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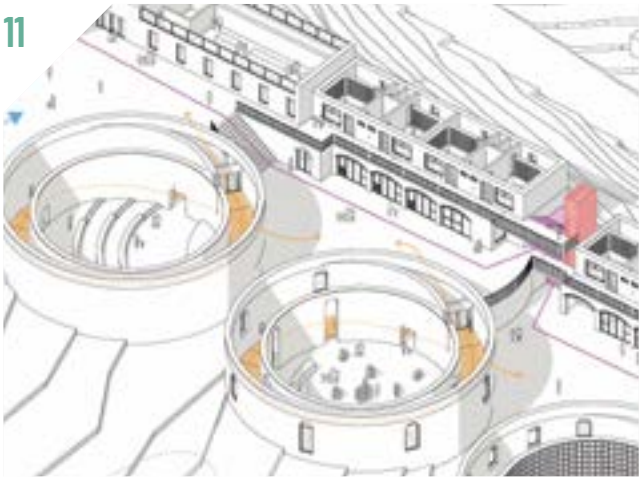

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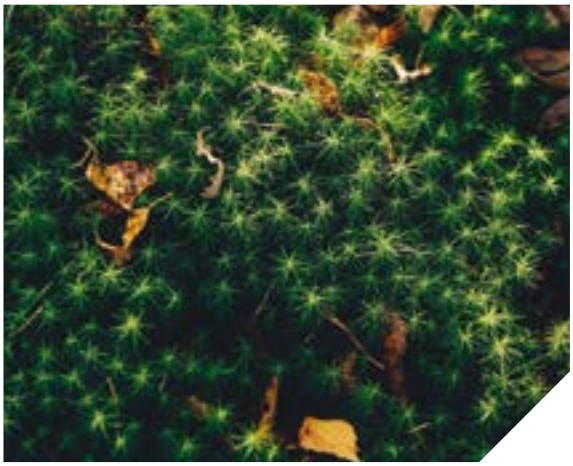

EDITORIAL

Peter Tyldesley

Time for change

As this issue of *Clean Slate* hits your doormat, we'll be less than two months away from the most important climate change talks since the signing of the Paris Agreement in 2015.

Taking place in Glasgow in the first two weeks of November, the COP26 conference will bring together world leaders to refocus efforts to combat and adapt to the climate emergency.

Against an urgent backdrop of COVID-19, accelerating climate impacts and devastating loss of nature, this pivotal moment demands real leadership and ambition from the world's governments.

We must see binding commitments to urgent action now to radically cut greenhouse gas emissions, not simply pledges to meet distant targets.

In June, the UK Government's climate advisory body, the Climate Change Committee, issued its annual assessment of UK progress in reducing emissions. Its message was clear:

"The Government has made historic climate promises in the past year, for which it deserves credit. However, it has been too slow to follow these with delivery... With every month of inaction, it is harder for the UK to get on track."

Combined with the stark warning from the Intergovernmental Panel on Climate Change that the window for staying within 1.5C (and even within 2C) of warming is closing fast, it is terrifyingly clear that every month, every week, every day matters.

And every fraction of a degree of warming makes a difference.

Climate change requires both urgent action and long-term sustained commitment. Whatever the outcome of COP26 it is vital that we continue to push for solutions and to provide the inspiration, knowledge and skills to help build a safer, healthier, fairer future for all.

In this issue you can read about the COP26 process and how you can get involved in calling for bold, ambitious action in the run up to and during the summit. We also have stories from people, businesses and communities who aren't waiting for others to make change happen, but are getting on with the job themselves in some of the most inspiring ways – many of them using skills, knowledge and networks gained through CAT's incredible community of changemakers.

Thank you so much for your support.

Peter Tyldesley, Chief Executive Officer

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Zero Carbon Britain Local Climate Action conference

On 30 September CAT is co-organising a free online conference, 'From Inspiration to Practice: Delivering Net Zero through Local Government', showcasing the most ambitious and transformative zero carbon local authority led projects from across the UK and Europe.

The conference aims to demonstrate how local action can help support and drive the transition to net zero, and share inspiration, tools, practical advice and resources for others to develop similar projects.

Workshop sessions and panel discussions will include those behind a range of successful projects, and cover topics from transport, energy, housing and land use to greener economies, waste, community involvement and partnership development.

Each session will focus on five principles: advice for replicating projects; how to get people on board; funding considerations; local economic co-benefits; and resource sharing.

CAT is organising the conference in partnership with Aberdeen Climate Action, Ashden and Climate Emergency UK, with support from Paths for All, Aberdeen City Council, First Bus, and the Collective for Climate Action.

Anthony Hurford, CAT's Zero Carbon Britain Hub Project Manager said:

"We've discovered so many inspiring projects out there creating real change in local authorities and communities. We're excited to be able to invite some of these contacts to speak at the conference and inspire others, as well as sharing our ongoing work in the Zero Carbon Britain Hub and Innovation Lab."

The event is focused on local and central government roles but is open to anyone interested in driving forward change to net zero greenhouse gas emissions. To find out more and book a place visit www.netzerolocal.org

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New partnership with the Carbon Literacy Project

CAT has partnered with the Carbon Literacy Project to offer a new accredited online short course designed for local authorities.

Drawing on CAT's Zero Carbon Britain research, the course will explore climate solutions in depth, enabling those working in local authorities to create action plans and gain Carbon Literate certification.

The Carbon Literacy Project describes Carbon Literacy as 'An awareness of the carbon costs and impacts of everyday activities and the ability and motivation to reduce emissions, on an individual, community and organisational basis.'

The course has two bookable dates with the option to finish the training on 1 November 2021, the first day of COP26, when thousands of learners across the world will also complete Carbon Literacy training as part of a global climate action training day.

You can read more about the Carbon Literacy Project on pages 26-27 or visit www.cat.org.uk/whats-on to find out more and book your place.

New Sustainable Architecture student exhibition

Our MArch Sustainable Architecture students have opened a new exhibition in the CAT eco centre this summer. The 'Alternative Architectures' exhibition showcases CAT's current fourth and fifth year students' Final Design Projects.

