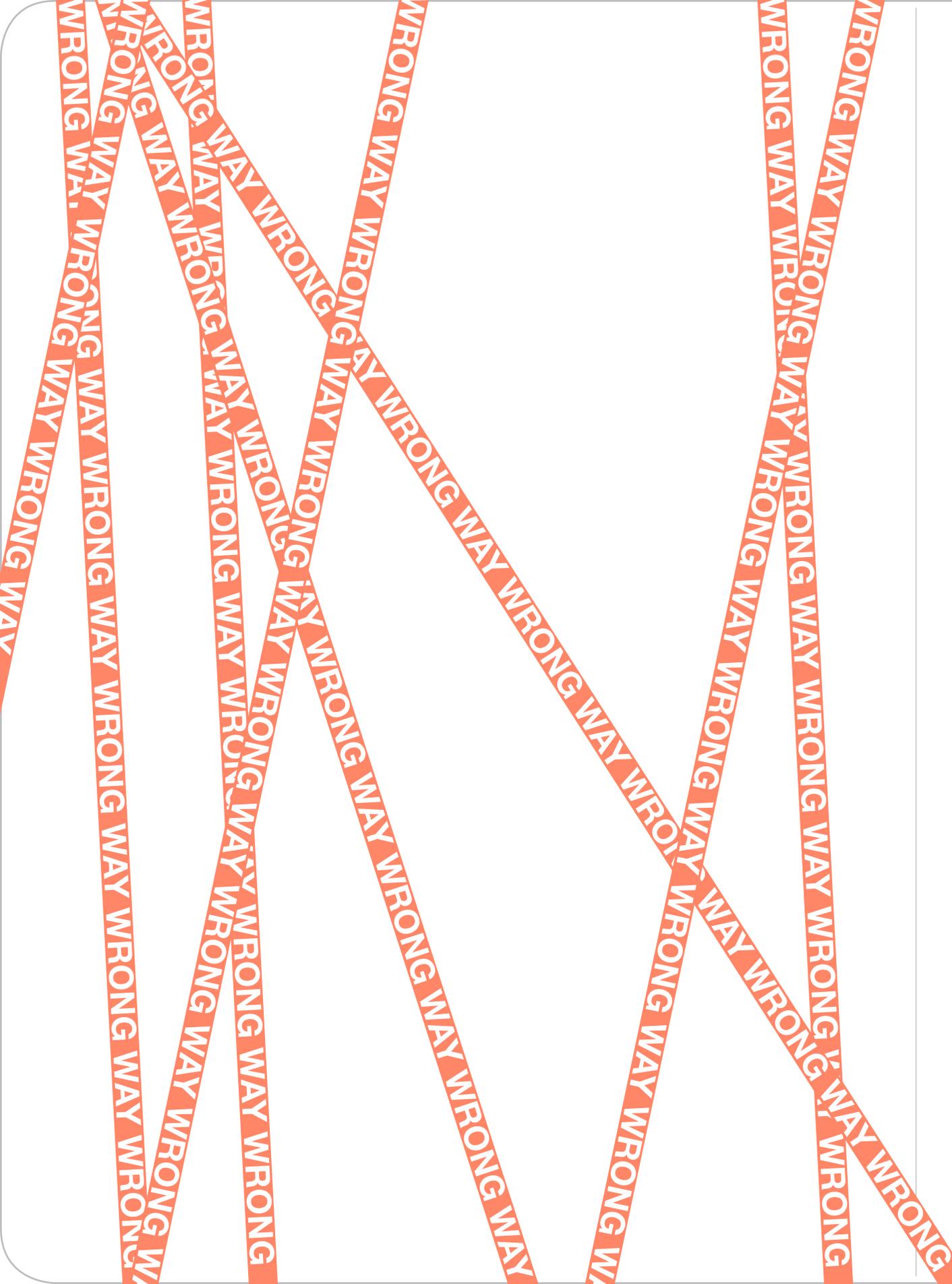

C°

Dangerous Degrees



IF WE DON'T CHANGE DIRECTION NOW, WE'LL END UP WHERE WE'RE HEADING.

Take a breath. The air entering your lungs isn't what it was even a decade ago. Year on year, the concentration of carbon dioxide (CO₂) and several other gases has been rising. Since 1900, humanity has pumped nearly one-and-a-half million million tonnes of CO₂ and other heat-trapping greenhouse gases into the atmosphere.¹ Today, CO₂ emissions from fossil fuels are around 50 per cent higher than they were 20 years ago, and have been rising each year.²

This kind of change to the chemical mixture in the air doesn't come without consequences. Acting like a blanket, the build-up of greenhouse gases is the main reason why the average global temperature has risen by nearly 1°C in the last century. In fact, the extra heat now trapped in the atmosphere is equivalent, in energy terms, to the detonation of almost 500 million Hiroshima-sized atomic bombs every year for the last century.³

Science has been studying the climate system (i.e. the air, oceans, and land) for well over 150 years. From the first studies confirming the heat-trapping properties of CO₂ in the 1850s, to the multiple lines of evidence pieced together by thousands of scientists today—we are witnessing a global warming unprecedented in human history.

The most up-to-date research sounds a clear warning: unchecked, the rise in greenhouse gas (or carbon pollution) emissions could see the average global temperature rise by more than 6°C above the pre-industrial average by the end of the century.⁴ Even with all of the pledges to cut emissions made so far by the nations of the world, the temperature is set to rise at least 4°C by the 2060s.⁵

What does this really mean? After all, the mercury can rise or fall sharply in a few hours. So what does a few degrees over a few decades matter? And, if climate change is as risky as scientists say it is, what is to be done?

