

Woodsmoke

What's all the fuss about?

*What are other communities doing
about it?*

Christchurch: Estimated health costs of wood smoke:

Health and Air Pollution in NZ:

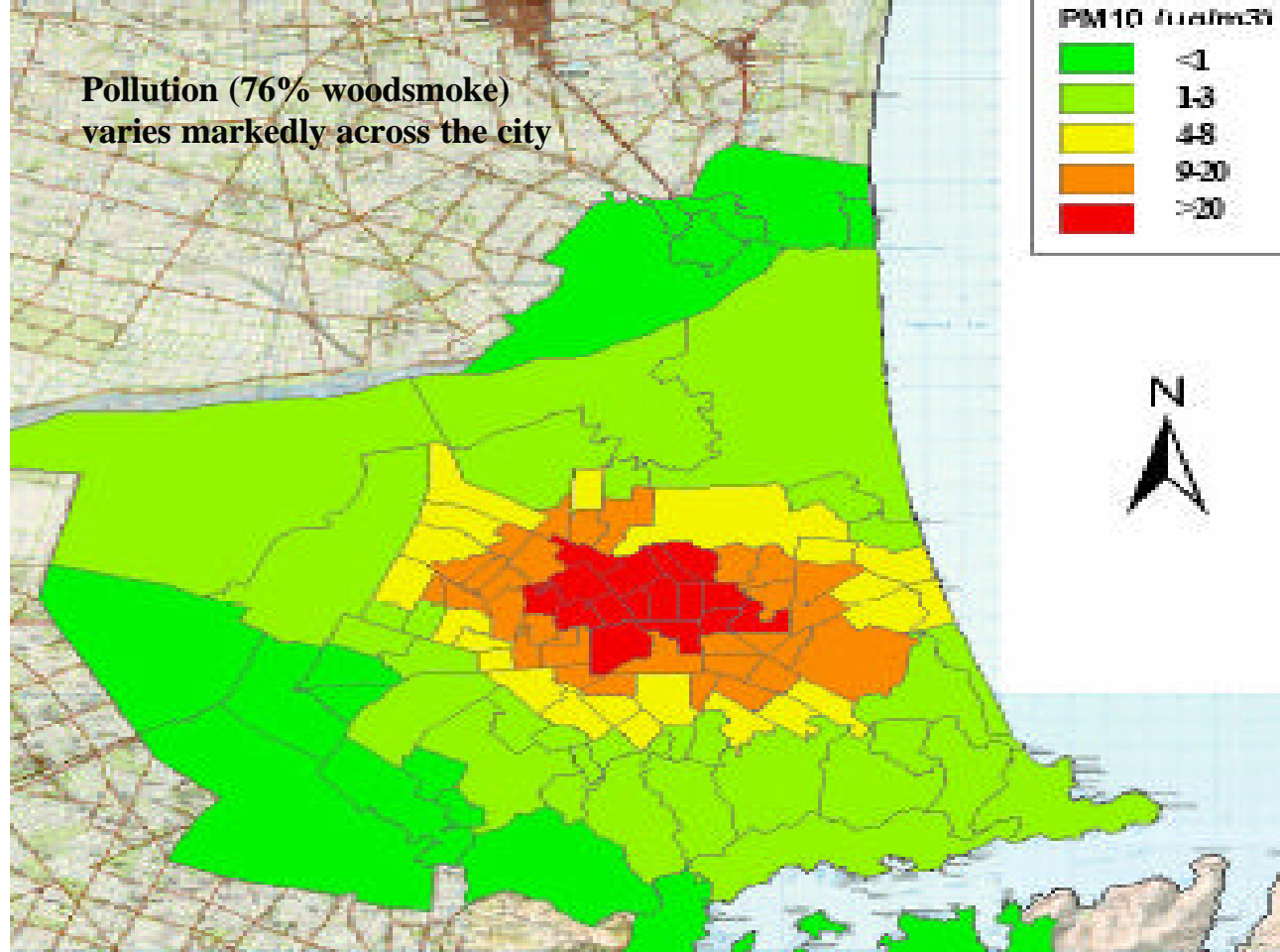
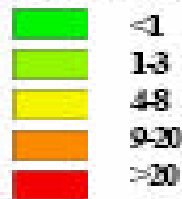
Pilot Study (31 Aug 05)

