Healesville Environment Watch Inc.

P O Box 444 Healesville VIC 3777
Phone/fax: (03) 5962 1224
Tues & Thurs: (03) 5962 5982
Secretary: Maureen Bond hewisec@bigpond.com

HEALESVILLE ♦ CHUM CREEK ♦ YARRA GLEN ♦ BADGER CREEK ♦ DIXONS CREEK ♦ STEELS CREEK ♦ TARRAWARRA

ABN: 67 253 515 594 ♦ Reg. No: A0018935T ♦
http://hewi.friends.melbournewater.com.au

This submission is made on behalf of Healesville Environment Watch Inc. (HEWI) and C4 (Communities Combating Climate Crisis) Healesville. It primarily addresses the causes and circumstances of the Victorian bushfires of February 2009. In particular it invites the Royal Commission to examine the substantial body of evidence of a connection between climate change and the extreme weather conditions that exacerbated the intensity and rate of spread of the fire, resulting in such tragic losses.

Climate Change and Extreme Fire Weather

The potential for increased risk of catastrophic bushfires in Victoria resulting from a changing climate has been acknowledged for at least the past two decades.

As early as 1989 the Victorian government was warned of the danger in a report for the EPA, which stated, "It should be noted that a number of practical consequences, such as … increases in degree-days, … and possibly increases in fire risk and episodic summer aridity, will occur ..." [1]

Since then there has been an enormous amount of scientific research leading to a better understanding and wide acceptance of Anthropogenic Global Warming. The link to extreme weather conditions leading to increased fire danger has been confirmed. In its 2007 report the Intergovernmental Panel on Climate Change stated, "An increase in fire danger in Australia is likely to be associated with a reduced interval between fires, increased fire intensity, a decrease in fire extinguishments and faster fire spread. In south-east Australia, the frequency of very high and extreme fire danger days is likely to rise 4-25% by 2020 and 15-70% by 2050. [2]

Releasing his 2007 report[3], researcher Dr Chris Lucas suggested a frightening outlook for residents of fire-prone areas. He said bushfire seasons in recent years had exceeded predictions for 2050 with extreme fires such as those in Victoria in 2002-03 and 2006-7 possibly providing an indication for the future. "Over the last five or six years, we've been seeing this increase in fire danger, and seasons like last year's are going to keep occurring," he said.[4]

In his 2008 report[5], Ian McPhail, the Victorian Commissioner for Environmental Sustainability, warned -

Climate change is affecting us already. Victoria has warmed by 0.6°C since the 1950s. Six out of the ten hottest years on record in Victoria have occurred since1990, with 2007 being the hottest year of all. Rainfall during the last ten years has also been much lower than the historical long-term average.
Climate change projections for Victoria include:

- *higher temperatures of 0.6°C to 1.2°C by 2030*
- *very high or extreme fire danger days across south-eastern Australia expected to increase by up to 25% by 2020 and up to 230% by 2050.*

In the first week of February, just before the fires, Professor Barry Brook of the University of Adelaide published a clear argument linking the January heat-wave to Climate Change.[6]

After the event, the Australian Bureau of Meteorology special report on the February bushfires[7] opened unambiguously - "Victoria experienced extreme fire weather conditions on Saturday 7 February that led to the tragic losses."

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[1] Regional Impact of the Greenhouse Effect in Victoria, A Barrie Pittock and K J Hennessy, CSIRO Division of Atmospheric Research, December 1989
[2] IPCC Fourth Assessment Report (2007) WGII
[3] Bushfire Weather in Southeast Australia: Recent Trends and Projected Climate Change Impacts, http://www.climateinstitute.org.au/images/stories/bushfire/fullreport.pdf
[4] *The Australian*, 27 September 2007
[5] State of the Environment Victoria 2008 Summary, Published by the Commissioner for Environmental Sustainability Melbourne, Victoria, 2008
[6] http://bravenewclimate.com/2009/02/03/is-there-a-link-between-adelaides-heatwave-and-global-warming/
[7] http://www.bom.gov.au/weather/vic/sevwx/fire/20090207/20090207_bushfire.shtml

Dr Grant Blashki, Senior Research Fellow, Nossal Institute, University of Melbourne concurred, “At the very least recent weather events in Victoria may be giving us a taste of what climate scientists say we can expect in coming decades.”

In a commentary published on 16th February 2009[8], Premier Brumby's chief scientific advisor, Professor David Karoly, leaves no room for doubt, "it is clear that climate change is increasing the likelihood of environmental conditions associated with extreme fire danger in south-east Australia.

