











AdaptNSW

Understanding and adapting to climate change in New South Wales



Bringing together climate adaptation, Indigenous knowledge and community health

How can we build community connections and resilience in the face of climate change, improve our health and put Indigenous knowledge at the centre?

armidaleclimateandhealth.com.au

## Overview of this webinar

- Climate change and health in Australia evidence and recent studies
  - Bushfires
  - Heatwaves
  - Drought and mental health effects
- The environmental impact of healthcare
- Practical sustainability in general practice
- Discussion and next steps

# THE LANCET

Volume 373 · Number 9676 · Pages 1659-1734 · May 16-22, 2009

www.thelancet.com

"Climate change is the biggest global health threat of the 21st century."

See The Lancet Commissions page 1693

# The 2019 report of The *Lancet* Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate

Nick Watts, Markus Amann, Nigel Arnell, Sonja Ayeb-Karlsson, Kristine Belesova, Maxwell Boykoff, Peter Byass, Wenjia Cai,
Diarmid Campbell-Lendrum, Stuart Capstick, Jonathan Chambers, Carole Dalin, Meaghan Daly, Niheer Dasandi, Michael Davies, Paul Drummond,
Robert Dubrow, Kristie L Ebi, Matthew Eckelman, Paul Ekins, Luis E Escobar, Lucia Fernandez Montoya, Lucien Georgeson, Hilary Graham, Paul Haggar,
Ian Hamilton, Stella Hartinger, Jeremy Hess, Ilan Kelman, Gregor Kiesewetter, Tord Kjellstrom, Dominic Kniveton, Bruno Lemke, Yang Liu, Melissa Lott,
Rachel Lowe, Maquins Odhiambo Sewe, Jaime Martinez-Urtaza, Mark Maslin, Lucy McAllister, Alice McGushin, Slava Jankin Mikhaylov, James Milner,
Maziar Moradi-Lakeh, Karyn Morrissey, Kris Murray, Simon Munzert, Maria Nilsson, Tara Neville, Tadj Oreszczyn, Fereidoon Owfi, Olivia Pearman,
David Pencheon, Dung Phung, Steve Pye, Ruth Quinn, Mahnaz Rabbaniha, Elizabeth Robinson, Joacim Rocklöv, Jan C Semenza, Jodi Sherman,
Joy Shumake-Guillemot, Meisam Tabatabaei, Jonathon Taylor, Joaquin Trinanes, Paul Wilkinson, Anthony Costello\*, Peng Gong\*, Hugh Montgomery\*

#### Key facts:

- 1 degree C warming is having major effects already
- Primarily driven by fossil fuels

