Air Quality in the Bay - the particulate story

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HAWKE'S BAY
REGIONAL COUNCIL

RED ALERT BEIJING

"AIRPOCALYPSE" (GREENPEACE)

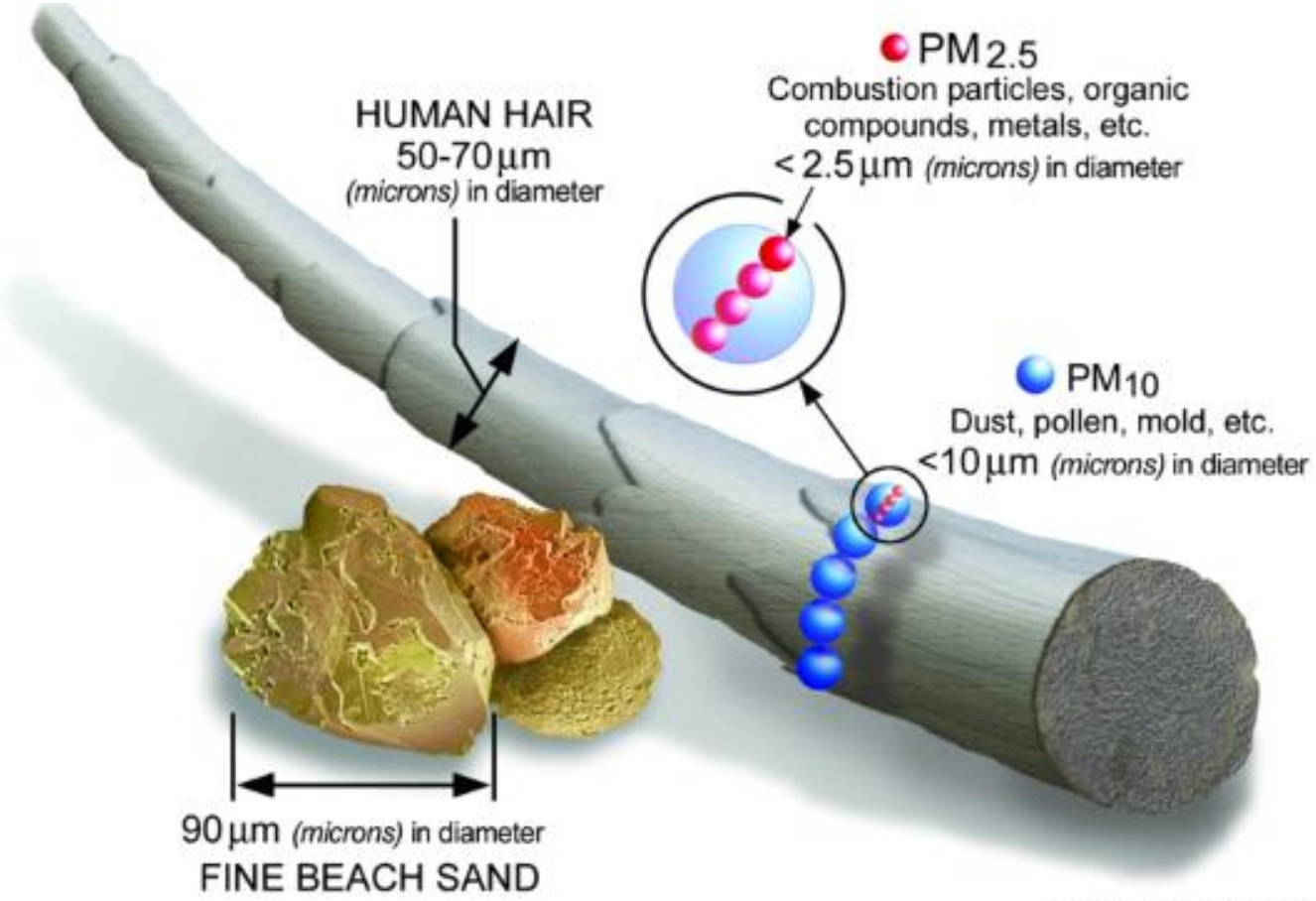
The Independent
http://www.independent.co.uk/news/world/asia/beijing-smog-red-alert-issued-schools-and-businesses-to-completely-shut-down-as-chinese-capital-a6763286.html#gallery