The projects explore solutions to a range of the challenges we face with advancing climate change, and all respond to the need to live within planetary boundaries.

The modular boards and displays being used in the exhibition were also created and built by students as one of their fourth year build projects. Designed by student Freya Bruce, the modular installation celebrates sustainable materials, including rammed earth and re-used timber. The new modular displays help create a flexible exhibition and additional workspace on-site at CAT.

Dr Alison Pooley, Programme Leader of CAT's MArch Sustainable Architecture Part 2 course said of the exhibition:

"The work displayed is diverse and challenging, as much critical as it is hopeful, vital yet playful. Picking up CAT's mantle of being 'alternative' and doing architecture differently, each student has wrestled with one of the current political, social and/or environmental challenges facing contemporary society – from homelessness to energy production, natural building materials to cultural and industrial heritage, all the way to historic landscapes."

The exhibition is free to visit with pre booked entry to the CAT site. CAT members can book a free visit by emailing visit@cat.org.uk

First online graduation ceremony

On 10 July we welcomed over 50 CAT graduates and their guests to our very first online graduation ceremony. Following the postponement of the on-site ceremony because of COVID-19, it was great to be able to celebrate together and to catch up with graduates again through the virtual ceremony.

"Due to the online nature of the ceremony we saw graduates joining from overseas and from closer to home," said Dr Adrian Watson, Head of the Graduate School. "It was exciting to be able to run the event with a mix of speakers joining from home and some joining live from the Sheppard Lecture Theatre at CAT to create a similar atmosphere to an on-site ceremony."

Attendees also heard from CAT CEO Peter Tyldesley and Programme Leaders for each of our courses, looking at how CAT and the Graduate School have adapted to the pandemic to continue to offer high-quality online experiences, and how the perseverance and continued passion of our students this past year has been such an inspiration. The first cohort of graduates from our courses Green Building, Sustainability and Ecology and Sustainability and Behaviour Change were also awarded their postgraduate awards, and all 2020 and 2021 graduates were gifted membership of CAT.

Sonya Bedford MBE, CAT Trustee also recorded a message for the ceremony about her inspiring journey from CAT student to trustee, and encouraged graduates to keep in touch with CAT to share their stories and inspiration. With over 100 students graduating there will be many inspiring stories to be heard and we can't wait to share these and showcase the amazing work CAT graduates are doing and the projects they're involved in. Congratulations to them all!

You can read about some of our recent CAT graduates in our CAT stories feature on page 33.

Summer holidays at CAT

We've enjoyed a busy summer at the CAT eco centre. Despite the challenges of COVID-19 limiting our usual full range of activities, it's been wonderful to see the site buzzing with families keen to use their staycation to learn more about solutions to the climate and biodiversity emergency.

We've welcomed thousands of pre-booked visitors to explore the site, taking in new displays on soil fertility and composting, an exhibition of work by our Masters in Architecture students, and interactive displays in our Living Wales gallery.

Our engagement team has been busy delivering tours and experience days, bringing solutions to the climate and nature emergency to life for visitors of all ages.

For those that couldn't make it to CAT this summer, we have a great range of events, activities and resources available in the #CATatHome section of our website, and we're continuing to increase our offer of online short courses.

For more information about visiting CAT and to see what's on, go to www.cat.org.uk/visiting

Practical skills at CAT

We'll be welcoming lots of you to site this autumn and winter (COVID-19 allowing) to learn practical sustainability skills on our short courses, from wildlife gardening to green building.

The focus is on biodiversity on our 'Gardening for Nature' experience day and 'Introduction to Bees and Beekeeping' courses, both this September. In October and November attendees will be looking at household efficiency and small scale renewable energy on 'Fixing Your Damp House' and 'Build a Small Wind Turbine'.

In early August we held our 'Build a Shed for Absolute Beginners' course. Suzanne Oakley, an attendee on the course said:

"The warmth and kindness of the CAT staff stood out. The tutors were super knowledgeable and prioritised confidence-building as well as skills. Good accommodation and excellent food. I wouldn't have changed anything, this has been a life changing week for me – I did stuff I never thought I could do."

After this popular introduction to green building skills, we're in talks with course tutors and natural building materials experts Em Appleton and Katharine Daish for more courses in 2022.

We're also continuing our online Zero Carbon Britain courses, with our new Carbon Literacy for Local Authorities course taking place on 1 November, and our in-depth two-day climate solutions course on 17-18 November.

To book a place and keep an eye on new courses for 2022 visit www.cat.org.uk/shortcourses

Course tutor and natural builder Em Appleton (centre) teaches our 'Build a Shed for Absolute Beginners' course.

A thank you to our supporters – from our Zero Carbon Britain team

Thank you very much to everyone who donated in response to our May fundraising appeal, in which we introduced our new innovation labs. Thanks to your support we hit our fundraising targets and will soon be welcoming three new members to the team. The new members of staff will be helping to expand and deepen the capacity of the team in supporting councils, communities and other organisations to act on the climate and biodiversity emergency.

The new posts include a Research Assistant to work directly with our land use innovation lab. The innovation labs will bring relevant individuals and organisations together to better understand the barriers within the current system and co-design solutions that will affect systemic change and better enable the journey to net zero. By taking this approach, we can develop solutions that are fit for use and effective whilst also empowering those able to affect change.

We've seen an increase in demand for innovation labs over the last year and have already carried out successful labs with Staffordshire County Council, Keele University and Shropshire Climate Action Partnership Enterprise Group. We have several exciting leads for future innovation labs, including with members of Welsh Government.

The team will also be joined by a Trainer/Facilitator to assist in the delivery of our Zero Carbon Britain training. With our digital delivery expanding to include new Carbon Literacy Project accredited short courses, and some on-site school and university visits restarting, the new post will be crucial in helping increase the knowledge, skills and capacity of individuals, institutions and communities.

An Administrative Assistant will also be joining the team to help with the efficient running of training, innovation labs and research.

Anna Bullen, CAT's Innovation Lab Manager said of the new posts:

"A big thank you to our members in making this happen with their generous support. As the urgency of our work becomes ever more apparent in the face of the climate emergency, it's great to be able to expand our capacity to better address the demand for innovation lab processes."

