Centre for Alternative Technology
Canolfan y Dechnoleg Amgen

ZERO CARBON BRITAIN

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AND...

A series of independent thought papers on rising to the climate emergency

Contents

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Achieving this Zero Carbon Britain is no small task – even just the modelling project! Our small but dedicated team of researchers has worked hard to figure out the technical and mathematical constraints on our scenario, but we can only do so much.

Over the last few months, we have been encouraging contributors to write a series of discussion papers entitled "ZCB and ..." to probe, ponder, reflect and imagine what a zero carbon Britain might be like. We asked for their help to raise awareness of a more carbon responsible society, by looking at a diverse range of impacts of a zero carbon Britain. From faith groups to farmers, from restaurants to rugby teams, the aim is to get people talking about what it would be like to live in a world where we rise to our 21st century challenges.

We had a great response – a huge thank you to everyone who has contributed their time, energy and expertise free of charge. Below is a taster of what we received – a few select pieces that give you an idea of all the exciting topics that relate to Zero Carbon Britain. But there are still many more interesting questions to ponder and discussions to be had.

If you can't find what you're looking for, or would like to write one of your own, why not get in touch. Contact details can be found online at **www.cat.org.uk**.

1 ZCB and rapid transitions – evidence-based hope in a warming world

Smoking, drink driving… is climate the next big behaviour change challenge? We know about all the technology and infrastructure that needs to change – new energy systems, millions of homes awaiting retrofit and the electric switch in transport – but what about our own behaviour too? Often even the concerned in relatively wealthy nations like the UK argue that it's wrong for pressure to fall on individual choices, when the choice architecture itself – the physical, economic and cultural setting in which we live – makes it hard to choose better options.

But as the scientists of the IPCC point out, limiting global warming to 1.5°C requires "rapid, far-reaching and unprecedented changes in ALL [my emphasis] aspects of society…". The latest science is telling us that nothing short of rapid, transformative change in our infrastructure and behaviour can prevent the loss of the climate we depend on. Also, there's no simple, linear relationship between cultural and behavioural change and the shift in political climate that will make changes in our economic and physical environment more likely. Yet, that said, the former certainly makes the latter more likely. Politicians need to know that there's demand and support for change.

But are we better at society-wide changes in attitude and behaviour than we give ourselves credit for? And do recent cultural shifts relating to everything from diet to plastics, sexism and attitudes to gender and identity suggest that we might be entering a phase in which more rapid behavioural changes are possible? In other words, is there cause for hope? Research in the *Climate and Rapid Behaviour Change: What do we know so far?* report from the new, international Rapid Transition Alliance, of which CAT and the team behind Zero Carbon Britain are founding members, suggests so.

"History… teaches nothing, but only punishes for not learning its lessons," is a sardonic aphorism coined by the Russian historian Vasily Kliuchevsky. In December 1952, a great smog enveloped London, England, killing thousands. It wasn't the first, but it triggered change and led to the passing in 1956 of the Clean Air Act. But nearly seven decades later, there are still around 10,000 premature deaths in London due to air pollution. Even as sales of diesel cars – especially responsible for the particulate pollution which causes multiple health problems – fell in the UK in 2018, the average carbon emissions from new cars rose by 3%. Furthermore, carbon emissions, driven by coal burning and transport fuels, hit an all time high globally.

Air pollution and climate change are inextricably linked, and that means tackling one problem can help to tackle the other. But can we find and implement solutions quickly enough to prevent climate breakdown gathering unstoppable momentum?

That's the question the Rapid Transition Alliance has been created to try and answer. Change is in the air from school strikes by children, to civil disobedience movements such as Extinction Rebellion, and towns like Machynlleth – neighbouring CAT – declaring a 'climate emergency'.

However, one obstacle is the difficulty of believing in the possibility of rapid transitions happening at the speed and scale necessary. Some say it's easier to imagine the end of the world than a change to the current economic system. The Rapid Transition Alliance is finding and communicating the lessons from clear, quantifiable changes in our values, behaviours, attitudes, and use of resources, energy, technology, finance and infrastructure, from the past and today, and from all around the world. These can guide what we do over the next five to ten years. The Alliance comprises experts in science, technology, community organising, finance, energy, communication and much more, and it wants to hear from you if you know good stories. Get in touch at rapidtransition.org and share them.

Today in the UK, less than one in five adults still smoke and rates have fallen sharply even in the last five years. But in the early 1970s, over half of men and over 40% of women smoked. It's a huge success against the odds concerning a highly addictive product, promoted by a powerful industry that knew

about, but publicly denied, knowledge of the harm it caused. Comparisons are close and disturbing with oil companies like ExxonMobil who were aware of climate change as early as 1977. Change was achieved with a comprehensive approach of awareness raising, tough regulation, pricing and support.

Dangerous and drunk driving is another example. Car use in the UK was 20 times higher in 2016 compared to 1949, but the risk of being injured or killed fell almost every year from 1949, from 165 deaths for every billion miles driven, to only 5.4 such deaths in 2015. To achieve that meant changing people's perceptions of risk about their own behaviour, raising awareness of the resulting harm to self and others, persuading people to leave their cars at home and take different forms of transport if they planned to drink, and changes to vehicles themselves and the physical driving environment.

Other examples of successful behaviour change can be found that range from responses to the HIV/AIDS crisis, diet, antibiotic resistance and in communities exposed to extreme risks, such as living in the shadow of active volcanoes.

These all carry hope, but there are signs indicating the possibility of even faster shifts in attitude and behaviour closer to what the science says is needed to meet vital climate targets. A mixture of new social movements and social media now seem capable of transforming gradual background shifts into defining moments of change. They reveal that while change can take decades, new social norms can become established almost overnight.

If we now know rapid shifts in how we live, work and run the economy have to be made, we also know there's a big evidence base for hope that changing our behaviour is possible and, in this case, hugely beneficial to health and wellbeing.