## Climate change a health emergency



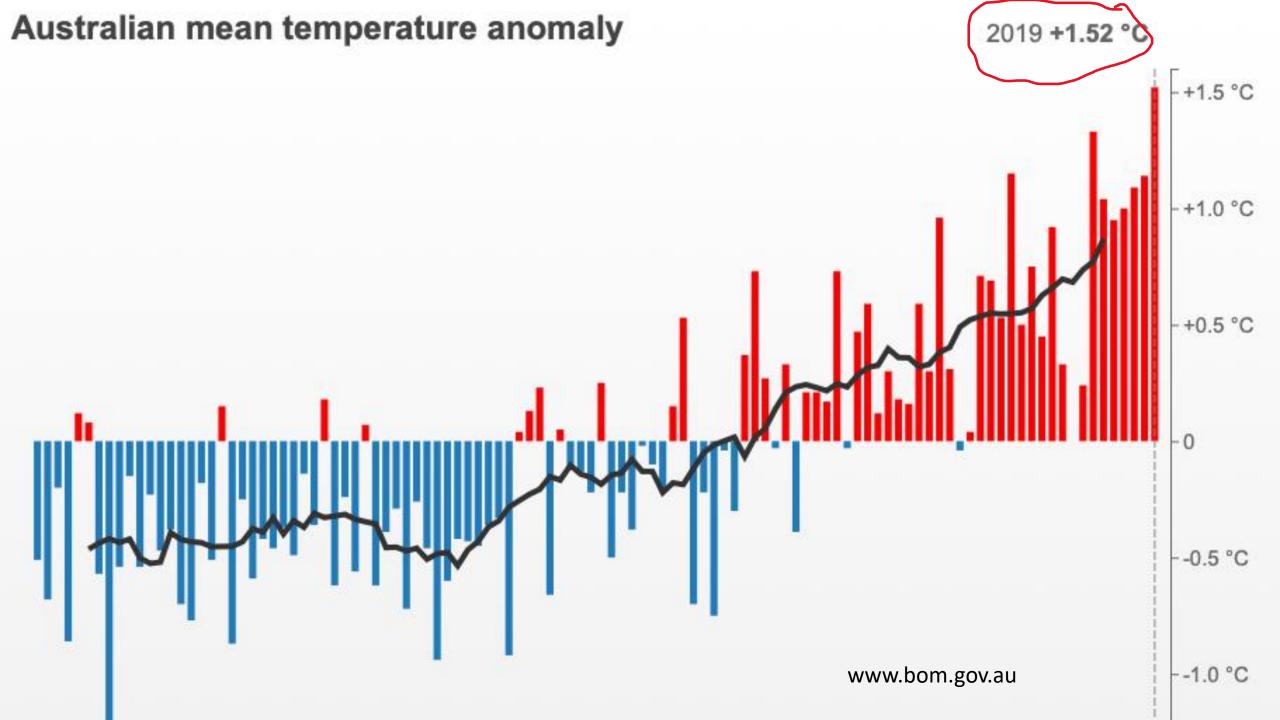




Royal Australian College of General Practitioners





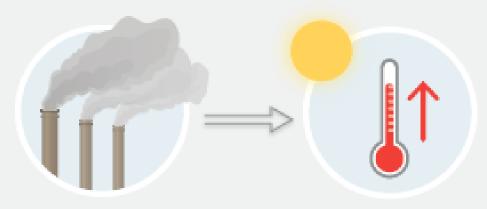


#### Increasing Levels of Carbon Dioxide and Short-Lived Climate Pollutants

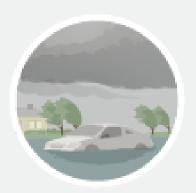
**Rising Temperature** 

Rising Sea Levels

#### Increasing Extreme Weather Events







## Demographic, Socioeconomic, Environmental, and Other Factors That Influence the Magnitude and Pattern of Risks

Geography

Ecosystem change

Baseline air and water quality

Agricultural and livestock practices and policies Warning systems

Socioeconomic status

Health and nutritional status

Access to effective health care

#### EXPOSURE PATHWAYS

Extreme Weather Events Heat Stress Air Quality Water Quality and Quantity Food Supply and Safety Vector Distribution and Ecology Social Factors

Haines and Ebi, 2019 NEJM

#### EXPOSURE PATHWAYS

Extreme Weather Events Heat Stress Air Quality Water Quality and Quantity Food Supply and Safety Vector Distribution and Ecology Social Factors



#### EXAMPLES OF HEALTH OUTCOMES



- Injuries
- Fatalities
- Mental health effects



Heat-related illness and death



- Exacerbations of asthma and other respiratory diseases
- Respiratory allergies
- Cardiovascular disease



- Campylobacter infection
- Cholera
- Cryptosporidiosis
- Harmful algal blooms
- Leptospirosis



- Undernutrition
- Salmonella food poisoning and other foodborne diseases
- Mycotoxin effects



- Chikungunya
- Dengue
- Encephalitis (various forms)
- Hantavirus infection
- Lyme disease
- Malaria
- Rift Valley fever
- West Nile virus infection
- Zika virus infection



Physical and mental health effects of violent conflict and forced migration (complex and context-specific risks)

#### Figure 3. Major Health Risks Associated with Climate Change.

Haines and Ebi, 2019

Examples of potential health outcomes and exposure pathways linking climate change with human health are shown, together with factors that can influence the magnitude and pattern of risks. The figure is based on several sources (e.g., Ebi et al., 5 Smith et al., 4 the World Health Organization, 16 Hallegatte et al., 17 and Missirian and Schlenker 18) and is not intended to be comprehensive.

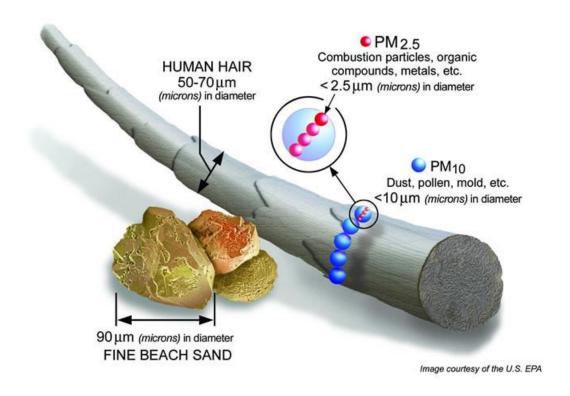


#### Research letter

# Unprecedented smoke-related health burden associated with the 2019–20 bushfires in eastern Australia

Nicolas Borchers Arriagada<sup>1</sup>, Andrew J Palmer<sup>1</sup>, David MJS Bowman<sup>2</sup>, Geoffrey G Morgan<sup>3,4</sup>, Bin B Jalaludin<sup>4,5</sup>, Fay H Johnston<sup>1,2</sup>