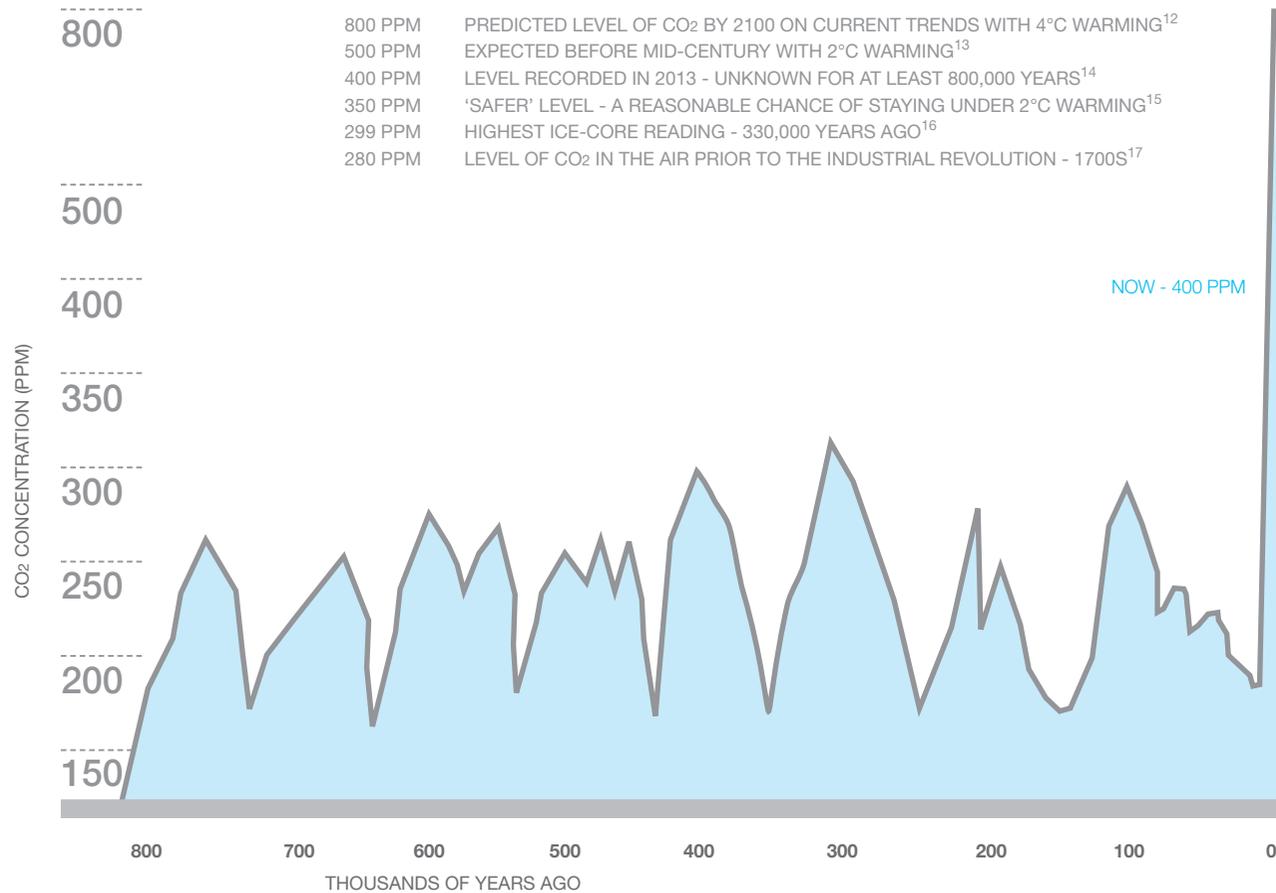
This booklet explains why a rise of only a few degrees in the average global temperature risks our prosperity, security, and health. It explains why it is so important to reverse the rise in emissions within the decade. And why it is still within our means to do so.

GLOBAL WARMING



ACTING LIKE A BLANKET, THE BUILD-UP OF GREENHOUSE GASES IS THE MAIN REASON WHY THE AVERAGE GLOBAL TEMPERATURE HAS RISEN BY NEARLY 1°C IN THE LAST CENTURY.

RISING CO₂ LEVELS



Sky-high Emissions

Despite a recent downturn in the fortunes of many countries, global emissions have continued to rise.⁶ In 2012, annual emissions of CO₂, mostly from fossil-fuelled activities, such as transport and electricity, rose to a record 35 billion tonnes.⁷ According to the International Energy Agency, if no action is taken to change our energy mix, this figure will double within 40 years.⁸

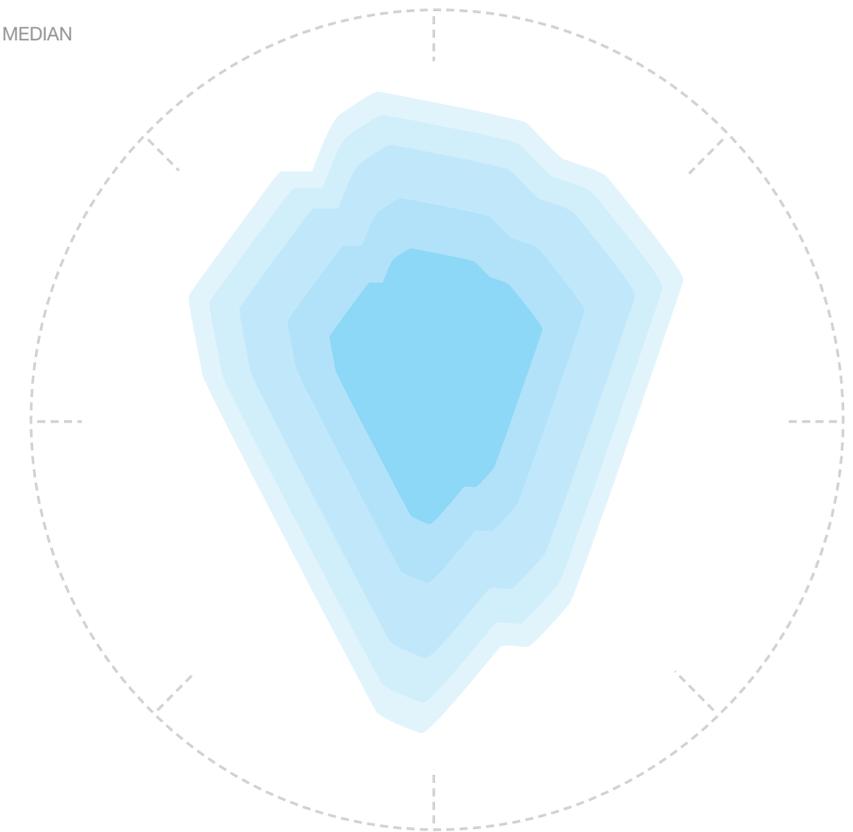
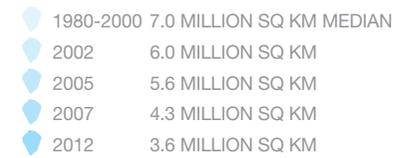
No generation has been witness to levels of greenhouse gases in the air as high as those of today. In May 2013, at Mauna Loa, Hawaii, the world's longest-running atmospheric observatory recorded a concentration of CO₂ of 400 parts per million (ppm).

By analysing the air in ancient bubbles trapped deep in Arctic ice, scientists can tell that CO₂ levels have not been this high for at least 800,000 years, which is as far back as the ice records go.

