

CLIMATE CHANGE

Newsletter on Global Warming for ANZ Friends
May 2013



LLYN RICHARDS.....	1
AUSTRALIA LINKS 'ANGRY SUMMER' TO CLIMATE CHANGE – AT LAST	4
AN INTRODUCTION TO GENERATION ZERO	6
AUTHOR CLIVE HAMILTON ON WHY WE'VE LEFT IT TOO LATE TO STOP CLIMATE CHANGE,.....	10
LARGE RISE IN CO2 EMISSIONS SOUNDS CLIMATE CHANGE ALARM.....	12
CURRENT RATES OF DECARBONISATION POINTING TO 6 °C OF WARMING	14
COMPARING CLIMATE PROJECTIONS TO OBSERVATIONS UP TO 2011	17
CO-OPERATIVE GROUP HQ, ONE ANGEL SQUARE, MANCHESTER	18
GLACIOLOGISTS FEAR THEY MAY HAVE SERIOUSLY UNDERESTIMATED THE POTENTIAL FOR MELTING ICE SHEETS	22

Llyn Richards

Llyn Richards has died. Stopped, as he once said he would, some day. The world was richer for his presence and we are now the richer for his memory, hard though that might be for us who are still here.

This is not an attempt at an obituary, just a few words of appreciation of his involvement in, and dedication to climate change issues.

It was Llyn who, one science weekend at the Settlement ten or so years ago, introduced a small group of Friends to carbon footprint measuring. I think we used the U.K. Quaker Living Witness carbon calculator. It certainly brought home to us the high carbon cost of flying, and the importance of individual contribution. That was before George Monbiot and Mark Lynas produced their books, 'Heat', and 'Six Degrees' respectively. So before the remorseless threat of climate change had hit home to the general public, at least in NZ.

I've never known him take more than one short internal flight since. And that in an emergency. In his determination to put his money where his mouth was, he'd bought a small yellow electric car some time ago, a nice little machine which suited his philosophy and which gave him a lot of satisfaction.

Some time ago we began writing to politicians and anyone else we thought wasn't listening to the climate scientists. Always Llyn who put the finishing touches to letters, cutting them down to the bare essentials for greater effect.

Llyn it was who refined a flock of ideas on shape and content etc. into the first climate change newsletter. Then one day, after a particularly robust discussion on how long it would be before the Earth's climate system returned to the normality in which humankind developed, the dear man stomped off in a huff. He knew where we were heading - way past the 400 ppm and 4° temperature increase - if we failed to cut down our greenhouse gasses emissions, but he hadn't done much reading about the inertia in the system.

I expect most of us thought a little while ago that once we stopped adding to our heat-trapping gasses then things would quite quickly return to normal and we could get on with designing a future based on how much CO₂ the biosphere could absorb. The discovery that, because of the greenhouse gasses we'd already shoved into the atmosphere with such gay abandon, plus the inertia in the complex system of ocean currents and heat transfer mechanisms, the 'return to normal' process will take centuries, if it happens at all, produced in Llyn a great despondency.

I know he tasted despair over the magnitude of the task ahead of us. But he got on top of that and returned to writing. Always a delight to work with, phone conversations about the current project were filled with humour. And he never gave up on trying to persuade Friends of the seriousness of the issue, and suggesting ways forward, sometimes in the face of concerted opposition.

And now he's gone.

Our love to Judith and the family.
Tony.

Introduction

This issue of the Newsletter is fearsome stuff, but not to look at it is to give up hope, because our only hope is that which we give ourselves by facing our difficulties as best we can. If, as you read this edition you experience a growing sense of despair at what we're doing/have done to the planet, and the magnitude of the tasks facing us - then read on. Because such despair, like anger, can, if put to good use breed the kind of energy we'll need to take us through the next decade - the defining decade as some of the climate change scientists are now calling it.

So a touch of despair will raise its head from time to time, it's one of the costs of loving God and our fellow creatures. We will be challenged to seek that of God in the polluters; those who seek only profit in oil and coal; politicians who, for a variety of reasons, put expedience ahead of care for the Earth.

Our Peace Testimony will remind us that if we want to live up to it then we need to remember that we must (good word, "must"!) bust a gut to avoid putting more greenhouse gasses into the atmosphere. Because every tonne will add to, for

example the tensions and incipient violence of climate change-caused water stress in the many densely populated parts of the world. Add to the difficulty of growing food in Australia.

But we're all in this together. We all in different ways support the destruction of the land which sustains us and all life, because we're part of the fossil fuel-based system we grew up in. A system which is now threatening life from Central Asia to the 'highly developed' nations. And even as religious people, Quakers are as culpable as anyone else. So what gives? What do we have to offer our God in this matter?

As we go, in this new journey, we'll find ourselves growing closer to the Earth, closer to our fellow creatures - closer to God - however we might experience that.

In this issue:



As Clive Hamilton says in the interview printed in this issue, "The only way we can maintain our integrity and dignity is not to retreat into apathy and indifference but to become more active and that includes civil disobedience if necessary.

Telling the truth doesn't mean you stop acting if the truth is very bad. This is not a justification for helplessness based on despair. But

if you're not despairing you're not listening to the scientists because that is the reality. It's too late to avoid dramatic climate change this century, but there are degrees of changes that can be influenced by what we do over, in particular, the next decade or two."

Close to home, you'll read about Australia's 'angry summer', with its 123 extreme weather records - use the links for images if you're reading the e-version of the newsletter.

Our Young Friend Jimmy Green is a leading light in Generation Zero. The Generation Zero story is encouraging, though regarding the comments on NZ's ETS you might refer to the ETS critique in the July issue of the newsletter. And George Monbiot of the Guardian Weekly has a recent story entitled, 'The EU ETS Died Yesterday'.

