Carbon Monoxide (CO) by ANZSIC Class in the GMR
 (Total Emissions = 1,800 tonnes/year)**



**Figure ES1.7: Commercial Emissions of Sulfur Dioxide (SO₂) by ANZSIC Class in the GMR
 (Total Emissions = 71 tonnes/year)**

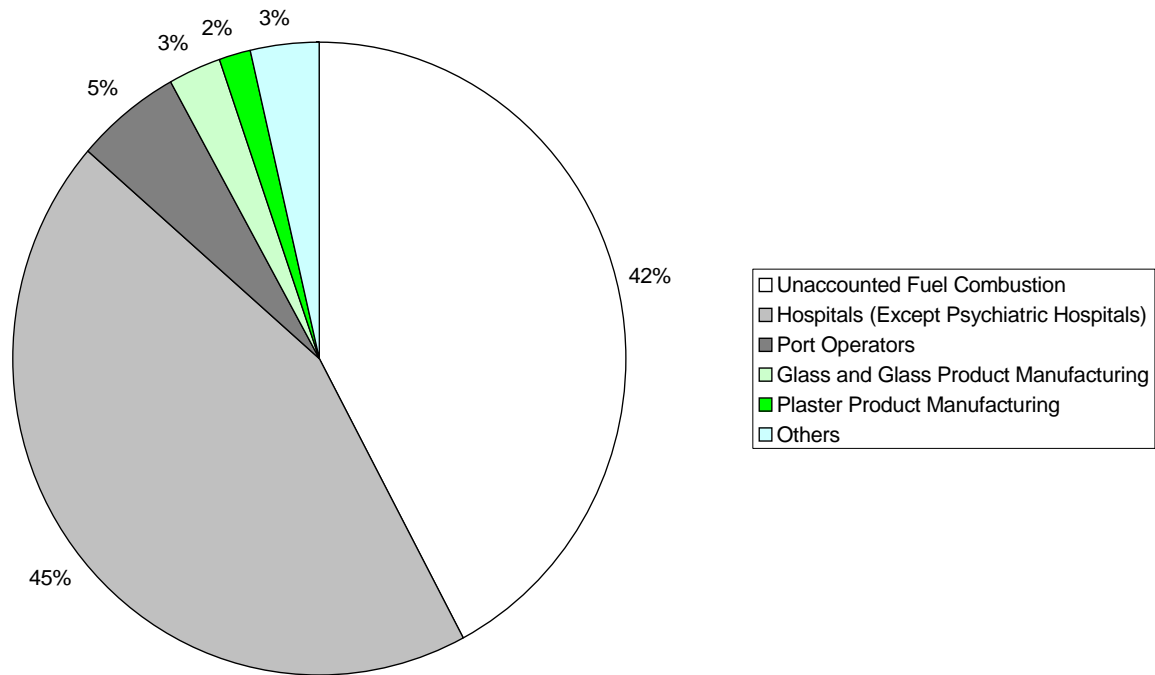


Figure ES1.8: Commercial Emissions of Oxides of Nitrogen (NO_x) by ANZSIC Class in Sydney (Total Emissions = 1,870 tonnes/year)