In fact, studies of the fossil record suggest that the last time the planet had CO₂ levels this high was even further back; perhaps three to five million years ago. At that time, the mean global temperature was around 3°C hotter than today, the seas were about 25 metres higher, and the Greenland ice sheet came and went many times.⁹

Since the start of the Industrial Revolution, carbon dioxide levels have risen by 40 per cent.¹⁰ The climate has changed naturally in the past, certainly, but it doesn't change without a cause. Today, human activity is the principal cause for the rapid growth in carbon pollution.¹¹

ARCTIC ICE MELT



The Canary in the Coalmine

The average global temperature is now around 0.8°C higher than it was at the start of the 20th century. And it's getting warmer faster: the 20 warmest years on record have all occurred since 1981, and the 10 warmest since 2000.¹⁸ Global temperatures hit a new record high in 2010.¹⁹

Glaciers worldwide are losing ice, and the Arctic sea ice is thinning and shrinking.²⁰ According to the US National Snow and Ice Data Center, the waters around the North Pole could be ice free in summer by 2030.²¹ Sea ice is the canary in the coalmine: an indicator of worldwide warming with disturbing, far-reaching consequences.

Over the planet as a whole, areas dry today are projected to become even drier and wet areas wetter.²² In southeastern Australia, high fire-danger conditions increased rapidly through the 1990s and early 2000s.²³ Despite the flooding in 2010 and 2011, most of the continent saw drier-than-average conditions in 2011, and the summer of 2012-13 was the hottest on record.²⁴

These striking events follow the warmest decade since records began. Australia's average daily maximum temperatures have warmed by about 0.8°C since 1910.²⁵ The frequency of days above 40°C is rising, the frequency of heatwaves is increasing, and record hot days now outnumber extremely cold days by more than two to one.²⁶ Southern Australia—where most of us live and most of our food is produced—has seen a significant decline in average annual rainfall. At the same time, in the north, the risk of torrential downpours and flooding rises with every degree.²⁷

Ready or not, we are living with the early symptoms of climate change. The financial, environmental and human costs are already being felt.

THE DECLINE IN THE EXTENT OF SUMMER ARCTIC SEA ICE RELATIVE TO THE AVERAGE FOR THE PERIOD 1980-2000: SINCE SATELLITE RECORDS BEGAN.²⁸ THE EXTENT OF ARCTIC SEA ICE VARIES CONSIDERABLY FROM YEAR TO YEAR. HOWEVER, ACCORDING TO THE US NATIONAL ICE AND SNOW DATA CENTER, THE LONG-TERM TREND IS DOWNWARDS.¹



ICE IS NOT POLITICAL OR IDEOLOGICAL, IT JUST MELTS

Ice Age to Hothouse

Two degrees, four, even five or six, doesn't sound like much. But a change of even a few degrees in the average temperature of the globe can make a big difference.

In the depth of the last Ice Age, 20,000 years ago, the average global temperature was colder than today by around 5°C.²⁹ Enormous sheets of ice, kilometres thick, covered Europe and North America as far south as London and New York. In the south, large parts of Chile and Argentina, as well as parts of southern Africa and Australia, were crushed under the ice. With so much water frozen, sea levels were as much as 120 metres lower than today.

The deserts were much larger too. Mammoths and myriad other now-long-gone creatures roamed this frozen world. The human population was little more than a few million, arranged in small bands scattered about the globe. A few degrees made a world of difference.

A Shock to the System

The warming that thawed the ice and brought humanity out of the cold, fundamentally changed the face of the planet. The climate does not change without being forced to: from the depths of the Ice Age to 12,500 years ago, subtle changes in the Earth's orbit together with a naturally occurring rise in carbon dioxide levels raised the mean global temperature by about 5°C.³⁰ These few degrees were enough to completely alter the environment, cause widespread coastal inundation, trigger innumerable extinctions, and see people begin to switch from hunting and gathering to farming.

And if a few degrees change in the average temperature was enough to so drastically and irreversibly change the prehistoric world, imagine what a few more might do. Back then, the warming took thousands of years, the world has already warmed by almost 1°C on average in a century. The projected rise of between 4°C and 6°C will take mere decades.³¹

Today, there are more than 7 billion human beings, and our numbers grow by about a million every week. By 2050, there could be as many as 9 billion people. We have nowhere else to go. Each degree risks making life for billions of people more dangerous; undoing decades of social and economic progress.

CHANGE

Cooking the Planet

A rapidly changing climate drives not just warmer but wilder weather. Past weather patterns are no longer a good guide to future risk. As new data has come to hand, and the scientific models found to match observed changes, projections of future climate risk have tended to become more dire, not less.

On present trends, we will pump enough carbon pollution into the air to push the world's temperature up by about 4–6°C above the pre-industrial average by 2100. And if the promises already made are not kept, we could hit the 4°C-mark decades earlier.³²

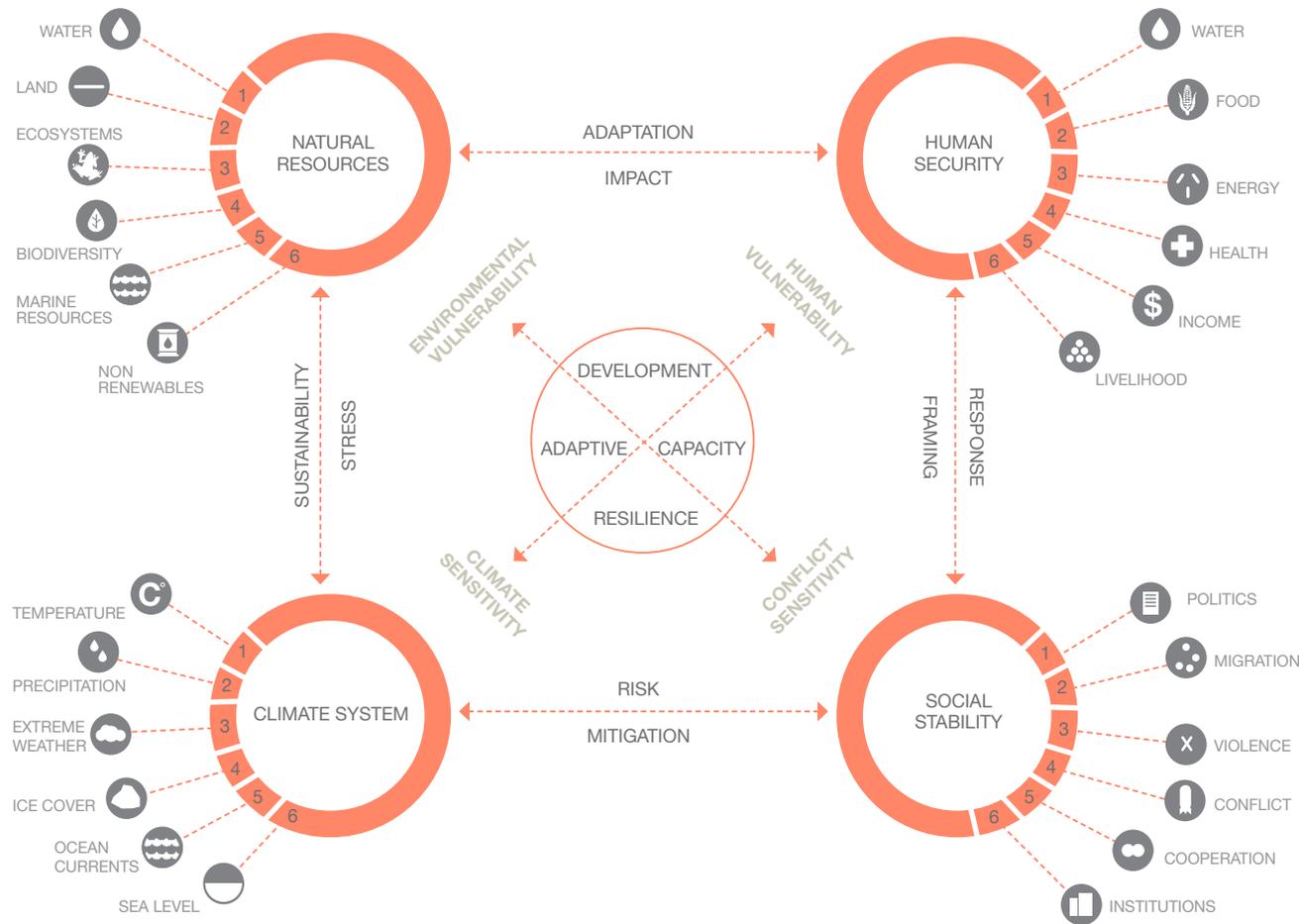
THE ANSWER TO THE OFT-ASKED QUESTION OF WHETHER AN EVENT IS CAUSED BY CLIMATE CHANGE IS THAT IT IS THE WRONG QUESTION. ALL WEATHER EVENTS ARE AFFECTED BY CLIMATE CHANGE BECAUSE THE ENVIRONMENT IN WHICH THEY OCCUR IS WARMER AND MOISTER THAN IT USED TO BE.³³