25 Authors

G. Fisher, T. Kjellstrom, A. Woodward, S. Hales, I. Town, A. Sturman, S. Kingham, D. O'Dea, E. Wilton, C. O'Fallon, A. Scoggins, R. Shrestha, P. Zavar-Rewa, M. Epton, J. Pearce, J. Sturman, R. Spronken-Smith, J. Wilson, S. McLeod, R. Dawson, L. Tremblay, L. Brown, K. Trout, C. Eason, P. Donnelly.

**Pollution (76% woodsmoke)
varies markedly across the city**

PM10 $\mu\text{g}/\text{m}^3$



Studied the effect of woodsmoke on health

- Compared death rates with woodsmoke levels
- after adjusting for other factors (age, sex, ethnicity, socio-economic status & tobacco smoking habits) death rates increased by 8% (respiratory deaths by 34%) for each addition 10 $\mu\text{g}/\text{m}^3$ of PM10
- People living in the worst areas have 16% higher total mortality (68% higher respiratory mortality) than people living in the cleanest areas

Christchurch (pop 333,000)

Estimated effect of air pollution premature deaths per year

<u>Source</u>	<u>Premature deaths/year</u>
Wood heating	124
Industry	18
Diesel vehicles	15.5
Petrol vehicles	0.5

Animal Experiments - Mice

- Mice were exposed for 6 hours either to woodsmoke, oil furnace fumes or clean air
- Then challenged with a respiratory bug
- 2 weeks later, 21% of those exposed to woodsmoke were dead, compared with 5% exposed either to clean air or oil furnace fumes
- The article described woodsmoke as *“a witches’ brew of carcinogens”*