But to be effective, campaigns on behaviour have to be linked to wider structural changes. The complexity of climate change means that to address it we'll need changes in areas ranging from food, to transport, manufacturing, water use, urban planning and finance. To be legitimate and effective, these need to be fair and democratic. Past radical changes in behaviour are about inclusive cultural movements,

Image © Creative Commons

not just government initiatives. In moving urgently to address climate change, we should ensure that the onus for change falls on those most responsible for it, and the benefits are shared by all. To help tell a better story of the possibilities of rapid transition please join in at rapidtransition.org.

About the author:

Andrew Simms is the coordinator of the new Rapid Transition Alliance, co-director of the New Weather Institute and Assistant Director of Scientists for Global Responsibility.

The Rapid Transition Alliance – www.rapidtransition.org – is being coordinated by a small group of people drawn from the New Weather Institute, the ESRC STEPS Centre at the Science Policy Research Unit (SPRU), the Institute of Development Studies and the School of Global Studies at the University of Sussex, and with help from our friends, colleagues and supporters. The work of the Alliance is kindly supported by the KR Foundation.

Rapid Transition Alliance
Evidence based hope in a warming world
www.rapidtransition.org

2 ZCB and Carbon Literacy – a foundation response to the climate emergency

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In an emergency you have to mobilise the community affected by it – whether it's a family trying to put out a house fire or a planet-spanning civilisation facing extinction. Such mobilisation can be achieved by diktat or by education and empowerment. The latter is surely more effective. Indeed, the peril of diktat without engagement is grimly shown by France's gilets jaunes.

'Carbon Literacy' is a shareable tool that any organisation or community can use to mobilise its people with education. It's an adaptable framework for a day's worth of action-based training on the 'whys and whats' of responses to the climate catastrophe. Its adaptability is to ensure that it's always relevant to the people in the room – both in terms of framing and the appropriateness of the suggested responses and training methods.

Invented in Manchester by Cooler Projects CIC, the Carbon Literacy Project is now owned by The Carbon Literacy Trust. The Project exists to facilitate the take up of Carbon Literacy by employers, communities, schools and universities. The team do everything but train – encouraging take up, supporting its advocates, mentoring the design of Carbon Literacy training and ensuring quality of delivery through its accreditation process. They have certified over 10,000 people in nine nations as well as some 40 organisations – this on top of being recognised as unique at the Paris climate summit in 2015.

The first Carbon Literate television production team is Coronation Street where the training has been the foundation of the 'greening' of the entire filming process – right down to being renewably powered and the reuse of props. The first Carbon Literate museum is Manchester Museum where all the staff have been trained – and Museums Development North West have trained dozens of other museum staff across the North West. This Carbon Literacy 'cascade' ended with the Dove Cottage Wordsworth museum in the Lake District village of Grasmere staging a Carbon Classroom for its adult residents – which was led by the village's primary school children as a result of their Carbon Literacy lessons.

A lot of the Project's work is about getting key organisations to take up Carbon Literacy and this often involves conversations with leaders to get climate change 'framed' in their professional priorities. The Chief Constable of Greater Manchester, Ian Hopkins, was part of one such conversation: when asked what happens in his job when it's a hot day, he said, "I get more trouble." When asked what he meant by that, he said, "More violence and more stealing – and there's data to back that up." And when asked at what temperature that phenomenon starts at, he quickly replied, "18 degrees." Ian Hopkins wants no more hot days on his beat than he has at the moment and is planning the roll out of Carbon Literacy for his force.

Once someone 'gets' Carbon Literacy, they can adapt the way they work. One council treasurer was recently faced with tough air quality targets plus the task of buying a new fleet of 30 bin lorries – but

he'd also just become Carbon Literate. The trouble he encountered was that there simply aren't fleets of EV or hybrid bin lorries to be bought – for now. The treasurer therefore changed his procurement framework to allow for the purchase of five trucks now, with reviews at three yearly intervals to access the best green technology available at later times.

All Carbon Literacy training is designed to comply with the Carbon Literacy Standard. Its learning outcomes include the science of the carbon cycle and the greenhouse effect, the likely scenarios stemming from inaction, and some of the basics of climate mitigation. They also include the ability and motivation to talk to others about the issue. There are guidelines on methodology to ensure relevance, collaborative enquiry and peer-to-peer learning. The training has to conclude with learners devising significant actions to contribute to carbon neutrality. Training devisers are also offered 'blank pages' where they insert content that ties climate action to the core priorities of their organisation or community. It might seem like devising such a programme is a big task, but the Project exists to make that as easy as possible – introducing newcomers to practitioners and enabling them to use the Carbon Literacy Course Construction Kit.

The Project also supports networks of participating organisations – it does so by sector, such as those in social housing, broadcast/film and the cultural sector – and by area, such as the Salford Carbon Literacy Consortium. It was at the latter that ZCB was introduced with a presentation by Paul Allen. There is also a training consortium linked by email and with occasional meetings called the Carbon Literacy Pioneers.

Our ideal Carbon Literacy process starts with creating a 'penny drop' moment with our learners – that moment when the climate breakdown moves from the screen backdrop into people's reality, framed with their priorities – and into a place where there's not only motivation to act but the support to do so. When people get to this stage they also want to know if 'it' can be done – the 'it' being achieving carbon neutrality, and that's where the Zero Carbon Britain report comes in.

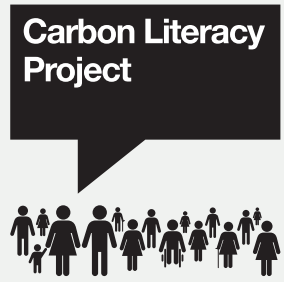
It's easy to be overwhelmed by the task ahead, which is why it's so vital to be able to say, 'we can do this', and point to the evidence that it can with the tools already at our disposal. This is why the ZCB reports are recommended to Carbon Literacy trainers as a learning resource that they can use in their work. Of course, it'll be a rare learner that can implement ZCB proposals at scale, but knowing that they're there – and why they're so necessary – completes the picture for the Carbon Literate.