Keep an eye on www.cat.org.uk/zcb for updates on the team and their work.

CAT students shortlisted for Architects' Journal Student Prize 2021

Our final year MArch Sustainable Architecture Part 2 students have been shortlisted as a collective for the Architects' Journal Student Prize 2021. The annual prize showcases the work of architecture students from across undergraduate and postgraduate courses.

The collective submission focused on the cohort's build projects, which were designed online (due to COVID-19) and then built over five days at CAT last September. The small-scale builds included The Storytelling House, for our CATkins parent and toddler group to use on-site; Educate, Agitate, Activate, a structure for playing and creating music; and a transportable composting toilet for Ynys Enlli (Bardsey Island) to be used by visitors to the nature sanctuary.

The MArch Sustainable Architecture Part 2 course has sustainability at its core and rejects the competitive nature of most other architecture courses. This creates a course with a welcoming environment and imbues students with a collaborative spirit, which prompted tutors to submit the submission on behalf of the collective, rather than focus on individual final design projects.

"We wanted to celebrate with peers and colleagues in architectural education the work of an entire cohort, completed in a year of adversity and uncertainty. In many ways this work is more representative of the profession where the work represents collaboration through design, construction, and response to the brief," said Senior Lecturer John Carter.

Congratulations to all the final year students, we can't wait to hear more about their next steps into architecture practice and further study. You can view some of their work on pages 11-13.

For more details about our MArch Sustainable Architecture Part 2 course get in touch with Alis Rees, Graduate School Marketing Officer at gsmo@cat.org.uk

Dà Mhìle Distillery partnership

Thank you to Dà Mhile Distillery for choosing to support CAT. They are donating 10 pence for every bottle of gin sold through their website.

Dà Mhìle was established in CAT's neighbouring county Ceredigion in 1992 when its founders were looking for organic whisky. Dà Mhìle (Dwy Fil in Welsh) means 'two thousand' in Gaelic, and is inspired by the first bottling to celebrate the millennium.

In 2012 they opened their own distillery on Glynhynod Farm (meaning 'Remarkable Valley' in Welsh), and they've gone on to create several organic spirits, from Apply Brandy to Seaweed Gin, all inspired by their history, surroundings and environmental ethos.

Dà Mhile said of the donations: "We are so proud to announce we are official supporters of the Centre for Alternative Technology. We ask ourselves a hundred questions every day about our impact on the environment. Supporting CAT is a choice to go even further, delivering on what we believe in and creating a positive impact on the planet, an impact that goes beyond the farm and distillery. No time is better than now."

Take a look at www.damhile.co.uk for more information.

Dà Mhìle is one of a number of companies that support CAT by donating a percentage of their income. If you know a company that would like to support us, please contact fundraising@cat.org.uk.

CAT funders Naturesave reach an important milestone

Congratulations to Naturesave Insurance, an ethical insurance broker based in Totnes, which has this year achieved the unusual landmark of giving £1m of its income to charity. The money goes into their charity, The Naturesave Trust, which has funded over 500 projects, including a grant to help upgrade CAT's eco cabins.

The grant has been invaluable in upgrading the heating systems of our eco cabins. As well as improving the energy efficiency of the building, the new system provides a fantastic teaching resource for schools and university groups staying in the cabins, allowing them to monitor the resource use and environmental impact of their stay.

If you know a company like Naturesave that would like to support us, please contact fundraising@cat.org.uk.

CAT's input to the Manifesto for Education for Environmental Sustainability

CAT is leading on the input from Wales to a UK-wide project exploring what education for environmental sustainability should look like, funded by the British Education Research Association (BERA).

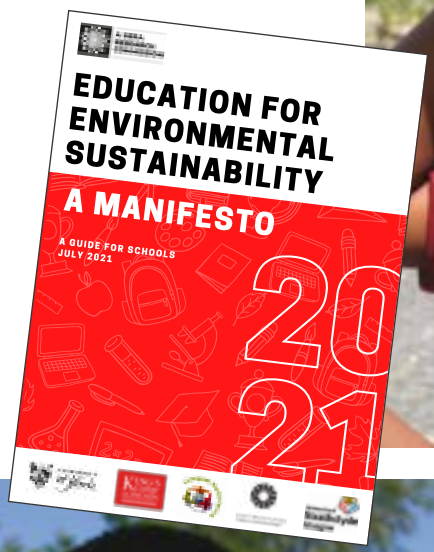
As part of the project, we developed a 'barriers and solutions' workshop, working with teachers and 16-18 year old pupils. These workshops, and the manifesto as a whole, looked at solutions across multiple levels, from individual and classroom, to school, community and policy scale.

BERA has gathered the findings and a written and illustrated version of the manifesto will be launched on 1 November 2021 to coincide with the first day of COP26.

Recommendations in the manifesto are likely to include placing student voice and agency at the core, appointing school sustainability leads, making sustainable options convenient in the classroom, school grounds and cafeterias, and representing sustainability in all leadership, decision-making and school-level policy.

We're looking forward to joining the launch alongside other partners in the research, including Strathclyde University, University of York, the Black Environment Network and the Liverpool World Centre.

To read more about the manifesto and join the launch visit www.bera.ac.uk/news/



Children get to grips with nature and sustainability on a school visit to CAT – but how can we embed this kind of learning within the classroom?

CAT Graduate company IndiNature receives £3m investment to open UK factory

Bio-based materials and construction company IndiNature, co-founded by CAT graduate Scott Simpson who we caught up with in the last issue of *Clean Slate*, have received a £3m backing from the Scottish National Investment Bank to open a dedicated natural insulation factory in the Scottish Borders.

Once local recruitment is complete, the factory will start manufacturing IndiNature's flexible hemp insulation batt 'IndiTherm' at high capacity, ready for launch in summer 2022.

IndiNature's vision is to transform the construction industry and existing damp and cold housing stock by providing a widely available safer, carbon negative solution to insulation for use in UK households and further afield.

As well as manufacturing a carbon negative product, IndiNature plan for the factory itself to be a showcase of sustainable systems, which Scott says CAT was useful in informing. They will use renewable technologies to power the factory and good design principles throughout.