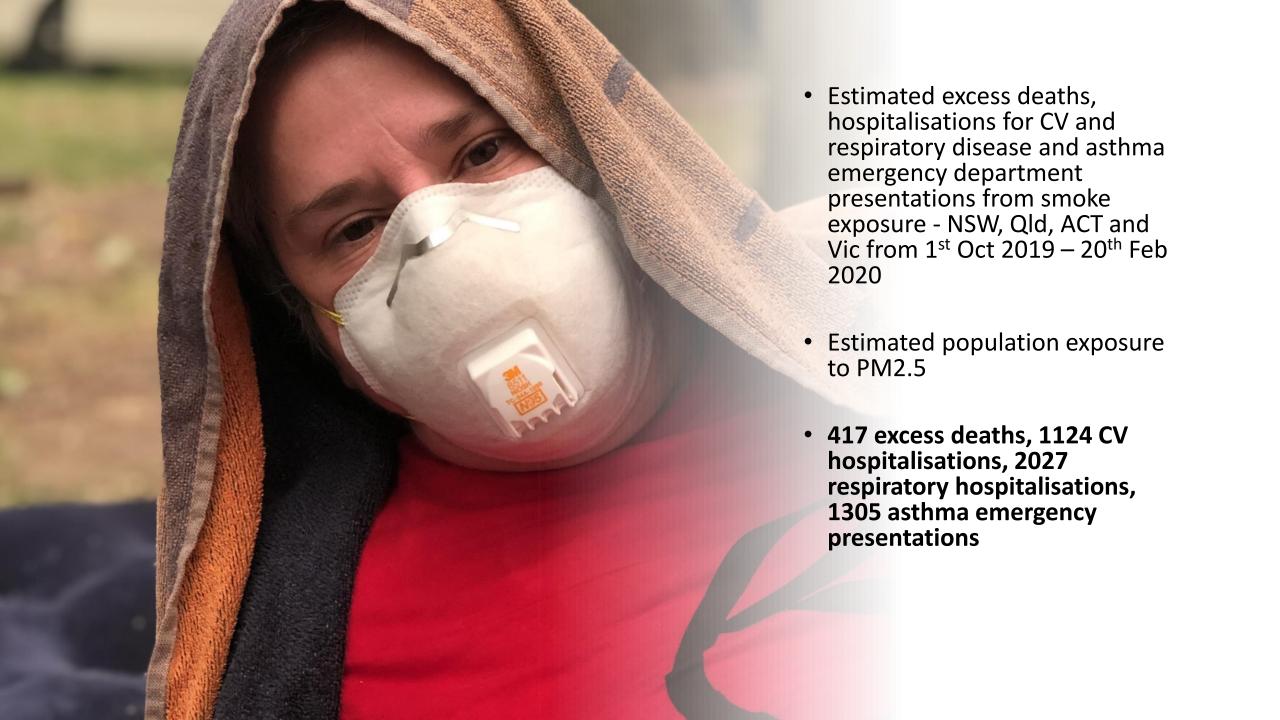
### Particulate matter – PM2.5

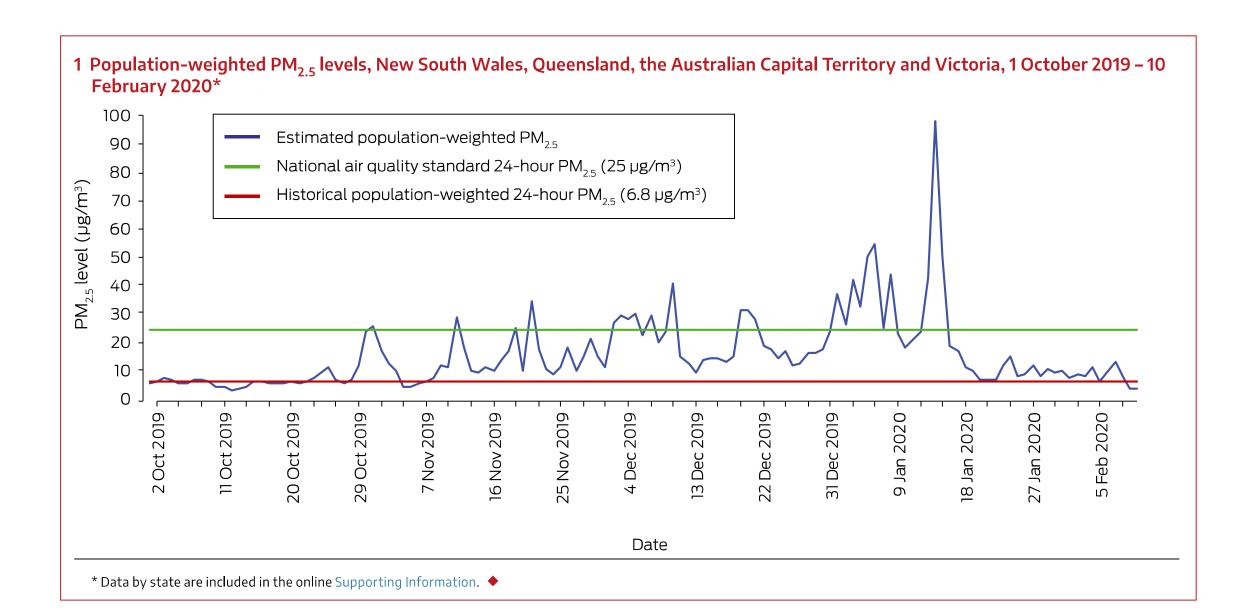


Coarse = PM<sub>10</sub> 10 microns or less

Fine =  $PM_{2.5}$ 2.5 microns or less

Ultrafine =  $PM_{0.1}$ 0.1 microns or less





## 2 Estimated health burden attributable to bushfire smoke, Queensland, New South Wales, the Australian Capital Territory and Victoria, 1 October 2019 – 10 February 2020

#### Estimated number of cases (95% confidence intervals)

	Australian Capital				
Outcome	Queensland	<b>New South Wales</b>	Territory	Victoria	Total
Excess deaths (any cause)	47 (17–77)	219 (81–357)	31 (12–51)	120 (44–195)	417 (153–680)
Hospital admissions, cardiovascular	135 (25–246)	577 (108–1050)	82 (15–149)	331 (62–602)	1124 (211–2047)
Hospital admissions, respiratory	245 (0–513)	1050 (0–2204)	147 (0–308)	585 (0–1227)	2027 (0–4252)
Emergency department attendances, asthma	113 (61–165)	702 (379–1026)	89 (48–131)	401 (217–586)	1305 (705–1908)





Australian bushfires 2019–20

Exploring the short-term health impacts