Carbon Literacy can be used by any group to engage their people and will soon be making its way across the UK public sector as part of a government funded initiative to enable many of its constituent parts to start their own Carbon Literacy programmes. The Public Sector Carbon Literacy Toolkit will cover central and local government, the NHS, emergency services and universities. It will create a raft of free, off the shelf courses and training materials for the relevant sectors, as well as some trained trainers, advocacy materials and evidence of outcomes. Pilots are underway at the time of publication, with full resources available around the end of 2019.

www.carbonliteracy.com has lots more information and the team can be contacted on info@carbonliteracy.com

About the author:

Phil Korbel is a Manchester-based social entrepreneur. He is the Co-Founder and Director of Advocacy of the Carbon Literacy Project. He shares his household with three humans, seven hens, two cats and a dog, and once cycled a tandem home from Australia.



3 ZCB and framing the climate emergency

"Every word comes with a conceptual frame"
George Lakoff

Emergency
noun
a serious, unexpected, and often dangerous situation requiring immediate action.
"personal alarms for use in an emergency"

So, you've declared an emergency

CAT's home town was the first to declare a climate emergency. However, many people across the world are already experiencing a climate emergency. Kiribati is disappearing under the Pacific Ocean. Mozambique is currently dealing with repeated cyclone strikes.

What do we mean in the UK when we say there is a climate emergency? Do we mean that other people are experiencing an emergency that we are causing, with our greater emissions? Do we mean the emergency is arriving at the shores of more affluent countries? Unpicking what we mean by emergency might help determine what steps we take after we declare an emergency.

An emergency often involves professionals taking over: think firefighters, UN peacekeeping forces or aid agencies. It suggests a situation that unfolds unpredictably or uncontrollably. Climate change fulfils this criterion. But its effects are also uneven and unequal, depending on the resources your society can deploy.

"The real tragedy of treating climate change as an emergency, rather than an uneven distribution of physical and social harm, is that it would worsen the inequality that brought us to this point in the first place"
Casey Williams *Why declaring a climate-change 'state of emergency' would be a disaster.*

Why does it matter what words and phrases we use?

Words like 'emergency' can inadvertently create fear. Fear can be paralysing. The emergency declarations have renewed the climate movement and inspired rebellion and school strikes. However, research suggests when we engage values around 'security' we might encourage people to act in accordance with unhelpful extrinsic values (PIRC, 2011).

By engaging 'security' and other extrinsic values we may magnify the public's desire for authoritarian responses to climate change. Fear can produce much needed reaction, but there is evidence it can also trigger less helpful responses at a time when we need international co-operation and positive solutions.

Whose emergency?

Emergency is a word that can sound like an accident that is happening to us. It sounds like an event out of our control, such as being forced to evacuate a building. Emergency can sound as if those experiencing the emergency are not responsible for it and are merely reacting to an unexpected situation. People in the UK (to an unequal degree, depending on income and class) are creating and also affected by climate change.

There is a danger that the language of emergency will create a desire for fast, dramatic solutions to climate change that might be unhelpful. Scared people may be more likely to agree to untested and potentially deadly geoengineering type solutions, rather than tried and tested renewables and land use changes. And who will shoulder the risk of the likely failures of geoengineering? Most likely those who are already on the sharp end of climate change. We are witnessing disproportionate attention to futuristic, high tech solutions – Mars expeditions, cloud seeding – compared to less glamorous but more workable plans, such as in Zero Carbon Britain.

How can we take the word emergency and use it to inspire positive action?

It's hard to avoid the word emergency when discussing climate change. Each year feels more like an emergency.

What we do next after declaring an emergency could be crucial to whether citizens become empowered and energised, or fearful and despairing. Here are some ways we think declaring a climate emergency can help inspire people to take action, and help keep the focus on positive outcomes.

1. Solutions focused. Having a local emergency action plan can help. Straight after one local council declared a climate emergency, they rubber stamped an airport expansion. If emergencies aren't backed up by the necessary actions, this will render them empty rhetoric. Developing an emergency action plan will help think about what the next steps look like in practice.
2. Citizen action. This is a chance to bring citizens in your community together. Climate emergency citizen response teams could be groups of people responding appropriately to the current climate situation: learning from each other. Discovering where their geographical area fits into national adaptation plans. Collecting data to monitor biodiversity. This is a chance to empower our communities.
3. Accountability to the global south. Learning from, and acting in solidarity with grassroots organisations who are working for climate justice with indigenous, black, brown and diaspora groups here in the UK and in the Global South. This will help keep a global focus on the issues.
4. Support for each other. The language of emergency can produce panic and burnout. The speed and intensity of action that is implied by an emergency framing could work against an inclusive and supportive space for people to act on climate change. Support for each other – especially the most vulnerable – is important. It reflects how a world adapting to climate change will be required to help vulnerable people, if we want climate justice.
5. Leave no one behind. In the UK and beyond, the poorest and more vulnerable people will be affected the most by climate change. They also have the most to gain from good climate policies and adaptation. Far from 'giving up' anything, for poor and working class people a net zero carbon society can add multiple benefits to life: better social housing, transport, redistribution of wealth and resources, access to nature and better quality diets.

Framing the language used around climate change

Climate emergency	Climate transformation
Survival	Co-operation
Individualism	Internationalism
Climate refugees	Displaced people/ movement of people
Growth	Steady state/degrowth
Collapse	Adaptation
Environmental security	Environmental peacebuilding
Scarcity	Sharing
Risks	Solutions
Environmental crises	Environmental justice
Fear	Empowerment

About the author:

Tanya Hawkes is a researcher/writer on climate change, mental health and other social justice issues. She works and studies at CAT and holds a postgraduate diploma in Environmental Policy from the Open University.