IndiNature estimate that at full capacity, the factory will capture 10,500 tonnes of CO_2 a year, which by 2050 will have the equivalent impact of planting 5 million trees.

During his time at CAT, Scott was able to experiment with industrial hempcrete in the lab, gaining technical skills he says helped in choosing appropriate materials. IndiTherm is made from UK grown industrial hemp which captures carbon as it grows and results in a product which is reusable, recyclable and biodegradable.

As well as the backing from Scottish National Investment Bank, IndiNature also received grant funding of £803k from Zero Waste Scotland and £250k from South of Scotland Enterprise.

Congratulations to IndiNature – we're looking forward to seeing this zero carbon solution scale up over the next few years.

We spoke to Scott Simpson about IndiNature's story in the last issue of *Clean Slate*. You can find out more on our blog at https://cat.org.uk/material-matters/

IndiNature's Scott Simpson, CEO (left) and Sam Baumber, COO at a 2020 industrial hemp harvest.

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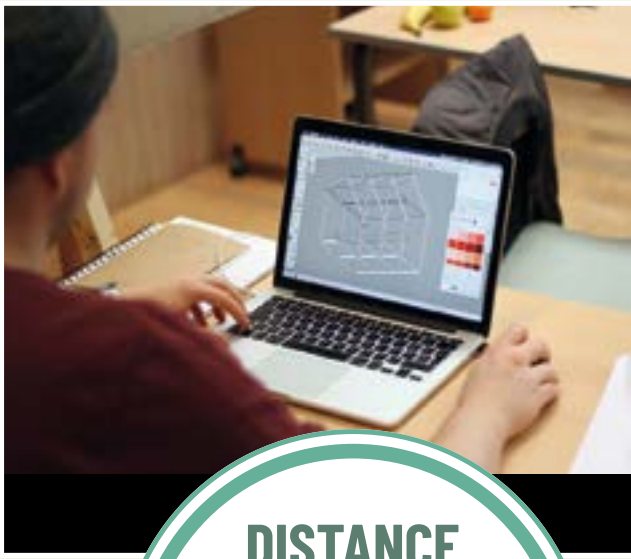

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*In early 2022, these courses will be undergoing a review and subject to revalidation by University of East London.

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ARCHITECTS IN TRAINING

How we design, build and refurbish the built environment is core to tackling the climate emergency, and the next generation of architects has a vital role to play. **John Carter** and **Alison Pooley** introduce inspiring designs from recent student projects, illustrating how architecture can support a more sustainable future for all.

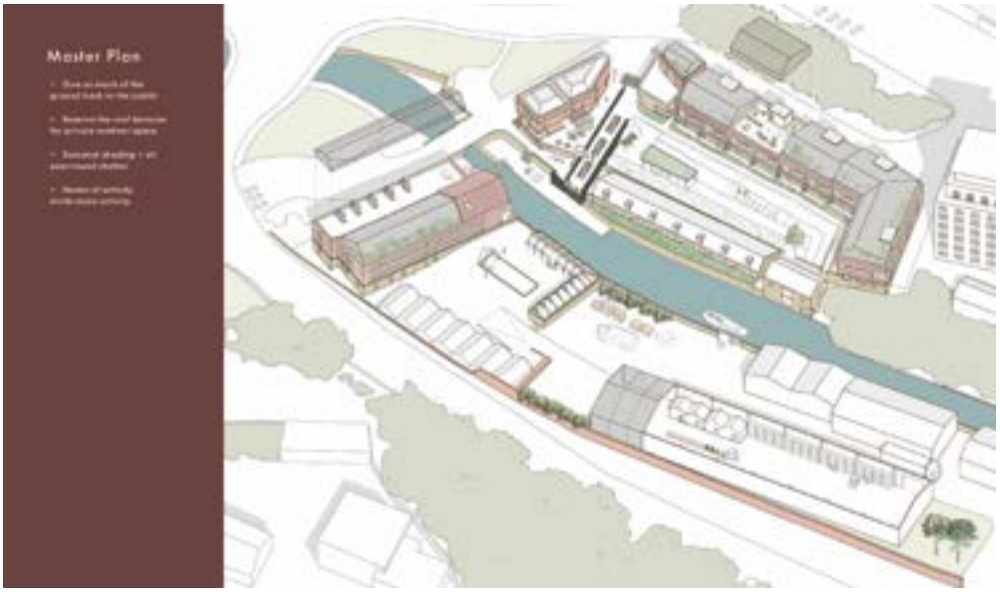
CAT's Masters in Sustainable Architecture MArch course strapline is "doing architecture differently". What we mean by this is that architecture must be sustainable in its construction (and de-construction), in its use, and in its reason for being. Think net zero-carbon architecture that has been designed to be healthy and uplifting, and which addresses climate change and biodiversity loss.

These essential qualities form the foundation stones of the Final Design Projects, which are the culmination of our current final year students' studies. Each student selects a site and develops a brief that allows them to explore sustainability concepts within architecture through the political, social and environmental challenges facing contemporary society and the built environment.

Students develop their projects through detailed design proposals and a technical report during the final year of the two-year course. This is a challenging piece of work, and especially so for this cohort who, since March 2020, have mostly undertaken design tuition via distance learning because of the pandemic. As usual, our students have risen to this challenge, and we are extremely proud of them. Here are a few selected examples of their Final Design Projects.

Adele Huelin – A biodiversity centre for Jersey

Adele's starting points for her Final Design Project were her native island of Jersey and its fragile ecosystems. She has designed a biodiversity research and study centre on the south-western tip of St Ouens Bay, sitting atop a World War Two sea wall. Touching the earth (and thereby the fragile ecosystem of this part of coastal Jersey) lightly is an important aim of Adele's design, as is the use of natural materials throughout.



Leah Davis – A community retrofit centre for Stroud

Leah chose to base her project in her hometown of Stroud. Part re-use of existing buildings and part exemplar new-build, her project explores the challenges that we face in retrofitting our existing buildings, especially our housing stock, to net-zero carbon standards using low-embodied energy materials. In so doing Leah also aims to 'repair' an unloved site close to the centre of Stroud and, in the housing part of her project, show what can be achieved if we think more communally and more sustainably.

