Senate Inquiry - The impacts on health of air quality in Australia.
Problems with the NPI database

Summary. The information on PM2.5 in the National Pollutant Inventory is a matter of concern, because it creates confusion about the level of PM2.5 emissions. Failure to warn NPI users that some tables do not list diffuse sources, which account for over 80% of PM2.5 emissions has led many people to over-estimate the dangers from coal mining and under-estimate the dangers of much larger, local, sources of health-hazardous PM2.5 such as woodsmoke, which accounts for more than 50% of man-made PM2.5 emissions in Sydney. Amounts spent on mitigation should be proportional to the estimated impacts on human health, which is likely to be considerably higher for PM2.5 emissions in densely populated urban areas that suffer wintertime temperature inversions and allow pollution to build up.

Detail. Research shows that current levels of air pollution are damaging our health – there is no safe level of PM2.5 pollution, currently considered the most health-hazardous pollutant in our air. PM2.5 is linked to the premature deaths of thousands of Australians every year. European data suggests that PM2.5 causes about 10 to 20 times as many premature deaths as the next worst pollutant, ozone (Appendix).

PM2.5 are so tiny they behave like gases and infiltrate houses even when all doors and windows are closed, and infiltrate the deepest recesses or our lungs where they cause inflammation leading to heart and respiratory diseases.

As the pollutant thought to be responsible for many more premature deaths than any other pollutant, the NPI should be a clear and accurate source of information on PM2.5 emissions. It is therefore noteworthy that the latest NSW EPA Emissions Inventory (2008) reports the following sources of PM2.5 for the NSW's Greater Metropolitan Region – essentially the airshed surrounding Newcastle, Sydney and Wollongong – see http://www.environment.nsw.gov.au/air/airinventory2008.htm

The following table (ES-4) is reproduced from: Main report (120255AEITR1NatHuman.pdf, 5.9MB)

Table ES-4: Total estimated annual emissions by human-made source type in each region

Substance	Region	Emissions (tonne/year)					
		Commercial	Domestic-Commercial	Industrial	Off-Road Mobile	On-Road Mobile	Grand Total
CARBON MONOXIDE	Sydney	335	82,186	14,173	20,801	123,712	241,208
	Newcastle	9.20	6,554	41,950	3,343	8,369	60,225
	Wollongong	20	4,412	529,474	1,698	4,786	540,390
	Non Urban	24	16,226	27,768	27,975	16,944	88,937
	GMR	389	109,377	613,365	53,817	153,812	930,759
OXIDES OF NITROGEN	Sydney	344	2,531	8,921	16,238	45,392	73,427
	Newcastle	39	184	1,833	3,548	3,902	9,506
	Wollongong	12	130	7,784	1,598	2,184	11,708
	Non Urban	106	445	172,873	31,826	9,453	214,704
	GMR	501	3,290	191,411	53,210	60,932	309,344
PARTICULATE MATTER ≤ 10 µm	Sydney	1,111	6,088	6,215	1,019	2,110	16,543
	Newcastle	129	504	3,744	284	176	4,838
	Wollongong	48	334	2,099	119	90	2,690
	Non Urban	732	1,262	61,155	2,185	417	65,752
	GMR	2,020	8,189	73,213	3,607	2,793	89,823
PARTICULATE MATTER ≤ 2.5 µm	Sydney	485	5,853	1,935	952	1,553	10,777
	Newcastle	30	485	1,110	266	131	2,023
	Wollongong	14	321	1,354	112	68	1,869
	Non Urban	167	1,214	13,273	2,104	319	17,076
	GMR	695	7,873	17,672	3,433	2,071	31,744

Total man-made PM2.5 emissions in the GMR are therefore 31,744 tonnes/year.

Yet, downloading the PM2.5 data from the NPI leads to an estimate of just 5,933 tonnes. There is no indication on the NPI website that their information is incomplete. However, it is clearly at variance with the data from the NSW EPA emissions inventory for the same year.