Animal Experiments - rats

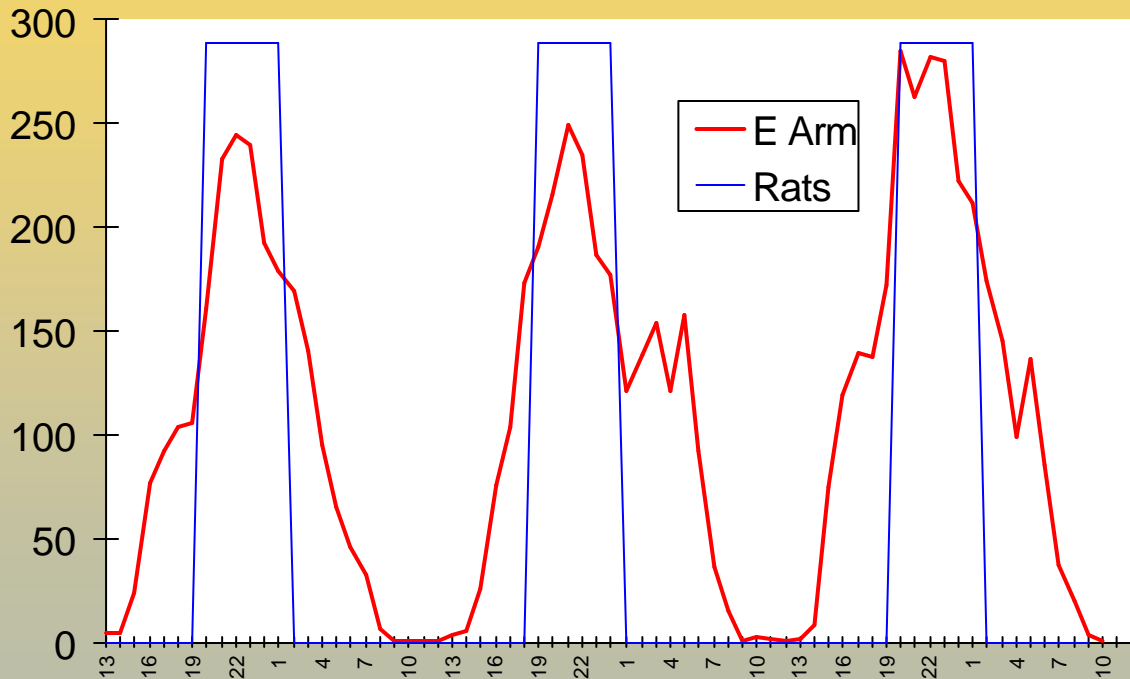
Godleski et al. (Harvard uni) 1996

- Air particle concentrator
 - process ordinary air, separating it clean, filtered air and air with an excess of fine particles
 - 3 clear, sunny days in Boston: temperature 1- 5 C; daily outdoor fine particle (PM 2.5) conc 8-11 $\mu\text{g}/\text{m}^3$
- Expose rats with bronchitis for 6 hrs/day to either a) the filtered air or b) air with PM2.5 concentrations of approx 288 $\mu\text{g}/\text{m}^3$

Harvard - rats study (continued)

- filtered air: no rats died
- particles:
 - no visible signs of irritant inhalation such as coughing, rubbing eyes, nose or sneezing
 - significant evidence of broncho-constriction
 - Significantly more neutrophils (white blood cells) in lungs 6.2×10^4 (particles) vs 2.3×10^4 (filt air)
 - **37% died**

E Arm Smog 11-14 June vs Rats Exposure (6 hrs @ 30 x Boston air concentration) (PM 2.5s)



Air pollution: estimated costs (NZ\$mill, annually)

Effect	Wood heat	Indust	Vehicle	Total
Mortality	\$93.0	\$13.5	\$12.0	\$118.5
Cancer	\$0.8	\$0.2	\$0.2	\$1.2
Chronic bronchitis	\$2.7	\$0.7	\$0.6	\$4.0
Adission - cardio	\$0.1	\$0.05	\$0.05	\$0.2
Admission - respir.	\$0.4	\$0.1	\$0.1	\$0.6
R'tricted activity days	\$30.0	\$7.0	\$6.0	\$43.0
Minor hospital costs	\$0.15	\$0.03	\$0.02	\$0.2
Total	\$127.0	\$22.0	\$19.0	\$168.0

Policies in Christchurch

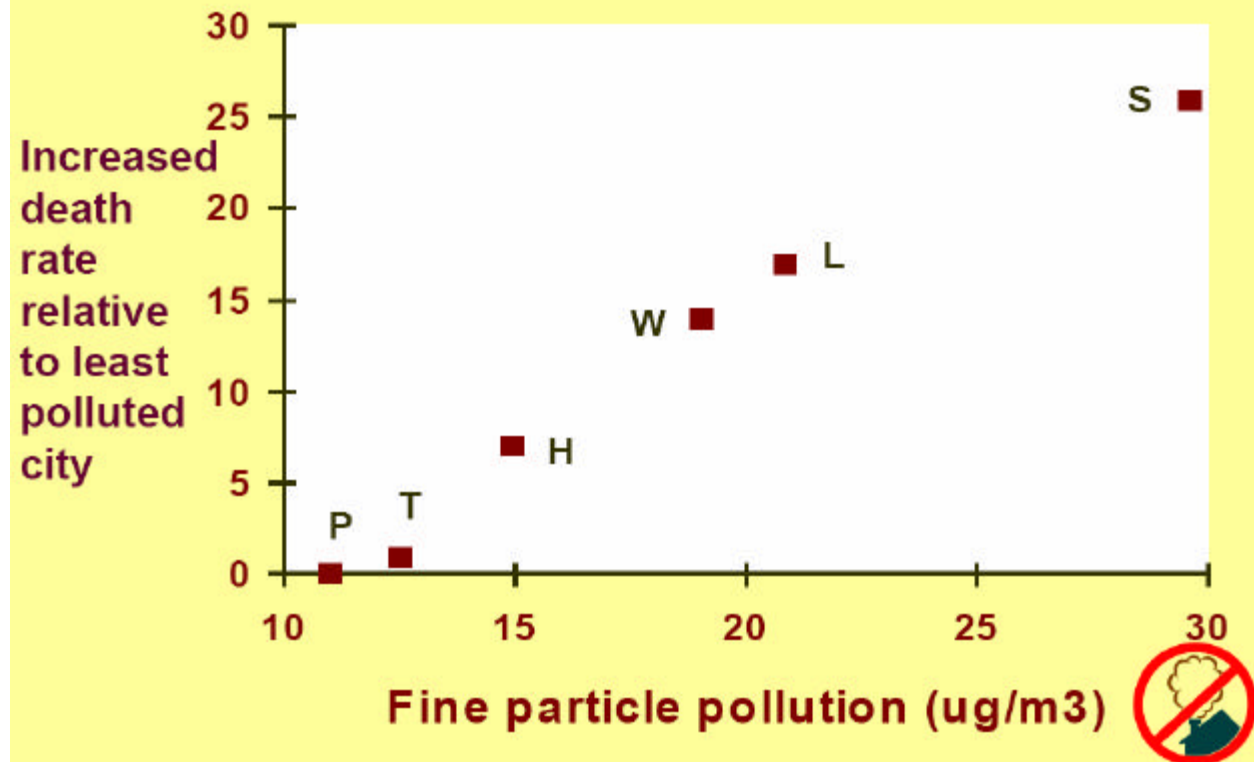
- ▣ **Total cost of woodheating – NZ\$127 million
NZ\$2,700 per heater per year**
- ▣ **No new wood heaters to be installed
except models rated < 1.0 g/kg wood, installed as
replacements for more polluting models.**
- ▣ **Phase out all heaters rated > 1.0 g/kg
From 2008 onwards, all heaters rated more than
1.0 g/kg to be replaced after 15 years use.**