Liv Harrison – Stone Pillow charity, more than a roof over heads

For her Final Design Project, Liv built on her dissertation research with Chichester-based homeless charity Stone Pillow. She took a redundant building, formerly shops and offices, in the heart of the city and re-imagined it as short- and long-stay accommodation, including extra-care accommodation for the frail and elderly, together with communal and welfare facilities for those without a permanent roof over their heads. In these ways, she aimed to address an urgent societal need and re-use a redundant building that was in danger of demolition.

Fred Palmer – A research and educational facility and museum of rural life and farming on the Salisbury Plain

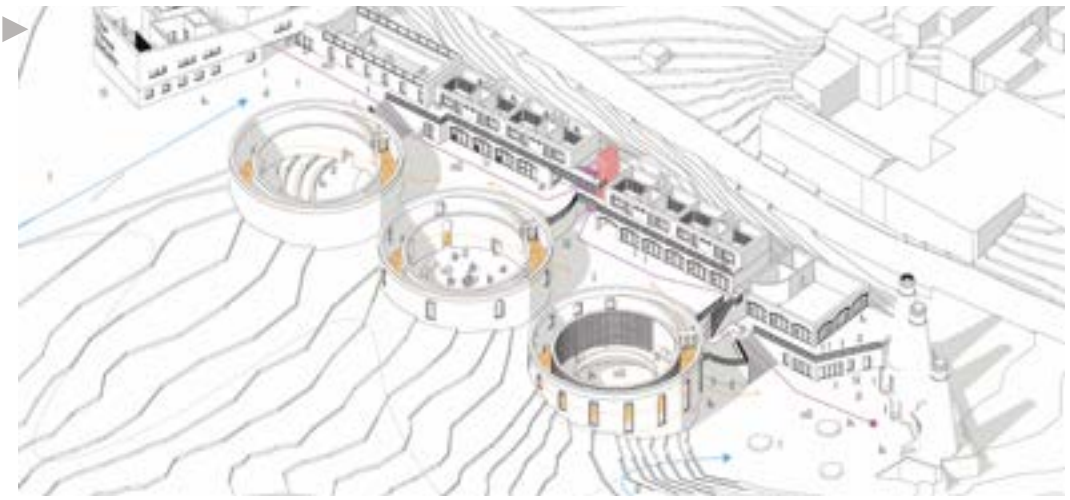
Like most of his fellow students, Fred adopted the maxim of thinking globally and acting locally. Following on from his dissertation in which he made an auto-ethnographic exploration of Salisbury Plan (his home turf), he based his Final Design Project on a redundant farmstead within the plain. In it he explores what we have lost (the area is used by the military for training purposes), but also what we have gained (the land has more biodiversity because, with its military occupation, it has not been subject to intensive farming methods), and thereby what we can learn for the future. In building terms Fred analysed the local vernacular architecture, especially of barns, and asked the question "how can we combine this vernacular with low-embodied energy materials to make a net-zero caron architecture?"

Mary Holden –
Inter-generational living and working in Ulverston

Mary chose to explore inter-generational living and community-centred care in her adopted home of South Lakeland. She chose a redundant site in the heart of the town (a former brewery site) and developed a brief based on housing for all ages, live-work accommodation, an intermediate care 'house' and a nursery. Her resulting proposal is pedestrian- and cycle-friendly, substantially car-free and full of life – a truly sustainable community.

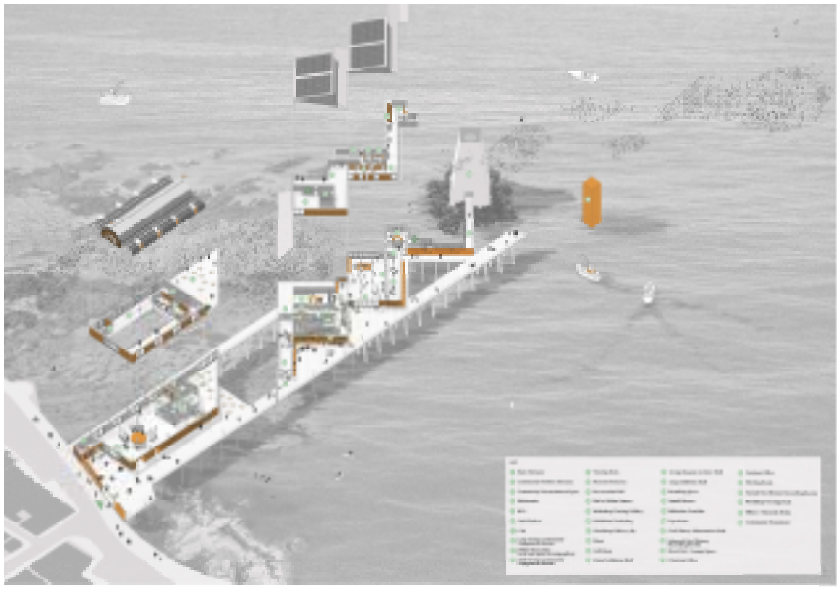
Josh Pass – The Three Sisters, Stoke-on-Trent – reinventing the use of clay

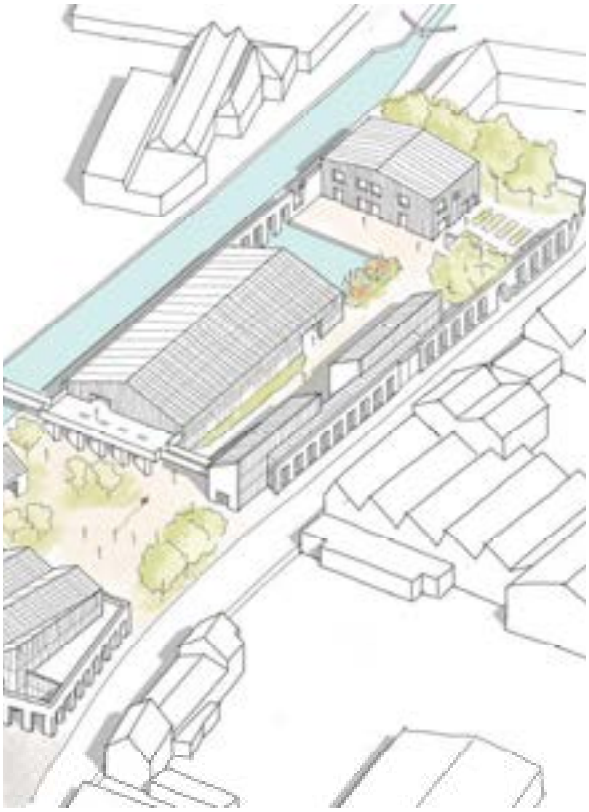
Josh returned to his birthplace for his project, taking a derelict site with three bottle kilns (the so-called Three Sisters) to establish both a research and testing centre and a visitor centre, alongside the existing art college, which is a centre-of-excellence in ceramics. His aim has been to explore what uses local clay can be put to in pursuit of low-energy building and in so doing reduce imports of such products and associated transport energy.