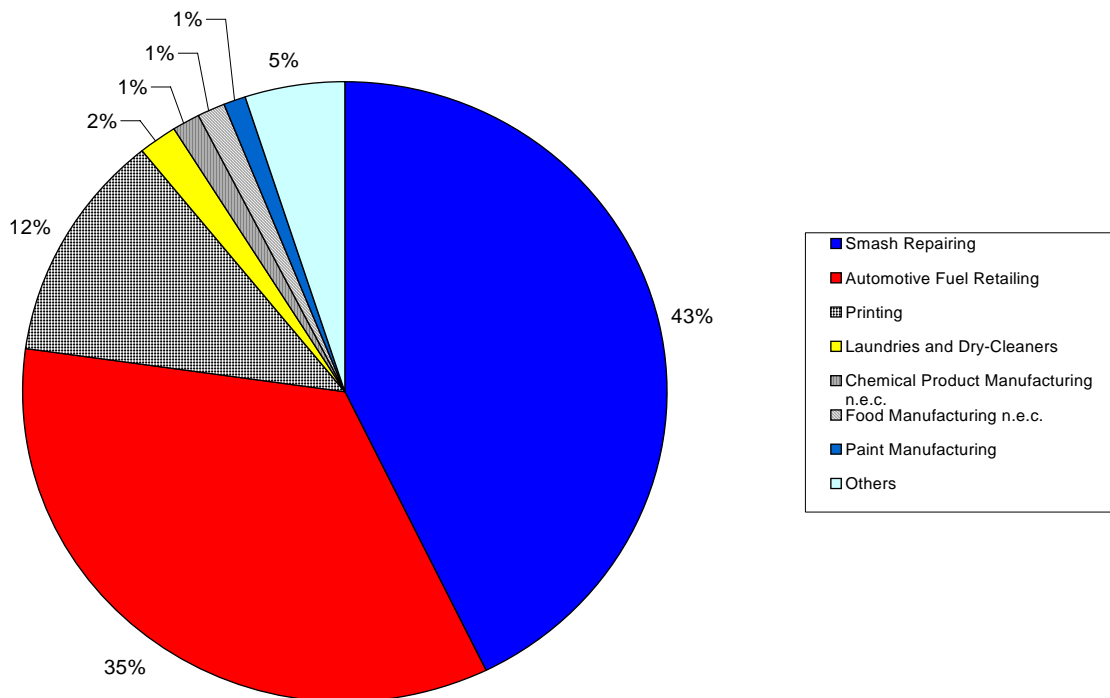


Figure ES1.9: Commercial Emissions of Total VOCs by ANZSIC Class in Sydney (Total Emissions = 9,970 tonnes/year)

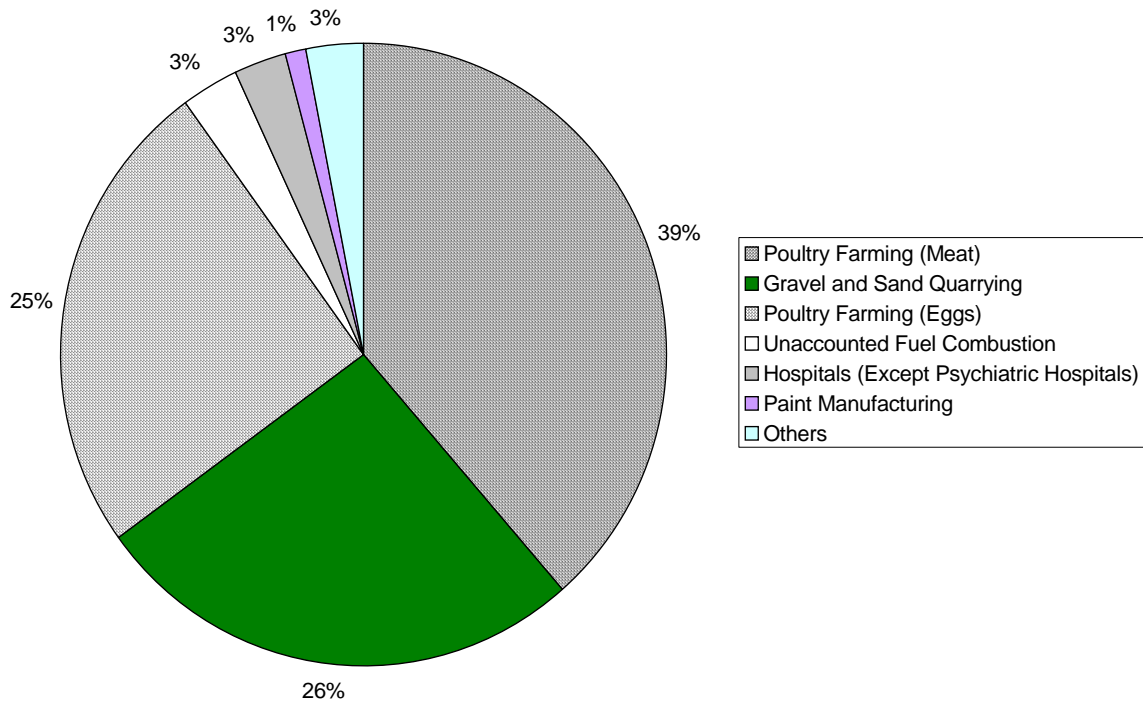


Figure ES1.10: Commercial Emissions of Particles (PM₁₀) by ANZSIC Class in Sydney
 (Total Emissions = 2,130 tonnes/year)