Other communities reduced pollution ... and saved lives

**Dublin banned non-smokeless coal in
September 1990**

- * 15.5% fewer respiratory and 10.3% fewer cardiovascular deaths in the 6 years after the ban, compared to the previous 6 years**
- * 116 fewer respiratory and 243 fewer cardiovascular deaths/year**
- * More than 2,000 lives saved in the first 6 years of the ban**

Six Cities Study (US, 1993)



Some cities took the problem seriously

- * Follow-up study: PM_{2.5} had dropped substantially in one city, moderately in another, remaining stable elsewhere.**
- * Death rates fell in the first two cities relative to the other four**
- * Strong evidence ... reducing pollution can save lives**

Switzerland reduced pollution (including woodsmoke) improved respiratory health

- * Decline of 10 ug/m³ in annual PM₁₀ exposure reduced children's chronic coughs by 35%, bronchitis by 34%, common cold by 22%, nocturnal dry cough by 30% and conjunctivitis symptoms by 19%.
- * *"No threshold of adverse effects of PM₁₀ was apparent because we observed the beneficial effects for relatively small changes of rather moderate air pollution levels."*
- * Reducing pollution improves children's respiratory health as well as saving lives

Launceston reduced woodsmoke pollution

- * Halved the number of woodheaters over the past few years, measured pollution also halved
- * Reduction in hospital admissions for lung disease and asthma
- * Smoke reduction continues – Program Cttee chaired by Dr Jim Markos (lung specialist)
- * Community understanding that woodsmoke is harmful – similar chemical composition to tobacco smoke, similar health problems – heart and lung diseases, low birthweight babies, cot deaths
- * 2 full time smoke patrol officers & 2 part-time ‘work for the dole’ volunteers

Tasmanian AMA president Dr Michael Aizen

- **Time for both *local* and state governments to sit up and take attention of Dr Markos' work and to come in with tougher measures to protect the health of our community**
- **Dr Aizen recommends banning wood heaters ... and introducing new subsidies for alternatives**
see <http://www.abc.net.au/news/stories/2006/10/16/1765526.htm>

Launceston

ABC 7:30 Report
11 Apr 07



Summary of Health effects

- Woodsmoke contains the same and very similar chemicals to tobacco smoke
- Similar health effects – heart and lung diseases, mouth, throat and lung cancer
- US EPA study (Ames tests on bacteria, tumor initiation tests on mice) suggests that the lifetime cancer risk from wood smoke may be ***12 times*** greater than from exposure to an equal amount of cigarette smoke
- Cities with higher levels of particulate pollution have increased risk of cot deaths
- PAH from air pollution (woodsmoke is a major source of PAH) causes genetic damage in babies