KEVIN TRENBERTH, SENIOR SCIENTIST, US NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

Four degrees of warming is highly likely to produce a planet marked with more frequent and more severe drought, chronic catastrophic fires, heavier downpours and more frequent floods, and more intense tropical cyclones. This will require extraordinary adaptation efforts.³⁴

The risks associated with environmental changes are often non-linear. Rather, they can blow out, with dramatic step changes. For example, a really big storm surge today might occur, on average, once a century. But research suggests that with only a 10cm sea-level rise, such extreme events are likely to occur several times a year. A 50cm sea-level rise could see such dangerous surges occurring hundreds of times a year in some locations.³⁵ Similarly, bushfire risk in southeastern Australia is projected to increase by 5 per cent with a 1.5°C rise in global temperatures above pre-industrial levels, but by 20 per cent with a 3.4°C increase.³⁶

THE CLIMATE SYSTEM, NATURAL RESOURCES, HUMAN SECURITY & SOCIETAL STABILITY



Shocks and Surprises

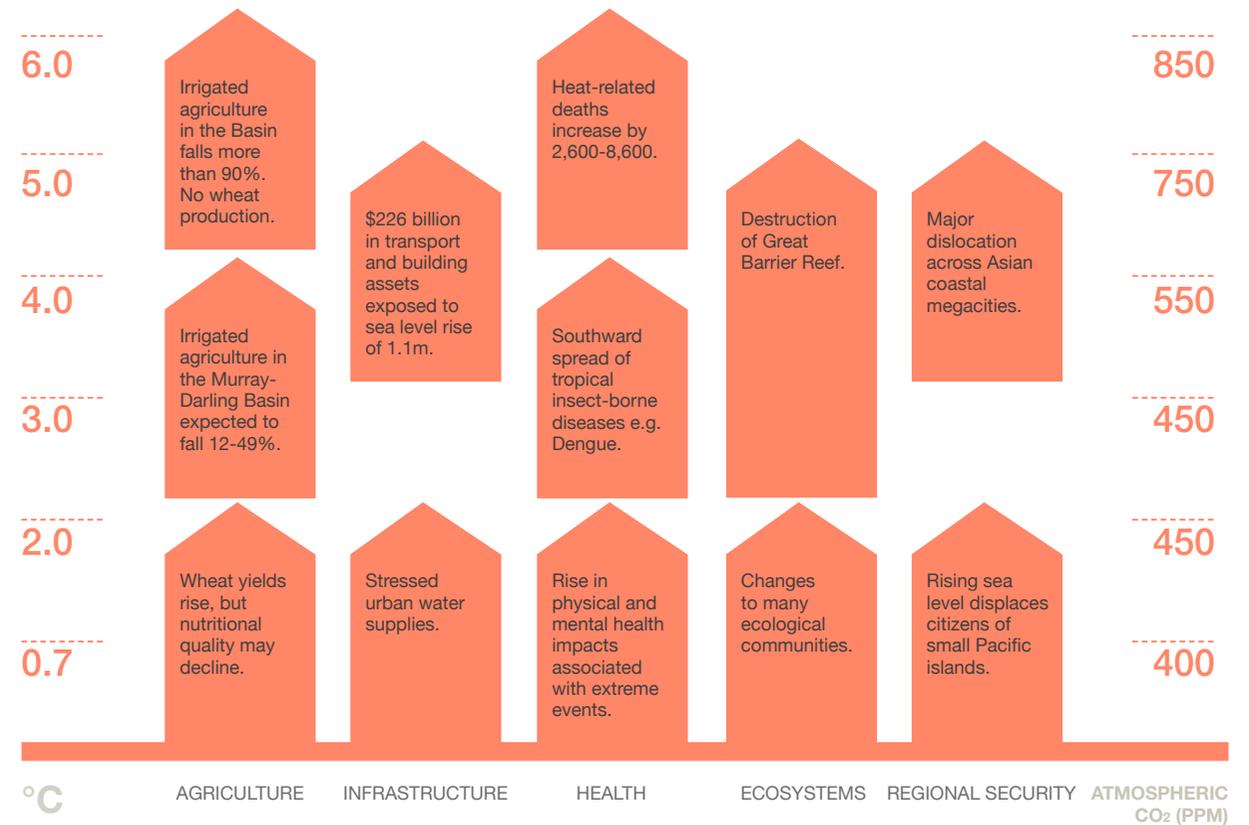
The future, by definition, is unknowable. While the science can tell us, in broad terms, the shape of things to come under different warming scenarios, we can't yet know exactly how the impacts will unfold or how they'll interact. We don't know how fast we need to adapt nor, given how climate change could erode our prosperity, whether we will have the shared wealth to cope with the worst scenarios.

We should not be lulled into a false sense of security, thinking that the globe will warm slowly, gently or steadily. Instead, natural climate variability is mixing with climate change; a cocktail that is likely to produce a more volatile environment.

These more hostile conditions can cause a breakdown in natural services such as those that deliver soil fertility and drinking water leading to chronic food and water shortages, environmental and economic deterioration, more ill health, large-scale movements of people, all of which place immense stress on people, commerce, and the institutions of government, further straining international relations, and causing a much higher security risk.