Following this lead, the Premier himself has publicly made the connection between climate change and the February fires on a number of occasions.

The link between climate change and the bushfires provided the title and theme of a powerful speech given in Melbourne by John Connor of the Climate Institute, "The Fires of Climate Change".[9]

Clearly this connection between climate change and increased risk of extreme bushfires is not controversial amongst informed scientists and commentators. In February 2009, in the words of Professor Stephen Schneider (Stanford University USA and IPCC)[10], we witnessed, “Nature cooperating with theory”, with tragic results.

How does Climate Change contribute to bushfire danger, frequency and intensity?

Fire danger and difficulty of suppression are assessed using the MacArthur Forest Fire Danger Index (FFDI), which was developed in the 1960s. The conditions of Black Friday 1939 provide a baseline index of 100. The index combines measurements and forecasts of temperature, wind-speed, humidity, drought-factor, fuel-load and topography to produce a number which is then interpreted to predict forecast fire conditions. An index above 50 is considered extreme and may prompt the CFA to declare a day of Total Fire Ban.

In his commentary Professor David Karoly refers to the FFDI and makes the following observations, “Long-term increases in maximum temperature have been attributed to anthropogenic climate change. In addition, reduced rainfall and low relative humidity are expected in southern Australia due to anthropogenic climate change.”

In a presentation given in Melbourne, Professor Dave Griggs of Monash University underlined the point, “For at least 3 of the factors in the FFDI the extreme values observed are consistent with climate change”.[11]

Both scientists conclude it is “very likely” that climate change increased the likelihood of extreme fire danger on 7 February 2009.

Mike MacCracken, scientist at the Climate Institute in Washington also includes the possibility of increased full loads, which is another factor in the FFDI. "Both the rising carbon dioxide concentration and climate change cause conditions to be more favorable to wildfire, you get faster build of biomass (grasses and trees), you get more intense drying, longer periods without rain. So you create the conditions that can lead to wildfire."[12]

With shorter winters and longer summers, there will be a trend towards shorter windows of opportunity for fuel reduction burns to be effectively and safely conducted, exacerbating the problem of fuel build-up.

In the Central Highlands and Alpine areas of Victoria winter snow-pack acts as a reservoir, releasing water over a period of time during the spring melt. This allows melt-water to soak into and moisten the ground. While the snow pack persists it also reflects the majority of sunlight falling on it. Once the snow has melted the majority of sunlight is absorbed by the darker ground and vegetation, having a warming effect. This is known as the “albedo flip”. Thus another effect of shorter winters with less snow is that drying will be hastened due to the combined effects of more rapid run-off of precipitation and earlier commencement of warming.

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[8] Bushfires and extreme heat in south-east Australia, David Karoly, Professor of Meteorology, University of Melbourne http://www.realclimate.org/index.php/archives/2009/02/bushfires-and-climate/

[9] http://www.climateinstitute.org.au/index.php?option=com_content&view=article&id=374:the-fires-of-climate-change&catid=39:media-releases&Itemid=36

[10] Address to CANA conference, 11th March 2009, http://www.cana.net.au/index.php?site_var=80

[11] Climate Change and its implications, Professor Dave Griggs, CEO ClimateWorks Australia, Monash University, 11th March 2009 available at http://www.cana.net.au/index.php?site_var=80

[12] http://www.cbsnews.com/stories/2009/02/09/world/main4785417.shtml

"**What can be done to ensure that so many lives are not lost? That so much devastation is not caused in such bushfires in the future?** " (Bernard Teague, Royal Commission Chairman, 20th April 2009).

If these aims are to be achieved the imminent threat must be reduced by regaining a relatively safe climate. In a paper published in 2008 the world's most respected climate scientist, James Hansen, and others concluded that this would require that atmospheric CO_2 be reduced to at most 350 parts per million. [13]

The current level already exceeds this, at 387ppm, helping to create the extreme conditions that led to the tragic losses in the recent fires. Therefore to return to 350ppm will require sincere, determined, effective and urgent policies to reduce greenhouse gas emissions and draw down existing atmospheric carbon. And yet that is not the effect of the current policies of either the Victorian State Government or the Australian Federal Government both of which have stated intentions to stabilize CO_2 levels higher than at present, at 450 or even 550ppm.

In other words, even if the governments' current policies are fully implemented and successful, we can expect more frequent and intense bushfires in the future, with even greater devastation and the loss of more lives, not less.