New heaters no better than older models



- Brand new heater in the brand new housing estate on Link Rd
- Creosote build-up demonstrates the amount of pollution it produces
- Standards Australia meeting – virtually everyone except heater manufacturers wanted
 - a) health warning on heaters
 - b) emission limit halved
- Nothing happened because all parties (including manufacturers) have to agree to the change

Same message from other Health Air/Pollution Experts

Australian Lung Foundation

- ***Use non-polluting alternatives to woodheating***

American Lung Association

- ***Avoid burning wood in homes where less polluting heating alternatives are available***

UK Dept of Health/Environment

- ***Avoid burning solid fuels, if possible***

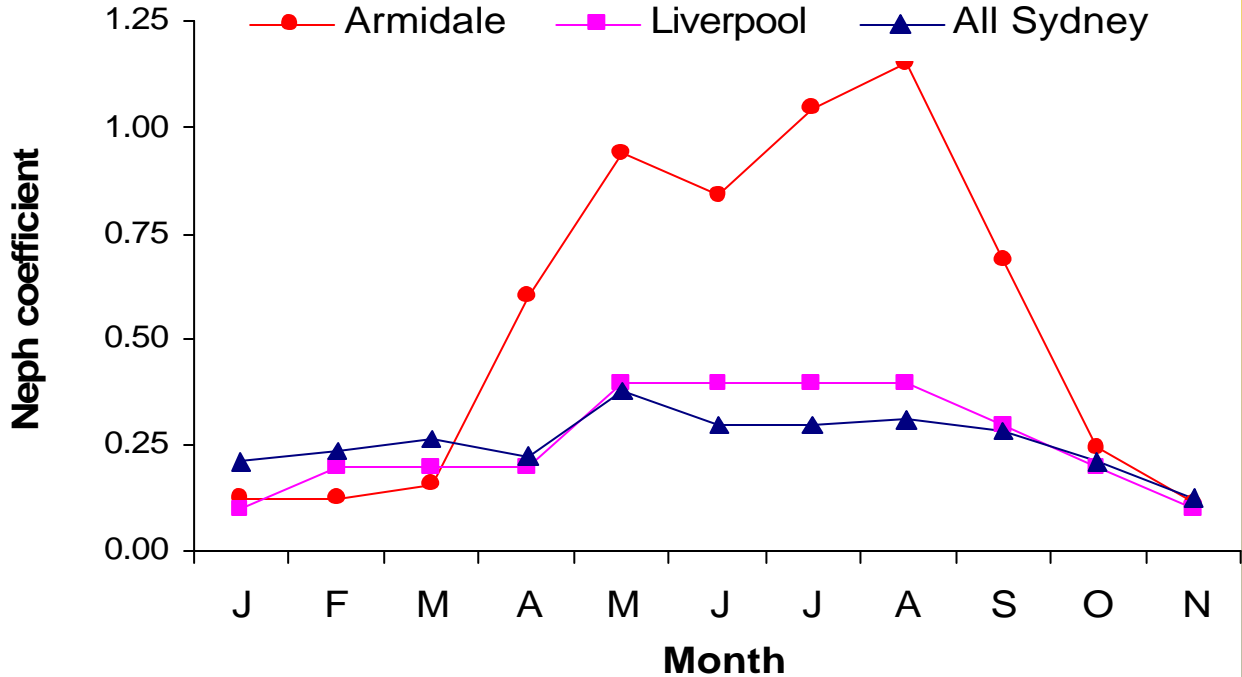
- World Health Organisation

No safe level of particle pollution

NSW EPA

- *(In areas where smoke builds up e.g steep hills and in valleys) home owners should consider alternatives to solid fuel heating*
- *If you can see or smell smoke then you are causing a problem for yourself, your family and your neighbours*

Pollution kills 1400 Sydneysiders!!