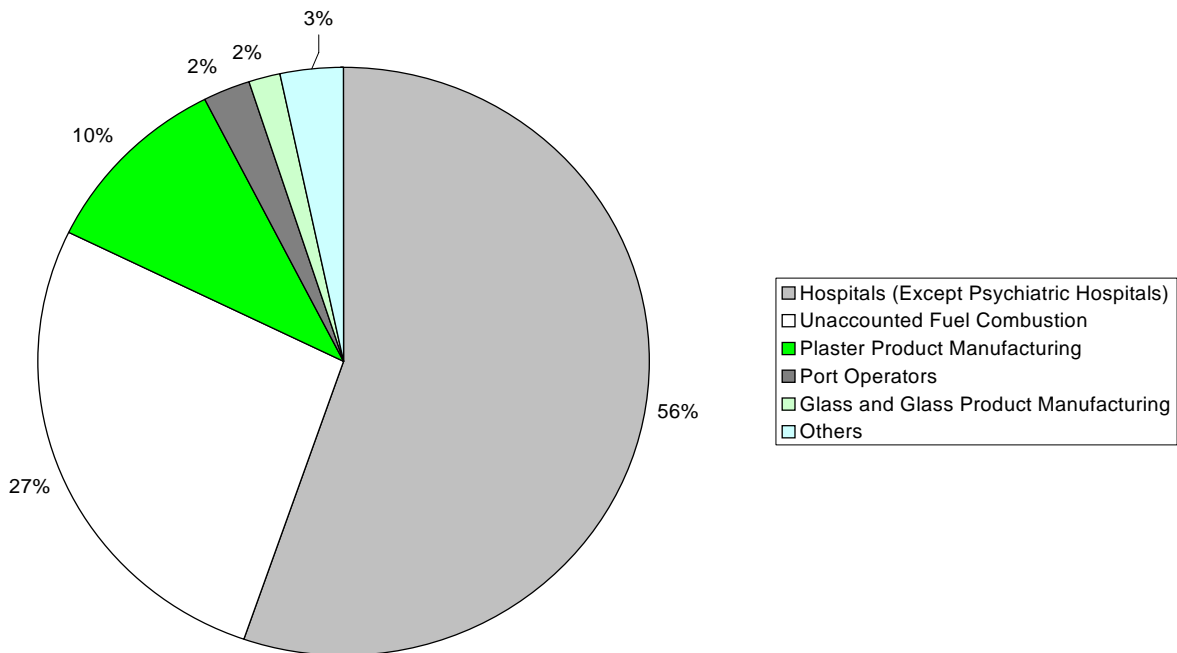


Figure ES1.11: Commercial Emissions of Carbon Monoxide (CO) by ANZSIC Class in Sydney
 (Total Emissions = 1,260 tonnes/year)

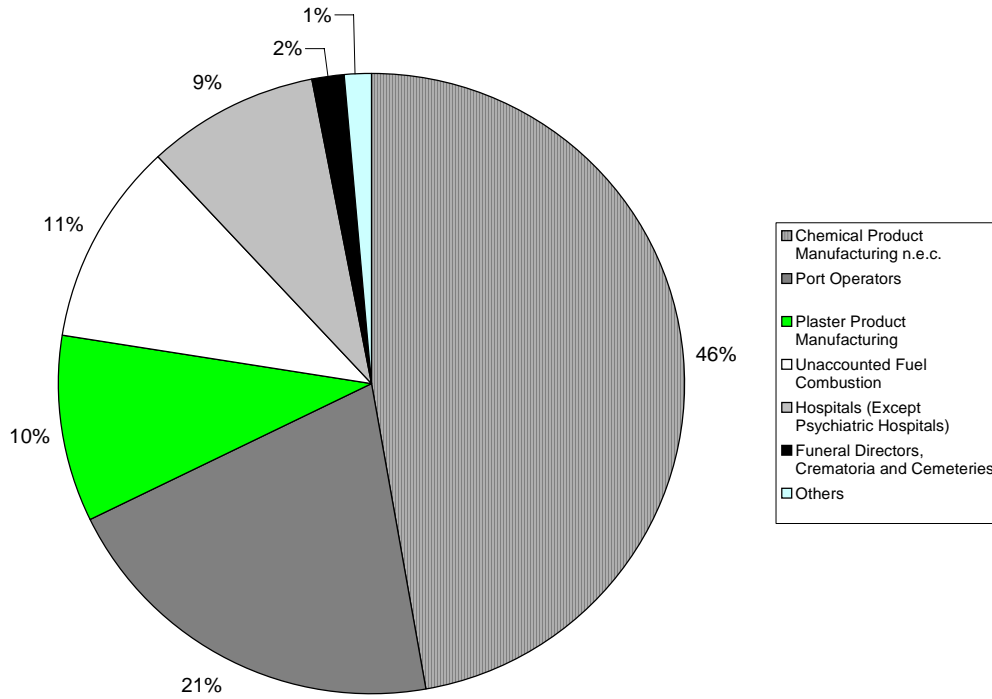


Figure ES1.12: Commercial Emissions of Sulfur Dioxide (SO₂) by ANZSIC Class in Sydney
 (Total Emissions = 48 tonnes/year)