Rosie Murphy – A conversation on Aberystwyth Pier

In her exploration of intersectionality, Rosie took the British seaside, as exemplified by Aberystwyth in general and Aberystwyth Pier in particular, and explored how it might form the location for a conversation about contemporary attitudes to race and racial history. To do so she imagined an extended pier that is both a pleasure 'palace' and a place to promote discussion and debate and to record memories. An important part of Rosie's project is something that she mooted but did not design – a people's sculpture, to be organised by the community, on the axis of the pier, just out to sea.



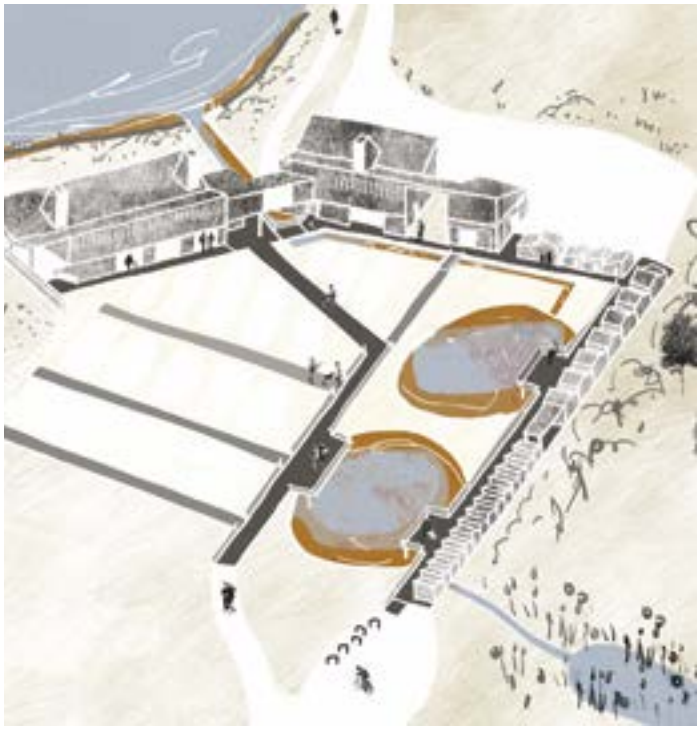


Jake Westmoreland – A heart for Slaithwaite

Jake also stayed local, basing his project in his hometown of Slaithwaite in West Yorkshire. Working with local company the Green Building Store he developed a brief that provided them with new, expanded facilities, as well as a low-energy construction training centre and visitor centre. His canal-side site transforms an existing pallet factory and yard and, via a new bridge across the canal, links it to the heart of Slaithwaite and the existing community. Once again, the emphasis is on the use of local materials, such as stone from a nearby quarry – all researched by Jake.

Emily Smith – A coalfields remediation demonstration project in Hirwaun

Emily selected a site in the former coal-mining valleys of South Wales for her project. After researching the many and varied (and sometimes opposing) views on how to remediate former open-cast mining sites, she developed a demonstration project based on a research facility and an education centre, re-using components from existing mining buildings and structures. Ultimately, when the job of her demonstration is done, it can all be de-constructed and re-used in other locations.



Embedded in all the projects you will see how our students are "doing architecture differently", with CAT's mission to inspire, inform and enable humanity to respond to the climate and biodiversity emergency running through their architecture. As this year's students graduate and take up roles in practice we know they will continue to inspire, inform and enable their colleagues and the profession to make the changes in the built environment we so urgently need.

You can view some of the work of our final year students in our 'Alternative Architects' exhibition, on show this summer at CAT. For more details about our MArch Sustainable Architecture Part 2 course, visit cat.org.uk/gse or get in touch with Graduate School Marketing Officer Alis Rees at gsmo@cat.org.uk.

About the authors

John recently retired as Programme Leader of CAT's MArch: Sustainable Architecture course. He 'converted' to architecture from engineering in the 1970s and admits to having been "hooked ever since". John continues to work on the MArch course as an external tutor, alongside part-time work with Cardiff-based Pentan Architects.

Alison is the new Programme Leader for the MArch: Sustainable Architecture. She first started teaching at CAT in 2003. Prior to teaching at CAT Alison was a housing officer in East London, which prompted her to return to university to study architecture, going on to work in practice for several years. Alison completed her PhD, exploring transformation and environmental responsibility within the construction industry, at the Welsh School of Architecture, Cardiff University. Her current research is focused on housing equality and resilient communities.

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Code red for humanity

The most recent IPCC report brings together evidence of the impact of human activity on global temperatures, and the effect this is having on every region on Earth. **Catriona Toms** looks at the lessons to be learned ahead of COP26.

Indian coastal city Puri, in the aftermath of Cyclone Fani, May 2019.

Rakesh Roul / Shutterstock

August's Intergovernmental Panel on Climate Change (IPCC) report was unequivocal: we are seeing widespread, rapid and intensifying changes in the Earth's climate in every region and across the whole climate system.

Many of these changes are unprecedented in thousands, if not hundreds of thousands of years. Some are 'irreversible over hundreds to thousands of years'.

No wonder, then, that UN Secretary-General António Guterres called the report 'a code red for humanity', saying:

"The alarm bells are deafening, and the evidence is irrefutable: greenhouse gas emissions from fossil fuel burning and deforestation are choking our planet and putting billions of people at immediate risk."