Monthly Average Pollution Armidale Creeklands vs Sydney

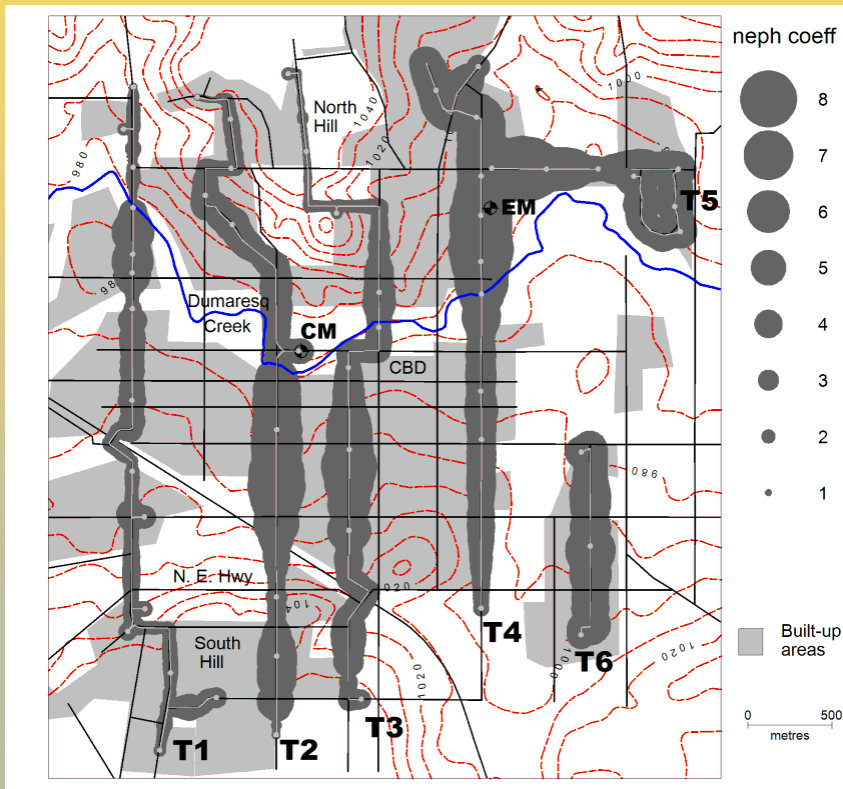
Sydney is reducing woodsmoke

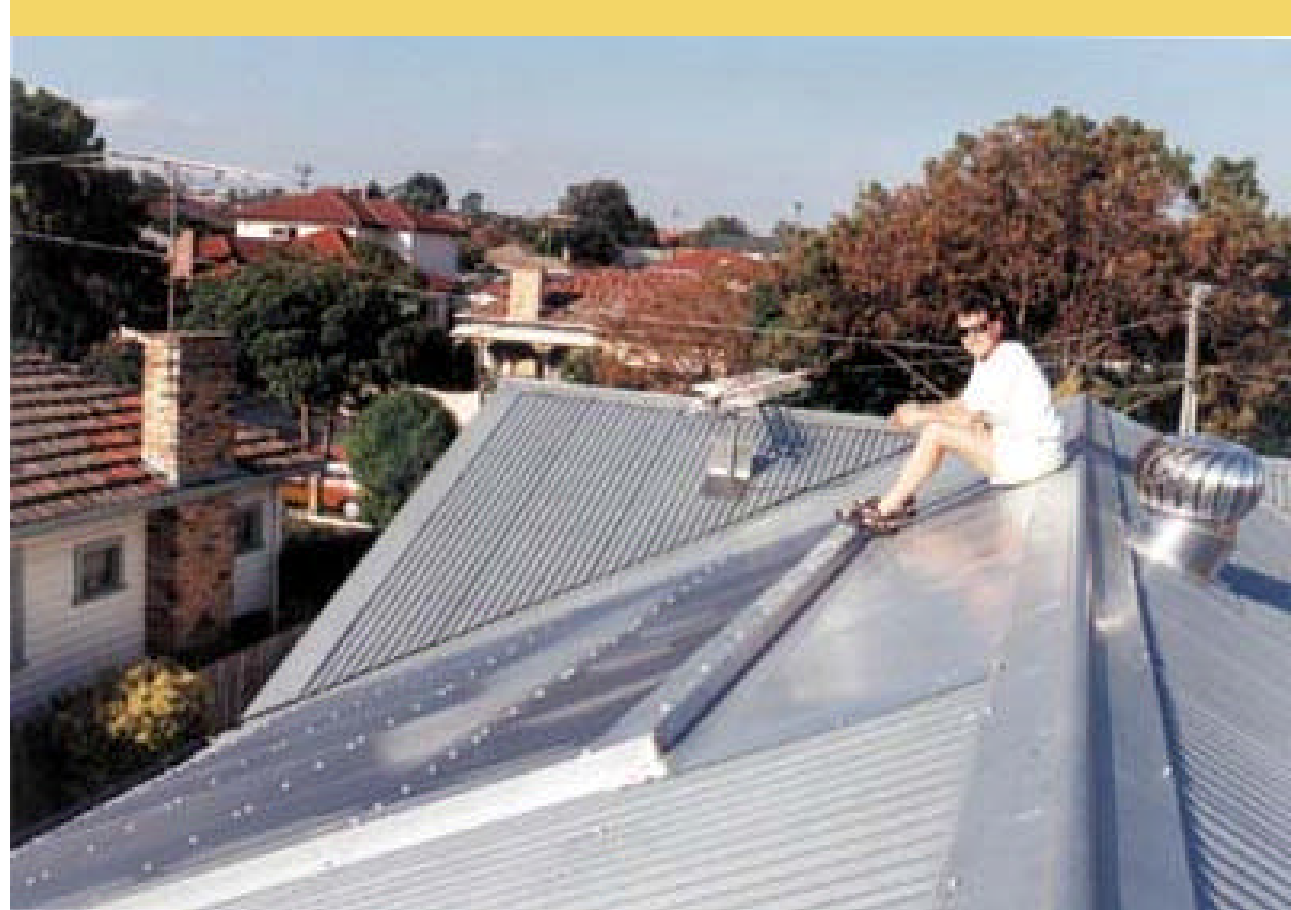
- Sydney is concerned about woodsmoke
- ‘Don’t light tonight’ messages when woodsmoke levels likely to affect health
- Several councils have banned the installation of new woodheaters
- Others subsidising the removal of woodheaters