Christina Figueres, United Nations climate chief, in the Rise in Emissions article is pretty cautious when she speaks of hopes of 2° fading as you'll see in Clive Hamilton's story and the one on Current Rates of Decarbonisation. Google around a bit and you'll find other climate scientists saying the same. And do you remember the Kevin Anderson story in the last climate change newsletter, when he said that if

we want a better than 50/50 chance of holding warming at 2° then emissions must reach zero by 2030?

Clive Hamilton speaks of our having left things too late to avoid some climate change, and of a process of constant adaption as the changes unfold. The need to face uncomfortable facts, the need for people to think of themselves as citizens rather than consumers. I think he underestimates the power of the consumer to bring about change, and plays down the responsibility of the individual. After all, when you dig down a bit, the total greenhouse gasses emissions is the sum of the consumers'.

For those readers who are interested in a touch of the science, the rather long story on comparing the scientific projections to what actually happened might be welcome.

The wonderful 'future proofed' building in Manchester, UK, is the sort of hopeful story being repeated in various parts of the world. Depends of course on what the future does bring. See the scenarios outlined in the Climate Hub article.

And what is a Quakerly response? How do our long-established views on justice and care for the environment match our understanding of and response to climate change? One suggestion is that we give serious thought to spending more time with the issue, both in group/workshop occasions, making full use of electronic technology, and perhaps in major seminars in both islands - to which of course we would not fly!

May I suggest you write a response to some of the articles in this issue, and all responses can be published in the next one? Email to: sjplusam@gmail.com

Tony Maturin.

Australia links 'angry summer' to climate change – at last

Guardian Weekly Environment Blog Mar.7th 2013

Government advisers unequivocally link the country's extreme weather and global warming, and say the worst is yet to come

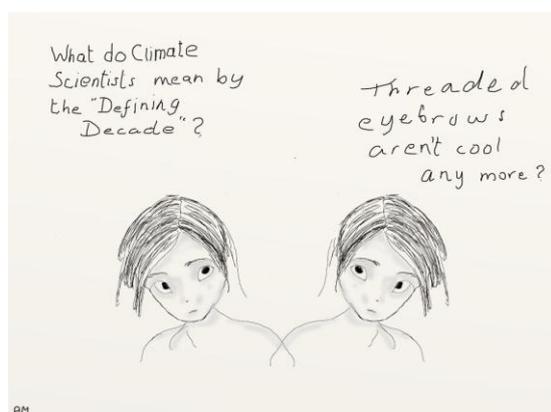
Map of extreme weather events that hit Australia during summer 2012/2013. Click on the image for a larger view. Photograph: Australia Climate Commission.

happening with our climate system. As it warms up, we're getting fewer cold days and cold events and many more record hot events."

Angry summer shows that 2012-13 was Australia's hottest summer since records began in 1910. Temperature records were set in every state and territory, and the national daily average temperature rose to unprecedented levels. Meteorologists were even forced to [add two new colour categories to Australia's weather prediction maps](#) as the heat rose.

In early January, [major bushfires burned](#) in the states of Tasmania, New South Wales (NSW) and Victoria. "Climate change is aggravating bushfire conditions and thus increasing the risk of fire," said the report. It also cited the introduction of a new category – "catastrophic" – for ranking bushfire risk following Australia's devastating 2009 Black Saturday fires, as "concrete evidence of this increasing risk".

Some 26 daily rainfall records were broken at weather stations across Australia over the 2012-13 summer. Five river-height records were broken and there was major flooding throughout south-east Queensland and northern NSW. "Extreme rainfall is consistent with the type of events scientists expect to see more often in a warming climate," the report says.



Despite some of the staggering records set, the worst is yet to come, the report suggests:

"Looking towards the future, it is virtually certain that extreme hot weather will continue to become even more frequent and severe around the globe, including Australia, over the coming decades. It is also likely that the frequency of heavy rainfall will increase

over many areas of the globe ... In Australia and around the world we need to urgently invest in clean energy sources and take other measures to reduce emissions of greenhouse gases. This is the critical decade to get on with the job."

An Introduction to Generation Zero

Mobilising New Zealand to take action on climate change:

By Rachel Evans, with support from the Generation Zero Media Team

Climate change has long been touted as the issue of our times. The warnings from the scientific community are becoming increasingly dire, yet inaction remains the most popular response. Internationally, countries are politically paralysed by the failure to achieve a binding agreement on how to tackle climate change. Individually,

some countries have set ambitious targets to reduce their emissions; however, New Zealand is not one of these. In 2006, Helen Clark said that New Zealand should be setting targets to be carbon neutral. In reality, we are not even close. In fact we're going backwards.

This inaction is not an option if we want a safe and thriving future. How do we inspire action? What does action on climate change realistically look like? These two questions are what the young people across the country who are involved with Generation Zero are trying to answer.