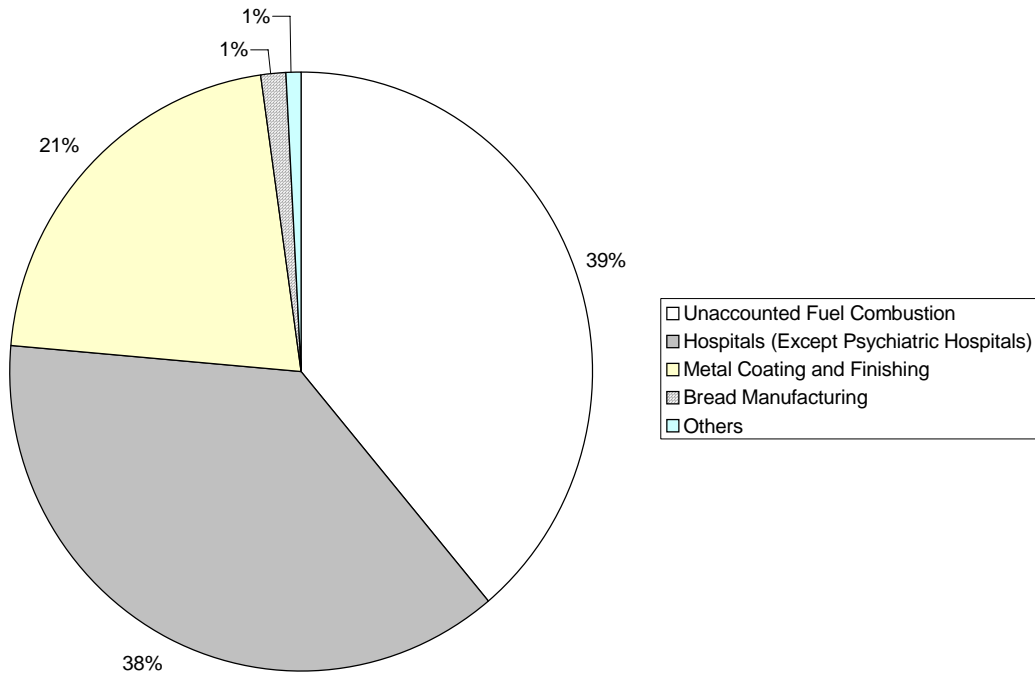


Figure ES1.13: Commercial Emissions of Oxides of Nitrogen (NO_x) by ANZSIC Class in Newcastle
 (Total Emissions = 134 tonnes/year)

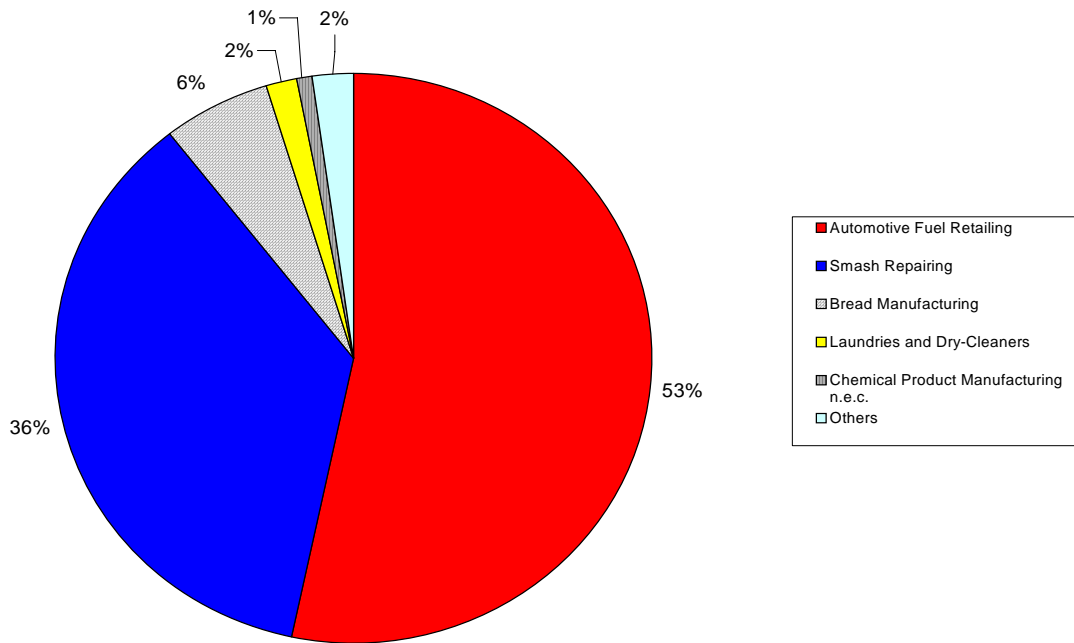


Figure ES1.14: Commercial Emissions of Total VOCs by ANZSIC Class in Newcastle
 (Total Emissions = 799 tonnes/year)