LONDON CYCLING

Napier 2005

Napier and Hastings 2005

Fine particulate matter (PM) is Hawke's Bay's biggest problem…



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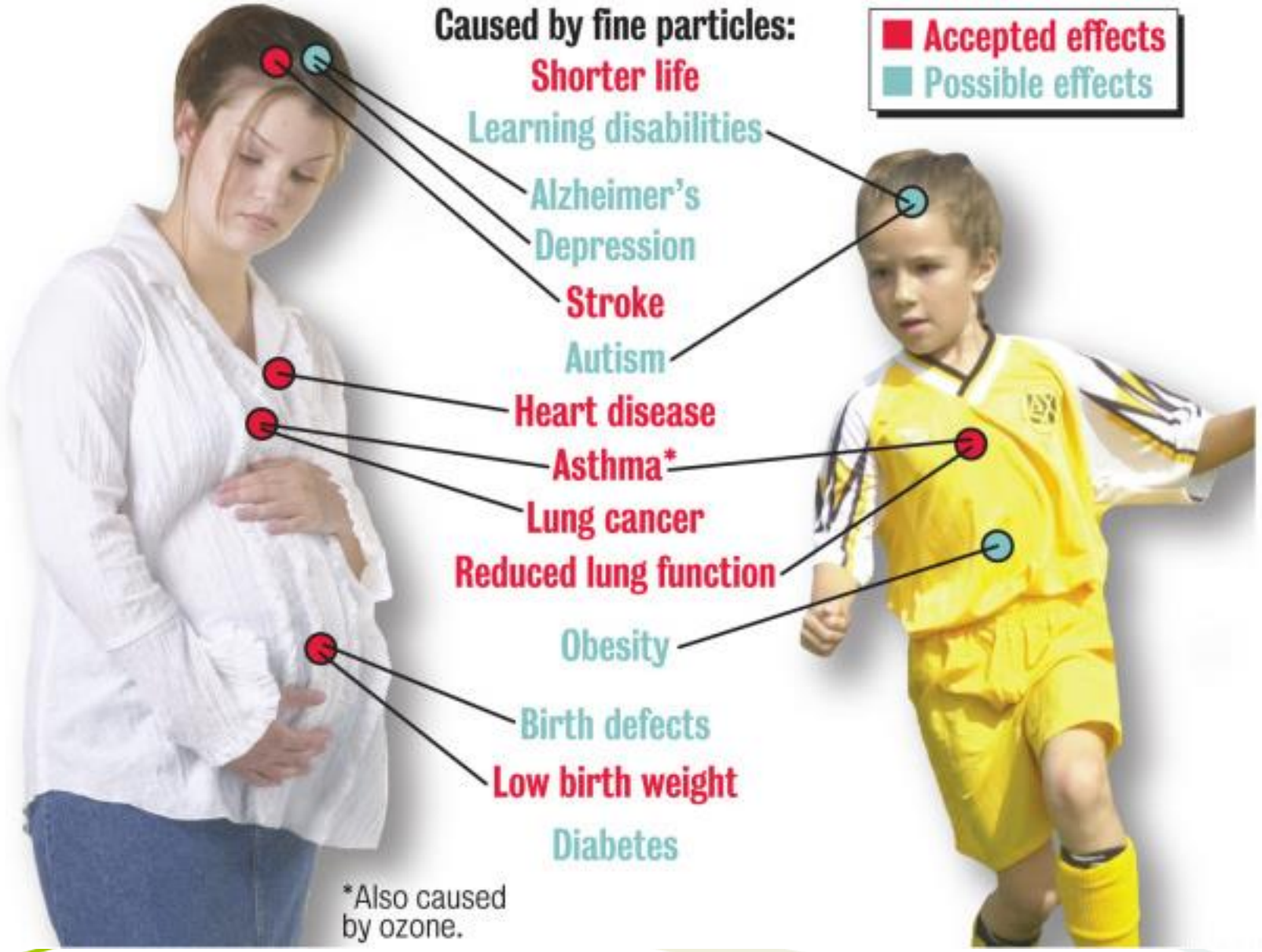
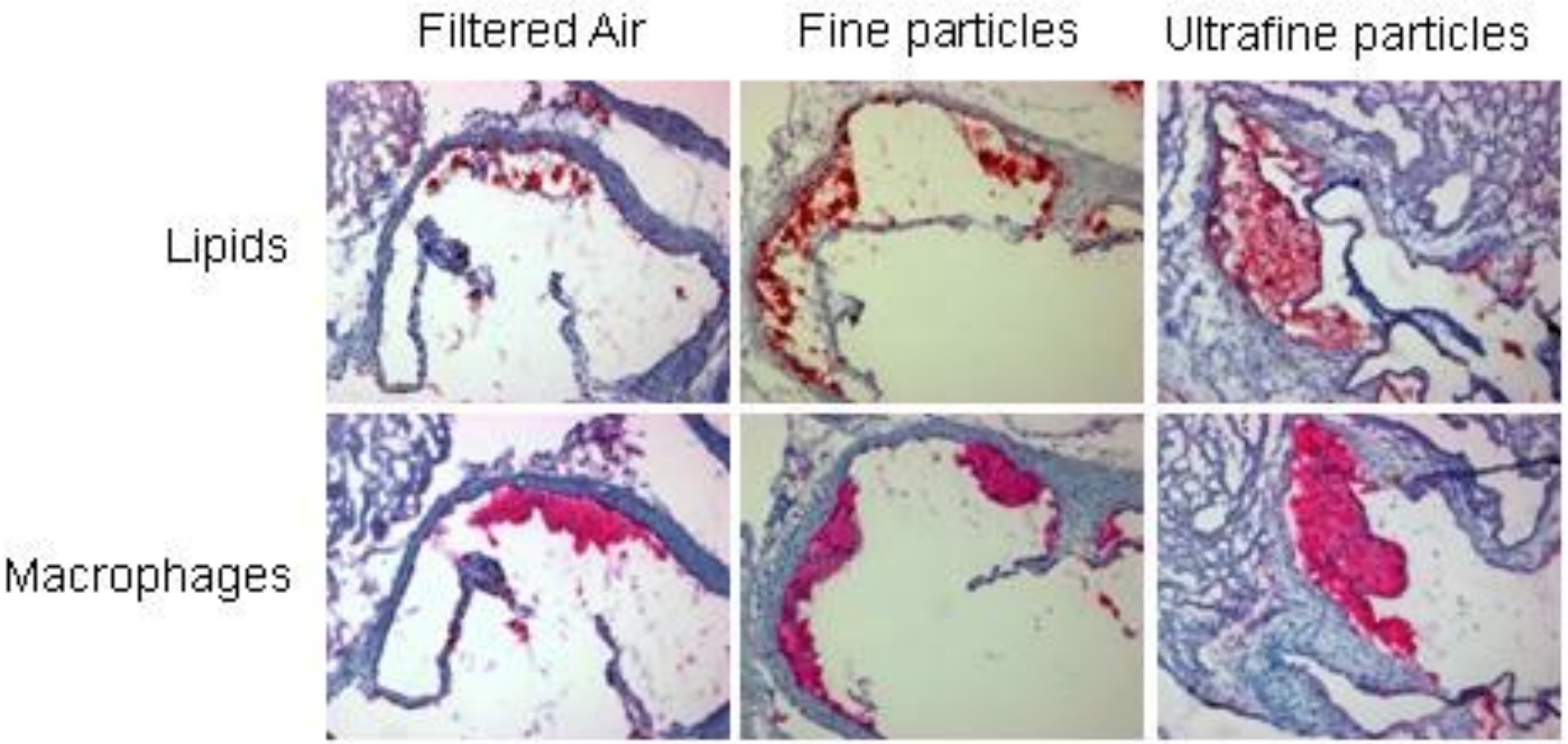
Fine particulates and health



http://www.airbetter.org/effects-air-pollution-human-health/

Heart disease…



http://www.nanotech-now.com/news.cgi?story_id=27536

NZ Studies

Christchurch study – a 3-4% rise in respiratory admissions and 1-2% rise in cardiac admissions with every 15 µg/m^3 increase in PM_{10}.

