

Absolute Zero

| 24th March 2020

Gareth Dale

The 'Absolute Zero' report demonstrates how the UK can deliver on its climate change commitments. In doing so, it debunks technological utopianism - but what of economy and class?



The UK government is committed by law to reducing greenhouse gas emissions to 'net zero' by 2050.

In late 2019, a team of researchers at the Universities of Cambridge, Oxford, Nottingham, Bath and Imperial College London, published the [Absolute Zero](#) report. It aims to show how the UK can deliver on its climate change commitment, as laid down in The Climate Change Act of 2008 and its amendment of 2019. I invited the report's lead author, [Julian Allwood](#), Professor of Engineering and the Environment at the University of Cambridge, to explain its rationale and to summarise its main findings. The report offers a formidable refutation of the case that a solution to the climate emergency exists in the form of breakthrough technologies. But, I ask Prof. Allwood, might it contain a utopianism of its own, with respect to the interests of incumbent economic and political powerholders in enacting the wholesale changes that the achievement of 'absolute zero' will require?

Gareth Dale: The Absolute Zero report outlines what is necessary in order to reduce UK emissions to zero by 2050. Why 2050?

Julian Allwood: 2050 is the target in the Climate Change Act, and is the reference date that most climate scientists have been talking about in order to develop some sense of urgency over the scale of action.

I think it remains a convenient date for planning. That the Climate Change Act refers to it is enough. It also happens to be my life expectancy, so I take it quite personally!

GD: And what is meant by the need to reduce emissions to 'absolute zero'?

JA: The phrase absolute zero reflects the fact that there are no negative emissions technologies (NETs) likely to be available at scale by 2050. The public discussion is currently talking about 'net zero', which is meaningful only if there are those NETs.

But although there are various NETs being discussed, both in the policy community and in science and innovation, none of them are operating at a meaningful scale, and none are likely to within the next twenty-nine and a half years.

GD: Your report disagrees with one parameter used by the Climate Change Act: the territorial unit.

JA: The Climate Change Act has been written to legislate for the emissions which are on, above or below the territory of the UK, and that happens to be convenient for UK politicians wanting to claim the most achievement with the least action, because since 1990 we have shut so many emitting industries.

In fact, if you look at the numbers for our balance of trade in physical goods, they were roughly balanced in 1990 and now obviously we are significant net importers. The fact that our steel production has halved since 1990 says nothing about the emissions resulting from our purchasing which have grown with our GDP but which occur in other countries from which we import goods.

It seems to me there's a very clear moral argument, that our targets should be based on our consumption, not on our territory.

GD: In the age of climate emergency, one of the central myths that breeds complacency is that breakthrough technologies will gallop to the rescue, when instead we require radical action.

In your words, this is the "comfort blanket of techno-optimism". So, oil and coal can be burnt because we'll capture and store all the carbon; or biomass can be burnt and all the carbon stored; transport can switch from fossil fuels to hydrogen; planes can fly on biofuels and batteries.

All these technologies exist, at least on the drawing board, and most of them are central to the programmes of governments and international agencies for tackling climate breakdown. Why does your report argue they will be of no avail until at least 2050?

JA: That's the most important question, I think. All of the data on past transitions in large energy and other infrastructure shows that it takes a long time for big change to emerge. A good example of that is that in 2004 the Scottish Government recognised that the Forth Road bridge had lost 10 percent of the strength of its reinforcement, due to corrosion, and needed to be replaced urgently. So they ran the project as fast as they could.

It took 14 years before the new bridge was open. For eight years no construction occurred, because they had to negotiate public financing, land rights, environmental concerns, concerns from local communities, and so on and so on. All of which have to be negotiated with large scale infrastructure developments.

For every major transition in the energy industry, that process of negotiations and permissions has caused a limit to the rate at which new technologies can be deployed. And typically, from the moment that something is first demonstrated, it takes 30 to 50 years before we get to the point at which large scale deployment accelerates.

