



War Against Global Heating

We need to declare war on global heating, and fight it on many fronts like it was World War III

A note from concerned scientists
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This document was created in consultation with a broad group of senior and award winning scientists including physicists, climate scientists, geophysicists, health scientists and science educators. It argues that no single solution is enough, and outlines seven 'fronts' in the war we need to fight, and why Australia needs to take a lead.

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Introduction

In 1827 the French mathematician Fourier, whose Fourier Transform powers most of our medical imaging scanners suggested *"that the atmosphere acts like the glass of a hot-house"*. One hundred and twenty five years ago, Swedish scientist Svante Arrhenius asked *"Is the mean temperature of the ground in any way influenced by the presence of heat absorbing gases in the atmosphere?"* Arrhenius went on to estimate that if the CO₂ concentration of the atmosphere doubled, the global temperature would rise 5 degrees Celsius, and somewhat worse at the poles.

Today it has become obvious that Arrhenius was basically correct. The 500 million tons of coal per year that he estimated was being used in 1896, has grown to more than 7000 million tons, supplemented by vast amounts of oil and gas and forest destruction. The CO₂ in the atmosphere is well on track to doubling. Arrhenius exposed the basic physics of climate heating, but it took detailed climate models to gain an understanding of how heating also gives rise to extreme weather such as the recent Australian bushfire conditions.

No nation can solve the problem alone. The problem has been down-played for so long that now it has become an emergency. Actions by groups such as Extinction Rebellion and the School Strike Movement demonstrate the depth of public concern, and the increasing realization that humanity is facing a life or death problem for large populations. Australia has a particular responsibility to act as one of the top twenty greenhouse gas emitters, with the tenth highest per capita emissions, and as the world's largest coal exporter.

The connection between droughts and global heating has been long predicted. It is no surprise that global heating enhances bush fires, as seen all around the world. The fires emit vast additional quantities of CO₂ that contribute to escalating warming. The droughts will

get worse as heating accelerates, and fires will become even more catastrophic. As the Arctic and Antarctic melt, and oceans warm, sea levels rise. The sea level rise predictions were recently doubled and it is likely that this is an under estimate. The cost to the world of ignoring climate change vastly exceeds the cost of the actions required to control it.

People are beginning to despair. To prevent despair, with its associated social and health costs, we need to empower people through action, participation, and national recognition of a shared challenge. We need bold economic policies designed to reverse our contribution to global heating. We need our political parties to promote constructive ideas, guided by the science. This is not a party political issue. It is an issue based on science, and should not be a matter for political point scoring or of personal belief. It represents an opportunity for leaders to be seen to be responding to the greatest issue of our time, while leading our nation in a transformation that will generate economic opportunities while helping to ensure a habitable planet for our children and grandchildren.

Global heating is a national and international emergency as significant as a world war. There is no simple solution. Like a world war, we need a *war office* to mobilise the country. Like all wars, we need massive amounts of information and data to allow all of us to know the global heating cost of every aspect of our lives. We need planning and research and massive renewable energy projects that will reverse our emissions by exporting emission reduction around the world. We need economic mechanisms to drive a rapid transition. The transition could be budget neutral in the long term, bringing new jobs and enormous profits. The breadth of initiatives needed provide diverse opportunities for ensuring a fair and just transition to a sustainable economy.

We cannot win the war by focusing on just one front. To focus on one front alone, such as the war against bush fires, takes our minds off all the other fronts that involve various ways of reducing greenhouse gas emissions, capturing CO₂ and reducing the absorbed heat from the Sun. We have identified seven fronts in the war. Because of their diversity, they complement each other in terms of employment, profits and balancing the budget.

If Australia declares war on global heating, it will lead the world by example, but more importantly, it will give us the moral authority to demand drastic reductions by the worst contributors to global heating: China, USA and India.

The war office should be a greatly expanded Greenhouse Office (begun by the Howard Government but now defunct) with powers to provide data on the global heating costs of everything we use and do, from food to travel to internet downloads. It should conduct research, provide leadership and national coordination, and recommend financial mechanisms that will drive the economy towards sustainability targets.