- McGowan et al, 2001, Australian and NZ Journal of Public Health

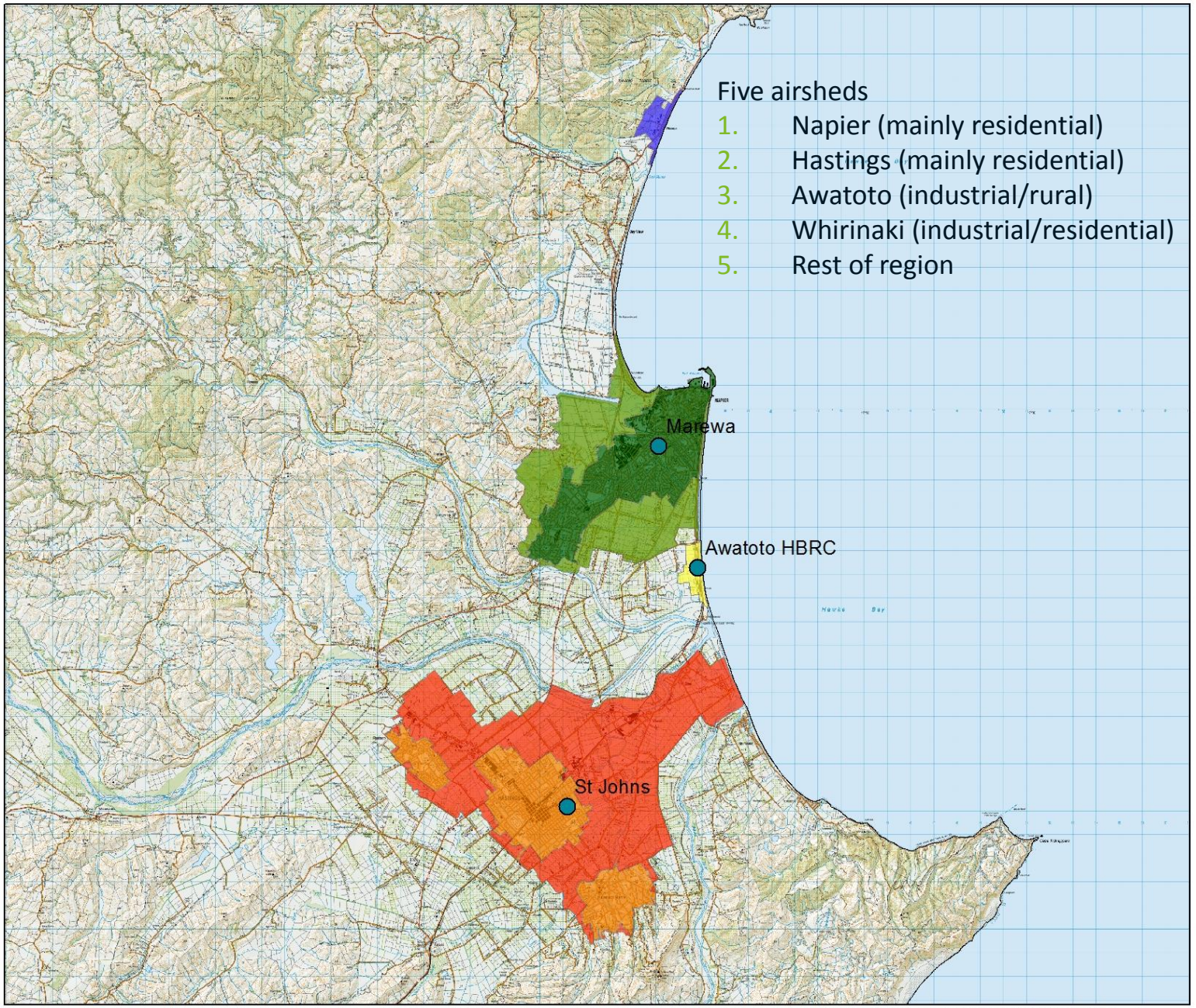
NZ Census mortality study - the odds of all-cause mortality in adults increased by 7% per 10 µg/m^3 increase in average PM_{10} exposure and 20% per 10 µg/m^3 among Maori. Associations were stronger for respiratory and lung cancer deaths.

- Hales S, Blakely T, Woodward A. J Epidemiol Community Health (2010).

HAPINZ - the estimated impacts on the population of Hawke's Bay (2006 data) are more than 100,000 restricted activity days, 54 hospital admissions, 113 premature adult deaths and social costs of $411 million

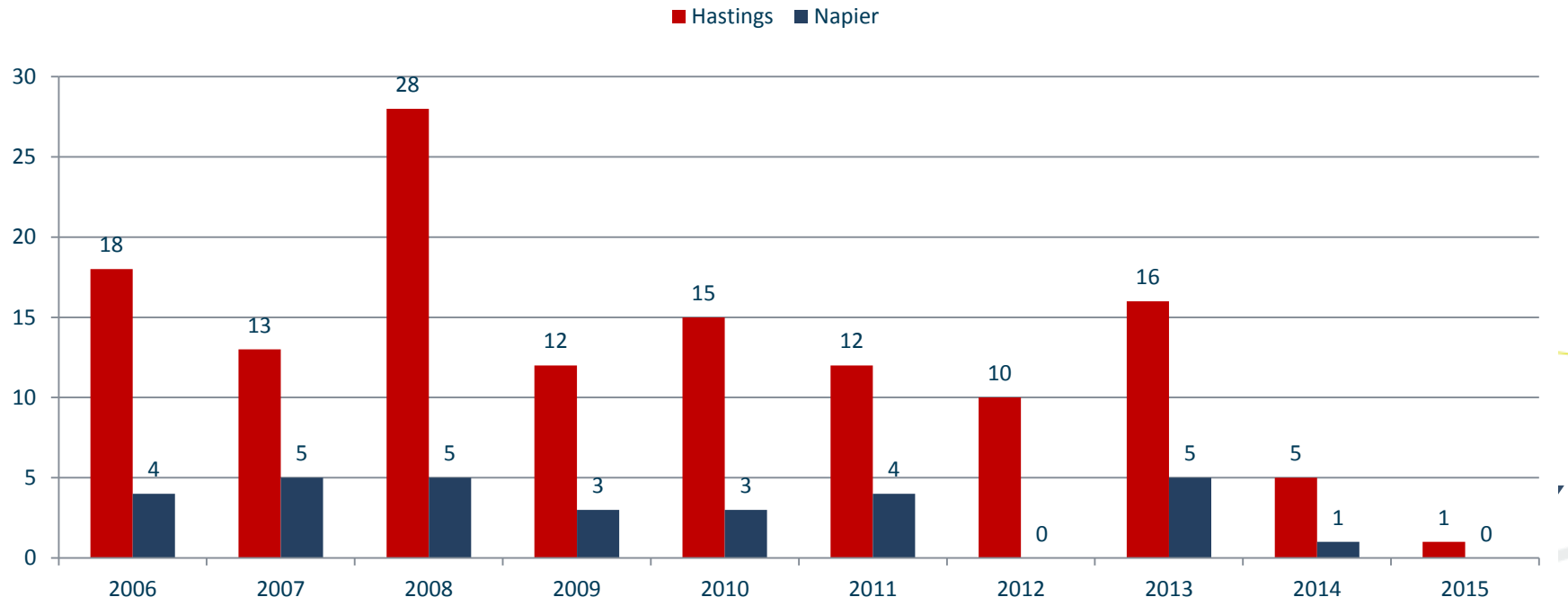
- Updated Health and Air Pollution in New Zealand Study, Kuschel et al., 2012.