PM2.5 emissions in the GMR airshed (year 2008-09)	kg	tonnes
Sum of all PM2.5 emissions listed below from the NPI	**5933294**	**5933**
Emissions by Source		
Electricity Generation [261]	3331261	3331
Coal Mining [060]	1834858	1835
Glass and Glass Product Manufacturing [201]	174364	174
Basic Ferrous Metal Manufacturing [211]	115769	116
Fertiliser and Pesticide Manufacturing [183]	111843	112
Cement, Lime, Plaster and Concrete Product Manufacturing [203]	111392	111
Petroleum and Coal Product Manufacturing [170]	89517	90
Construction Material Mining [091]	27308	27
Basic Chemical Manufacturing [181]	22171	22
Dairy Product Manufacturing [113]	20569	21
Water Transport Support Services [521]	11565	12
Meat and Meat Product Manufacturing [111]	11100	11
Basic Non-Ferrous Metal Manufacturing [213]	9824	10
Pulp, Paper and Paperboard Manufacturing [151]	6571	7
Other Wood Product Manufacturing [149]	6437	6
Water Supply, Sewerage and Drainage Services [281]	5461	5
Other Transport Equipment Manufacturing [239]	4840	5
Grain Mill and Cereal Product Manufacturing [116]	4612	5
Other Food Product Manufacturing [119]	3761	4
Ceramic Product Manufacturing [202]	3681	4
Structural Metal Product Manufacturing [222]	3613	4
Other Fabricated Metal Product Manufacturing [229]	3163	3
Other Mining Support Services [109]	2990	3
Oil and Fat Manufacturing [115]	2485	2
Basic Non-Ferrous Metal Product Manufacturing [214]	2153	2
Bakery Product Manufacturing [117]	1765	2
Waste Treatment, Disposal and Remediation Services [292]	1754	2
Other Non-Metallic Mineral Mining and Quarrying [099]	1381	1
Beverage Manufacturing [121]	1267	1
Printing and Printing Support Services [161]	1207	1
Polymer Product Manufacturing [191]	783	1
Airport Operations and Other Air Transport Support Services [522]	560	1
Cigarette and Tobacco Product Manufacturing [122]	415	0
Gas Supply [270]	401	0
Converted Paper Product Manufacturing [152]	379	0
Other Basic Chemical Product Manufacturing [189]	370	0
Other Personal Services [953]	257	0
Metal Container Manufacturing [223]	243	0
Poultry Farming [017]	220	0
Fruit and Vegetable Processing [114]	211	0
Motor Vehicle and Motor Vehicle Part Manufacturing [231]	185	0
Mineral, Metal and Chemical Wholesaling [332]	174	0
Scientific Research Services [691]	96	0
Hospitals [840]	77	0
Basic Ferrous Metal Product Manufacturing [212]	76	0
Cleaning Compound and Toiletry Preparation Manufacturing [185]	70	0
Sugar and Confectionery Manufacturing [118]	53	0
Pharmaceutical and Medicinal Product Manufacturing [184]	41	0

A closer examination of the NPI web page shows that 'All sources' **omits diffuse sources**, which the NPI marks by a [*]. Diffuse sources (e.g. the 7,359 tonnes of PM2.5 emissions in the GMR from domestic solid fuel combustion (wood heaters) – see NSW EPA inventory, bottom of page) are missing. This confuses many people, who often think that the NPI reports total PM2.5 emissions, not just 19% of the total!

www.npi.gov.au/npidata/action/load/emission-by-source-result/criteria/year/2009/destination/AIR/airsh

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Summary | Sources | Emissions | Transfers | Download | Map

by Source | by Facility

2008/2009 data within Greater Sydney Newcastle & Wollongong Regions (GMR)[A] - Particulate Matter 2.5 um from All Sources

A list of emissions of the chosen substance by source. Click on a source to add it to the current search criteria. Industrial sources are indicated by their three digit ANZSIC Group code. Diffuse sources are indicated by [*].

Source	Air (kg)[1]	Land (kg)[1]	Water (kg)[1]
Electricity Generation [261]	3,300,000		
Coal Mining [060]	1,800,000		
Glass and Glass Product Manufacturing [201]	170,000		
Basic Ferrous Metal Manufacturing [211]	120,000		
Fertiliser and Pesticide Manufacturing [183]	110,000		
Cement, Lime, Plaster and Concrete Product Manufacturing [203]	110,000		
Petroleum and Coal Product Manufacturing [170]	90,000		
Construction Material Mining [091]	27,000		
Basic Chemical Manufacturing [181]	22,000		
Dairy Product Manufacturing [113]	21,000		
Water Transport Support Services [521]	12,000		
Meat and Meat Product Manufacturing [111]	11,000		
Basic Non-Ferrous Metal Manufacturing [213]	9,800		
Pulp, Paper and Paperboard Manufacturing [151]	6,600		
Other Wood Product Manufacturing [149]	6,400		
Water Supply, Sewerage and Drainage Services [281]	5,500		
Other Transport Equipment Manufacturing [239]	4,800		
Grain Mill and Cereal Product Manufacturing [116]	4,600		
Other Food Product Manufacturing [119]	3,800		