Compiled by 234 authors from 66 countries and drawing on more than 14,000 cited references, *'Climate Change 2021: The Physical Science Basis'* brings together the latest information from climate science to provide the most up-to-date physical understanding of the climate system and climate change.

Whilst the basic thrust of the report comes as no surprise, the unrelenting detail of the profound changes being wrought by human activity still has the power to shock.

Impacts on every region on Earth

The report outlines the evidence for multiple different changes already taking place across different regions, and their attribution to human influence – evidence which the authors are clear is now 'unequivocal'.

Some of the headline observed changes include:

- In 2019, atmospheric carbon dioxide concentrations were higher than at any time in at least 2 million years.
- In the same year, concentrations of methane were higher than at any time in at least 800,000 years.
- Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years.
- Global surface temperature was 1.09°C higher in 2011-2020 than in 1850-1900.
- Warming over land is larger than the global average, and it is more than twice as high in the Arctic.
- Global mean sea level has risen faster since 1900 than over any preceding century in at least the last 3000 years.

What is the IPCC's Sixth Assessment Report?

The Intergovernmental Panel on Climate Change (IPCC) is the UN body for assessing the science related to climate change. It was set up in 1988 to provide policymakers with regular evaluations of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

The IPCC has produced five comprehensive Assessment Reports in its 30-year history as well as several Special Reports on specific topics. It is now producing its Sixth Assessment Report, of which *'Climate Change 2021: The Physical Science Basis'* is the first release.

- Hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s, while cold extremes (including cold waves) have become less frequent and less severe.

Crossing thresholds

As well as outlining impacts to date of global temperature rise, the report also provides new estimates of climate futures based on the most up-to-date datasets and climate models, outlining a range of scenarios based on different levels of future greenhouse gas emissions.

The authors conclude that, "Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades."

At 1.5°C of warming, we will see increasing heat waves, longer warm seasons and shorter cold seasons. 2°C would result in heat extremes that would more often reach 'critical tolerance thresholds' for agriculture and health.

Rain, ice and snow

With 'every additional 0.5°C' the intensity and frequency of extreme rainfall and flooding events increases, as does the intensity and frequency of drought episodes in many areas.

Additional warming will amplify thawing of permafrost, melting of glaciers and ice sheets, loss of seasonal snow cover, and loss of summer Arctic sea ice, with the Arctic likely to be 'practically sea ice free' in September at least once before 2050.

Whilst the authors conclude that there is a low likelihood of abrupt responses and tipping points of the climate system – such as strongly increased Antarctic ice sheet melt – they are clear that these kinds of impacts 'cannot be ruled out', particularly at higher levels of warming.

Sea levels and ocean systems

Sea level will continue to rise throughout this century, with more frequent and more severe coastal flooding in low-lying areas, and with related coastal erosion. Coastal flooding events that were previously seen 'once in 100 years' could be an annual occurrence by the end of the century.

Warming of the oceans, an increase in the frequency of marine heatwaves, ocean acidification, and reduced oxygen levels are all linked to human activity. These changes will continue throughout this century 'at least'.

No time for delay, no room for excuses

Whilst the report makes for bleak reading, the authors are clear that their findings should not be seen as a reason for hopelessness – rather they must be a spur to action to roll out the solutions at the scale and speed demanded by the evidence, and to prepare for the unavoidable impacts that can no longer be prevented.

As the IPCC has highlighted many times, and as it repeats in this latest report, "With every additional increment of global warming, changes in extremes continue to become larger." In other words, every fraction of a degree of warming matters – and concerted action in the next decade can make all the difference.

As world leaders prepare to head to Glasgow for the all-important climate summit, the alarm bell being sounded loud and clear by the world's leading experts in climate science should be ringing in their ears. In the words of UN chief António Guterres, "If we combine forces now, we can avert climate catastrophe. But, as [this] report makes clear, there is no time for delay and no room for excuses." CS

About the author

Catriona is Editor of Clean Slate *and manager of CAT's marketing and communications team. She has a Masters degree in Food Policy and has spent 20 years communicating environmental solutions.*

Warming of the oceans, an increase in the frequency of marine heatwaves, ocean acidification, and reduced oxygen levels are all linked to human activity.