Hawke's Bay Airsheds & Continuous $PM_{10/2.5}$ monitoring sites

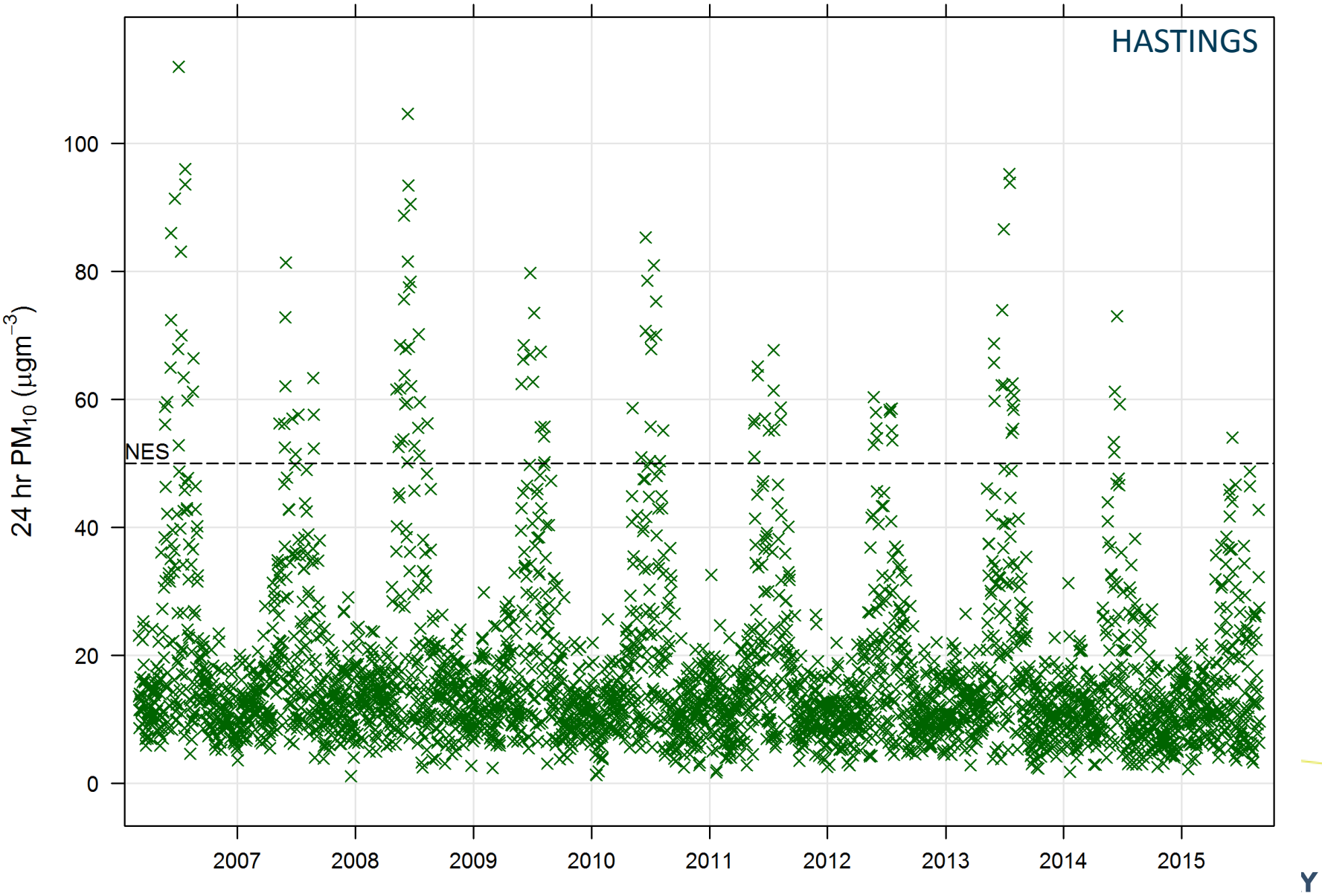


Annual exceedances of the National Environmental Standard (NES) for PM_{10}

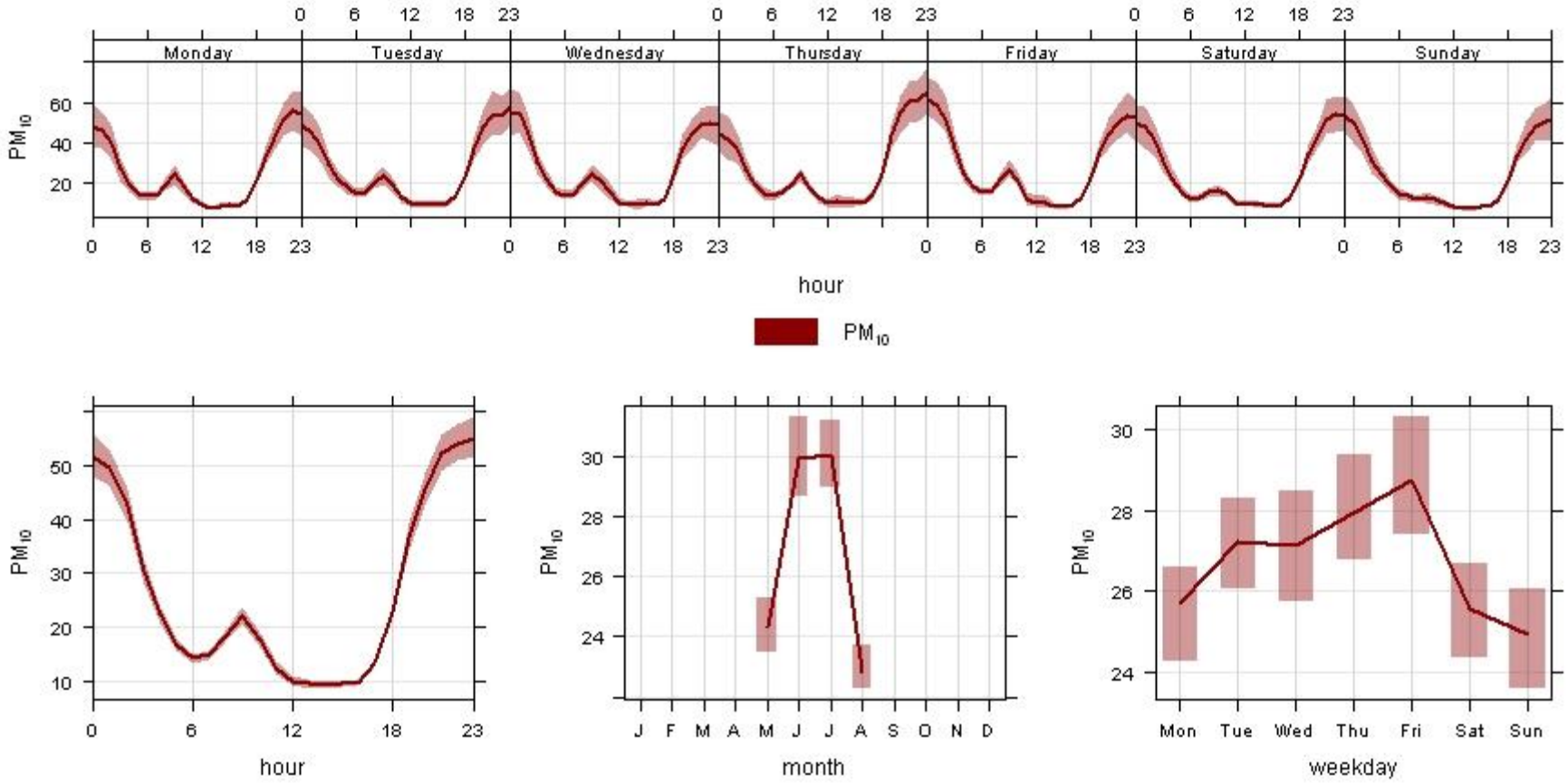
Contaminant	Standard	Time Average	Allowable exceedances per year
Carbon monoxide	10 mgm^{-3}	8 hours	1
Nitrogen dioxide	200 μgm^{-3}	1 hour	9
Ozone	150 μgm^{-3}	1 hour	0
PM_{10}	50 μgm^{-3}	24 hours	1
Sulphur dioxide	350 μgm^{-3}	1 hour	9
	570 ugm^{-3}	1 hour	0