In the report we quote a reference from Imperial College describing the fastest rates of change for nuclear, combined cycle gas turbine, wind and solar deployments in recent times, showing that it has always taken between 30 and 50 years from first demonstration of a new technology at reasonable scale until the period of mass deployment begins.

The idea of all these technologies that might save us from modifying our behaviour has been around for at least 20 years. If you look back at the 2001 International Energy Agency's World Energy Outlook they are all listed there. But they are still, today, operating at tiny scale, if at all.

So if we view this as a problem of risk management it's appropriate to plan for zero emissions with today's technologies. We should pursue all the innovation we possibly can in the hope that they'll be deployed rapidly after 2050. But we should be realistic about the unlikelihood of significant change in our nationally deployed technology basket over the next twenty-nine and a half years.

GD: I understand that major new technologies normally take decades to reach full scale. But this stems from the consultation processes and getting a sufficient mass of public or venture capital on board, and suchlike. Could these steps not be sharply accelerated, given the crisis situation?

Climate activists often point to the US economic turnaround during WWII. When the state backs them, new technologies can be jump-started and rapidly ramped. The Manhattan Project is a well-known case. Could

a similar acceleration of tech change not be achieved to save the habitability of the planet it did back then to prosecute war?

JA: I've three immediate reactions to that. Firstly, there isn't yet political agreement that there is an emergency. That is not yet driving action in the way that war generates action.

Secondly, it is clearly the case that if you abandon elements of democracy, either for centralist totalitarian control or under the guise of an emergency such as war, then you can make things happen more rapidly than if you consult. But again, we aren't near that point.

And thirdly, the Manhattan Project is a pretty unfortunate parallel, and its goal was to produce two bombs, not to equip all the world's arsenals with a large-scale availability of bombs. Our problem isn't to produce just one of any new technology. It's to replace the entire existing global deployment of existing energy systems with alternative technologies. So I think it's not a good analogy for the transition we're trying to make.

GD: Your report recommends a radical transformation to the way we live. All shipping must be phased out by 2050, and likewise all use of cement-based mortar or concrete.

In Britain, all airports except Heathrow and Glasgow will have to close by 2029, and those two by 2049. Aviation must become illegal by then, and, as the report states, ensuring that carbon is at zero must become "a regulation issue, with prohibitions on the use of carbon similar to prohibitions on the use of asbestos."

The report doesn't use the word 'degrowth' but is that the implication, at least until 2050?

JA: I don't think we know that, actually. We point to four activities in the report that have no electrical substitute. The first is ruminant meat. Over the last three years we've seen an extraordinary growth in vegetarian and vegan eating, motivated I think by the [1.5 degree report](#) of the IPCC. That was the most obvious public reaction to that report.

Clearly, in the last four weeks we've seen an extraordinary change in attitudes to flying, and although that is now, in the last week, being mandated, the bulk of the reduction was voluntary, as people associated flying with the fear of harm.

Of course the stock market has fallen very rapidly, but I don't think anyone believes that it's fallen to a stable state. We're in a period of transition—we don't know what the economic effects will be. We also note in the report that there will be substantial growth associated with zero emissions.

For example if we electrify all current uses of energy then that will entail a massive growth in both the production and installation of, for example, electric heating, electric transport, and so on. And the fact that for a period we won't be flying and we'll have no alternatives to shipping means that we're going to be reconfiguring the economy.

Whether that means degrowth or not we don't know. I sort of think that's a red herring, compared to the recognition that this isn't a transition that we can opt into or opt out of. One of the slightly misleading analyses that keeps getting reported, dating back to the Stern Report, is to talk about the cost of mitigating climate change as being a fraction of GDP, as if not mitigating it would allow GDP to grow more.

But if you think about it, not mitigating means the end of GDP. So we're using the wrong metric to compare the cost of mitigation with the cost of not mitigating.

GD: The report advocates some areas of expansion, such as rail construction, electric vehicles, building insulation, and renewable energy. Much of this depends heavily on imports. The steel in the wind turbines, the lithium in the batteries, the solar panels.