New Zealand's Current Situation

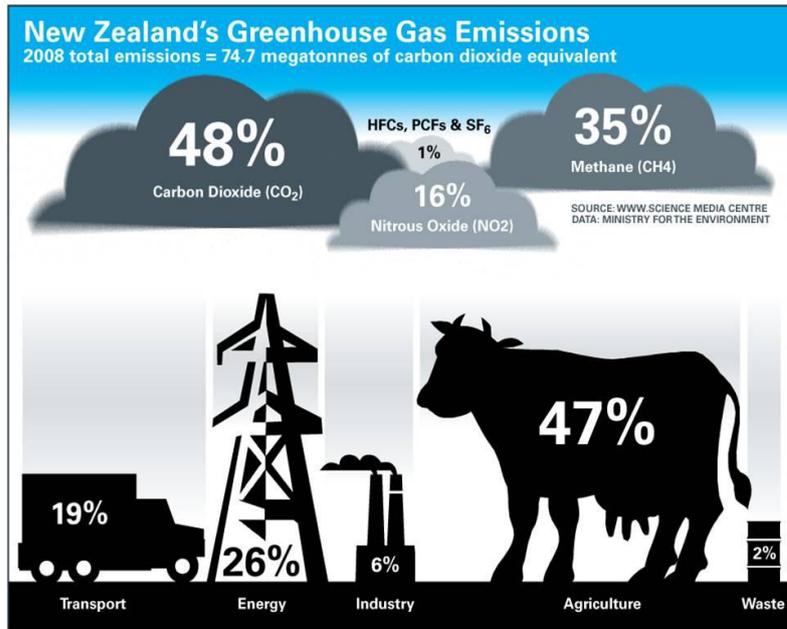
The International Energy Agency has warned that if greenhouse gas emissions don't peak in 2017, then the world is likely to experience irreversible climate change resulting in humanitarian crises. Yet New Zealand has no credible plan to meet its targets for reducing emissions. In fact, systematic weakening of our

climate change policy is moving us away from a carbon-neutral future.

The Emissions Trading Scheme has been watered down by a series of measures which have rendered it virtually ineffective. The price of carbon has now fallen to a low of 14 cents a tonne, meaning businesses have little incentive to reduce carbon emissions: 14 cents per tonne is not a high price for industry to pay to emit carbon and it offers scant compensation to owners of carbon-absorbing forestry blocks. The absurdity of our current situation is demonstrated by a quick comparison with Australia: their carbon price recently opened at \$23 a tonne. To top it all off, last November the Government withdrew from the Kyoto Protocol, showing that it is not prepared to commit to legally binding action on climate change.

There are some positive signs at the local Government level. Examples include Dunedin, where Council leadership has seen the Dunedin City Council cut its own emissions a whopping 56% in the two years from 2010 to 2012. Christchurch has a \$69 million plan to build Copenhagen-style cycleways, but a lack of Government support means rates will have to be increased by \$20 per ratepayer to fund the new project. Mayor Len Brown and his Council have ambitious plans for the City Rail Link and a more dense Auckland - but the government is again refusing to help out.

Local governments nationwide are ready for action but starved of funding as central government continues to invest the vast majority of its transport budget in the emissions-intensive Roads of National Significance (RoNS). To fund the RoNS, the government is raising debt whilst slashing funding for smarter transport solutions.



In the meantime, New Zealand's emissions continue their inexorable rise - our net emissions rose a whopping 88.1% from 1990 to 2011.

What does action on climate change look like?

In order to create solutions, you first need to understand your problem. The general population

may not be aware of the intricacies and urgency of the climate situation. The prevalence of 'green-washing' has generated confusion regarding what is really 'environmentally friendly', 'sustainable', or 'carbon neutral'. There are many actions which may be perceived as "environmentally friendly" in some way, but in reality, those actions might contribute very little, if at all, to reducing emissions. Action on climate change means implementing measures that reduce the amount of greenhouse gases emitted into the atmosphere.

Agriculture, transport and energy generate 94% of New Zealand's greenhouse gas emissions. The biggest is agriculture - producing 47% of our greenhouse gas emissions. A further 45% is caused by energy use (26%) and transport (19%). There are significant easy wins in reducing agricultural emissions (if you are interested, [this blog](#) is a good place to start), but it is going to require a concerted and long-term focus. Agriculture is an incredibly difficult issue politically - when Labour's carbon price in the early 2000s was dubbed a "fart tax", it stood little chance of succeeding in a country where the traditional farming lifestyle remains a cultural treasure..

In 2013, Generation Zero is focusing its actions on the transport and energy sector - places where significant progress is easily achieved. Three facts might give you pause to think. First, New Zealand's wind energy potential is estimated to be three times our current demand. Second, the Energy Efficiency and Conservation Authority estimates that available energy efficiency solutions could save New Zealand businesses \$2 billion per year. Third, seven out of ten New Zealanders want more investment in public transport.

Moving forward, it's important that policy mechanisms support this potential. The transport budget needs rebalancing: we cannot create a transport system which gives people real transport choices if we insist on putting \$12 billion into the RoNS and only \$0.5 billion into walking, cycling and public transport infrastructure. We also need an effective emissions trading scheme which makes polluters pay for the

true cost of the carbon they emit. Although market mechanisms aren't a full answer by any means, they are a crucial condition for applying comprehensive, across the board pressure. If you are not convinced, take a look across the ditch to where Australia has reduced its emissions 8.6% in the year since the carbon price came into effect.

How can we inspire action?

If it is true that solutions to climate change exist, then what will it take for us as a country to step up and start changing the way we do things? We face a massive issue, with a worsening forecast, in a political situation where reducing emissions is simply not a factor. Creating jobs and boosting the economy dominates the debate. We need to remember that without considering reducing emissions whilst creating growth, that economic growth will only be short term.

Generation Zero sees climate change as a systemic problem, rather than simply a matter of personal choice. To bring about real change, we need a cross-party consensus around the need to take action on climate change. In New Zealand, beliefs about climate change seem to correspond closely to individuals' position on the political spectrum; those most concerned about climate change are generally left-wing voters. However, this is not the case in Europe. Denmark began its exemplary programme of climate change action while under a right-wing government for the ten years leading up to 2011. Taking action on climate change needs to be a priority that supersedes political ideology.

Generation Zero seeks to catalyse this transformation in the public debate by mobilising young people. As the generation that is coming of age, we are the ones that will feel the effects of climate change in our lifetimes, and we must oversee the transition to a zero carbon economy.