NPI

- NPI Home
- NPI Database Search

Search Criteria

- Source Type = All
- Include subthreshold facility data = Yes
- Reporting year = 2008/2009
- State = National
- Airshed/Catchment = Greater Sydney Newcastle & Wollongong Regions (GMR)[A]
- Substance = Particulate Matter 2.5 um
- Destination type = Air

Edit Criteria

Key

Links to an another web site
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2008 Calendar Year Domestic-Commercial Emissions: Results
Executive Summary

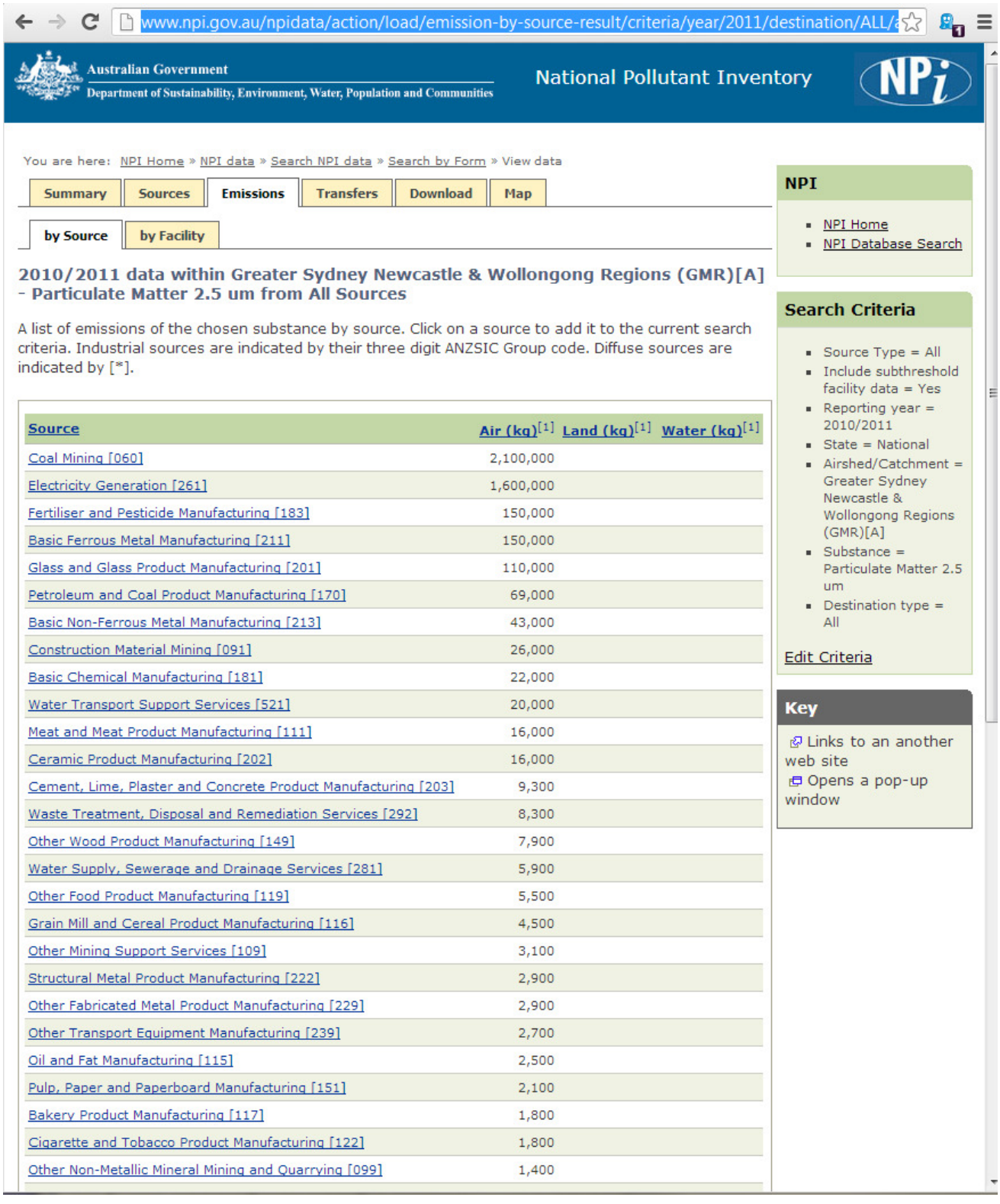
Table ES-3: Total estimated annual emissions by domestic-commercial source type in the GMR