- Clear increase in respiratory presentations in NSW, by up to 86%
- Sales data from pharmacies increase in salbutamol sales, by up to 144%

- Mental health more than half of Australian adults felt anxious/worried by the fires.
- Increase in Lifeline calls
- Additional Medicare items for mental health affected by bushfires – almost 500 claims/week

## Heatwaves

## Sydney clocks the hottest place on Earth as hot weather continues

By William McInnes

Updated 8 January 2018 — 5:11pm, first published at 6:40am

High temperatures, combined with high humidity, made it an unpleasant sleep for some in Sydney overnight.



The Bureau of Meteorology confirmed on Monday that Penrith had reached the highest temperature on earth in the past 24 hours when it reached 47.3 degrees on Sunday afternoon.



## Case Study Melbourne, Australia, 2009

#### **Temperatures**

27-31 January 2009: max temperatures 12-15°C above summer norm.

28-30 Jan: > 43°C

Number of ambulance call-outs

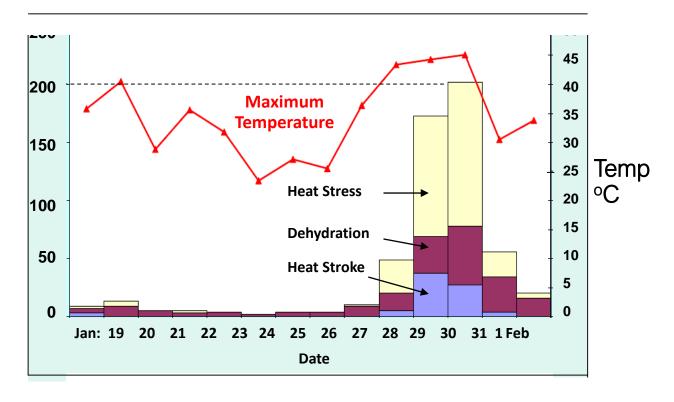
#### Call-outs, deaths

January 28-30:

46% increase in ambulance call-outs

126 out-of-hospital **deaths** (vs. 44 expected deaths)

Ambulance call-outs for heat-related illnesses in Metropolitan Melbourne, 19 Jan - 1 Feb, 2009



Source: January 2009 Heatwave in Victoria: an Assessment of Health Impacts. *State of Victoria 2009* 



RESEARCH Open Access

# Emergency department visits, ambulance calls, and mortality associated with an exceptional heat wave in Sydney, Australia, 2011: a time-series analysis

Andrea Schaffer<sup>1\*</sup>, David Muscatello<sup>1</sup>, Richard Broome<sup>2</sup>, Stephen Corbett<sup>3</sup> and Wayne Smith<sup>2</sup>

**Results:** During the heat wave there were 104 and 236 ED visits for heat effects and dehydration respectively, and 116 ambulance calls for heat exposure. From the regression model, all-cause ED visits increased by 2% (95% CI 1.01-1.03), all-cause ambulance calls increased by 14% (95% CI 1.11-1.16), and all-cause mortality increased by 13% (95% CI 1.06-1.22). Those aged 75 years and older had the highest excess rates of all outcomes.



#### Canada

**Leyland Cecco** in Toronto

Sat 3 Jul 2021 10.01 AEST

## Record heatwave may have killed 500 people in western Canada

British Columbia reports jump in number of 'sudden and unexpected deaths' and links them to extreme weather



▲ A person enters the Hillcrest Community Centre where they can cool off, during the extreme hot weather in Vancouver on 30 June. Photograph: Don Mackinnon/AFP/Getty Images

Nearly 500 people may have been killed by record-breaking temperatures in Canada's westernmost province, as officials warn the grim toll from "heat dome" could rise again as more deaths are reported.

On Friday, British Columbia's chief coroner said that 719 "sudden and unexpected deaths" had been reported over the past week - triple the number during a similar period in a typical year.



## Drought-related stress among farmers: findings from the Australian Rural Mental Health Study

Emma K Austin, Tonelle Handley, Anthony S Kiem, Jane L Rich, Terry J Lewin, Hedda H Askland, Sara S Askarimarnani, David A Perkins and Brian J Kelly Med J Aust 2018; 209 (4): 159-165. || doi: 10.5694/mja17.01200

Published online: 30 July 2018

- Data from Australian Rural Mental Health study (ARMHS), collected 2007-2013
- Outcome measures were personal drought-related stress (PDS), community drought-related stress (CDS) and general psychological distress (K10)
- Farmers that were under 35, both lived and worked on a farm, experienced greater financial hardship, and were in outer regional, remote or very remote NSW had higher drought related stress



Research

## Psychological outcomes following the Victorian Black Saturday bushfires

Richard A Bryant 1,8, Elizabeth W aters<sup>2</sup>, Lisa Gibbs<sup>2</sup>, H Colin Gallagher<sup>3</sup>, Philippa Pattison<sup>3</sup>, Dean Lusher<sup>4</sup>, Colin MacDougall<sup>5</sup>, Louise Harms<sup>6</sup>, Karen Block<sup>2</sup>, Elyse Snowdon<sup>2</sup>, Vikki Sinnott<sup>5</sup>, Greg Ireton<sup>7</sup>, John Richardson<sup>8</sup> and David Forbes<sup>9</sup>



Australian & New Zealand Journal of Psychiatry 2014, Vol. 48(7) 634–643 DOI: 10.1177/0004867414534476