What about Armidale?

- Armidale has higher pollution levels than Sydney
similar range of pollution levels to Christchurch
- Expect similar health effects as Christchurch (pro-rata –
127 premature deaths in Christchurch, 11-12 in Armidale)
- Armidale residents who die this year – might have lived
another 115 years without woodsmoke
- PhD study: 1999 – 38% of visits to GPs for respiratory
visits due to woodsmoke
- Woodsmoke reduces opportunities for sustainable living –
people move out of town, need more and longer car
journeys, increased electricity consumption for filters &
indoor clothes driers

Map of Armidale Pollution





Solar Heating

- **Armidale - ideal climate for solar heating**
- **With development (use UNE expertise?), solar heaters could be cheaper to install than wood heaters**
- **Cheaper and more convenient to run than woodheat**
- **Reduced greenhouse emissions**
- **Advertise the benefits of a clean, environmentally friendly, city where people might want to retire**
- **5 heaters costing \$2000 each and reduce heating bills (and greenhouse emissions) by 50% far more effective than 1 heater costing \$10000 and reducing heating bills by 85%**

Progress in Armidale

- Joint meeting of the Council's DEWP and Health and Wellbeing Committee in Oct 07
- Dr Gary Baker told the meeting
 - Host of health problems associated with woodsmoke
 - Data from ambient air quality readings in 2003 of concern
 - Woodsmoke could be regarded as a hazardous chemical
- Cr Maher suggested Council could make a submission to the State and Federal Ministers to provide assistance in some form
- Council's average annual spending on woodsmoke 10% of the cost of a roundabout

SLA could

- Publicise the fact that Australian Lung Foundation, American Lung Association & UK Department of Health recommend not using woodheaters.
- Promote solar heating project to provide cheap heating and insulation to existing stock
- Send in submission to Climate Change Committee (due 10 Dec 07) asking State Gov to fund local solar heating project

SLA could

- Write to council arguing that:
 - Provide resources to deal with woodsmoke complaints (people should not be forced to move out of Armidale to escape smoke)
 - Educate all heater owners (especially those with excessively smoky chimneys) on the health problems caused by woodsmoke and that the AMA, the Aust Lung Foundation, the Amer Lung Assoc & UK DEEFRA all recommend using non-polluting alternatives if available
 - New houses can be designed so they don't need wood heaters – so no woodheaters in new buildings
 - Christchurch has banned the installation of new heaters in houses that don't already have them – should we do the same?
 - Christchurch is phasing out all heaters emitting more than 1 g/kg after 15 years use – should we do the same?
 - Other NZ communities are also removing all heaters emitting more than 1 g/kg when houses are sold – should we do the same?