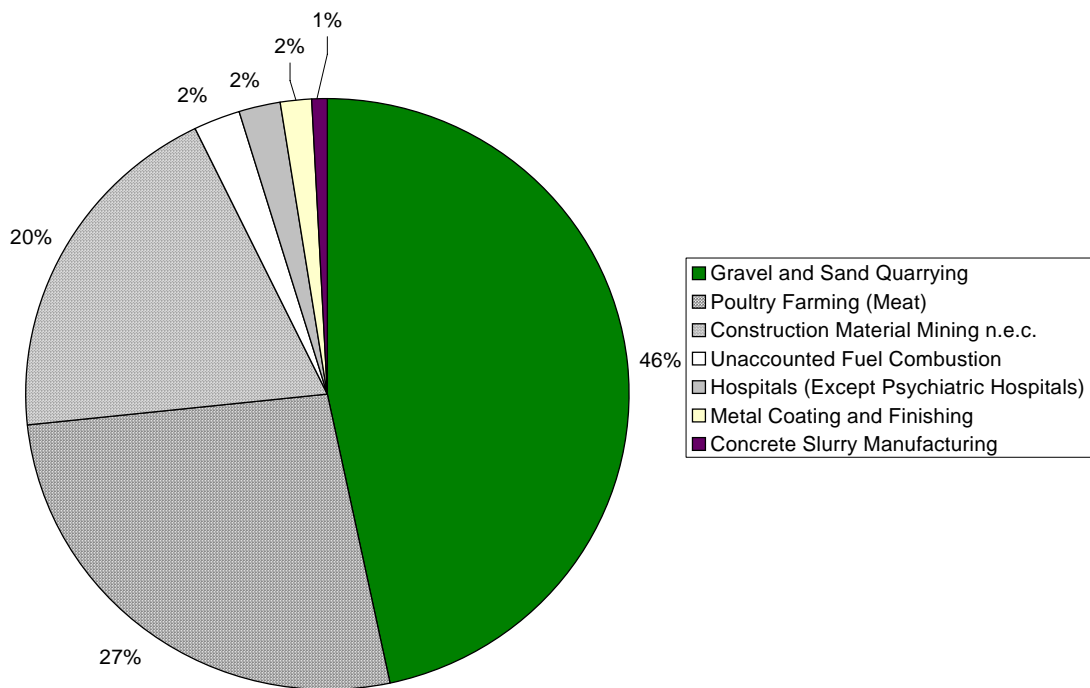


Figure ES1.15: Commercial Emissions of Particles (PM₁₀) by ANZSIC Class in Newcastle
 (Total Emissions = 173 tonnes/year)

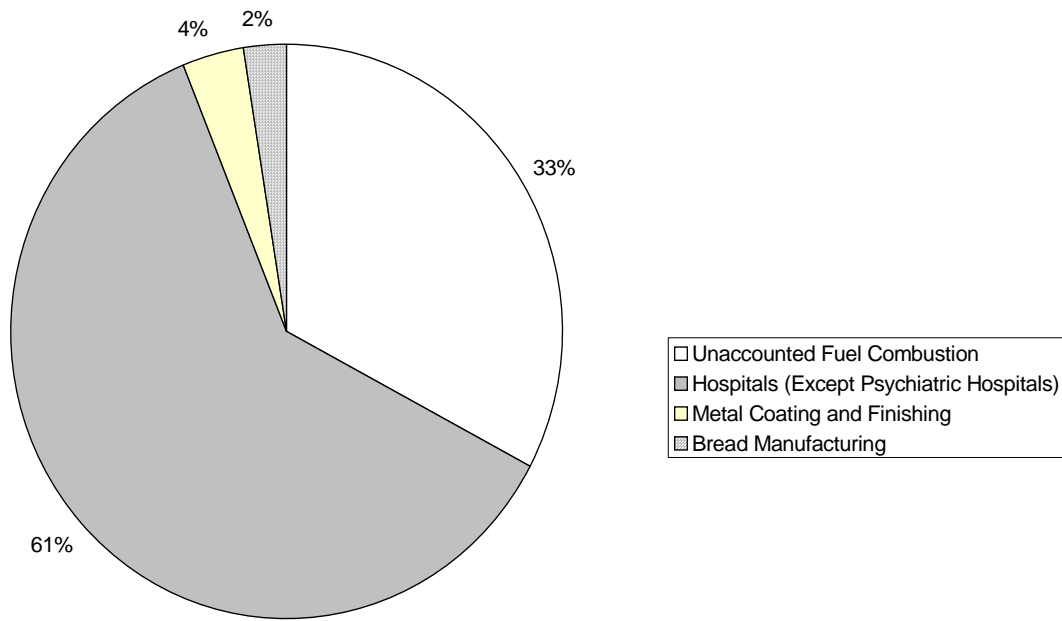


Figure ES1.16: Commercial Emissions of Carbon Monoxide (CO) by ANZSIC Class in Newcastle
 (Total Emissions = 68 tonnes/year)