4 ZCB and one million climate jobs

The One Million Climate Jobs report, currently in its third edition, came about through the work of individual trade unionists, many of whom were also activists within the Campaign against Climate Change (CACC). The group rejected the idea that good, well paid jobs and a sustainable environment were mutually exclusive; the common but false assertion that trade unionists were only interested in protecting jobs and conditions with no regard for the environment; and that environmentalists had no interest in ensuring that workers had secure and well paid employment. One Million Climate Jobs aims to demonstrate how good, well paid, secure and unionised jobs can be created to tackle the climate emergency, and that jobs and the environment should not be pitted against each other. The report also aims to galvanise and mobilise the trade union and environmental movement to campaign for this.

Central to the plan is a recognition that rapidly reducing greenhouse gas emissions need to be at the heart of any strategy for jobs and the environment. As a result, the report was produced by activists, trade unionists and academics outlining how one million jobs that could reduce emissions by 86% within 20 years could be created in the UK. Since then the report has gained the support of seven national trade unions and the National Union of Students. The trade union group within CACC is currently working on an update to the report which will locate the specific contribution made by One Million Climate Jobs within the context of growing support for other ideas, such as a Green New Deal, and continuing debates within the environmental and trade union movement. An updated report will also revisit the increased urgency of the climate crisis and place the demand for one million climate jobs in this context, as well as take heart from the growing and inspiring movement for action led by young people.

Climate Jobs – a unique idea

The analysis contained within the report is driven by the idea of creating employment specifically to reduce emissions – 'Climate Jobs'. This approach starts with analysing where in the economy greenhouse gas emissions are produced and takes as priority the urgent reduction, within 20 years, of those emissions. Climate Jobs are jobs in all areas of the economy with a direct impact on this. This contrasts with some approaches that concentrate primarily on emissions generated within the energy sector and, therefore, that focus only on a Just Transition of employment from fossil fuel based energy to renewable energy, rather than the creation of employment which can reduce emissions. Climate Jobs would most definitely be created in the energy sector, but they would also be created in many other areas that would reduce and end greenhouse gas emissions.

Climate Jobs could be created in meeting our energy needs through wind, solar, wave and tidal power. Climate Jobs could also be created in insulating and retrofitting existing homes and buildings to reduce and conserve energy as well as tackle fuel poverty. A well funded national public transport system powered by renewable energy would ensure the creation of thousands of Climate Jobs, getting people out of private cars and ending the social isolation of many in the community currently cut off from access to an effective transport system. In a sustainable agriculture system, and in reducing waste through reducing, reusing, repairing and recycling, thousands of Climate Jobs could be generated. In education, new Climate Jobs could be created to teach the knowledge and skills needed to meet the climate and ecological crisis.

Most Climate Jobs would meet local employment needs and would play a central role in creating diverse, sustainable local economies. Climate Jobs would carry with them the pride and status of playing a key contribution in tackling the climate emergency and providing a safe future for the planet and those that live on it. The creation of Climate Jobs would begin to fill the gap experienced by many communities after decades of decline as a result of

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globalisation and austerity.

The One Million Climate Jobs report details how in each area of the economy thousands of jobs could be created, and specifies the emissions reductions which would follow as a result of these jobs.

A National Climate Service - delivering Climate Jobs and a Just Transition

A second unique feature of the One Million Climate Jobs report is the proposal for a National Climate Service. This would not simply be an advisory body to government, such as the role currently played by the Government Committee on Climate Change. Instead, the National Climate Service – the NCS – would directly employ people to get the work done. People in Climate Jobs would be directly employed by the government in well paid, secure, skilled and unionised jobs. Those in Climate Jobs could be retrained as new kinds of work are needed. A National Climate Service would also ensure that anyone losing a job in carbon intensive industries would be guaranteed a job in the new Climate Service at the same rate of pay and skill.

A National Climate Service is a fundamental aspect of guaranteeing that we are able to act with the speed and urgency required to tackle the climate emergency. In the past, government policy has, at best, relied on tax breaks and subsidies to encourage private investment in renewable energy. The change this has produced has been too slow and far too limited to meet the challenge of the climate crisis. In times of emergency, such as war, it is government not the private sector that can deliver a response on a scale and with the speed needed to meet the challenge of an emergency.

It is time to act as though it is a climate emergency and take the urgent action needed at a scale that can only be delivered at government level. Time to create a Million Climate Jobs, badged as jobs which are central to tackling the climate emergency and delivered through a National Climate Service.

To find out more about our work and to get involved, email: climatetradeunion@gmail.com

To read the third edition of the One Million Climate Jobs report visit https://www.cacctu.org.uk/climatejobs

About the author:

Suzanne Jeffery is Chair of the Campaign against Climate Change Trade Union Group, which is part of Campaign against Climate Change. CACCTU Group work to educate and develop a clear understanding within the trade union movement of climate change and its impacts. A key focus for the group is to identify solutions to the climate crisis which are rooted in an understanding of the needs of working people and communities for a Just Transition. Suzanne has played a leading role in this work over a number of years.

5 ZCB and the amazing world of offshore wind and how to make it even more amazing!

The first two offshore turbines were installed off the coast at Blyth in 2000. Since then, a new industry has developed, with turbines increasing in size and power output. These were 2 MegaWatt (MW) machines engineered to withstand the harsher marine environment. The latest turbines being planned for offshore sites are between 10 and 12 MW. The importance of offshore wind in the future energy mix has been recognized by many and offshore wind can be built quickly and at scale. The UK is a world leader and home to the world's largest offshore wind farms.

In the early days of the offshore wind industry, the cost of building and operating offshore wind farms was high. However, through a planned programme of financial support and a great deal of innovation and enthusiasm, offshore wind is now lower in cost than most other forms of energy. Financial support initially took the form of the Non-Fossil Obligation, followed by the Renewable Obligation (RO), which required electricity suppliers to include renewables in their mix – the RO Certificate (or ROC) acting as evidence that suppliers met their renewable generation targets. More recently, the RO regime has been replaced by a competitive auction to win 'Contracts for Difference' (CFD) which guarantee long-term power prices for windfarm owners. Offshore wind developers can use the certainty of the CFD to borrow large amounts of money – often several billion pounds – which is needed to build an offshore wind farm. The competitive auction coupled with larger turbines and growing experience has delivered dramatic cost savings over the last few years: the cost of energy produced peaked around £150/MWh while in the next auction they are expected to be below £52/MWhr.