The fronts in the war are listed in no particular order

1. **Bush Fire War.** We believe that the threat to Australia from global heating is a strategic threat that greatly exceeds the magnitude of military threats. Bush fires can be very effectively controlled by water bombers if they can arrive at the scene within 30 minutes to 2 hours. The Australian Defense Forces should be given the responsibility and funds to develop a fleet of Boeing 737-scale water bombers and a network of airfields located within less than 2 hours flight of every fire-risk area. This would need an investment

equal to one or two new submarines. The fleet would also allow Australia to offer fire support to our northern neighbours. It could also double as evacuation transport as cyclones and flood disasters increase as predicted.

- In some environments sea water can be used by water bombers when fresh water is not available without major adverse environmental consequences. It is already used as witnessed by scenes from the NSW south coast fires. In many locations the bombers may need new airfields and associated water supplies.

2. **Renewable Energy Export.** Many have recognized our enormous opportunities in renewable energy export in the form of hydrogen, ammonia and electricity by DC underwater cables. Proposals are on the table but they need to be embraced by government and greatly accelerated, on a par with the Apollo program's race to the moon. The schemes will allow us to do more than reduce our emissions. They allow us to export *emission reduction* to all our customers, enabling them to transition away from fossil fuels. The schemes offer enormous economic benefits to Northern Australia, while enabling a much faster transition to a zero emission future.

- The concepts for these projects are already well developed. They need to be accelerated by adopting them as a coordinated national policy goal supported by foreign affairs, trade and industry.

See: <https://www.sbs.com.au/news/australian-sunshine-could-soon-be-farme...>

<https://www.abc.net.au/news/rural/pilbara-renewable-energy-potential...>

3. **Energy and Transport.** Australia's biggest contribution to global heating is from the energy and transport sectors. We need to transition rapidly to renewable energy, energy storage and electric or renewable hydrogen powered vehicles. Economic mechanisms are essential to drive this transition. All users of fossil fuel need to pay an appropriate price. To prevent social dislocation, economic changes should be gradual and include safety net solutions.

Shipping is often overlooked as a significant source of global emissions. Ship emissions could be reduced 25% if ship speeds were reduced 20%. Future ships could be powered by renewable hydrogen, but an immediate contribution by Australia to this worldwide problem would be to scale berthing charges to satellite-monitored ship speed, and to encourage other nations to do likewise.

- The new DC transmission technology could allow east-west power transfer within Australia to provide extended solar generation time because of the time zone differences, as well as reduced supply fluctuations.
- Incentives should be designed to encourage renewable energy powered charging stations for both electric vehicles, and hydrogen vehicles.
- Safety net solutions should be provided. These could include renewable energy shares or installations, awarded to those in need to compensate for increased electricity and fuel costs.
- Private investment in solar power should be enhanced by removing caps to grid connected solar generation (as it is at present), to encourage individuals to invest in larger solar installations including battery banks and recharging stations.
- Consultation and research should be undertaken before implementation to prevent adverse consequences from ship speed reductions.

4. **Radiative Management:** A much neglected aspect of global heating abatement is called radiative management, the reflection of incoming solar energy from the Sun back into space. Techniques for reducing the solar radiation load include replacing black asphalt in car parks by pale surfaces such as limestone, the painting of dark roofs with white paint, and changing farming practices to maximise the reflectivity of crops and stubble. These can be very low cost contributions to abatement, and particularly to reducing temperature extremes. The difference between heat absorbed by black and white roofs is enormous: a house with a white roof also uses less airconditioning energy and white roofed cities are cooler. Australian suburbs are full of unnecessary dark roofs and treeless car parks. Policies are needed to encourage a transition. The solution can be cost neutral.
- New dark roofing and unshaded roads and carparks need to be discouraged through mechanisms such as rates, land taxes and planning rules.
 - Incentives are needed to encourage emissivity reduction of existing dark surfaces through use of white paint, pale paving, and changes in agricultural practice.
 - Expertise is required to provide data on the relative cost/benefits of abatement by solar roofs, tree planting or radiative management for each situation.
 - Research is required to determine the feasibility of changes in farming practice (such as increased no-till farming) in Australian conditions.