This is unacceptable, as was recognized in an open letter prepared by the Firefighters' Union, "Given the Federal Government's dismal greenhouse gas emissions cut of 5 per cent, the science suggests we are well on the way to guaranteeing that somewhere in the country there will be an almost annual repeat of the recent disaster and more frequent extreme weather events." [14]

In their paper[12] Hansen et al suggest that, "an initial 350 ppm CO_2 target may be achievable by phasing out coal use except where CO_2 is captured and adopting agricultural and forestry practices that sequester carbon."

Both the State and Federal Governments remain committed to mining, burning and exporting coal (for illustrations see endnote [i]), relying on Carbon Capture and Sequestration (CCS) to reduce emissions, even though those technologies remain elusive and unproven at scale.[15]

Victoria's greenhouse gas emissions continue to grow. Overall, 2008 emissions from energy were 2.1 per cent higher than 2007 levels, 6.2 per cent higher than 2000 levels and 32 per cent higher than 1990 levels. As at 7th May, Victoria's emissions for 2009 were 0.1% higher than at the same stage in 2008.[16]

Similarly both state and federal governments remain supportive of the native forest logging industry, although the forests of Victoria and Tasmania are now recognized to be among the most carbon dense in the world.[17]

Clearly current policies are incompatible with a sincere commitment to reducing the threat of devastation and loss of human lives in future bushfires, which will be exacerbated by climate change, when those policies fail to adequately address the causes of climate change and are based around an explicit aim to stabilize atmospheric CO_2 at a level significantly higher than the current level, which contributed to the recent fires.

Conclusions

For many years there has been mounting scientific evidence to suggest that one of the inevitable effects of Anthropogenic Global Warming in SE Australia is a tendency toward hotter and drier conditions leading to more frequent and severe fire weather. Already compelling, this evidence continues to grow.

Similarly there is a significant body of informed opinion that it is very likely that the severity and impact of the tragic Victorian fires in February 2009 were linked to changes that have already occurred to the climate.

In order to prevent the continued increase in future fire hazard, and to have any chance of reducing the current level of threat, effective policies need to be immediately adopted to achieve a reduction in atmospheric CO_2 to 350ppm as a matter of urgency.

This will require immediate changes in current government policies, both domestic and international, and at State and Federal levels.

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[13] Target Atmospheric CO_2: Where Should Humanity Aim? James Hansen et al. http://www.columbia.edu/~jeh1/2008/TargetCO2_20080407.pdf

[14] http://www.ufua.asn.au/267.html

[15] Quarterly Essay "Quarry Vision" *Guy Pearse*, Black Inc., Melbourne

[16] 2008 Greenhouse Indicator Annual report, www.theclimategroup.org/indicator

[17] *Green Carbon*, B Mackey et al., ANU 2008, http://epress.anu.edu.au/green_carbon/pdf/whole_book.pdf

Recommendations

In order to more effectively communicate the meaning of Fire Danger Index ratings to the public, HEWI and C4 Healesville suggest that the Commission endorse the official adoption of two new categories of fire risk, Very extreme (FFDI >75) and Catastrophic (FFDI >100), as considered in Lucas *et al*'s 2007 report.

We ask the Bushfire Royal Commission to acknowledge the very likely connection between Climate Change and the devastation and loss of life in the February fires.

To minimize the risk of similar, and even more severe, events happening with increasing frequency in the future, finally we ask the Royal Commission to recommend that Australian state and federal governments endorse a target of 350ppm atmospheric CO_2.

Faithfully,

Stephen Meacher
Chairman, HEWI &
Spokesman, C4 Healesville

Maureen Bond
Secretary
HEWI

Lorraine Leach
Secretary
C4 Healesville

Adrian Francis
Member of HEWI & C4

David Ward
Member of C4

[i] As recently as December 2008 Prime Minister Rudd announced an investment of $580m to "more than double the export capacity at Newcastle from 97 to 200 million tones of coal a year". The Federal Government has committed a subsidy of $100m to a new coal-burning power station in the Latrobe Valley and the Victorian government has promised $50m.

When the Federal Government announced its plans for a Carbon Pollution Reduction Scheme, which it proposes as its primary mechanism for reducing emissions, one of the first responses from the Victorian Government was to seek guarantees that the profitability of the coal-burning power stations of the Latrobe Valley would be unaffected.

When representatives of the coal industry complained that the CPRS would cost jobs and force the premature closure of 16 mines Greg Combet, the federal Parliamentary Secretary for Climate Change, responded, "The report exaggerates the impact of the (scheme) in a number of ways". In effect, the government's own spokesman was promising that the CPRS would be ineffective.