Substance	Emissions (tonne/year)											
	Aerosols and solvents	Barbecues	Cutback bitumen	Gaseous fuel combustion	Graphic arts	Lawn mowing	Liquid fuel combustion	Natural gas leakage	Portable fuel containers	Solid fuel combustion	Surface coatings	Domestic-Commercial Total
1,3-BUTADIENE	-	1.25	-	-	-	44	-	-	-	73	-	119
ACETALDEHYDE	-	18	-	2.78×10^{-4}	-	27	7.54×10^{-3}	-	-	243	0.27	289
BENZENE	1.13×10^{-2}	4.10	-	4.40×10^{-2}	-	389	3.23×10^{-4}	-	17	369	-	779
CARBON MONOXIDE	-	520	-	861	-	54,003	7.70	-	-	53,985	-	109,377
FORMALDEHYDE	12	13	-	1.57	-	70	5.17×10^{-2}	-	-	612	9.07×10^{-2}	709
ISOMERS OF XYLENE	681	0.84	21	-	80	1,167	1.57×10^{-4}	-	12	57	1,412	3,430
LEAD & COMPOUNDS	-	3.04×10^{-3}	-	1.05×10^{-2}	-	0.33	1.94×10^{-3}	-	-	0.77	-	1.12
OXIDES OF NITROGEN	-	100	-	1,996	-	356	28	-	-	811	-	3,290
PARTICULATE MATTER ≤ 10 µm	-	34	-	159	-	347	3.66	-	-	7,645	-	8,189
PARTICULATE MATTER ≤ 2.5 µm	-	31	-	159	-	320	3.28	-	-	7,359	-	7,873

Changes since 2008/09. In the 2010/11 inventory, PM2.5 emissions from coal mining increased to 2,100 tonnes while PM2.5 from electricity generation decreased to 1,600 tonnes. However, total PM2.5 emissions from coal mining and electricity generation in the GMR – 3,700 tonnes are still only half as much as the 7,359 tonnes per year emitted by domestic-commercial solid fuel (wood) combustion in the GMR.The failure to warn NPI readers that some tables do not list diffuse sources, which, in for PM2.5 account for over 80% of emissions has led to many people over-estimating the dangers from coal mining and under-estimating the dangers of much larger sources of health-hazardous PM2.5.

Government policies must address all sources of PM2.5 pollution. More importantly, the amounts spent on mitigation should be proportional to the estimated impacts on human health, which is likely to be considerably higher for PM2.5 emissions in densely populated urban areas that suffer temperature inversions where pollution builds up.

http://www.npi.gov.au/npidata/action/load/emission-by-source-result/criteria/year/2011/destination/ALL/airshed-catchment/26/substance/92/source-type/ALL/subthreshold-data/Yes/substance-name/Particulate%2BMatter%2B2.5%2Bum



www.npi.gov.au/npidata/action/load/emission-by-source-result/criteria/year/2011/destination/ALL/a

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Summary | Sources | Emissions | Transfers | Download | Map

by Source | by Facility

2010/2011 data within Greater Sydney Newcastle & Wollongong Regions (GMR)[A] - Particulate Matter 2.5 um from All Sources

A list of emissions of the chosen substance by source. Click on a source to add it to the current search criteria. Industrial sources are indicated by their three digit ANZSIC Group code. Diffuse sources are indicated by [*].