See <https://www.nature.com/articles/s41561-017-0057-5>
<https://heatisland.lbl.gov/coolscience/cool-roofs>

5. **Tree Cover.** Trees are the best natural carbon sinks: inexpensive, and self-sustaining. They capture carbon over decades and centuries. We need massive tree planting in all possible areas, including areas where conventional agriculture is no longer viable. Tree clearing should cease. This requires major government leadership with incentives and penalties across all possible landscapes and environments including degraded farmland, saline areas, urban areas and arid areas. Community groups and businesses need to be empowered to participate. Given future expected drought conditions renewable energy-powered desalination may be required in some places to enable forests to be established. This meshes beautifully with an important new technology: CO₂ mineralisation.

Tree cover implementation requires research and planning and broad consultation. It would provide social benefits and major new employment opportunities in tree nurseries, tree planting and associated irrigation systems, especially in areas where conventional farming is no longer profitable or sustainable. It would enable schemes such as Urban Forests, Buy Back Bushland and Gondwana Link to be accelerated nationally, and it should provide benefits to wildlife.

- Policies should empower individuals, non-profit groups, businesses, and local authorities to invest in large scale remediation action.
- Incentives should be designed to encourage tree planting on large treeless heat islands such as car parks, unshaded roads and degraded land.
- Planning should include construction of large scale renewable energy powered desalination plants where irrigation is required for initial establishment of new tree plantings.
- Land clearing, a major source of Australia's emissions, should be stopped immediately.

6. **CO₂ Mineralisation.** Mineralisation of CO₂ turns it into a passive and valuable solid material. The process involves direct injection of CO₂ into brines, microbial fermentation of brines or modifications of the industrial Solvay process used to produce sodium carbonate. Although the yield at present is relatively low (50,000 tons of CO₂ captured per 10⁷ tons of brine, the cost using renewable energy supplies is low and there is potential to upscale the process to areas adjacent to existing desalination plants and to wide expanses of remote areas with positive impacts on the environment. The bi-products are significant quantities of industrial and pharmaceutical grade calcium and magnesium carbonates (present costs about \$100 per ton) and, if engineered properly, a local supply of fresh water.

- Targeted research into CO₂ mineralisation should be stimulated by governments with a view to commissioning a large scale operating plant within 5 years.
- Suitable sites and full cycle climate change benefits should be investigated.

See <https://www.mdpi.com/2075-163X/7/11/207>

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3365716

<https://www.chemistryworld.com/news/switching-desalination-plants-from-carbon-dioxide-source-to-sink/8170.article>

7. **Farming.** The last crucial front for action is farming. Changes in farming practice are required to reduce farm emissions. Huge quantities of CO₂ are liberated by farm cleanup. The burning of tree waste accounts for up to 50% of the carbon captured by tree farms. Waste wood piles that decompose naturally provide a carbon sink, as well as a moisture and nutrient store. While they re-emit their CO₂ over their decomposition lifetime, they represent a substantial carbon store that could provide a 5-20 year slowdown in carbon emissions. Cattle and sheep emit large amounts of the very powerful greenhouse gas methane, while other animals emit less. Research is underway on reducing methane produced by cows. Farming practice that increases the store of soil carbon offers enormous opportunities to reverse the decline of soil carbon. All strategies need close involvement of the farming community to develop appropriate guidelines and incentives suitable for different regions and different types of farms, as well as to ensure safety.

See <https://e360.yale.edu/features/carbon-loophole-why-is-wood-burning-counted-as-green-energy>

<https://theconversation.com/un-climate-change-report-land-clearing-and-farming-contribute-a-third-of-the-worlds-greenhouse-gases-121551>

We emphasise that we need an integrated long term national strategy to fight the war against global heating. The strategy needs to include retraining opportunities as Australia transitions away from unsustainable industries to a sustainable economy powered by renewable energy. By investing in renewable energy and increased desalination of sea and ground waters, we will be able to ensure abundant fresh water for all Australians, as well as affordable and dependable energy supplies. The transition will combine significant social benefits in health, employment and public safety. The transition to foods that have lower global heating impact will provide health benefits, and more local employment.