In the short term, how do you approach the problem that much of this output depends on fossil fuels—the concrete for rail construction, the iron ore mining, the solar panels produced using coal power?

JA: I think it's important to separate the bulk materials from the technology materials. The two key bulk materials are steel and cement. Blast furnaces that make steel from iron ore won't be able to operate because they inevitably lead to process emissions. But for steel we have a very good substitute, because recycling steel powered by renewables could produce the same quality of steel as we use today.

The technology innovations or interventions required to make that happen either exist or could be brought about very rapidly.

Cement is a major problem. For the moment we don't have any substitute binders. I think that's the hardest of the problems that we've pointed to in the report, and the one that merits the most urgent research. We've got some ideas about that of course and we're working on a proposal at the moment. So the problem with the bulk materials is primarily that there is no substitute for cement. However, these are in a different category to the technology materials, and of course, as you rightly say, our demand for lithium is going to grow substantially.

I was at a meeting on critical technology metals and small-scale mining at the Camborne School of Mines in Cornwall last week. The project we were looking at is exploring the development of small-scale mines to increase the production of the technology metals and to some extent therefore to relocalise the supply and there are some very promising developments in that area.

But you're right to point to the issue that some of them, of the technology materials that we need in order to deliver this new life, are not available in the UK and we have to find some other way to transport them.

GD: Turning to agency of change, you place quite a lot of responsibility on individual consumers. I can see that on a few counts the decisions are simple. Quit flying. Stop eating beef and lamb. But many others are devilishly difficult.

For instance, you would prohibit airfreighted goods, but flowers flown from Kenya can occasion lower emissions than those we import from closer to home, if they've been hot-housed using fossil energy. These more complex examples can be multiplied a million-fold.

Demanding that a harried parent or a stressed-out worker or an internet-uncertain elderly citizen should address these questions is a recipe for turning them against your programme?

JA: Briefly to start, this isn't what we as a research programme or I as an individual are advocating. What we're doing is reflecting what's currently in the law of the UK.

Theresa May, the former Conservative prime minister, changed the Climate Change Act to mandate a 100 percent cut in emissions. There are no NETs, so therefore the law is that we'll be operating in zero emissions in twenty-nine and a half years' time. That was passed unanimously in both houses of parliament.

So, if you like, don't shoot the messenger. All we're doing is revealing what is already in law. However, you're right that it's a key question to ask who's going to act? I've been reflecting on that a lot, in thinking through the response to the report, not least when it was debated in the House of Lords—and it seems to me there are two major axes on which people's responses can be plotted.

One is the question of whether this is a problem for which the solution should be led by the government or by individuals and businesses. The other axis is whether incumbent institutions will lead the change, or whether the change requires a transformation.

By default, the current policy discussion assumes that incumbent institutions will deliver the transition in response to government action. That means that the only viable portfolio of solutions depend on investing in new technologies, and that remains what the political incumbents and the incumbent players in business and so on believe is going to happen. We have clear evidence that that isn't true, it can't happen fast enough.

So what we really want is to be transformative. That I think requires that the public leads. You see, we don't have much experience of the government interfering in behaviour until the public shows that they want

them to do so. Whether it's asbestos or smoking or obesity, whichever 'sensitive' (so to speak) behaviour we take up, the government tends to follow rather than lead.

But eventually, with government following public changes in behaviour, this leads to these issues being categorised as health and safety issues rather than as economic issues, which I think is where this one has to end. There's a very encouraging example in Sweden, with the two mothers who set up the movement to have a hundred thousand people sign up and pledge not to fly for a year. That led to the 'flight shame' [*flygskam*] movement in Sweden. As a result, if you look at national statistics on take-offs in Sweden, the domestic ones have fallen and the government has responded by investing more in rail as an alternative to aviation.

That's only the beginnings but that's what's missing at the moment. The belief that incumbent institutions led by the government are the mechanism of change means that absolutely nobody is informing and engaging the public in the process of change. We can't begin the transformation that is inevitably required to deliver this kind of scale of difference until we collectively understand which actions to care about. It's flying and cement not cling-film and plastic straws.