Source	Air (kg)[1]	Land (kg)[1]	Water (kg)[1]
Coal Mining [060]	2,100,000		
Electricity Generation [261]	1,600,000		
Fertiliser and Pesticide Manufacturing [183]	150,000		
Basic Ferrous Metal Manufacturing [211]	150,000		
Glass and Glass Product Manufacturing [201]	110,000		
Petroleum and Coal Product Manufacturing [170]	69,000		
Basic Non-Ferrous Metal Manufacturing [213]	43,000		
Construction Material Mining [091]	26,000		
Basic Chemical Manufacturing [181]	22,000		
Water Transport Support Services [521]	20,000		
Meat and Meat Product Manufacturing [111]	16,000		
Ceramic Product Manufacturing [202]	16,000		
Cement, Lime, Plaster and Concrete Product Manufacturing [203]	9,300		
Waste Treatment, Disposal and Remediation Services [292]	8,300		
Other Wood Product Manufacturing [149]	7,900		
Water Supply, Sewerage and Drainage Services [281]	5,900		
Other Food Product Manufacturing [119]	5,500		
Grain Mill and Cereal Product Manufacturing [116]	4,500		
Other Mining Support Services [109]	3,100		
Structural Metal Product Manufacturing [222]	2,900		
Other Fabricated Metal Product Manufacturing [229]	2,900		
Other Transport Equipment Manufacturing [239]	2,700		
Oil and Fat Manufacturing [115]	2,500		
Pulp, Paper and Paperboard Manufacturing [151]	2,100		
Bakery Product Manufacturing [117]	1,800		
Cigarette and Tobacco Product Manufacturing [122]	1,800		
Other Non-Metallic Mineral Mining and Quarrying [099]	1,400		

NPI

- NPI Home
- NPI Database Search

Search Criteria

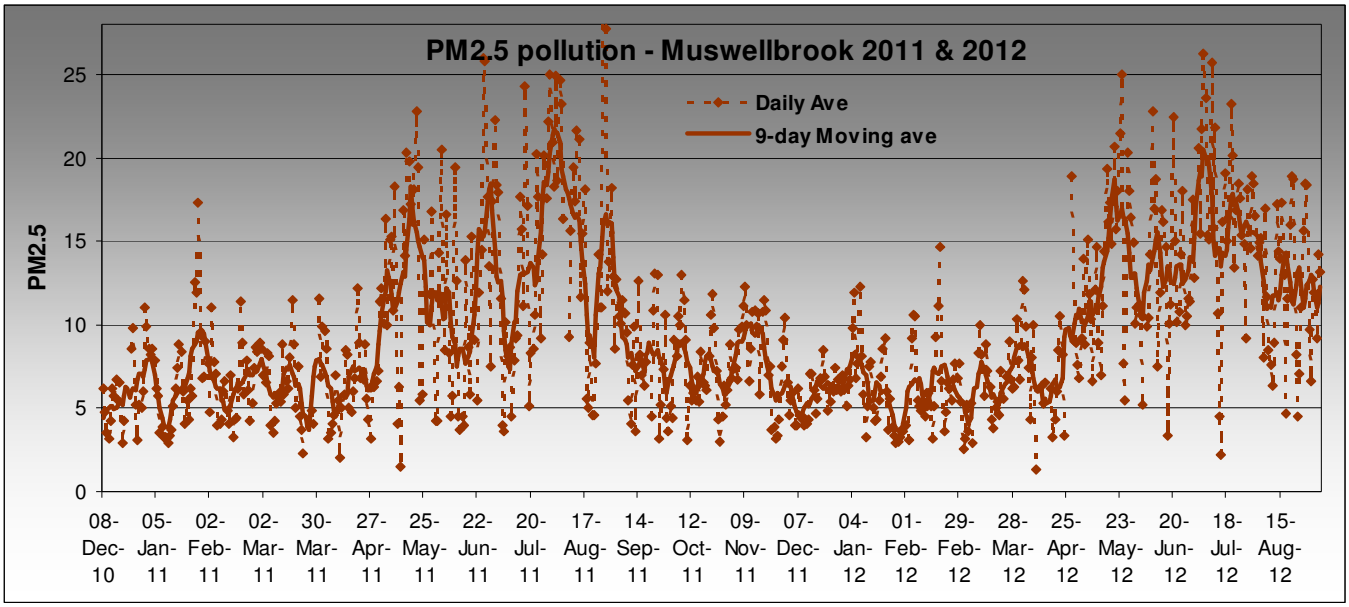
- Source Type = All
- Include subthreshold facility data = Yes
- Reporting year = 2010/2011
- State = National
- Airshed/Catchment = Greater Sydney Newcastle & Wollongong Regions (GMR)[A]
- Substance = Particulate Matter 2.5 um
- Destination type = All