Air Pollution, East Armidale, 1996



Many people do not take very seriously the loss of life and health due to air pollution, like that due to smoking, because they believe it is “only statistical”.

Noel de Nevers

Air Pollution Control Engineering, 1995.

Nowadays,

The health effects and economic costs of tobacco smoke taken very seriously....

What about air pollution in Armidale ?



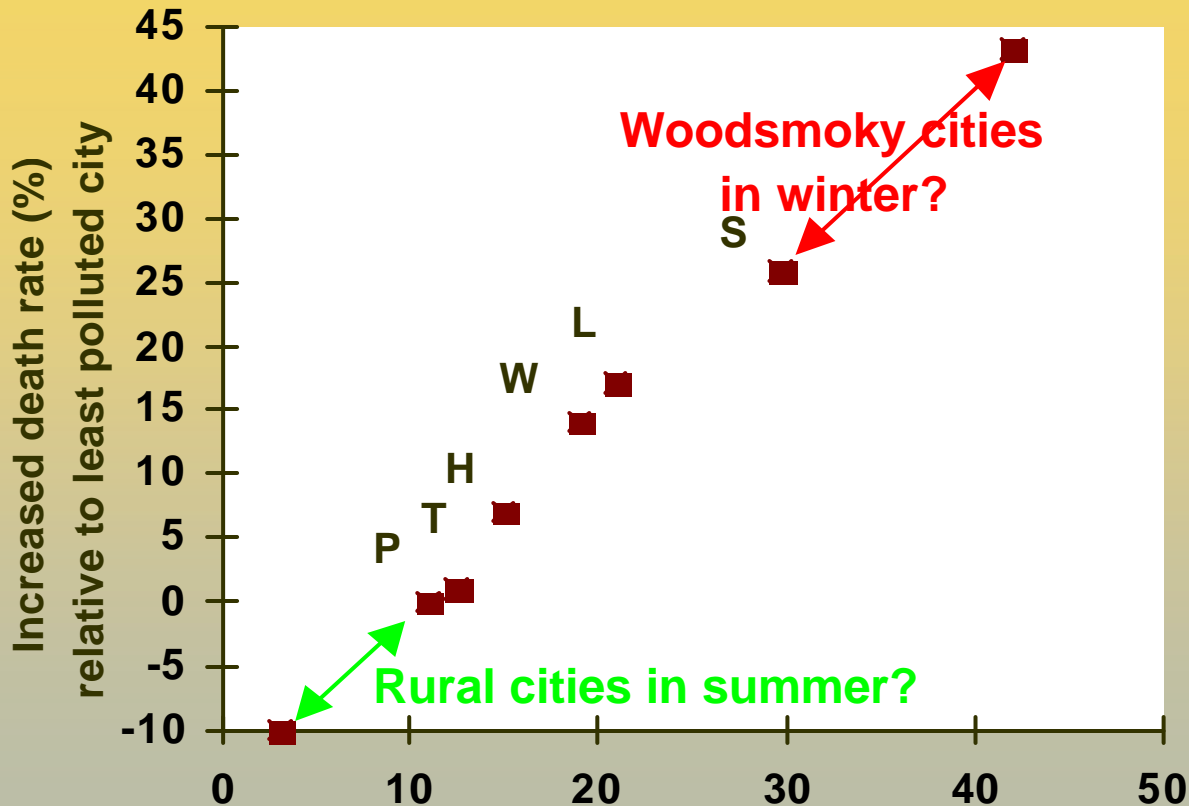


Fig 4. PM2.5 (ug/m3) - 6 US Cities

Final thoughts

- *"There is no safe level of particulate air pollution"* World Health Organisation
- National problem - National solutions
- All Australian cities should meet the PM2.5 standard - annual average PM2.5 < 8 ug/m³

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