It has been a real privilege to see the industry develop. The world of offshore wind is full of amazing things – some of which are shown on the diagram 'The Amazing World of Offshore Wind'. We have built electricity substations in the middle of the sea, used some of the largest crane ships in the world and created special boats which enable maintenance workers to safely transfer onto turbines. We even use specially designed ships where technicians live on-board for several weeks at far-offshore sites.

Being in this industry at this time is exciting and it's easy to get swept along in the wave of enthusiasm. We must celebrate our successes, but we should also remember the bigger picture. We are in a climate emergency and we need to switch to using zero carbon forms of energy production as soon as possible. The current 'Industrial Strategy' – the deal done with the UK government – is aiming for 30 GW of offshore wind by 2030, which is one quarter of the capacity needed under the ZCB plan. So why are we not accelerating the number of wind turbines installed offshore? Despite installing nearly 3,000 offshore turbines, why are none manufactured in the UK? Why has the installation rate of offshore wind turbines fallen recently? And why did the government introduce a cap on the amount of offshore wind that can be developed in the 2019 CFD auction no matter how cheap it is?

It is not easy to criticise the industry I love to be a part of, especially when I know how many individual engineers, offshore workers, designers, environmental specialists, planners, vessel skippers and many others have worked so hard to bring us to where we are today. It has not been an 'easy ride' to get to this point – early offshore wind workers were ridiculed for moving out of the fossil fuel sector, worked long hours and kept going through periods where the industry faltered and struggled. We owe it to all these people and to the youth to accelerate our plans.

The Zero Carbon Britain energy model estimates that we will need to install around 9,000 additional turbines around the coast of the UK. To do this quickly required a rethinking of the industry's delivery plans. We have proven our industry's capability to install large numbers of turbines but not consistently year-after-year. It will take 24 years to install the extra 9,000 turbines, needed in the ZCB model if we install consistently at the current proven rate. If we go at twice this rate, then we could do it in 12 years – but it is not quite that simple.

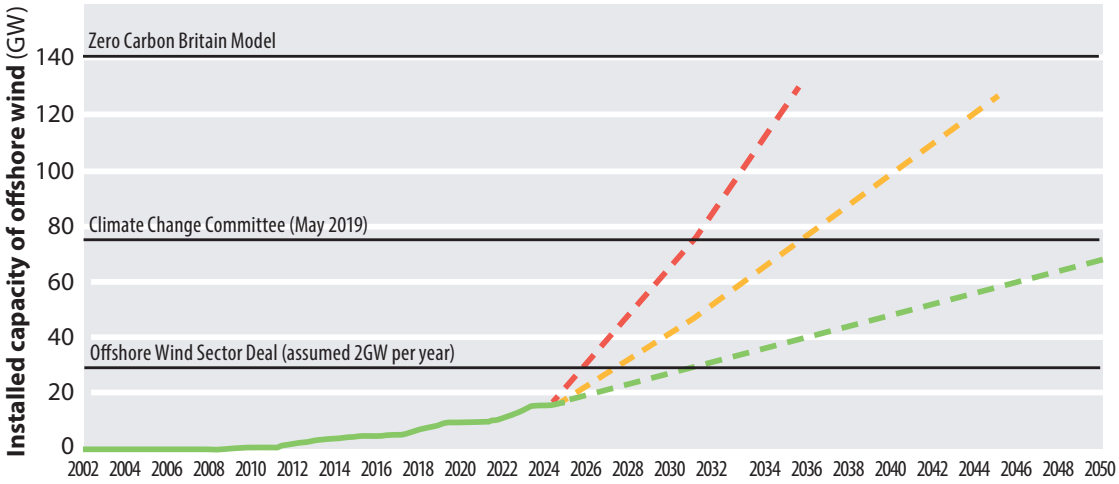

Figure 3.41: Growth scenarios for UK offshore wind compared with future capacity targets

We also need to ensure the planning and development of projects keeps pace – it currently takes 7- 10 years to find sites, gain planning permission and undertake surveys and engineering design work before construction can start.

We also need to build in increasingly challenging area: deeper water, rougher weather, and the need to consider potential wildlife and visual impacts. We need to make sure we place turbines in the right places, but make these decisions quickly to secure a bigger pipeline of projects and give manufacturers the confidence to build factories in the UK. We need to improve our understanding of the impacts on wildlife – especially birds. We also need to urgently accelerate the commercialisation of floating wind technology – an area in which the UK is currently a leader – so that we can build in deeper water that is further offshore. And we need to make sure improvements to the electricity grid do not hold us up.

We need to recruit and train more environmental and consenting experts if we are to avoid delays in bringing projects forward. We need to make the Industrial Strategy a reality by investing in ports and manufacturing facilities to deliver jobs as well as turbines. There is a huge role for government to support the enabling work that underpins the growth of a clean energy sector.

Challenges surround us, but I am filled with hope as more people understand the emergency we face. However we need to push ourselves to do more, with more urgency. Take heart from the words of Mahatma Gandhi, "the difference between what we are doing and what we are capable of doing would solve most of the world's problems".

About the author:

Sally Shenton, Director of Generating Better Limited – http://generatingbetter.co.uk/

Sally Shenton has worked in the electricity supply industry for her entire career. Sally led the operation of two offshore wind farms before setting up a renewable energy consultancy and now advises investors, owners and operators in operational strategy and implementation. Sally coordinates an offshore wind industry knowledge sharing group and is a regular contributor at events and conferences.

In her spare time Sally is an improving folk fiddler, enjoys gardening and volunteers at the Penrith Repair Café.