Working out how to build a cross-party consensus on a polarised issue is an ongoing challenge, but in concluding this article, we offer two observations. First, the demonstration of solutions at a grassroots level is a powerful tool. Campaigning on solutions enables people to reclaim hope as positive alternatives are presented. It also gives a specific focus, and the chance to educate. In our election campaign in 2011, we interviewed over 100 politicians and publicised the results [online](#) to educate young people, asking questions about different aspects of the climate solutions picture. This year, we are ramping up our focus on solutions even further - running local projects like renovating "Dunedin's Worst Student Flat in 2012" (as voted by the Mayor) to make it an example of healthy, low-carbon living. We are using our **100% Possible** campaign to continue to campaign on a national level to highlight the array of options available to move New Zealand beyond fossil fuels right now. We've supported the development of new cycle networks in Dunedin and we're engaging with Auckland's Unitary Plan to show that young people are ready for quality, compact living, and that density is a prerequisite to the future we want.

Second, young people are ready to step up, but we need help. Our generation has passion and drive, but without wider support we lack the power to influence policy makers and effect the necessary change. Climate change is going to require all New Zealanders to take a hard look at the way we do things. With its 2,500 members nationwide, and its volunteer network giving as much time as they can throw at this, Generation Zero is doing everything it can, and we'd love any advice or help you can give.

Author Clive Hamilton on why we've left it too late to stop climate change,

his horror over geoengineering and the urgent need to become citizens rather than consumers

Tom Levitt: What does this book say to the environmental movement?

Clive Hamilton: One should not assume that environmental activists are necessarily in the vanguard of their understanding of the science and its implications. I think a lot of environmentalists are in denial about the severity of the crisis that is starting to unfold. The science does demand a wholesale re-thinking of how we go about dealing with climate change, because if, as the science shows overwhelmingly, there is no possibility of limiting warming to 2 degrees and we'll be lucky if we can limit it to 4 degrees, we're gonna have a radically transformed climate on earth and this changes everything. Every other book says 'yes, it's serious but it's not too late'. They might say 'we don't have much time and it's urgent and we must act immediately' but they always say 'it's not too late'. Either because the authors believe that or they feel if they say it's too late then people will lose hope and become immobilised. I can understand that concern, but the truth is we are past the point of no return, so we have to completely re-think the problem and not pretend there are things we can do that will save the situation.

TL: Do you worry that if we accept the reality of climate change we will bring out the worst in human instincts?

CH: There is a serious danger of that - military forces in the major countries are planning for different types of conflict to merge in decades to come so they are viewing climate change as what they call a 'threat intensifier'. Progressive voices in the environmental movement need to start thinking about how we can shift the political system so that the response to climate change is more just and peaceful than it could otherwise be, and that is why I talk about the need to democratise survivability as much as we can and stop the poor and powerless losing out to the rich and well-connected.

TL: You quote a 13-year girl in your book saying 'we should accept the reality of climate change and deal with it'. So what is the next step?

CH: The purpose of this book is to confront people with reality of climate change rather than the comfortable stories that it could still be okay. When you really look at what the scientists are saying it causes us to re-think everything, including the

whole notion of adaptation because previously it was thought of as a marginal activity. If the pattern of climate change unfolds as broadly expected it will be a process of constant adaptation and there is a danger of making investments that will become dated in decades when we realise we didn't go far enough. I worry about immediately leaping to what we can do because I think we have to accept this very different future first and I don't think we are anywhere near doing that yet.

TL: Is there a danger that this kind of reality will lead to apathy?

CH: The only way we can maintain our integrity and dignity is not to retreat into apathy and indifference but to become more active and that includes civil disobedience if necessary. Telling the truth doesn't mean you stop acting if the truth is very bad. This is not a justification for helplessness based on despair. But if you're not despairing you're not listening to the scientists because that is the reality. It's too late to avoid dramatic climate change this century, but there are degrees of changes that can be influenced by what we do over, in particular, the next decade or two. You can sit back and say, oh we're going to have terrible climate change and there's nothing I can do about that, but if those people have children then they are pretty poor parents not to worry about the conditions in which their children will live. I think that is a pretty powerful incentive to do as much as we can to at least delay the worst effects and begin preparing ourselves for life in a transformed climate.

TL: Can we solve climate change?

CH: We can't avoid it because we've left it too late. Ten years ago if the major countries of the world had embarked on far reaching policies to reduce their GHG emissions we would have had a good chance of avoiding most of the effects. All the science suggests that in this century and the next the climate is going to be changed in many ways hostile to humans and life in general - we're not going to avoid that. The question of solving it is out of the question. It's not like urban air pollution, where when it gets bad enough you introduce some laws on catalytic converters and it goes away, because we have set off a huge process of change in the global climate system which has its own dynamic.

TL: What about geoengineering?

CH: Geoengineers are saying that we humans should take control of the atmosphere of the earth in order to modify it in ways that suit us, in a way to operate a global thermostat, which we then fiddle with in a way that is in our interests - assuming that the great diversity of interests around the world could meet some consensus, which they probably couldn't. It's rich white blokes saying, 'well we've got to take control of this problem and we're going to engineer the atmosphere'. I just find that the most audacious and terrifying proposal that humans have ever put forward. Fundamentally, the technological capabilities of human beings are far in advance of the psychological maturity, which is why I think if we embark on geoengineering built on the psychological predisposition and weakness that have given us climate change we are only going to make the problem worse. I think we are insufficiently evolved as a species to responsibly intervene in the earth's atmosphere.

TL: You talk about the failure of green consumerism; do you think our desire to consume is a block on tackling climate change?