Scientists have long voiced concern that global warming might reach one or more tipping points: thresholds beyond which even a little more warming radically alters key elements of the climate system, causing conditions to deteriorate permanently.³⁷ Examples include a massive dieback of the Amazon rainforest, interruptions to the Indian Monsoon, and the loss of summer sea ice in the Arctic. Some changes may accelerate the warming. It is feared, for instance, that a thawing of the Arctic permafrost could release massive volumes of methane, itself a potent greenhouse gas.

THE INCREASING DIFFICULTY OF ADAPTATION AS TEMPERATURES RISE³⁸



A 4°C WORLD IS SO DIFFERENT FROM THE CURRENT ONE THAT IT COMES WITH HIGH UNCERTAINTY AND NEW RISKS THAT THREATEN OUR ABILITY TO ANTICIPATE AND PLAN FOR FUTURE ADAPTATION NEEDS. THE LACK OF ACTION ON CLIMATE CHANGE NOT ONLY RISKS PUTTING PROSPERITY OUT OF REACH OF MILLIONS OF PEOPLE IN THE DEVELOPING WORLD, IT THREATENS TO ROLL BACK DECADES OF SUSTAINABLE DEVELOPMENT. A 4°C WORLD CAN, AND MUST, BE AVOIDED.³⁹

DR JIM YONG KIM, PRESIDENT, WORLD BANK

CLIMATE CHANGE WILL EXACERBATE EXISTING HARDSHIPS AND STRESSES IN OUR NEIGHBOURHOOD, POSSIBLY RISKING THE REACHING OF CRITICAL TIPPING POINTS... AS THE WORLD BECOMES MORE NETWORKED, THE IMPACTS OF CLIMATE CHANGE IN ONE COUNTRY OR REGION WILL AFFECT THE PROSPERITY AND SECURITY OF OTHERS AROUND THE WORLD.⁵⁸

AUSTRALIAN SECURITY POLICY INSTITUTE

A Less Safe, Less Secure World

A storm, heat wave or drought doesn't occur in a vacuum. No country, community or company experiences disasters in isolation. We live in an interdependent world; one facing dwindling stocks of critical resources, such as freshwater, seafood, soil, and arable land. Strife in one corner of the world easily spills over into others. Disasters tie up emergency services, armed forces, and medical teams. They damage supplies of power, water, fuel and food. They destroy farms and damage tourism, and may slash export earnings by millions, even billions of dollars.

The recent uprisings in the Arab world, for example, were catalysed in part by rising food prices.⁵⁹ When the world food crisis of 2007–08 hit there were already nearly a billion people undernourished; the crisis saw hundreds of millions more people plunged into hunger and food stress. The crisis compromised trade, triggered riots in major cities, and saw old grievances explode into violence. The causes of the crisis were many (including more expensive oil and fertilisers) but drought in grain-producing countries like Australia served to amplify price shocks.⁶⁰

There is still a lot that is not known about how impacts on one sector or region might cascade into others. In a world heading towards more and more intense extremes, the direct and indirect or knock-on effects are beginning to worry agencies whose job it is to promote economic development. According to the Asian Development Bank, climate change is one of the greatest emerging threats to food security in the region.⁶¹



IF CLIMATE CHANGE GOES BAD, YOU COULD HAVE HUNDREDS OF THOUSANDS OR MILLIONS OF PEOPLE DISPLACED AND THEN SECURITY WILL START TO CRUMBLE PRETTY QUICKLY.⁶²

ADMIRAL SAMUEL J. LOCKLEAR III, COMMANDER, US PACIFIC COMMAND

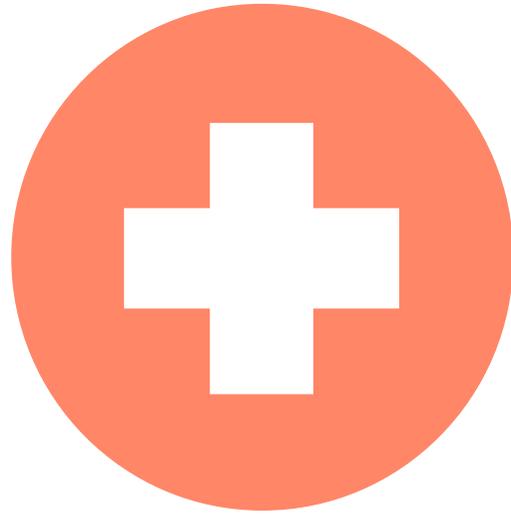
The Internal Displacement Monitoring Centre reports that, between 2009 and 2011, more than 40 million people in the Asia-Pacific region were displaced by climate-related and extreme weather events.⁶³ The poor in particular will struggle to cope with more and more extreme events and gradual or even abrupt environmental deterioration—all compounded by pre-existing problems, such as civil strife, war, and endemic poverty.

The drivers of population displacement and migration are complex. Climate change adds a new layer of complexity and a new driver. Predictions of the likely number of future 'environmental refugees' vary widely—from tens of millions to up to a billion by 2050—and will depend on a host of factors, including how quickly and forcefully the world acts to rein in emissions.⁶⁴

Take our fragile, crowded, hungry, interconnected world and turn up the thermostat by a few degrees. What will happen? How will communities, governments, companies, and the natural environment cope? A growing stack of American and European reports has identified climate change as an emerging risk to peace and security.⁶⁵ Recent work by the American Security Project reveals that the defence departments and intelligence services of more than 100 countries now view global warming as, not simply an environmental issue, but a real risk to national security.⁶⁶

CLIMATE CHANGE IS THE BIGGEST GLOBAL HEALTH THREAT OF THE 21ST CENTURY... THE IMPACTS WILL BE FELT ALL AROUND THE WORLD, AND NOT JUST IN SOME DISTANT FUTURE BUT IN OUR LIFETIMES AND THOSE OF OUR CHILDREN.⁶⁷

THE LANCET, 2009



The Human Costs of Climate Change

As the temperature rises and the climate shifts, the risks to human health from more hostile weather climb and multiply, as if the direct effects of heat waves, torrential downpours, floods, storm surges, and bushfires weren't already bad enough.