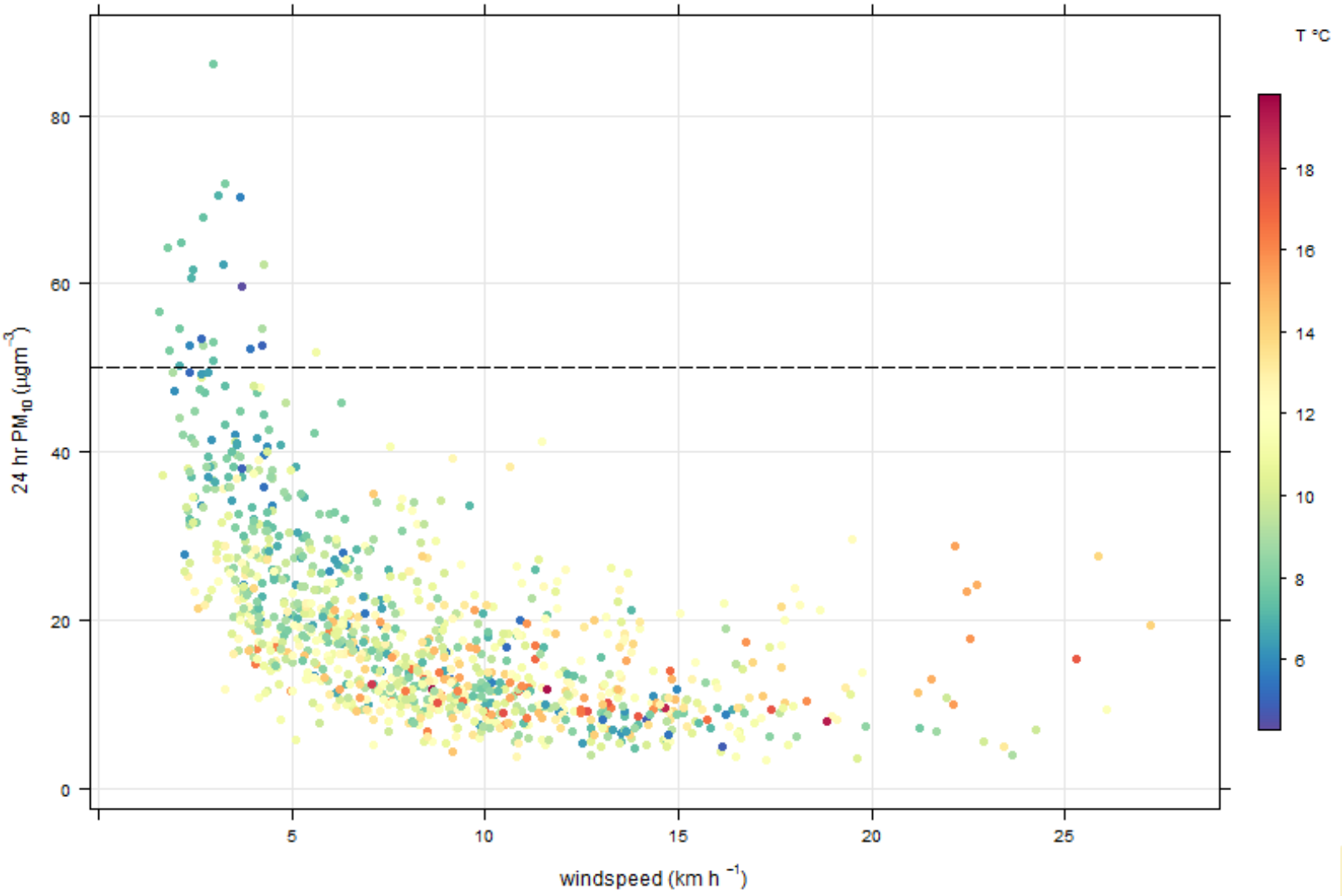


PM_{10} – a winter problem in residential airsheds



Typical residential (Hastings) winter hourly PM_{10} profile

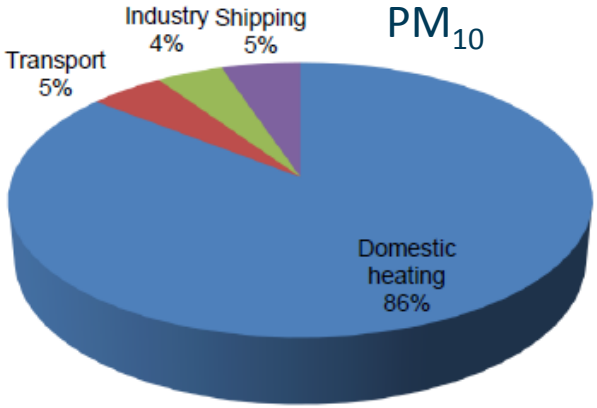


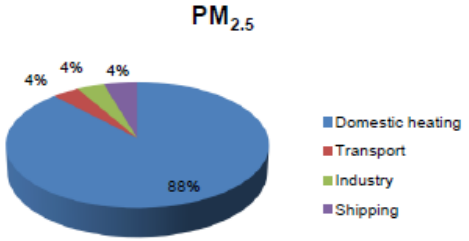


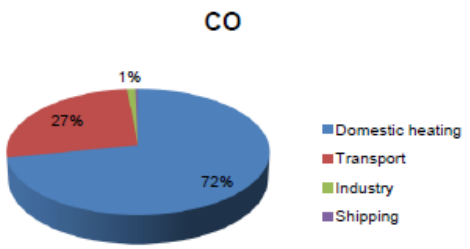
Meteorological influences on exceedances - Napier daily PM_{10} versus wind speed and temperature.

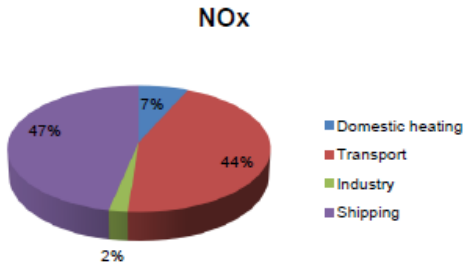
A characteristic day for an exceedance is when mean wind speed is less than 5 kmh^{-1} and mean temperature is less than 11°C.