CH: It's a huge obstacle because people have become habituated to their consumerist lifestyle. I mean ten years ago people were quite happy without mobile

phones but if you took them away today there would be riots in the streets. But only for a little while, because people would become quite used to it. People are afraid of change and use consumerism in our types of affluent societies as a way of defining themselves and gaining a sense of personal identity. It worries me when environment groups pander to that by effectively arguing we can consume our way out of trouble and I don't think we can. However, I don't think consumerism is essential to human nature. Most cultures in most times haven't been driven by astounding greed and materialism. Forty years ago in the UK the levels of consumerism and materialism were vastly less than today so we're talking about a very modern phenomenon. Not to say human greed hasn't manifested itself for much of human history but it is only in very recent times that greed and intense materialism has become the dominant characteristic of certain society. But even in our types of affluent societies there are certain sub cultures that don't engage in that intensely materialist treadmill that so dominates public thinking and policy and private behavior, for example downshifters. People are able to escape the clutches of consumerism but it takes a wrench, and I don't think we have time to wait for a possible social revolution in which we transcend consumerism and materialism before we take measures to tackle climate change.

TL: So what can individuals do or are they powerless?

CH: They need to think of themselves as citizens not consumers. As consumers they can't make a difference. I don't mind if people advertise ten things you can do to reduce your level of personal guilt but I think it's wrong to say 'ten things you can do to tackle climate change'. The truth is green consumerism has made virtually no difference and shifts responsibility from the shoulders of the big polluters and governments that need to introduce the policies onto individuals. Individuals as citizens - that is political actors - can be very effective because it is only through far-reaching mandated policy change that we will get anything like the response we need. *Clive Hamilton is the author of Requiem for a Species: Why We Resist the Truth About Climate Change. For a [20 per cent discount off the RRP £14.99, enter code Requiem20 when you order online here](#)*

Large rise in CO2 emissions sounds climate change alarm

John Vidal, The Guardian, Friday 8 March 2013



Hawaii's Mauna Loa observatory, where record CO2 increases are being documented (Photograph: Richard Vogel/AP)

Hopes for 'safe' temperature increase within 2C fade as Hawaii station documents second-greatest emissions increase.

The chances of the world holding temperature rises to 2C – the level of global warming considered "safe" by scientists – appear to be fading fast with US scientists reporting the second-greatest annual rise in CO₂ emissions in 2012.

Carbon dioxide levels measured at Mauna Loa observatory in [Hawaii](#) jumped by 2.67 parts per million (ppm) in 2012 to 395ppm, said Pieter Tans, who leads the greenhouse gas measurement team for the [US National Oceanic and Atmospheric Administration \(NOAA\)](#). The record was an increase of 2.93ppm in 1998.

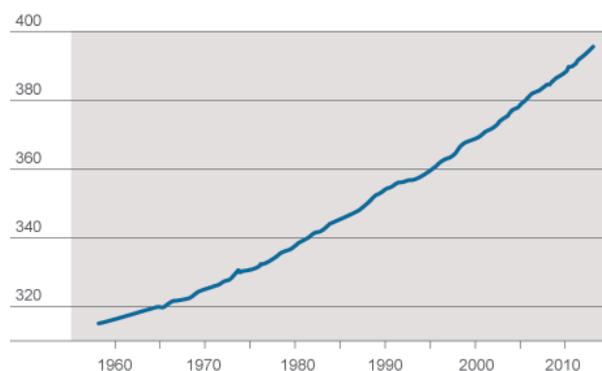
The jump comes as [a study published in Science on Thursday](#) looking at global surface temperatures for the past 1,500 years warned that "recent warming is unprecedented", prompting UN climate chief, Christiana Figueres, [to say](#) that "staggering global temps show urgent need to act. Rapid [climate change](#) must be countered with accelerated action."

Tans told the Associated Press the major factor was an increase in fossil fuel use. "It's just a testament to human influence being dominant", he said. "The prospects of keeping climate change below that [two-degree goal] are fading away."

Preliminary data for February 2013 show CO₂ levels last month standing at their

Atmospheric carbon increases

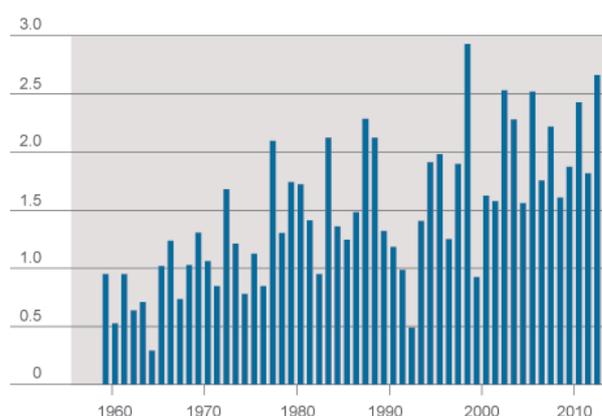
Parts per million, at Mauna Loa observator, seasonally adjusted



highest ever recorded at Manua Loa, a remote volcano in the Pacific. [Last month they reached a record 396.80ppm](#) with a jump of 3.26ppm parts per million between February 2012 and 2013.

Carbon dioxide levels fluctuate seasonally, with the highest levels usually observed in April. Last year the highest level at Mauna Loa was measured at 396.18ppm.

Annual mean growth rate, parts per million per year



What is disturbing scientists is the acceleration of CO₂ concentrations in the atmosphere, which are occurring in spite of attempts by governments to restrain fossil fuel emissions.

[According to the observatory](#), the average annual rate of increase for the past 10 years has been 2.07ppm – more than double the increase in the 1960s. The average increase in

SOURCE: NOAA, SCRIPPS INSTITUTE OF OCEANOGRAPHY

CO₂ levels between 1959 to the present was 1.49ppm per year.

The Mauna Loa measurements coincide with [a new peer-reviewed study](#) of the pledges made by countries to reduce CO₂ emissions. The Dutch government's scientific advisers show that rich countries will have to reduce emissions by 50% percent below 1990 levels by 2020 if there is to be even a medium chance of limiting warming to 2C, thus preventing some of [climate change](#)'s worst impacts.