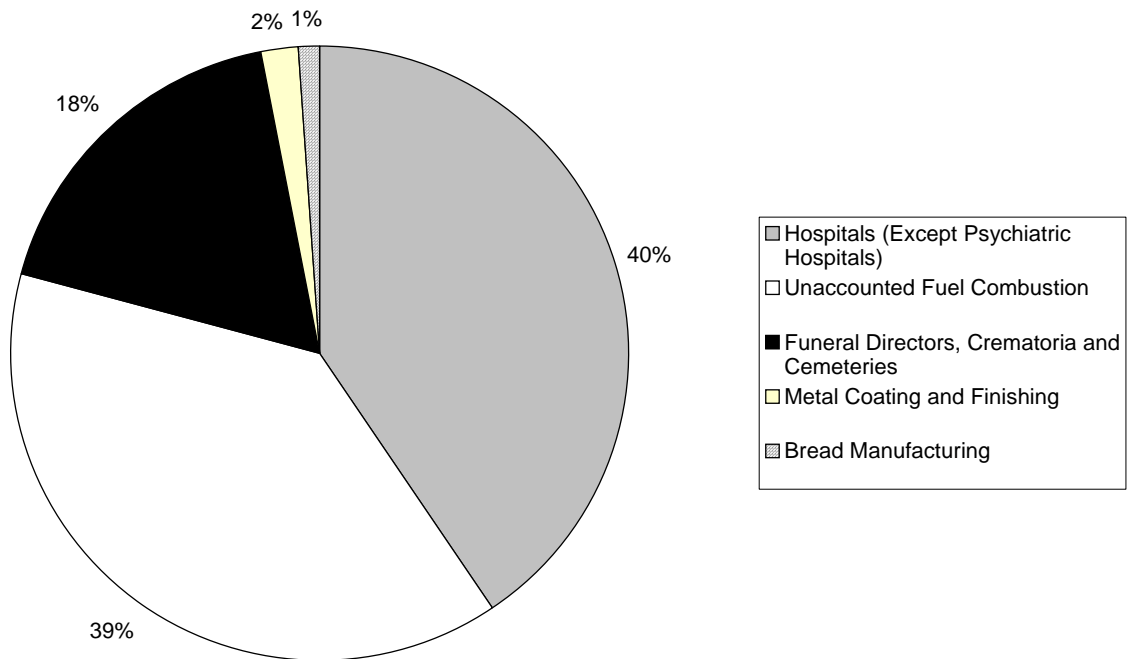


Figure ES1.17: Commercial Emissions of Sulfur Dioxide (SO₂) by ANZSIC Class in Newcastle
 (Total Emissions = 0.9 tonnes/year)

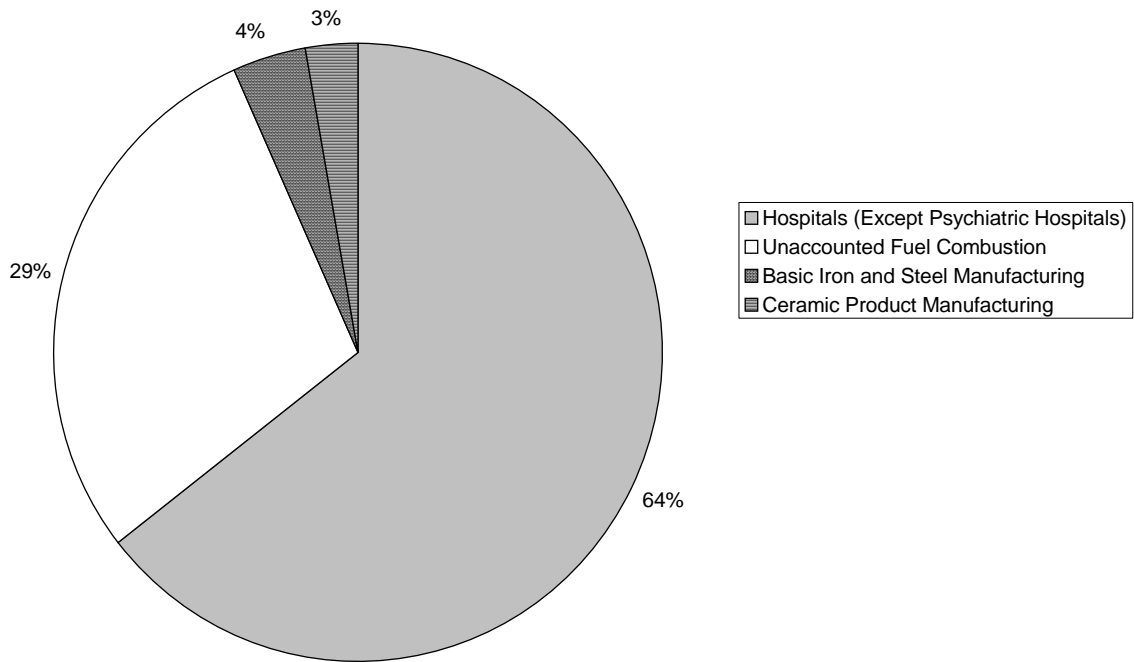


Figure ES1.18: Commercial Emissions of Oxides of Nitrogen (NO_x) by ANZSIC Class in Wollongong
 (Total Emissions = 132 tonnes/year)