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**\$SAGE** 

**Editor's Choice** 

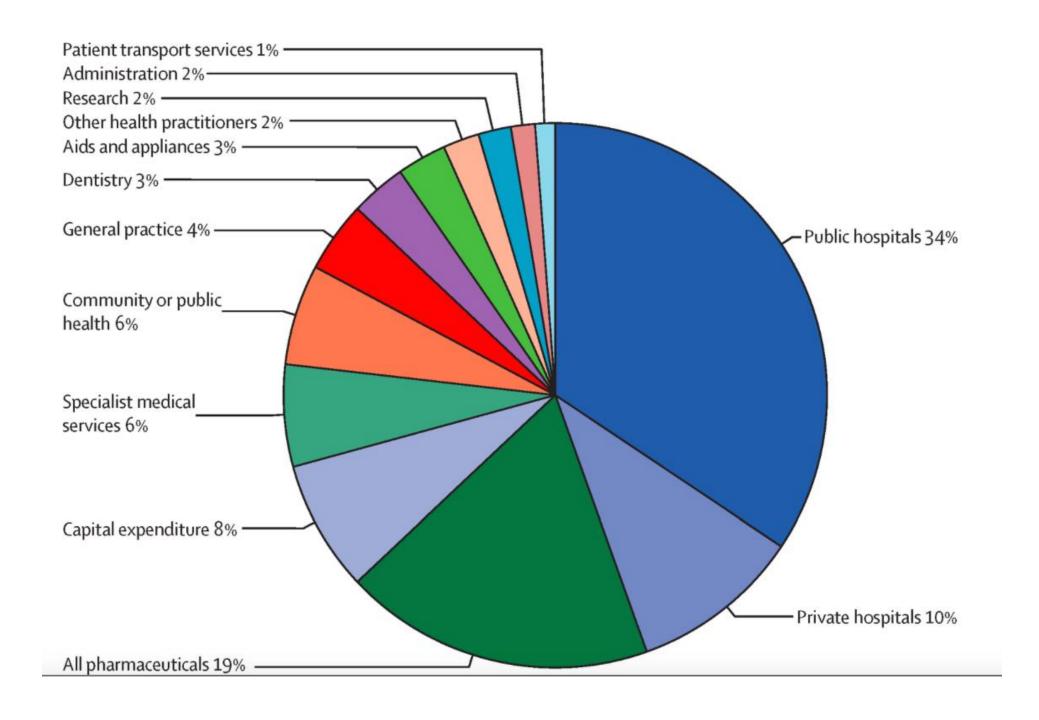
Table 2. Prevalence of mental health conditions across communities.

Psychological outcome	High-affected (N = 630) N (%) <sup>a</sup>	Medium-affected (N = 182) N (%)	Low-affected (N = 205) N (%)	
PTSD (fire-related) <sup>b</sup>	97 (15.6)	13 (7.2)	2 (1.0)	
PTSD (general) <sup>c</sup>	135 (21.7)	25 (13.8)	18 (8.8)	
MDE	81 (12.9)	16 (8.8)	13 (6.3)	
Psychological distress <sup>d</sup> None (resilient) Mild Severe mental illness	487 (77.3) 77 (12.3) 61 (9.8)	148 (81.3) 20 (11.1) 9 (5.0)	174 (84.9) 21 (10.2) 10 (4.9)	
Heavy drinking	155 (24.7)	34 (18.7)	40 (19.6)	



## THE LANCET Planetary Health







## Benalla Church Street Surgery

- Located in North East Victoria
- Open 57 hours per week
- 14 doctors, 11 administration staff, 7 nurses



## Practice meetings and the diversity of views



### Towards an environmentally sustainable future

#### **Aims**

Reduce carbon emissions to as close to zero as possible and if possible save money while doing it.

Advocate for personal action towards a more environmentally sustainable future by example.



"There are **known knowns**.

These are things we know that we know.

"There are **known unknowns**.

That is to say, there are things that we know we don't know.

"But there are also unknown unknowns. There are things we don't know we don't know."

Donald Rumsfeld

## Practice Energy Audit

Ecomaster Pty Ltd engaged to complete energy assessment.

#### Results

For <\$1,500 for energy assessment (plus practice partner time) the surgery now has a dramatically improved understanding of:

- how it uses/wastes energy
- opportunities for significant immediate savings 22% of current outgoings
- priorities for immediate and longer term investment

## Energy Consumption 2016

	Daily	Annual
Energy consumption	170 kWh	62,050 kwh
Cost	\$63	\$22,958
CO2*	221 kg	79,000 kg
Balloons	4,420	1,500,000