Matching food output and quality to 21st century demand will be a hard enough challenge as it is, but climate change will almost certainly make agriculture overall a lot harder as the century wears on. Moreover, food safety can be compromised by extremely hot weather, and the nutritional quality of crops can be degraded as key environmental factors shift. Loading up the air with extra CO₂, for example, is known to depress protein yield in wheat and elevate toxins such as cyanide in other staples.⁶⁸ Much extra CO₂ is actually dissolved in the seas, raising the acidity of the waters. A warming of 4°C equates to a rise in the acidity of the oceans of about 150 per cent, with profound consequences for seafood production.⁶⁹

As weather patterns change and the temperature rises, so too the spread of existing infections will change and new diseases arise. Mosquito-borne diseases, such as Dengue Fever, are likely to spread further afield; affecting millions more people. Today's climate confines Dengue to North Queensland, but with northern Australia becoming both hotter and wetter, millions more Australians are likely to be exposed to the infection in coming decades.⁷⁰

The frequency of extremely hot days in Australia has already doubled since 1960, with heat waves rising in frequency.⁷¹ According to Australia's Bureau of Meteorology and CSIRO, with no action on climate change, the end of the century will see the number of days in a year over 35°C rise 2.5 times in Adelaide, treble in Melbourne in Hobart, quadruple in Sydney, be six times higher in Canberra, and 20 times in Brisbane.⁷² In Perth, for more than two months out of a given year, the mercury will soar over 35°C, as it will for 10 months in Darwin.⁷³



Where there are multiple, simultaneous extreme weather events, or where diseases emerge in surprising places, health-care services will almost certainly be strained. Victoria's long and intense heat wave and catastrophic 'Black Saturday' bush fires of early 2009 pushed ambulance and other emergency services to their limit.⁷⁴

Mental health too is at risk. Post-traumatic stress, for instance, is commonplace following violent disasters such as fires.⁷⁵ The incidence of depression, self-harm, and family breakdown increases with slower disasters, like prolonged drought.⁷⁶ Aggressive behaviour and substance abuse can soar on extremely hot days.⁷⁷ Given psychological disorders already affect the lives of millions of individuals; with mental health a substantial economic impost, any additional strain will cost families, communities, and industries dearly.

The helpers themselves are not immune to disaster and the workload stresses that come in its wake. Doctors, social workers, counsellors, and paramedics are, after all, only human too. In the wider community, as always, it is the very old, the very young, the poor, the marginalized, and the chronically ill who are most vulnerable in an increasingly moody climate; a climate in which the social safety net will almost certainly be stretched.

As difficult as things could become in Australia, it is the poor who are likely to suffer the most. In the developing world, climate-change pressures on public health are compounded by weak infrastructure, potentially forcing people to move and increasing their reliance on foreign aid. Malnutrition and infection by diarrhoeal diseases, already killers today and sensitive to temperature, are likely to tighten their grip as the the world heads towards 2, 3 and 4 °C warming.



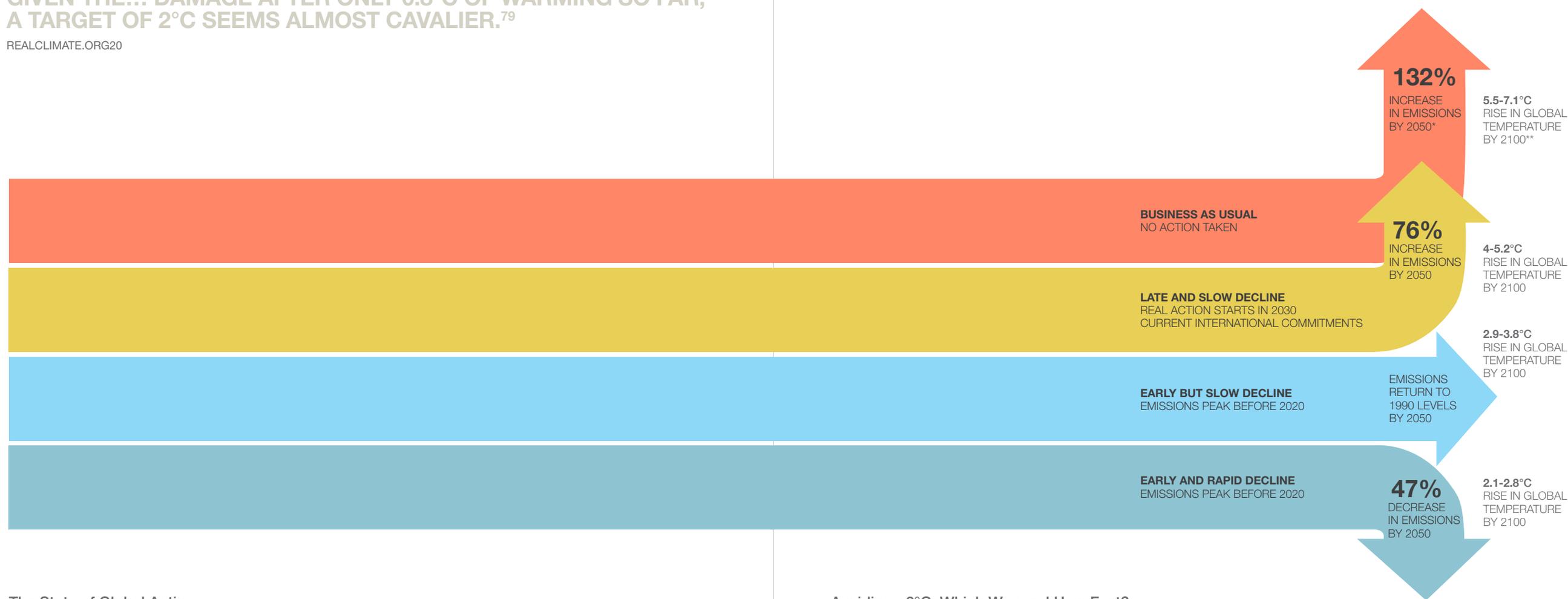
CLIMATE CHANGE ACTS AS A THREAT MULTIPLIER. ECONOMIC AND ENVIRONMENTAL CONDITIONS IN ALREADY FRAGILE AREAS WILL FURTHER ERODE AS FOOD PRODUCTION DECLINES, DISEASES INCREASE, CLEAN WATER BECOMES INCREASINGLY SCARCE, AND LARGE POPULATIONS MOVE IN SEARCH OF RESOURCES. WEAKENED AND FAILING GOVERNMENTS, WITH AN ALREADY THIN MARGIN FOR SURVIVAL, FOSTER THE CONDITIONS FOR INTERNAL CONFLICTS, EXTREMISM, AND MOVEMENT TOWARD INCREASED AUTHORITARIANISM AND RADICAL IDEOLOGIES.⁷⁸

MILITARY ADVISORY BOARD, CNA (US CENTER FOR NAVAL ANALYSES)

GIVEN THE... DAMAGE AFTER ONLY 0.8°C OF WARMING SO FAR, A TARGET OF 2°C SEEMS ALMOST CAVALIER.⁷⁹

REALCLIMATE.ORG20

EFFECTS OF FOUR EMISSIONS REDUCTION SCENARIOS



The State of Global Action

There are some reasons to be optimistic: the last decade has seen a global boom in clean energy and other low-pollution investment. In 2011, nearly half of all global investment in power generation was directed towards clean energy.⁸⁰

More than 80 countries representing around 80 per cent of global emissions have now committed to reduce or limit their carbon pollution. All major economies, including the US and China, are implementing policies to reduce emissions, drive clean energy investment, and improve energy efficiency. Several developing nations, China, Brazil, South Africa, Mexico, and India, amongst them, are following suit.