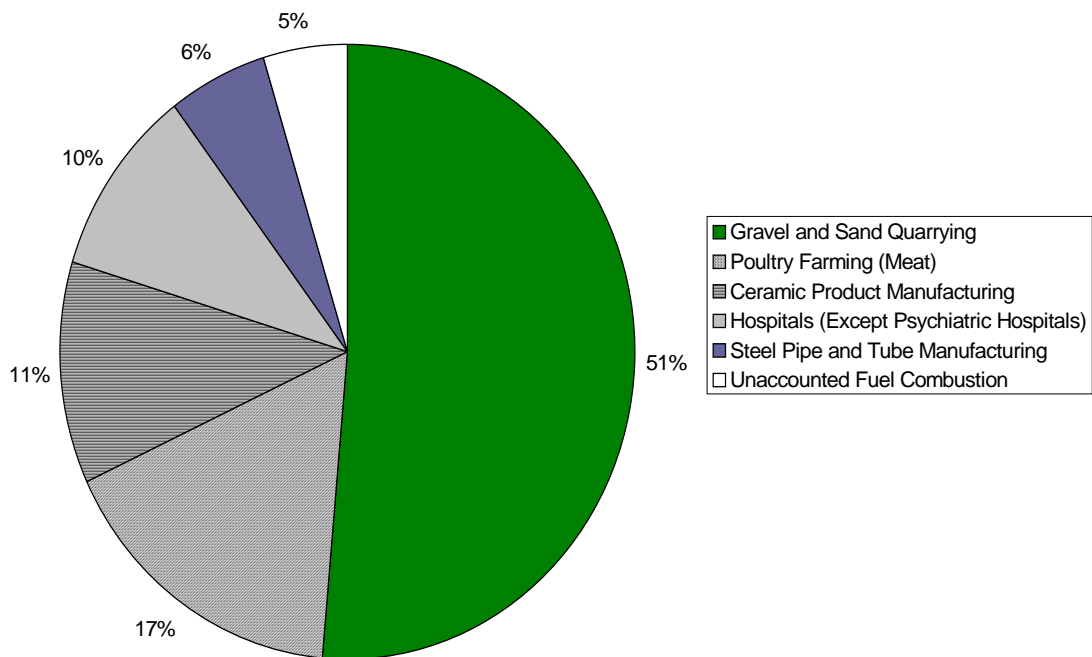


Figure ES1.19: Commercial Emissions of Particles (PM₁₀) by ANZSIC Class in Wollongong
 (Total Emissions = 64 tonnes/year)

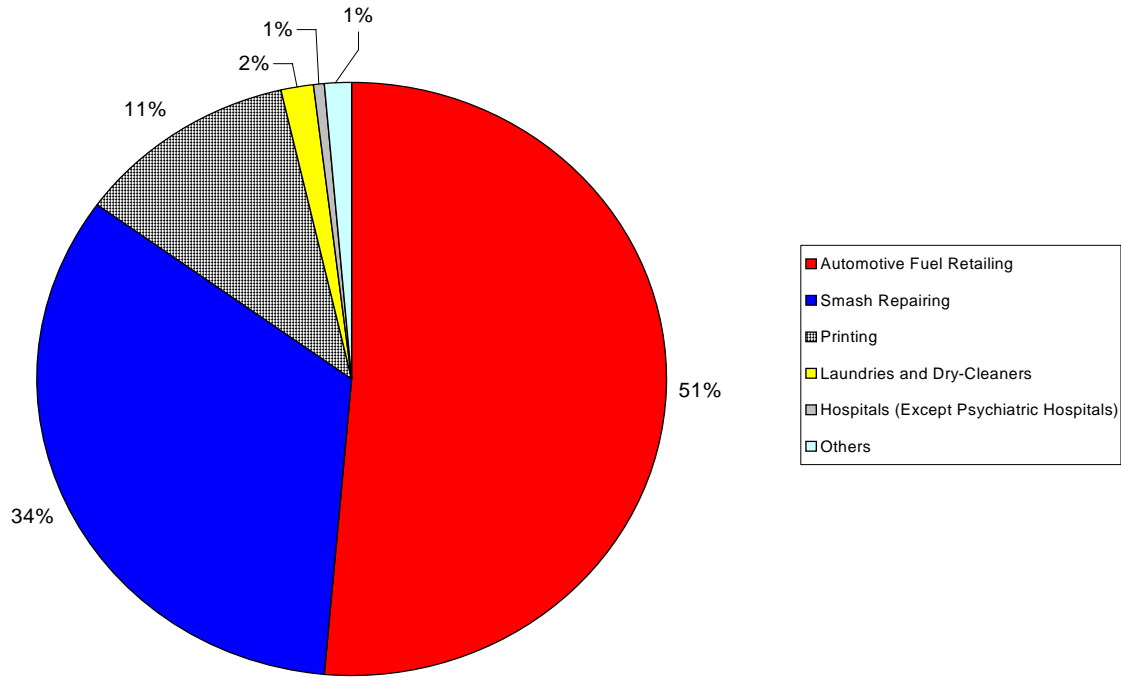


Figure ES1.20: Commercial Emissions of Total VOCs by ANZSIC Class in Wollongong
 (Total Emissions = 624 tonnes/year)