"The challenge we already knew was great is even more difficult", said Kelly Levin, a researcher with the World Resources Institute in Washington. "But even with an increased level of reductions necessary, it shows that a 2° goal is still attainable – if we act ambitiously and immediately."

Extreme weather, which is predicted by climate scientists to occur more frequently as the atmosphere warms and CO₂ levels rise, has already been seen widely in 2013.

China and India have experienced their coldest winter in decades and Australia has seen a four-month long heat wave with [123 weather records broken](#) during what scientists are calling its 'angry summer'.

"We are in [getting] into new climatic territory. And when you get records being broken at that scale, you can start to see a shifting from one climate system to another. So the climate has in one sense actually changed and we are now entering a new series of climatic conditions that we just haven't seen before", said Tim Flannery, head of the Australian government's climate change commission, this week.

Earlier this week [the Met Office warned](#) that the "extreme" patterns of flood and drought experienced by Britain in 2012 were likely to become more frequent. One in every five days in 2012 saw flooding but one in four days were in drought.

Current rates of decarbonisation pointing to 6 °C of warming

[This is pre Doha material, but is as applicable now as then, every bit as true, and essential for understanding the issues. For context, suggest you Google:-

[Impacts by Degree Overview | Climate change facts, The Climate Hub](#)
[www.theclimatehub.com/topics/the.../climate.../impacts-by-degree?...](#)

*And past 6 degrees Celsius of warming, the danger of runaway **climate change** is inevitable, perhaps spurred by the escape of oceanic methane stored below ...Ed.]*

The annual rate of reduction of carbon emissions per unit of GDP needed to limit global warming to 2 °C, has passed a critical threshold according to new analysis

from PwC (Price Waterhouse Cooper). The rate of reduction now required has never been achieved before.

The analysis in the PwC Low Carbon Economy Index, measuring developed and emerging economies progress towards reducing emissions linked to economic output. It demonstrates that at current rates of emissions growth at least 6 °C degrees of warming could be possible by the end of the century.

The report shows that while the increase in emissions intensity in 2010 has been reversed, with only a 0.7% reduction globally in 2011, it's a fraction what is required against the international commitment to limit global warming to 2 °C. To limit global warming to 2 °C would now mean reducing global carbon intensity by an average of 5.1% a year – a performance never achieved since 1950, when these records began. The report warns that "governments and businesses can no longer assume that a 2 °C warming world is the default scenario." It adds that any investments in long term assets or infrastructure, particularly in coastal or low-lying regions need to address far more pessimistic scenarios.

With less than four weeks to the UN Climate Summit in Doha, the analysis illustrates the scale of the challenge facing negotiations. The issue is further complicated by a slow market recovery in developed nations, but sustained growth in E7 economies, which could lock economic growth into high carbon assets.

Emerging markets' previous trends on carbon emissions reductions linked to growth and productivity have stalled, and their total emissions grew by 7.4%. By contrast, the UK, France and Germany achieved record levels of annual carbon emissions intensity reductions, but were helped on by milder winters.

Jonathan Grant, director, sustainability and climate change, PwC said: "The risk to business is that it faces more unpredictable and extreme weather, and disruptions to market and supply chains. Resilience will become a watch word in the boardroom – to policy responses as well as to the climate. More radical and disruptive policy reactions in the medium term could lead to high carbon assets being stranded.



"The new reality is a much more challenging future in terms of planning, financing and predictability. Even doubling our current annual rates of decarbonisation globally every year to 2050, would still lead to 6 °C, making governments' ambitions to limit warming to 2 °C appear highly unrealistic."

The pace of reducing global carbon intensity has been slow despite growing international focus on climate change. The financial crisis has dampened progress further, with carbon intensity falling less than 1% in the four years since it began.

Leo Johnson, partner, PwC said: "While we've reversed the increase in emissions intensity reported last year, we're still seeing results that are simply too little too late. We've now got to achieve, for the next 39 years running, a target we've never achieved before."

"This isn't about shock tactics, it's simple maths. We're heading into uncharted territory for the scale of transformation and technical innovations required. Whatever the scenario, or the response, business as usual is not an option."

Jonathan Grant, director, sustainability and climate change, PwC said:

"The challenge now is to implement gigatonne scale reductions across the economy, in power generation, energy efficiency, transport and industry, as well as REDD+ in forested nations."

Examining the role of shale gas, PwC's report suggests that at current rates of consumption, replacing 10% of global oil and coal consumption with gas could deliver emissions savings of around 3% a year (1gt CO₂e per annum). However the report warns that while it may "buy some time", it reduces the incentive for investment in lower carbon technologies such as nuclear and renewables, and could lock in emerging economies with high energy demand to a dependence on fossil fuels.

Notes

1. Carbon intensity is our preferred metric for analysing countries' movements towards a low carbon economy, as it accounts for expected economic growth, and can generate comparable targets.
2. The carbon intensity of an economy is the emissions per unit of GDP and is affected by a country's fuel mix, energy efficiency and the proportion of industrial versus service sectors.
3. Despite achieving its highest levels of carbon intensity reduction annually, the UK still needs to reduce carbon emissions intensity 5.2% per year. Staying within the UK's pledge of 34% reduction on 1990 emissions levels would require action on the scale of equivalent of shutting down all the UK's coal – fired power plants.
4. PwC helps organisations and individuals create the value they're looking for. We're a network of firms in 158 countries with more than 180,000 people who are committed to delivering quality in assurance, tax and advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com.