6 ZCB and local action - gearing up to support community level change

Cumbria Action for Sustainability (CAfS) is a registered charity and company that's been operating for 20 years. Its vision is a zero carbon Cumbria that brings about a better way of life in balance with the environment. Its 12 paid part-time staff and a small pool of volunteers run projects in the county to motivate, inspire, enable, advise and support people and organisations to reduce their greenhouse gas emissions and live in a more sustainable way. CAfS has consciously aligned its mission to that of Zero Carbon Britain, distilled down to a local level, and is guided by the ZCB principle that we already have the technology we need to transition to net zero. Its projects aim to normalise these solutions.

With no 'core' government funding, projects are often influenced by the availability of grants and contracts. But CAfS has a clear vision, a five-year business plan and prioritises the highest impact sources of emissions that it can realistically have an impact on. It also factors in its strengths and skills, and the actions that others are taking in the county, so as to support and not duplicate effort.

Examples of local actions led by CAfS

CAfS' projects have touched on virtually all main sources of local carbon emissions, from food and transport, to buildings, waste and energy production – many of the ZCB topics in 'powering down' and 'powering up'.

The scale has ranged from one-off talks, workshops or film screenings through to a £1 million 'whole-place' approach to transform the long-term sustainability of a community. CAfS is perhaps best known for its work in a few key areas of emissions: the built environment and community energy, with some examples below.

Buildings

As Zero Carbon Britain shows, retrofitting existing buildings for energy efficiency and tightening the regulations for building energy use are central to the UK's path to net zero.

Achieving this demands action from individual property owners as well as within the construction industry and the planning and building control frameworks. Recognising this, and recognizing that there is a need for low carbon skills and knowledge to be shared as widely as possible, CAfS has supported and upskilled people at all these levels through its projects and services, including:

- Its annual Cumbria Green Build & Sustainable Living Festival (the first in the country, in its 14th year in 2019), offering a month-long programme of green open homes, site visits, workshops and training courses showcasing low carbon technologies and lifestyles.
- Technical training for construction professionals and homeowners in low energy new builds and retrofits, including CPD-certified courses up to Level 4.
- Thermal imaging.
- Energy audits for buildings.
- Schemes to install draughtproofing measures and offer energy advice.

Some of these are free via funding, while others are paid for by the client. CAfS contracts out some services to trusted local partners, with others carried out in house by specialist staff.

Community energy

Zero Carbon Britain spells out the need to shift away from fossil fuels and shows that local generation of power from renewables must be a significant part of the UK's energy mix. CAfS has strived to develop community owned renewable energy in Cumbria to harness its many benefits for the area – from generating income for community projects, to bringing people together and making it possible for schemes to go ahead that may not have done with private investment.

CAfS used its charity reserves to seed fund Community Energy Cumbria, supporting this new organisation to set up community owned renewable energy schemes, including hydro and solar power. CAfS has used its expertise to manage share offers for several community groups, raising almost £1 million.

Integrating small-scale generators into the electricity distribution network is a big challenge for network

operators, along with enabling the shift to electric vehicles. CAfS has built a strong partnership with its local operator, Electricity North West, by sitting on its sustainability advisory board and co-hosting several events looking at electricity distribution in a low carbon future.

Influence and reach

Community organisations can be the bridge that brings others together on a theme like climate change – something that will be crucial for local areas striving to reach net zero. CAfS is increasingly influencing development across the county, as an enabler of change as well as a visionary body and delivery organisation.

For example, in 2019, CAfS chaired Cumbria's first summit on climate change for leaders in the private, public and third sectors and is helping to drive high-level partnership working to rapidly decarbonise the county.

Success factors

CAfS has managed to survive, thrive and stay true to its vision through periods of funding cuts and reduced interest in climate change. It's been possible for three main reasons, which are linked:

- The clarity of purpose and ability to articulate a clear, long-term, positive vision for a zero carbon Cumbria, using Zero Carbon Britain to influence priorities for work and fundraising.
- The organisation's success in sourcing grants and contracts for paid services, based on its reputation.
- Having paid staff to lead the organisation, communicate its work effectively and deliver projects, and competitive recruitment for strong trustees.

Lessons for local groups from CAfS' experience

- Use Zero Carbon Britain to influence what you do on a local level.
- Work out the priorities for your area. This will be a mix of opportunism and strategy, balancing what needs doing, what you can get funding for and the skills available.
- Tackle the sources of carbon emissions that individuals, local businesses, communities or local authorities have direct control over.
- Share your expertise as widely as possible – train others and build a strong base of local knowledge – support people to bring about the changes they want to see.
- Capitalise on current interest in climate change to engage local experts who weren't involved before.
- Consider the co-benefits of carbon reduction actions, as these can open up more funding (e.g. fuel poverty), but stay true to your purpose.
- Identify your gatekeepers – organisations that hold the funds, or with whom you need to partner.
- Understand that there will be limits to what you can achieve operating on a local basis, but maximise your impact within these limits.

And finally...

Perhaps most importantly, do not give up. The science is crystal clear, the solutions are available and local groups have the potential to play a pivotal role in bringing people together and guiding action, as local authorities and others begin turning to them. Groups have weathered the storm through periods of low public interest but the clouds are breaking. Now is the time for environmental groups to gear up, keep climate change on the agenda, and ensure that they can respond when their moment comes.

About the author:

Hazel Graham is chief executive of climate change charity, Cumbria Action for Sustainability and a climate jobs campaigner with 20 years' professional experience of transformative emissions reduction and social justice programmes.