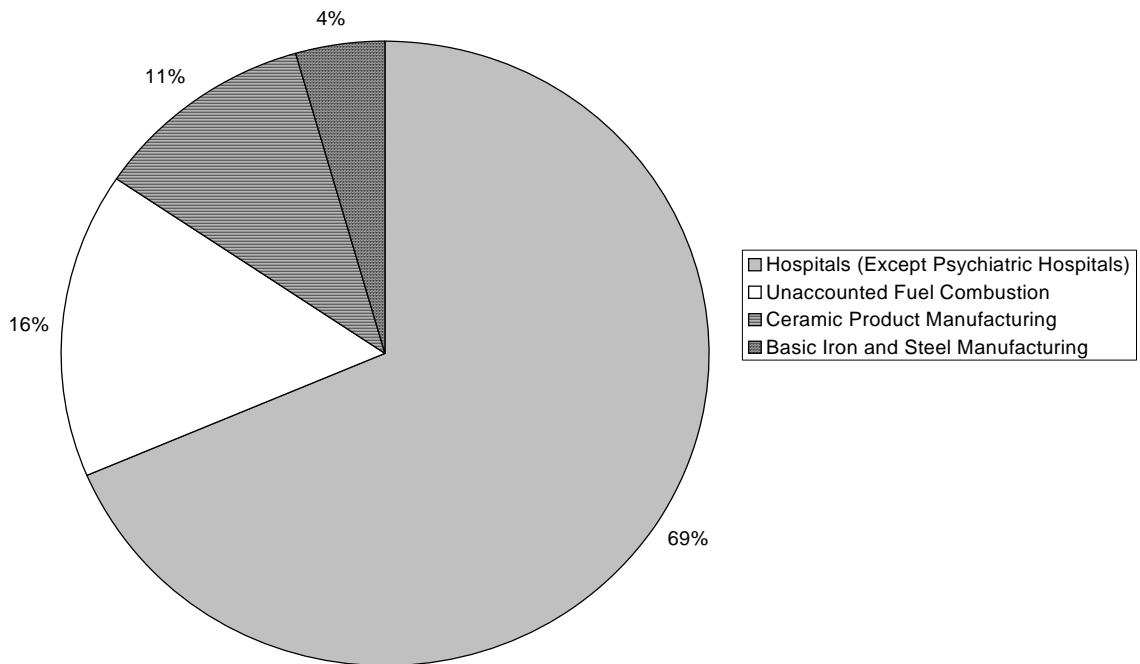
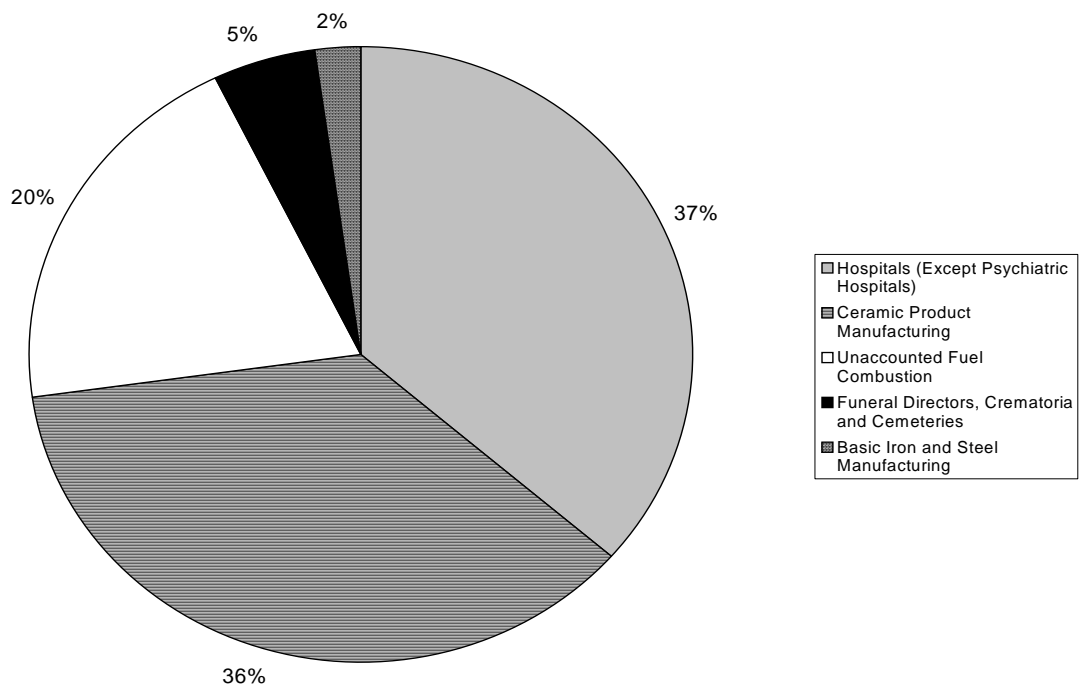


Figure ES1.21: Commercial Emissions of Carbon Monoxide (CO) by ANZSIC Class in Wollongong
 (Total Emissions = 103 tonnes/year)



**Figure ES1.22: Commercial Emissions of Sulfur Dioxide (SO₂) by ANZSIC Class in Wollongong
(Total Emissions = 1.2 tonnes/year)**