## Findings

Surprise energy waste

= 30 kWh/day = 14,235 kg CO2 pa = \$4,051 saving

Mysterious background energy use

= 36 kWh/day

? PABX /Malfunctioning air exchanger



Boiling Billy Running 24/7

### Duelling air conditioners







Excessive amount Hot Water 630 L



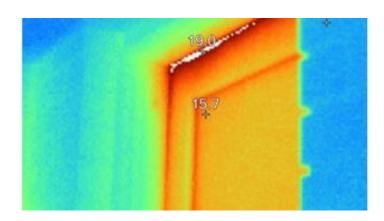
Front door draft

#### Thermal images



Above: Draft around window

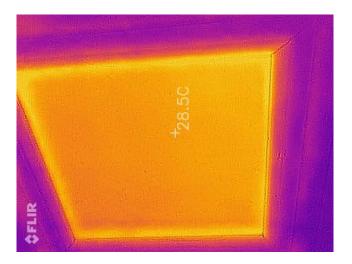
Below: Heat escaping through door





Above: Missing ceiling insulation lets in summer heat

Below: Skylight lets in summer heat



# Cost of potential responses

	Cost	Energy saving (kwh/day)	ROI (years)
Solar panels 25kw array	\$32,000	76	3.1
Draft proofing	\$5,600	10.8	3.8
Shading	\$6,000	8	4
Ceiling insulation	\$5,700	6.8	6.2
A/C current COP	\$50,000	23.0	16
Secondary glazing	\$28,811	5.2	41

#### Actions to reduce building energy use

- Draft proofing of Surgery
- Reset thermostats for heating/cooling 21C winter and 24C summer
- Change Energy Provider now use 100% Renewable Energy (at a cost premium of 8.2c /Kwh)
- New Air conditioner/Heating System
- Smaller more energy efficient HWS
- Insulation
- Investigating solar panels

#### Average daily kWh purchased from the grid

	2015	2016	2017	2018	2019	2020
Winter	223	NA*	140	124	94	84
Summer	191	199	99	49	27	24
Total Winter+Summer	414		239	173	121	108
% change cf 2015			-42%	-58%	-71%	-74%

Jun-17 Install new reverse cycle split system AC Sep-18 Install 20kW solar array

NA\* - Not available - Incomplete data due to change in provider

#### Additional Sustainability Actions

#### **Waste Management**

- Educated staff (clinical/admin & cleaning ) on waste management and added recycling bins /trays throughout surgery
- Decreased Clinical Waste 8.8% (decrease from last year despite having excisions commenced at surgery)
- Decreased general waste by 3 bins a fortnight (360L per week / 18,720 L per year)
- Increased recycling by 3 bins a fortnight
- Added 1 organics bin a fortnight

#### Reduce paper use

#### Decrease paper usage by 35,000 sheets per year

- all incoming faxes going to email
- reusing paper
- emailing payslips/ Reports / meeting minutes & agenda
- Incoming & Outgoing emailing patient results and reports /specialists letters
- Hot Docs Recall/Reminder System

#### Cost savings for current financial year to date

Clinical waste \$280General waste \$250

Printing & Stationery \$2,600

TOTAL SAVING \$3,130



Advertising avalanche



# The sample drawers

#### Additional Sustainability Actions cont.

- Recycling printer cartridges to Planet Ark
- Harmful chemicals-sprays/ hand washes ..replace
- Turnover of stock
- Reduce pharmaceutical advertising
- No longer stocking samples
- Leadership ..Joined North East Sustainability and Health Group, Taken the TAKE 2
   Pledge