GD: Your report is sober and realistic in its debunking of technological utopianism, but it purveys its own utopianism on matters of economy and class. In calling for wholesale reduction in most economic sectors, and radical economic deglobalisation (end of aviation, end of shipping), it - and the Climate Change Act itself if it generates serious and consistent policy changes on the lines you propose - will bring forth tremendous opposition, even hostility, from capitalists, from the business community.

Not just from the usual suspects — aviation, fossil fuel corporations, etc — but much more widely. How do you propose that the fight is taken to those interests?

JA: I'm not quite sure I agree with what you just said. It does imply deglobalisation in some productive activities, particularly ones associated with high-volume materials. I don't think it implies anything about deglobalisation of intellectual activity. It's a myth that streaming emits anything like aviation; it doesn't. So, the virtual connections will allow many of our currently globalised activities to continue.

I also want to return to the fact that I'm not particularly putting forward a position here. We're reflecting what's already in the law. So, the question isn't pointed at us, as a research project, but is pointed to us collectively, about how we want to respond.

The sunset industries like aviation, fossil fuels, cement, blast furnace steel, are of course going to oppose it because they have to shut, but we just have to face up to that, and make sure that their voice isn't given undue attention. The so-called revolving door between the fossil fuel industry and Whitehall is pretty alarming in that respect and needs to be pointed up and made very visible.

I think also we can focus on the opportunities where people will benefit from being part of the change. It's striking over the last few weeks [during the coronavirus outbreak] that that has happened: despite the loss of social interaction—none of which is implied by Absolute Zero—there's been wide acceptance of the need for change, and presumably new things will start growing out of the constraints, over the next twelve weeks.

If we're sitting in our houses, feeling cut off, then new things will emerge that we can't currently anticipate. Overall, my feeling is that until we embrace the realities of the constraints that are in law and that are consistent with climate science, we can't anticipate where the innovations will emerge.

So, focusing on degrowth, and whether it happens or not, I almost feel is a slight distraction from embracing the transformation, recognising that the early movers are going to find advantage in it.

GD: The climate emergency is global. The rich classes and the rich countries are its principal cause, but the poor classes and the poor countries tend to suffer the consequences most quickly and sharply. Your report's focus is national. How might it be extended to address North-South relations, climate justice, and the question of mass poverty in the postcolonial world?

JA: I'm not an expert on this. The report focuses on the UK because it reflects what's in the law of the UK. I personally feel that we don't have much moral basis for talking about what anybody in any other country should do until we've made meaningful change.

Our claims to have mitigated emissions so far are largely illusory, due to the fact that we've been shutting production. Switching our electricity generation from coal to gas has been a good step in reducing our emissions, but now we have to get rid of the gas.

We've done so little in the UK, and every year since 1990, the reference date, our cars have got heavier, our internal temperatures have gone up. Until we've acted meaningfully, I don't believe we've got anything to say elsewhere. When I looked at India's current climate mitigation targets, what they say is that per capita their emissions will never be higher than those of the developed world, and I think that's a marvellous target and throws all the burden back on us.

GD: Finally, the report directs our attention to the wrenching changes that are urgently required if the planet is to be maintained in a habitable state. But you appear confident that such a transformation is compatible with 'living well'.

JA: Yes. The one thing to add is that the most positive aspect of the report is on its back cover: the activities that everybody says they most value, the things that old people reflect on and say are the most important things to pass on to the next generation, the things that we reflect in the national Time Use Survey as our most valuable activities are all low-emitting and can all grow and expand.

So, there's actually a great opportunity for a lot of positives to be wrapped up in the journey that we've already signed into law and are committed to making.

This Author

Gareth Dale teaches politics at Brunel University. He is a co-editor of [Green Growth](#) (Zed, 2016). His articles are available [here](#). He tweets at [@Gareth_Dale](#).