About Cumbria Action for Sustainability

CAfS is a registered charity and company based in Penrith, striving towards its vision of a zero carbon Cumbria with a better way of life in balance with the environment. Formed in 1998, it empowers people, communities and organisations by managing and delivering projects and sharing knowledge, practice, skills, networks and practical experience.
www.cafs.org.uk

7 ZCB and rewilding ourselves

"Caring for myself is not self-indulgence it is self-preservation, and that is an act of political warfare."
Audrey Lorde

In the nature connection courses I run, I see time and time again how connecting deeply with the natural world lights people up – it's like watching them come alive. I work with burnt out activists, sustainability students, artists, architects and others involved in social change. Witnessing the process of transformation from the people I meet at the beginning of a course – often tense, guarded, distracted, perhaps a little sceptical – and those that head off at the end – open, playful, present, energetic and tuned in to the magic of the natural world around them – is quite remarkable. Having had many of these transformative experiences myself, I have become convinced of the power of this work. What excites me most about it though, is the harnessing of this power to bring about social change.

Post-modern Western society has become deeply disconnected from the natural world. More than half of the human population lives in an urban context, predicted to rise to 68% by 2050 (already over 80% in North America). Most Western people live highly alienated lifestyles, spending a staggering 90% of their time indoors in artificial, temperature-controlled environments. Our whole socio-economic system is designed from a worldview of ecological disconnection, affecting all areas of our lives – our lifestyles, resource use, buildings and urban design, transport, economic, food, education and health systems.

Research shows that disconnection from nature is linked to mental and physical health problems in individuals, and increased conflict, violence and crime in communities (for a comprehensive literature review, see: Sandifer et al., 2015 and Natural England, 2016). On a societal level, an alienated, exploitative relationship with nature fuels the ongoing destruction of the ecosystems upon which we depend for life. And, as highlighted in the *ZCB Making it Happen* report, our disconnection is a major barrier to social change towards a zero carbon, sustainable and just society.

The recent surge in interest in 'rewilding' reveals a yearning for a different way, and offers restored health to our degraded ecosystems as well as bringing many benefits for us. Rewilding aims to regenerate, reconnect and restore, to create healthy, functional ecosystems, succinctly outlined in the simple model of the '3 C's': cores, corridors and carnivores. This points to the key rewilding principles of protecting core wilderness areas, reconnecting fragmented habitats for free movement of wildlife and restoring lost keystone species, which are often (but not always) carnivores.

But, as key parts of the ecosystems we dominate, humans must also be part of the rewilding. Healing our damaged relationship with nature, which caused the degradation in the first place, is the only way to secure lasting change and long-term viability of restoration efforts. The concept of rewilding is usually used as an ecological term, but when interpreted in its broadest sense it offers a holistic framework for regenerating not only healthy ecosystems but also healthy human society and ourselves. A rewilding of the self, of the heart and soul, is a re-enchantment with the natural world, a reawakening of our senses and intuition, a dissolving of the false boundaries between our atomised and isolated selves and our earthly home. It is a restoration of meaningful connections with nature, our selves and each other.

People who feel more connected to nature are more likely to care about ecological issues, more likely to act, and more likely to reduce consumption (Mayer and McPherson, 2004; Frantz and Mayer 2009; Trostle, 2008; Giubey & Oberhauser, 2009; Dutcher et al., 2007). Connecting with nature strengthens 'intrinsic' values – other-regarding values like social justice, protecting the environment and equality (Blackmore et al., 2013). Put another way, when we taste the real joy of deep connection, consumerism loses its appeal and a sustainable, fair, ecological future becomes both possible and irresistible.

Just like the foundations of Western society, our separation from nature and domestication of

our culture is closely tied to colonialism, built on foundations of violence and slavery. As lands were invaded and colonised, wild land tamed and cleared of indigenous peoples, the land-based cultures of those peoples were forcibly taken away – making them more easily exploited as a workforce.

Our disconnection from nature is political.

Our relationships with nature, ourselves and each other all inescapably influence each other. As long as white people oppress people of colour, men oppress women, the heteronormative oppress the queer and humans oppress nature, oppression will poison all of our relationships. Liberation is only possible if it takes place on all levels and in all relationships. Equally then, our reconnection with nature is political. It is part of the essential decolonisation process, and part of the rewilding.

Ultimately non-productive, time spent simply connecting with nature is a subversion of post-modern productivist culture, an inherently rebellious act. And as a powerful way to sustain and resource social action – to build on Audrey Lorde's famous quote about self-care being an act of self-preservation for continued political action – it can even be seen as an act of political warfare.

However, on its own, simply reconnecting with nature is not enough. Connection that does not result in meaningful acts of solidarity remains in the realms of alienation, and therefore cannot be true connection – for example, the curiously common frequent flying of nature lovers to exotic destinations to connect with wild nature. When we really connect, we see through the false construct of the self, to our true identity as an intrinsic part of nature, and can no longer justify ecologically destructive acts for pleasure or convenience. The social and ecological are not – and can never be – separate. With this insight, we realise that we are not individuals or even collectives defending nature, but nature defending itself. Within this expanded sense of self lies an abundance of energy, strength and resilience.

Action that comes from this place of connection is free from cycles of overactivity and burnout. It is regenerative, looping back into the cycle of things. The more connected we are, the more resilient we are. The more resilient we are, the more powerful we become. When directed towards the collective good, this power can be a truly liberative force. It can sustain and galvanise resistance to oppressive and destructive structures and forces; it can inspire regenerative action that creates conditions for the flourishing of human society and the ecosystems within which we are embedded.

As Edward Abbey reminds us: "It is not enough to fight for the land; it is even more important to enjoy it. While you can. While it's still here. So get out there and explore the forests, climb the mountains, bag the peaks, run the rivers, breathe deep of that yet sweet and lucid air, sit quietly for a while and contemplate the precious stillness, the lovely, mysterious, and awesome space. And I promise you this much; I promise you this one sweet victory over our enemies... You will outlive the bastards."

About the author:

Kara Moses is a facilitator of social and ecological regeneration, supporting people and land to rewild. She teaches nature connection and rewilding, on short courses and Masters programmes at CAT and other education centres, and is Vice Chair of the Cambrian Wildwood project. In the winter months she works to restore ancient woodlands and writes about rewilding.