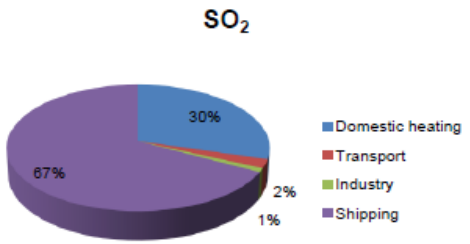
Emission Inventory 2015 – estimated sources of PM_{10} & other contaminants (Napier winter)

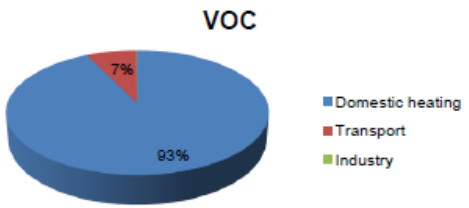


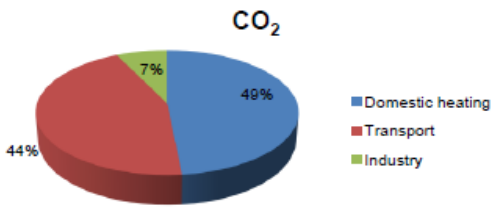






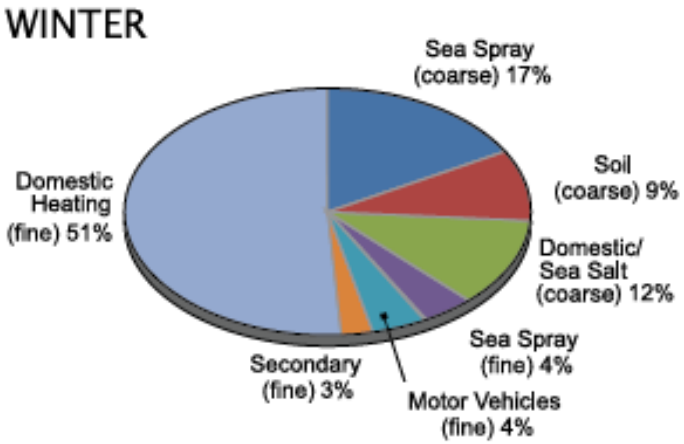


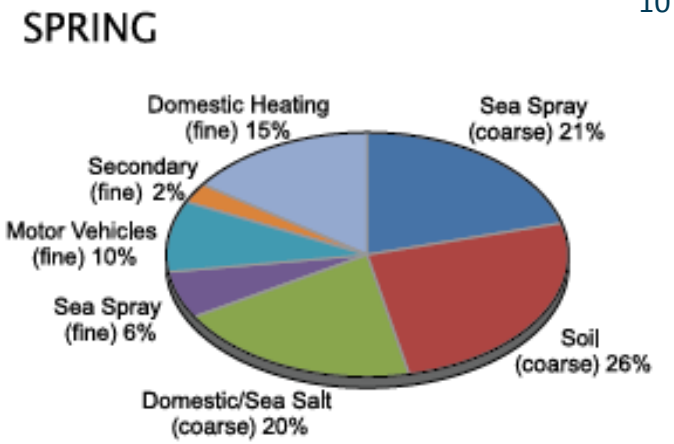


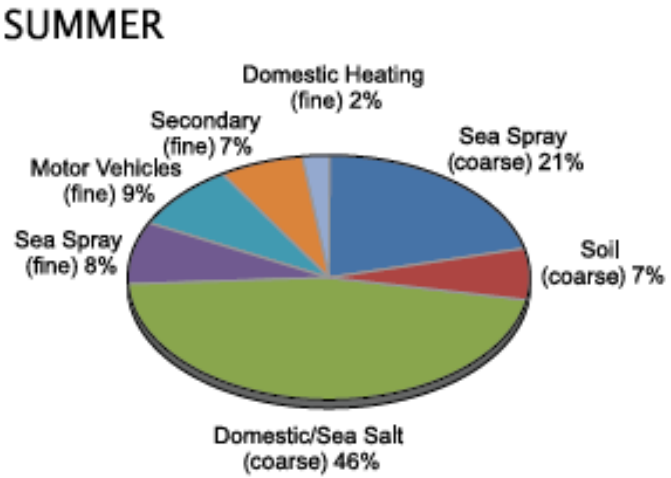


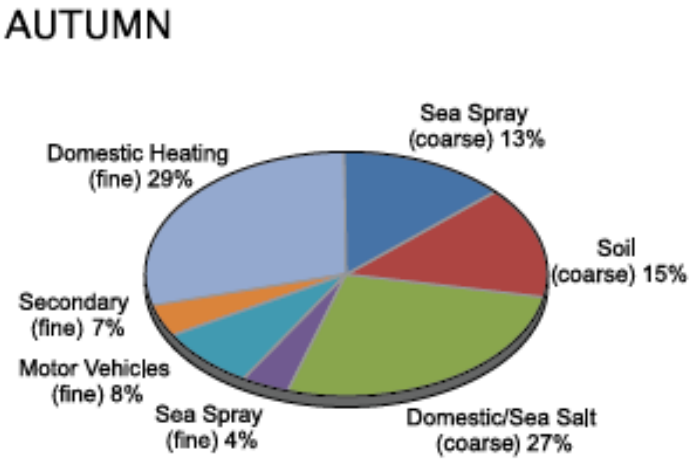
Source Apportionment 2010 – measured sources of PM_{10} & $PM_{2.5}$ (Napier)