Source: PwC [Price Waterhouse Cooper]

Comparing climate projections to observations up to 2011

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Stefan Rahmstorf *et al* 2012 *Environ. Res. Lett.* **7** 044035

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Abstract

We analyse global temperature and sea-level data for the past few decades and compare them to projections published in the third and fourth assessment reports of the Intergovernmental Panel on Climate Change (IPCC). The results show that global temperature continues to increase in good agreement with the best estimates of the IPCC, especially if we account for the effects of short-term variability due to the El Niño/Southern Oscillation, volcanic activity and solar variability. The rate of sea-level rise of the past few decades, on the other hand, is greater than projected by the IPCC models. This suggests that IPCC sea-level projections for the future may also be biased low.

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1. Introduction

Climate projections like those of the Intergovernmental Panel on Climate Change (IPCC [2001](#), [2007](#)) are increasingly used in decision-making. It is important to keep track of how well past projections match the accumulating observational data. Five years ago, it was found that CO₂ concentration and global temperature closely followed the central prediction of the third IPCC assessment report during 1990–2006, whilst sea level was tracking along the upper limit of the uncertainty range (Rahmstorf *et al* [2007](#)). Here we present an update with five additional years of data and using advances in removing short-term noise from global temperature data.

Atmospheric carbon dioxide concentration continues to match the prediction: the mean value reached in 2011 was 390.5 ppm (NOAA [2012](#)), only about 1.5 ppm higher than the central IPCC projections published in 2001. For historical perspective, in his article 'Are we on the brink of a pronounced global warming?', Broecker ([1975](#)) predicted an increase from 322 ppm observed in 1970 to 403 ppm in 2010. A more detailed analysis of anthropogenic climate forcing, which also includes other greenhouse gases, aerosols and surface albedo changes, is beyond the scope of this

letter. Here we focus on two prime indicators of climate change: the evolution of global-mean temperature and sea level.

To see the rest of this article, go to:

<http://iopscience.iop.org/1748-9326/7/4/044035/article>

Co-operative Group HQ, One Angel Square, Manchester

Sustainable measures, particularly to conserve energy, mean the Co-operative Group's new headquarters will produce 80 percent less carbon and halve its energy use, writes Andy Pearson.

Sustainability is a cornerstone of the Co-operative Group's principles. Since 2003 the retailer and financial services provider has reduced its greenhouse gas emissions by 38 percent. From 2007, 99 percent of the electricity supplied to the organisation has been from renewable sources. The group even has its own wind farms contributing to the energy needs of its stores and branches.

With such deep green credentials it is no surprise that the Co-operative's recently completed 30,500m² One Angel Square headquarters in Manchester has achieved the accolade of being one of the UK's highest BREEAM-rated buildings with a BREEAM Outstanding score at interim (design) stage of 92.25 percent.



Description

One Angel Square hosts more than 3,000 Co-op employees who are being co-located in one office for the first time. The new, 15-storey building is unusual in that it is a three-sided building with a fully glazed double skin façade that curves both horizontally and vertically around the building. Its gently curving walls are severed abruptly by a diagonal series of stepped terraces, which rise towards the back of the building, forming its roof. These terraces face south to grab every last ray of Manchester sunlight.

At the heart of this triangular building is a soaring, full-height atrium, its three sides formed from white-painted concrete balconies at each floor level. The atrium floods the building's interior with light. Behind the balconies sit the large, column-free open-plan office floors.

Key features

The atrium is fundamental to the building's ventilation strategy. Each of its three corners houses one of the building's vertical service cores. Some 50m³/s of fresh air is sucked into the building from its landscaped forecourt through three giant earth tubes buried beneath the building; this helps temper the air, cooling it in summer and warming it in winter. Air is heated or cooled in a huge basement plant room before giant fans push it up the service cores to the floor plates.

The building's 2,700m² concrete floor plates are divided into 12 control zones; each core delivers fresh air to four zones. Configuration of the building's cores, ceilings and windows was designed to provide resilience and flexibility and to allow for letting and possible future subdivision. Carbon dioxide sensors regulate the amount of fresh air supplied to each zone to minimise the volume of air treated.

A displacement system delivers fresh air to the offices through a 350mm raised floor void. As the air is warmed it rises 4m to the soffit and out of the offices into the central atrium, which acts like a giant chimney. In the atrium the air ascends to roof level, where it is drawn through a heat recovery system before being ejected.

In addition to the recovered heat, 764kW of waste heat from two 400kW combined heat and power (CHP) units is used to heat the fresh air. These are fuelled by waste cooking oil and rapeseed oil produced on the Co-op's own farms. The CHP units also provide cooling through an absorption chiller. Cooling is delivered to the offices through passive chilled beams suspended beneath the concrete soffit.



The building's double skin facade helps minimise heating and cooling loads. In summer louvres at the top of the facade open to allow the warmed air trapped between its inner and outer skins to rise up and out of the building. In winter these louvres are closed so the facade can form an insulated blanket around the building.

Solar gain is limited by coatings on the glazing and by shading – provided both by the facade's access walkways and by varying the depth of the bronze mullions on the inner face of the double skinned facade. The mullion's depths were determined by their position on the facade in relation to the winter sun.

The building has been future-proofed against forecast 2050 temperatures – a predicted five

percent increase in summer temperatures and a 30 percent reduction in winter temperatures.

Other key features include:

Low energy LED lighting in the atrium

Low energy IT equipment and systems

Low water consumption appliances

Greywater and rainwater recycling systems for toilet flushing and irrigation

10 high efficiency passenger lifts and three service lifts, with regenerative motors and destination controls.

Outcomes

One Angel Square is predicted to operate with 80 percent fewer carbon emissions and half the energy consumption of the Co-operative's old head office, which is expected to save the group over £500,000 per annum. The company will be measuring performance. Peter Cookson, programme director of Co-operative Group, says: "We have built a big research project and we will be metering it to death to ensure we optimise the building."