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8 ZCB and creative practice – a great imagining

"I am an artist and I know where my voice belongs"

So sang poet and performer Zena Edwards in April 2019 in the Turbine Hall of London's Tate Modern, once an electrical power station.

One of six 'heralds' at the launch of Culture Declares Climate and Ecological Emergency, Zena is part of a new energy in the arts and cultural sector, demanding the truth be told about climate breakdown and the extinction of endangered species, including our human selves.

The tide of over 500 (and rising) culture 'declarers' include artists, and cultural organisations both large and small: orchestras, theatres, galleries, museums and arts centres. Architecture Declares followed, then Music Declares Emergency: movements to drive rapid cultural change alongside the local authorities and national governments that are declaring climate and ecological emergencies.

The wheels of change turn faster: the word 'culture' originates from words for 'wheel' – to turn over, cultivate and 'till the soil'.

Climate awareness in creative practice has been built by the likes of Platform, Julie's Bicycle and many others to 'till the soil' for a cultural movement to grow – by decarbonising the cultural sector and showing how artists and cultural practitioners can both spark and nurture conditions for change. ZCB's evidence-based scenarios demonstrate that decarbonising transport systems, food production and homes is possible: "We have all the technologies", says ZCB's Paul Allen, "what we need is the will."

Extinction Rebellion's demands to government to 'act as if the truth is real' creates a shift in the narrative of change, as do Swedish Greta Thunberg's appeals to protect the Earth's living systems through disobeying 'the rules', which are inspiring global Youth Climate Strikes. Heatwaves, Arctic fires and permafrost melting 70 years sooner than expected make climate change part of everyday conversation. Greater moral clarity exists around systems of oppression and injustice – colonialism, racism and sexism – that perpetuate the crisis.

The protesting of fossil fuel sponsorship of art and culture also marks a step change for artists recognising 'where their voices belong'. Campaigns by Culture Unstained, Liberate Tate and Art Not Oil disrupt long-standing connections between art and oil. Actor Mark Rylance has resigned from the Royal Shakespeare Company, citing theatre sponsor BP's role in furthering the planetary crisis. And 78 artists, including sculptor Anthony Gormley, have requested the National Portrait Gallery drop BP sponsorship saying, "A crucial role of art is to describe to future generations what it is to be alive now, and to provide an echo of our humanity to those who seek it in the future."

This longer, intergenerational view of time, gives museums a strategic role in redefining the human story as one of stewardship and care.

As places of collective knowledge and learning, museums' collections "show the societal shifts we are capable of – in energy, production, consumption, transport, arts and culture as well as in ethics and morals" says Hilary Jennings, director of the Happy Museum, which places wellbeing within an environmental and future-facing frame. A great imagining is possible. The Climate Museum UK collects evidence of the creative innovation emerging to reimagine more viable futures, inviting "the greatest diversity of people to allow for the maximum imagination of what is possible."(https://climatemuseumuk.org)

Cultural organisations step up convening powers as civic players, too: Manchester Museum hosts an Iftar meal for Islamic communities celebrating the end of Ramadan; Reading Museum stages Where is Reading Heading? which looks at Reading's past, present and future for a growing population and low carbon economy. London's Roundhouse calls a Culture Declares Emergency Assembly where 300 curators, makers, theatre directors, visual artists, poets, dancers and producers look at radical ways of 'making, sharing and cherishing art and culture'. How do we overcome the "disconnection between self, society and ecosystems?" they ask. Also, "how to maintain global connections with less flying? How to act in solidarity with communities on the front line

Zena Edwards, culture declares at the Tate april 2019.

Image © Jamie Lowe

of climate breakdown?" And, "what to leave intact for future generations?"

With such deep existential questioning, artists evolve their societal roles, rehearsing new cross-sector conversations: the Welsh Government and Natural Resources Wales commissioned Emergence artists to foster collaborative space across the public sector, plus communities and NGOs to deliver the Environment Act and Wellbeing of Future Generations Act. Encounters artists gathered Totnes Extinction Rebellion, Transition Town Totnes and Totnes Council to create a People's Climate and Ecological Emergency Plan.

On Walthamstow High Street, Bankjob takes up residence in the disused Co-op Bank to challenge existing financial systems by buying – and cancelling – local debt with money raised from printed original artwork bonds.

Dark Mountain anthologies make sense of disruption and uncertainty by tracing 'the deep cultural roots of the mess the world is in'.

In Sheffield, a circus show called High Hopes, created by 11-24 year olds, makes sense of uncertainty, training young people in physical risk taking and bravery. Director Teo Greenstreet says, they "uncover and share expression of a common fear and explore ways forward."

These activities, and thousands more like them, rehearse radical change, providing creative grounds for social reinvention. They embody what Barbara Heinzen (2004) identifies as the qualities of interaction and learning that enable societies to adapt: intimacy (small numbers) and diversity (different educational backgrounds, ages, cultures), working project by project, together over time.

In 2020, The Season for Change is set to celebrate the abundance of creative and cultural practices emerging to inspire action and adaptation. The season will lead to the UN Climate Talks, COP26 – to take place in Glasgow – pushing for representation of those in the cultural sector experienced in engaging people collectively at an imaginative level; building bridges across disciplines, local communities, institutions and the international.

Whilst voices call for urgent action, artists and cultural organisations also make space for slowing down; awakening a sense of awe and wonder in the deep fabric of the living world; places of playful encounter and the emergence of new ideas.

In Loughborough, artist Anne-Marie Culhane's Fruit Routes plants an edible landscape across the university campus. Marking its 8th year, May Day May Day invited people to walk and picnic together, studying moths and learning how insects respond to habitat destruction, while messages to express feelings about the climate and ecological emergency are transmitted live by hand on citizens' radio via a morse code beeper.

We are human. We are an endangered species. And we know where our voices belong.

About the author:

Lucy Neal is a theatre maker, activist, author of *Playing For Time – Making Art As If The World Mattered* (Oberon, 2015) and founder declarer of *Culture Declares Emergency*
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