Edit Criteria

Key

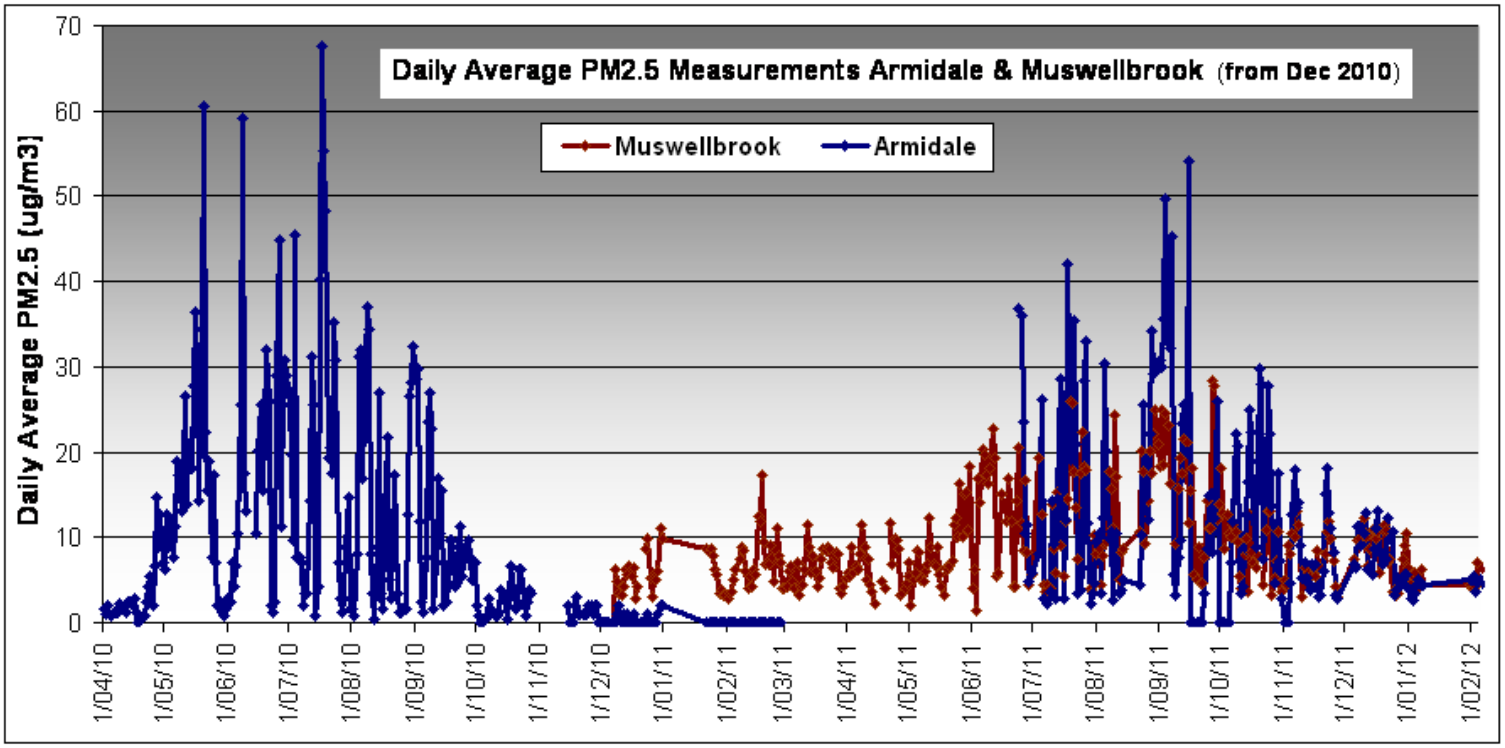
Links to an another web site
Opens a pop-up window

Domestic wood heating blamed for high PM2.5 pollution in mining town (Muswellbrook)



Media release: 28 June 2011: "The NSW Office of Environment and Heritage reports today that higher concentrations of PM2.5 particles measured at the Muswellbrook and Singleton air quality monitoring sites in the Upper Hunter over the weekend *was likely due to woodheater use*."

Colder areas such as Armidale have even worse PM2.5 pollution than mining towns.



Appendix – Relative dangers of PM2.5 vs Ozone

In Europe, PM2.5 pollution is associated with more than 492,000 premature deaths, corresponding to a loss of almost 4.9 million years of life (YOLL)."[1] In contrast, European O_3 pollution is estimated to cause 21,000 premature deaths[2].

[1] F. d. Leeuw and J. Horálek,Assessment of the health impacts of exposure to PM2.5 at a European level. (European Topic Centre on Air and Climate Change. Available at http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2009_1_European_PM2.5_HIA, Bilthoven, 2009).

[2] NSW EPA,Action for air - 2009 update. Available at: http://www.environment.nsw.gov.au/air/actionforair/ActionforAir2009.htm, 2009).