PM_{10}

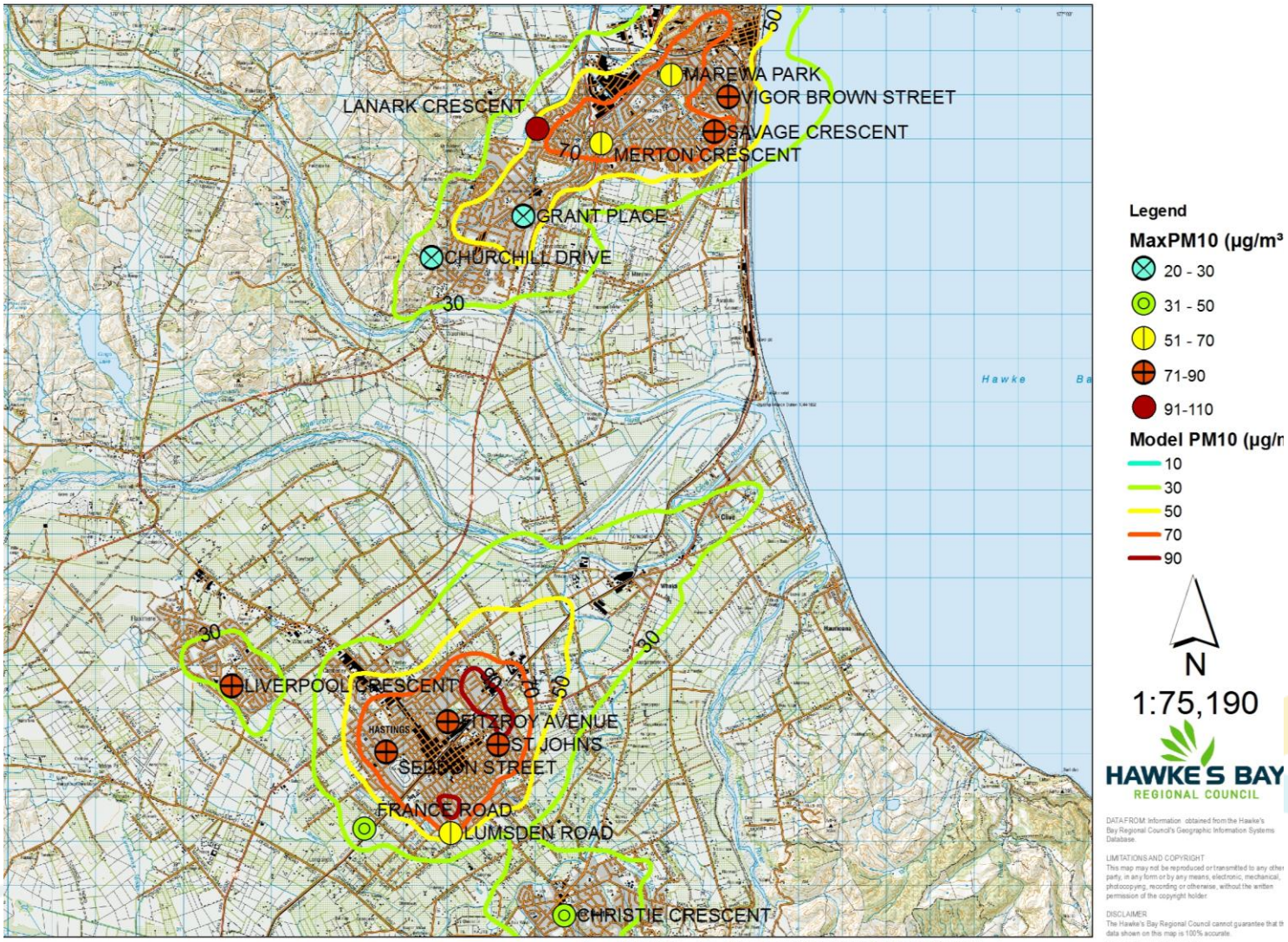




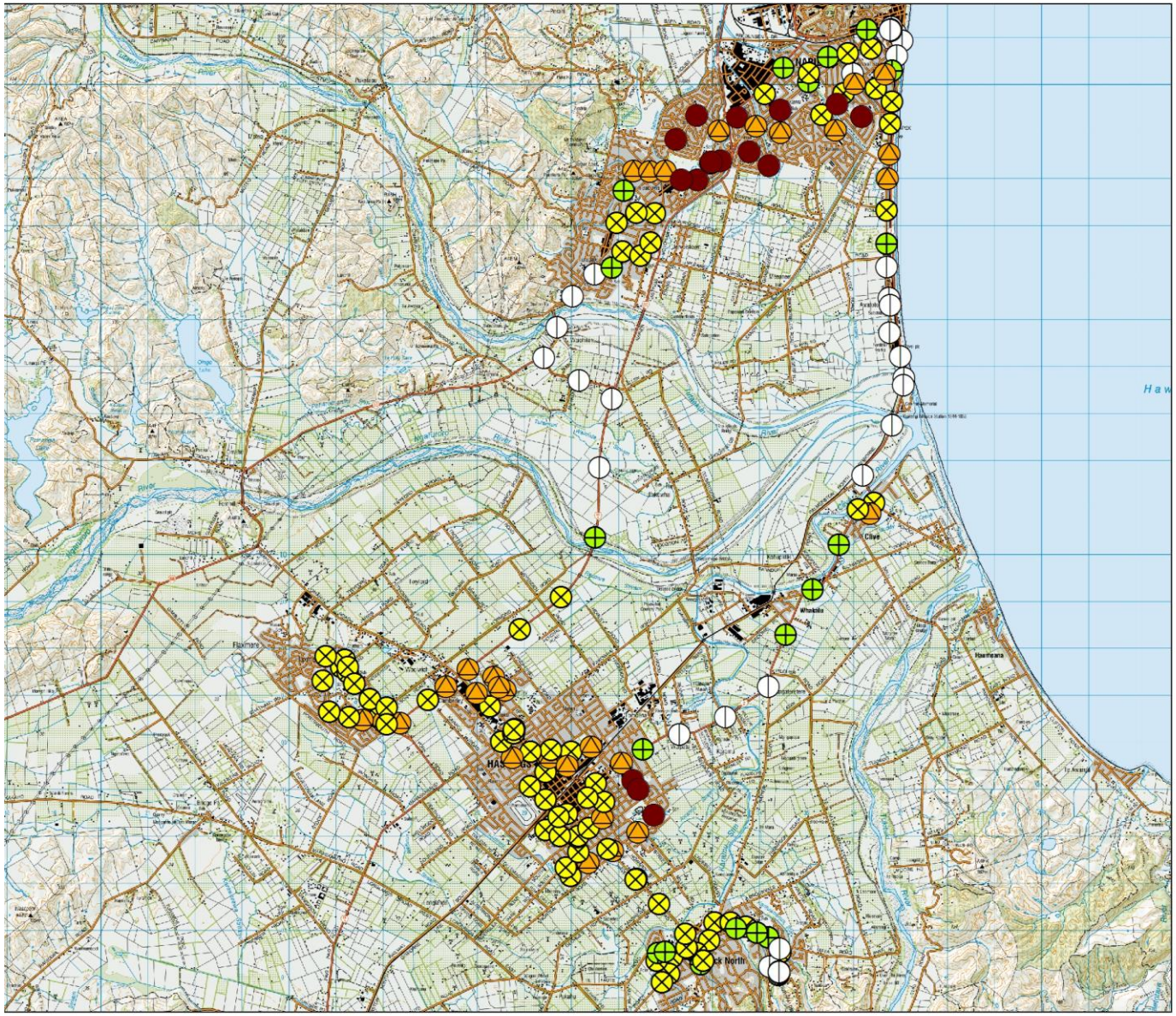




Airshed PM_{10} modelling 2012 – compared to a temporary network of PM_{10} monitors (2014)



Mobile PM_{10} monitoring

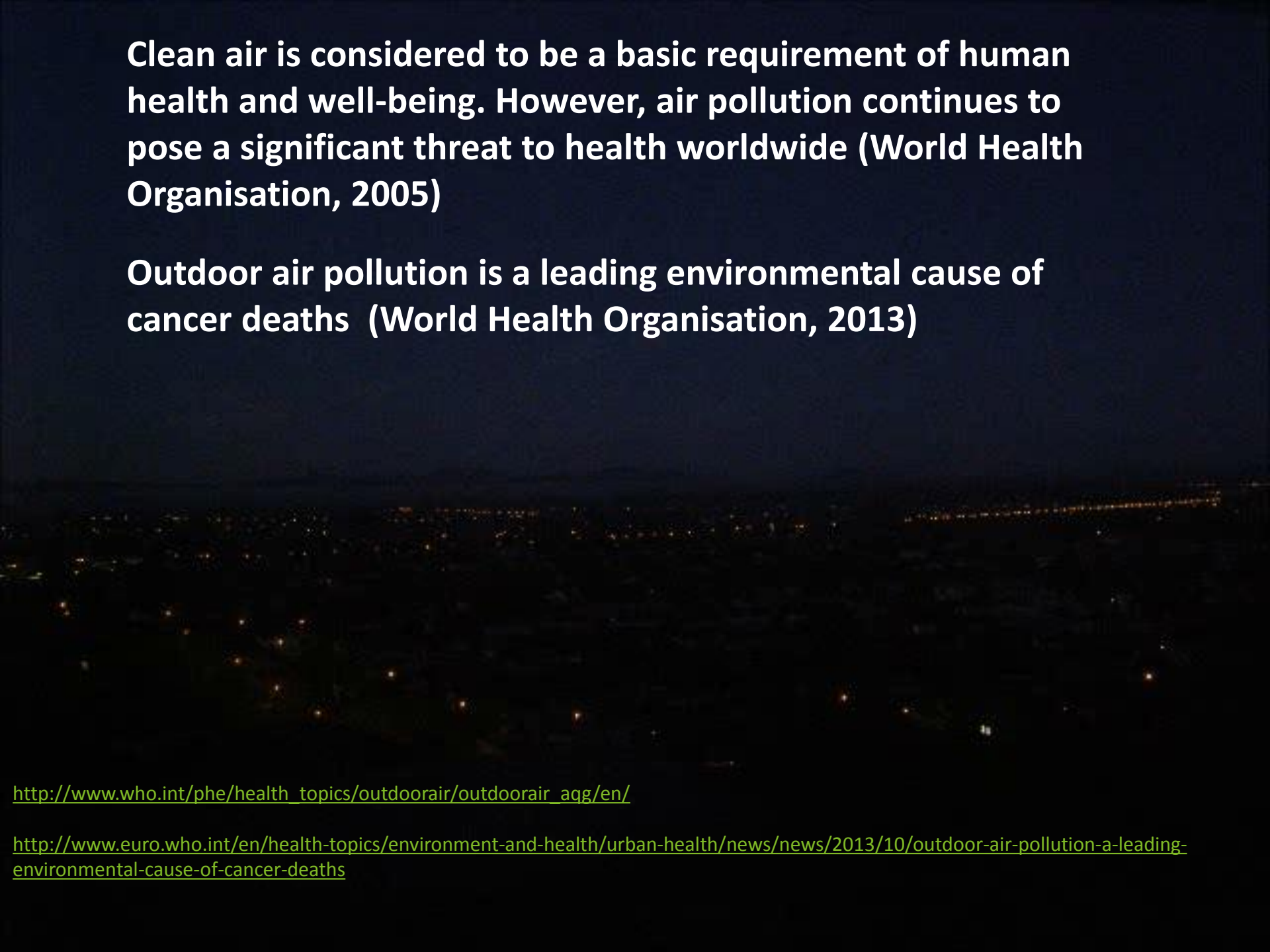


Mobile PM_{10} monitoring– identifying hotspots

The concentrations shown are instantaneous measurements taken at 1 minute intervals using a Dustrak (on the evening of 23rd June 2014).

Clean air is considered to be a basic requirement of human health and well-being. However, air pollution continues to pose a significant threat to health worldwide (World Health Organisation, 2005)

Outdoor air pollution is a leading environmental cause of cancer deaths (World Health Organisation, 2013)



http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg/en/

http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/news/news/2013/10/outdoor-air-pollution-a-leading-environmental-cause-of-cancer-deaths