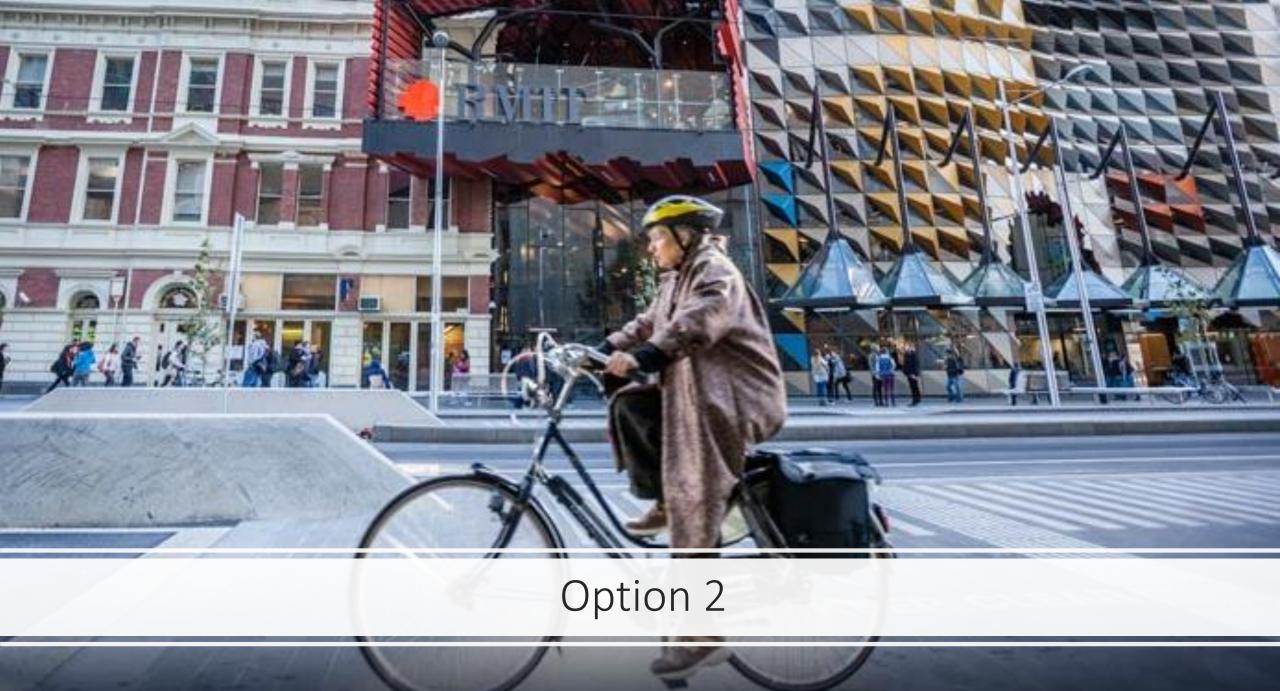


# Vehicle energy comparison

15,000 kms/annum	Fuel consumption (litres/100kms)	Fuel (litres/year)	kg CO2	Kw equivalents (coal)	Kwh/day
Large 4WD	10	1,500	4,180	3,344	9.1
Small car	5.00	750	2,090	1,672	4.55
Tesla 90D - grid recharge	0	0	2,500	1,987	5.44
Tesla 90D - 100% renewable	0	0	0	0	0



Option 1



#### Communicating actions to our patients





Connecting with and sharing information with other community based Health Providers





#### Resources and networks

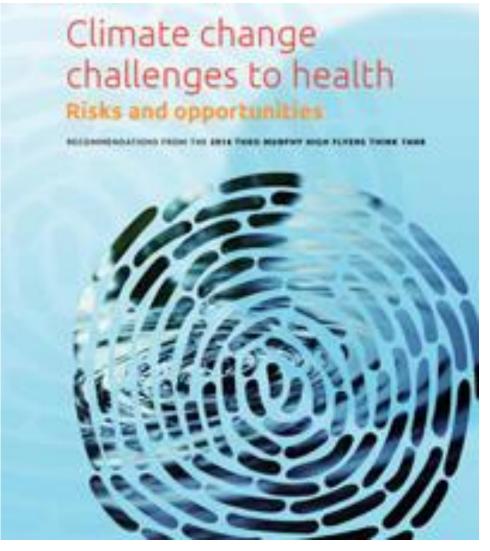


www.caha.org.au

www.greenhospitals.net







https://www.science.org.au/learning/general-audience/science-booklets-0/science-climate-change

https:www.science.org.au/supporting-science-sector-analysis/reports-and-publications/climate-change-challenges-health

#### SYDNEY NORTH HEALTH NETWORK

# CLIMATE AND HEALTH STRATEGY 2020







A member based group that policy makers listen to



#### Engagement with the broader community



#### What Can a Doctor Do?

- Practicing good medicine
  - Public health (smoking, alcohol, obesity, diabetes, advance care planning)
  - Avoid polypharmacy, minimize medication in the elderly
  - i.e. being a 'good G.P.'
- Teleconferencing/Telemedicine
- Think about how you travel
- "How green was your electricity today?"
  - Know your unknowns
- Join Community projects (electricity use)
- Use your member based organizations

#### Global Green and Healthy Hospitals | Agenda Goals



Leadership

Prioritize environmental health as a strategic imperative



Chemicals

Substitute harmful chemicals with safer alternatives



Waste

Reduce, treat and safely dispose of healthcare waste



Energy

Implement energy efficiency and clean, renewable energy generation.



#### Water

Reduce hospital water consumption and supply potable water



Transportation

Improve transportation strategies for patients and staff



Food

Purchase and serve sustainably grown, healthy food



**Pharmaceuticals** 

Prescribe appropriately, safely manage and properly dispose of pharmaceuticals



**Buildings** 

Support green and healthy hospital design and construction



Purchasing

Buy safer and more sustainable products and materials

We are using the Global Green and Healthy Hospitals Goals as a guide

www.greenhospitals.net