Learning points

The new building will be used to drive more flexible ways of working both culturally and technically. Current working practices are often paper-based, using unnecessary space. By maximising digital storage, the building's size has been optimised, minimising the use of construction materials. The planning module is based on one person per 8m2. Cookson, says "We've got rid of so much documentation. We would have needed two floors of the building to store it."

Painting the exposed concrete balconies in the atrium white enabled the artificial lighting to be reduced from 550 to 300 lux, saving significant amounts of energy.

More expensive bronze anodised facade components were used in place of a powder coated finish to reduce maintenance costs.

Building information modelling (BIM) was used on the project. Cookson explains: "We didn't set out to use BIM, but we have by default."

Project team

Client: The Co-operative Group

Architect: 3DReid

Project manager and QS: Gardiner & Theobald



Global Climate models have been used to calculate various likely future scenarios. Consequences are related not just to the average global temperature but also to the

length of time we remain at that temperature. Unfortunately, once CO₂ is in the atmosphere, its warming effects continue for centuries. In his book and Website Mark Lynas offers a [summary of the expected changes](#) by degree.

To date there is no plausible mechanism for extracting atmospheric CO₂ in sufficient quantities. Absorption of CO₂ by forests is massively outpaced by industrial emissions.

The most optimistic scenario is that a dramatic change in international [targets and treaties](#) and a cap on all [fossil fuel](#) extraction causes emissions to start falling in the next ten years. Yet even if we start cutting greenhouse gases today, we are locked in to a 2.89 degree Celsius rise in global temperatures by 2100.

Current levels of warming (less than 1 degree Celsius) seems likely to cause Arctic [sea ice](#) to disappear by 2030 or even earlier, causing the [extinction](#) or migration of Arctic species such as polar bears.

At 1-2 degrees Summer heat waves will become an annual event, killing tens of thousands and displacing millions of [environmental refugees](#).

Above two degrees of warming – the most optimistic current target – tropical rainforests are likely to release much of their stored carbon via forest fires, see [positive feedbacks](#).

Warmer, more acidic [oceans](#) will result in the destruction of coral reefs, and drastic reduction in plankton and krill which are the basis of the marine food chain. This process is already strongly in evidence

At 3-4 degrees Celsius warming, [water shortages](#) will strangle downstream cities and agricultural land dries up as glaciers and mountain snow disappears. The most affected areas will be California, Peru, Pakistan and China.

Global [food production](#) will be severely reduced as key agricultural areas in Europe, Asia and the United States suffer drought, and heat waves devastate crops.

The most pessimistic scenario is where governments fail to comply with their commitments to climate change.

With no preventative action, there is a 90% probability of a 4.85 C rise by 2100. At 5 degrees Celsius, London and New York would be at risk from flooding, while hundreds of millions of people in China and India would suffer from [water shortages](#) as Himalayan glaciers disappear.

At 4-5 degrees Celsius warming, much human habitation in southern Europe, north Africa and the Middle East will be uninhabitable due to excessive heat and drought. Humanity will be forced towards the poles, where temperatures remain cool enough for crops, and the rain still falls, although often in floods.

If we reach 5-6 degrees Celsius of warming, average global temperatures will be hotter than they have been for the last 50 million years. The entire Arctic would be ice-free all year round. [Sea levels](#) will rise so rapidly that coastal cities across the world will be abandoned by [environmental refugees](#) in their millions.

And past 6 degrees Celsius of warming, the danger of runaway climate change is inevitable, perhaps spurred by the escape of oceanic methane stored below the sea bottom, and released as the deep [ocean](#) water becomes increasingly warm. Over time the seas will be nothing but a vast dead zone. The few remaining humans will retreat to highland areas and the polar regions. Perhaps 90% of species will become extinct, beating the worst mass [extinctions](#) in the Earth's 4.5 billion-year history.

These drastic scenarios are predictable with a high degree of confidence. Many of the processes described are already clearly measurable. It seems increasingly likely that we will exceed the critical 2 degrees of warming before the end of this century. This being the case, part of our focus should be on preparing the worst-affected areas to [adapt](#).

Glaciologists fear they may have seriously underestimated the potential for melting ice sheets



to contribute to catastrophic sea-level rises in coming decades which could see increases of a metre or more by 2100.

The Independent Tuesday 26 March 2013

The ice sheets of Greenland and Antarctica contain about 99.5 per cent of the Earth's glacier ice and could raise sea levels by 65 metres if they

melted completely – although experts think this is highly unlikely in the foreseeable future. However, a survey of the world's top 26 glaciologists found most believe melting of the ice sheets could be more rapid and severe than previously estimated. They believe that melting of the ice sheets alone this century would be likely to raise the average global sea level by 29cm, the poll found, but there is a five per cent chance of it increasing even further by a catastrophic 84cm.

This would take the total sea-level increase to well over a metre if other factors such as the thermal expansion of oceans and runoff from mountain glaciers are taken into account.

"Our analysis shows the biggest uncertainty when it comes to sea levels is the contribution from the ice sheets," said Professor Jonathan Bamber of Bristol University, lead author of the study published in the journal Nature Climate Change.

"It shows glaciologists believe there is a one-in-20 chance of sea levels rising by a metre or more by 2100, and a metre rise in sea level is really very serious.

"The impacts of sea-level rise of this magnitude are potentially severe, implying a conceivable risk of the forced displacement of up to 187 million people within this century.

"Rising sea levels are one of the greatest uncertainties of climate change. A warmer world causes oceans to expand thermally but also leads to faster melting of mountain glaciers and some regions of the polar ice sheets.

"However, glaciologists are uncertain about how the ice sheets will respond to increasing global temperatures and climate change," Professor Bamber said.

"One of the most challenging issues facing glaciologists is working out how much of the melting of the Greenland and West Antarctic Ice Sheet is due to natural variation and how much is due to emissions of man-made greenhouse gases into the atmosphere," he said.