At recent UN conferences, 190 countries agreed to hold global warming to below 2°C.⁸¹ While the ink is on paper, it remains to be seen if words translate into the level of action matching the scale and urgency of the task.

However, 2°C is a global guardrail to steer clear of; it is *not* a benchmark of safety to aim for. Keeping under 2°C reduces but doesn't rid us of the risk of dangerous climate change. It does help to focus the attention of governments and to steer international effort away from the worst scenarios, but it is far from a safe goal.

Beyond 2°C the world enters dangerous territory. The science suggests we are headed for tipping points in the earth system beyond which adaption becomes very difficult and costly. The limit of 1.5–2°C is the global community's best guess of a global warming guardrail; above this the risk of abrupt, irreversible, and dangerous climate change rises.

There is a big and growing gap between the emissions pathway we need to be on to avoid a rise over 2°C and the one we're on. To give the world a reasonable chance of staying well below the 2°C line, emissions must peak before 2020 and fall steadily thereafter.⁸²

Avoiding +2°C: Which Way and How Fast?

Many nations, including Australia, as well as numerous local communities and leading firms, have made good steps in the right direction. Often, action is taken because clean energy and energy efficiency simply make good economic and/or business sense. Dozens of countries have already put a price on pollution, signalling the market to invest and innovate in the right direction.

Closing the gap towards effective action is still doable - technically and economically. Modelling of emissions trajectories suggests that, despite rising emissions to date, it is still possible to meet even a 1.5°C by 2100 target and avoid altogether the risks of a world 2°C hotter.⁸³ In fact, to 2020, the path to 1.5°C or 2°C is much the same.⁸⁴ The technology and know-how already exist to re-tool the economy and meet the world's energy, food, and other needs in a much cleaner way.

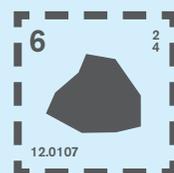
THE WORLD'S ENERGY SYSTEM IS AT A CROSSROADS... THERE IS STILL TIME TO CHANGE... WHAT IS NEEDED IS NOTHING SHORT OF AN ENERGY REVOLUTION.⁸⁵

INTERNATIONAL ENERGY AGENCY

* FROM 1990 LEVELS

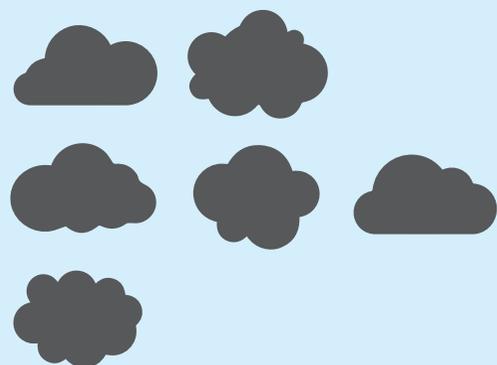
** TEMPERATURE RISE IS RELATIVE TO PRE-INDUSTRIAL LEVELS AND RANGES FROM THE MOST LIKELY (50% CHANCE OF OCCURRING) TO THE WORST CASE (10% CHANCE OF OCCURRING).

STEERING CLEAR OF 4°C



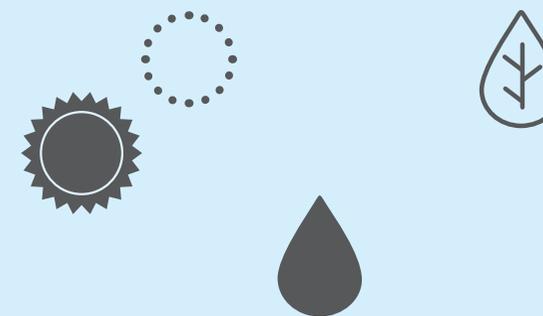
Capture and Store Carbon

It would be imprudent to bet on a wholesale transformation of the energy supply in the short time available to avoid dangerous warming. Modelling of future warming shows that even if humanity were to stop pumping out greenhouse gases today, the global temperature would still rise by at least another degree or so. Atmospheric levels of CO₂ and other pollutants are already too high. Carbon must be drawn down out of the atmosphere. Moreover, the heavy base of fossil-fuelled power already installed is difficult to unbuild and replace, and has decades yet to run. To cut the risk of long-term warming beyond 2°C we must, in effect, produce a nett drop in emissions, i.e. *negative emissions*. This means scaling up reforestation efforts. It also means biomass power stations equipped with carbon capture and storage (CCS) facilities.



Reduce all Pollutants

There are no two ways about it: without cuts in carbon dioxide emissions, the world cannot avoid runaway warming. It is very important, however, that deep reductions are made in *all* greenhouse gases: methane, nitrous oxide, and others. Focusing on some pollutants at the expense of others will only make the task harder. Cutting other pollutants, such as ozone, sulphur oxide and soot, will not only help to keep global warming in check, but also save lives and health-care costs. An effective mitigation strategy means spreading the effort.



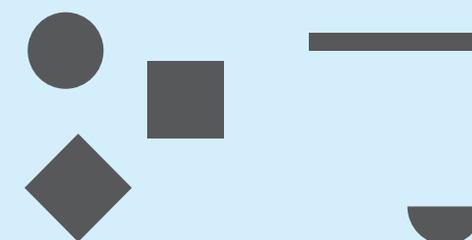
Invest in a Broad Mix of Cleaner Alternatives

In recent years, the renewable energy sector has shown very strong growth, despite a downturn in global economic activity overall. Policies that catalyse a plethora of clean energy sources will spread risk and cut the chances of any one approach failing to live up to expectations. Because of its capacity to both produce energy more cleanly and to absorb carbon, bioenergy is likely to feature strongly in future sustainable energy mixtures. Australia also has abundant and mostly untapped renewable energy resources in solar, wind, geothermal, and wave energy. Governments should also try to optimise the social, environmental, and economic benefits that come with the development of renewables.



Make Sure all Major Emitters do their Share

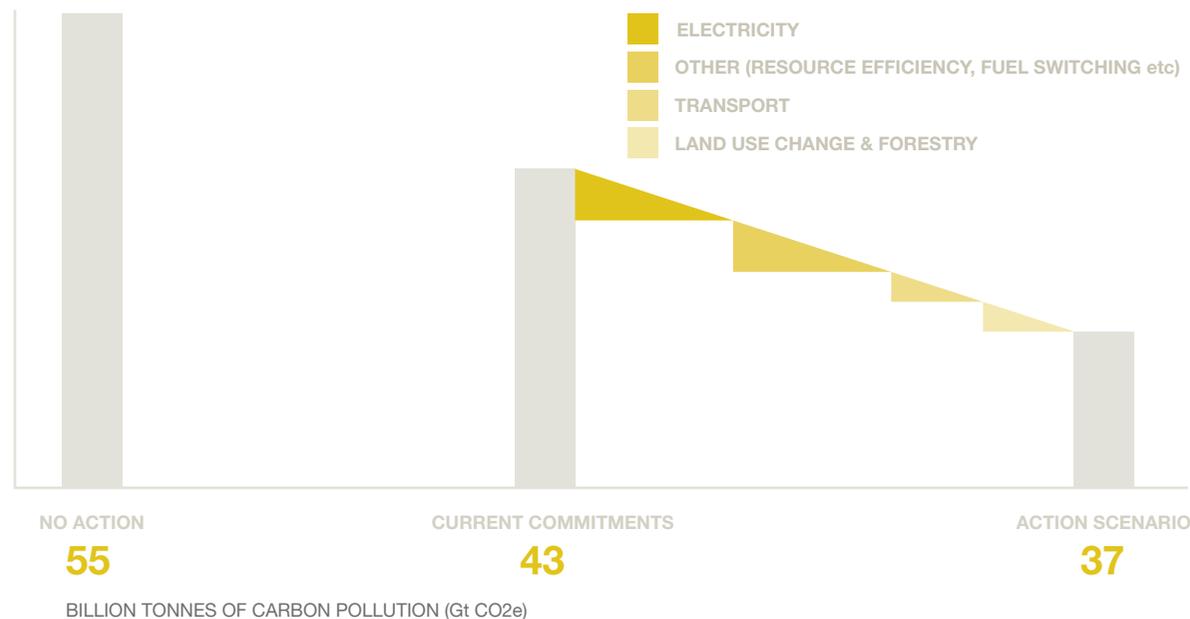
At the UN negotiations in Durban, South Africa, 2011, nations agreed to finish, by 2015, a new legal framework covering all major emitters; those countries with the highest contribution to the problem. The decision to adopt a new, single, binding agreement in 2015 is important for both political and practical reasons: by bringing in China, India and other major sources of pollution, it removes a key barrier to a US commitment to pollution reductions. As the negotiations unfold, it is still an open question whether Australia will, in its role as a middle power, deploy its diplomacy to strengthen global ambition, or weaken it.



Develop a Diverse Policy Portfolio

There is no silver bullet that will stop climate change. No single policy measure or program can work alone. Instead, a diversity of initiatives is needed. This means scaling up existing efforts, and filling in any gaps, to re-tool and re-design the global economy, including: carbon pricing, energy efficiency incentives, research and development, commercialising clean energy, reduced deforestation, and cleaner transport.

STEPPING BEYOND CURRENT COMMITMENTS



Reducing Emissions

Based on analysis by the Australian Treasury, the above illustrates three global emission scenarios. The first assumes the world is not acting to reduce emissions.⁸⁶ This sees annual emissions from all sources increase to 55 billion tonnes in 2020. The second assumes that countries continue to implement policies to reduce emissions in line with the commitments they have made internationally. The third scenario is more consistent with action that gives a better chance of avoiding a 2°C increase in global temperature.

There is a gap between the current commitments and the less risky scenario—between rhetoric and what needs to be done to avoid disaster: around 6 billion tonnes in 2020. However, it also shows that by taking some important steps the world can close this emissions gap.

Action in the electricity sector—renewable energy and energy efficiency—is particularly important, though not enough by itself. Emissions from transport can be avoided by using hybrid and electric vehicles in tandem with clean energy. And putting deforestation into reverse is critical.

Taking steps to close the gap between danger and safety will see the global economy continue to grow: 50 per cent by 2020, according to expert modelling. If they're not taken, then that year the economy will have grown by 52 per cent.

In other words, taking early action to invest in avoiding dangerous climate change will see the world achieve the same level of increased prosperity only a few years later.

THE LONGER WE WAIT. THE HARDER THE TASK. PROCRASTINATING AND TRYING TO PLAY CATCH UP LATER ON WILL PROVE VERY EXPENSIVE AND VERY RISKY.



Getting on Track Means Starting Now

The International Energy Agency warns that current investments in buildings, transportation systems, factories and other infrastructure are locking in high energy-use patterns and associated emissions for decades, limiting future options for abating emissions and stranding assets.⁸⁷

The longer we wait, the harder the task. The higher the emissions in 2020, the lower they must be in 2030.⁸⁸ Procrastinating and trying to play catch-up later on will only prove very expensive and very risky. If we start in earnest right now, the transition to a clean economy can be steady and manageable; we keep our options open. Dawdling, however, will mean higher costs in the future.

Australian and overseas investments in coal sit precariously on a speculative carbon bubble. While investors, governments, and even some coal companies may say they take climate change seriously, many seem to be gambling that demand for dirty fuels will continue to rise. The clear shift to low-carbon policies worldwide suggests that it is not smart to invest in the polluting practices and industries of the past.

The Climate Institute and the Carbon Tracker Initiative, recently used analysis from the Potsdam Institute and the Grantham Institute at London School of Economics to determine the carbon budget available for a strong (although by no means certain) chance of achieving the 2°C goal. The conclusion is that only 20-40 per cent of coal, oil, and gas now on the books of listed companies can be used before the dangerous threshold is crossed. This has implications for the immediate future of the energy sector.

Adaptation to a changing climate is vital, but it is likely to be extremely difficult for a country like Australia to hold on to our hard-won prosperity in a world of 2°C of warming or more. Our economy is certainly strong, but whether, in the future, we'll have the wealth to cope with a hothouse world remains an open question. The challenge is to manage the unavoidable changes ahead while avoiding the unmanageable.

There is still time to get on track, but not much time. The sooner we start, the more choices and chances are open to us, and the easier it will be.

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This project was possible thanks to support from the Dara Fund No. 2 (a sub fund of the Australian Communities Foundation) and The Poola Charitable Foundation (Tom Kantor Fund). We would also like to acknowledge the support of Michael and Silvia Kantor and the Nelson Meers Foundation towards our Creative Fellowship.



Now more than ever, we need your help to build public awareness and support for climate and carbon action. Support our Carbon Crunch Appeal and help ensure Australia's zero-carbon future.

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Key imagery in this booklet has been photographed by Michael Hall, Creative Fellow at The Climate Institute



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**IF YOU LOOK AT THE
SCIENCE ABOUT
WHAT IS HAPPENING
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AREN'T PESSIMISTIC,
YOU DON'T
UNDERSTAND DATA.**

**BUT IF YOU MEET
THE PEOPLE WHO
ARE WORKING TO
RESTORE THIS EARTH
AND THE LIVES OF
THE POOR, AND YOU
AREN'T OPTIMISTIC,
YOU HAVEN'T
GOT A PULSE.**⁸⁹

PAUL HAWKEN, AUTHOR, JOURNALIST, AND ENTREPRENEUR