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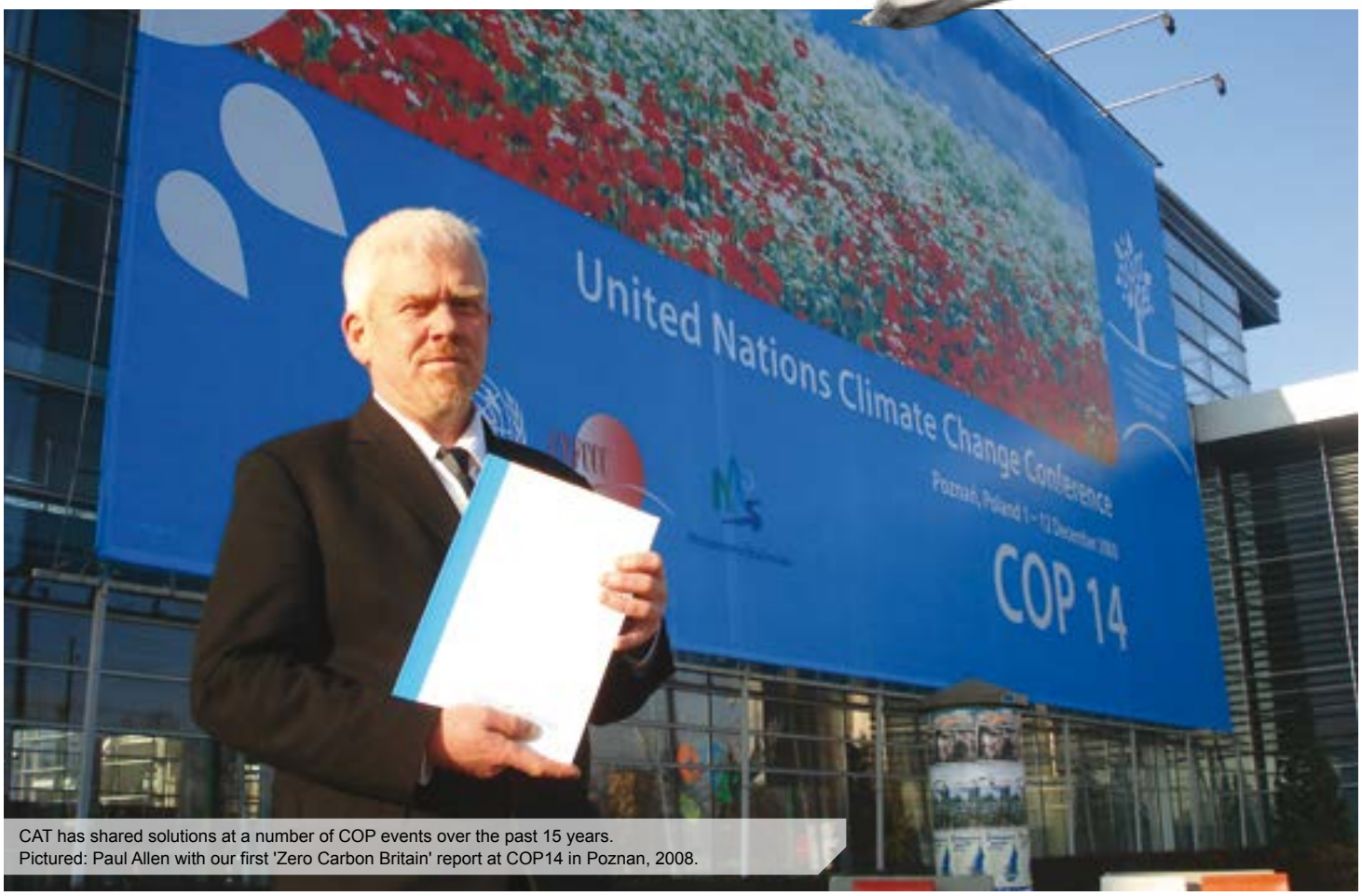
COP26 – what needs to happen?

In the run up to this year's UN climate summit, **Paul Allen** explores the history and background of international climate negotiations and looks at what needs to happen now.



CAT has shared solutions at a number of COP events over the past 15 years.
Pictured: Paul Allen with our first 'Zero Carbon Britain' report at COP14 in Poznan, 2008.

In November this year, nearly 200 of the world's governments and thousands of policymakers, negotiators, scientists, campaigners and businesses will come together for the most important climate change negotiations since the signing of the Paris Agreement nearly six years ago.

As this issue of *Clean Slate* goes to print, an in-person event is expected to go ahead in Glasgow from 31 October to 12 November, although there remains a possibility that changes to the COVID-19 situation will force these plans to change.

Whether in person or virtually, CAT plans to be there to share our research on zero carbon solutions and how we're supporting urgent action on the most pressing issues through our Zero Carbon Britain Hub and Innovation Lab and our training and education programmes. In the run up to the talks we're joining the call for greater ambition, pressing governments and industry to increase their commitments in a range of key areas.

But what is COP26, why is it so important, and what kind of commitments and action should we look for from world leaders?

To get a better understanding of what might be achieved, it's useful to start by looking back at the history of climate negotiations, exploring what has worked, what hasn't, and what needs to happen now.

Climate negotiations – from Rio to Copenhagen

The story of COP26 is rooted in the 1992 Rio Earth Summit. Alongside several key decisions, the Rio Summit opened the United Nations Framework Convention on Climate Change (UNFCCC) for countries to sign up to, with the convention entering into force in March 1994. It offers an ongoing international framework for bringing together efforts by the world's governments to tackle the serious challenges posed by climate change.

The UNFCCC gained near universal acceptance; the countries that signed up being referred to as 'Parties to the Convention'. Since then, a 'Conference

of the Parties', or 'COP' for short, has been held every year (except last year) to assess progress to date and agree the actions that need to be taken next.

As these annual negotiations progressed it became clear that too little progress was being made, due in part to the underestimation of climate change as a global problem. By COP13, the growing urgency suggested by the climate science triggered a two-year process called 'the Bali Road Map', aiming to finalise a binding agreement by 2009 at COP15 in Copenhagen.

To help increase the ambition in this process, CAT presented our first Zero Carbon Britain report at 'side-events' for both COP14 in Poznan and COP15 in Copenhagen. 'Side-events' are the way the official UNFCCC process allows the national delegations and research teams to access information from a wide variety of sources.

However, despite a great many people pushing for an agreement, Copenhagen failed to deliver any serious climate commitments. A 'Copenhagen Accord' was drafted by a small group of nations, but it was not based on the negotiations and was nowhere near the level of ambition needed to rise to the scale of the climate challenge.

The Paris Agreement

The UNFCCC learned a hard lesson when Copenhagen failed to deliver any meaningful international agreement. Many people became disappointed and disillusioned but there was no option other than continuing negotiations. The process was rethought, with a focus on agreeing global climate targets at COP21 in Paris in 2015.

Rather than having to reach a final agreement that apportions exactly who will do what, the Paris process was based around voluntary 'nationally determined contributions' (NDCs) from each country, backed by a 'ratchet mechanism' to increase ambition every five years, until the voluntary pledges become enough to collectively deliver on the agreed global targets.

To help ensure success, many diverse elements of global society came together in Paris to press for an agreement on the targets, including visionary leaders from both developed and developing countries, civil society, businesses, national politicians, the world's major religions, citizen activists, celebrities, NGOs, mayors and governors. CAT was honoured to be invited to present Zero Carbon Britain at a number of side-events within the official Paris negotiations.

This time, success was achieved, and a meaningful agreement on a target and a process emerged. This was an important milestone which revitalised confidence.

The Paris Agreement was a historic moment as the climate science became formally accepted by the vast majority of nations. Its target was far more ambitious than many expected. It aims to, *"hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change."*

The agreement reached in Paris sparked real hope that governments were serious about collaborative leadership towards a world where warming would be limited to 1.5°C, so protecting many of the most vulnerable areas and people.

UK climate commitments

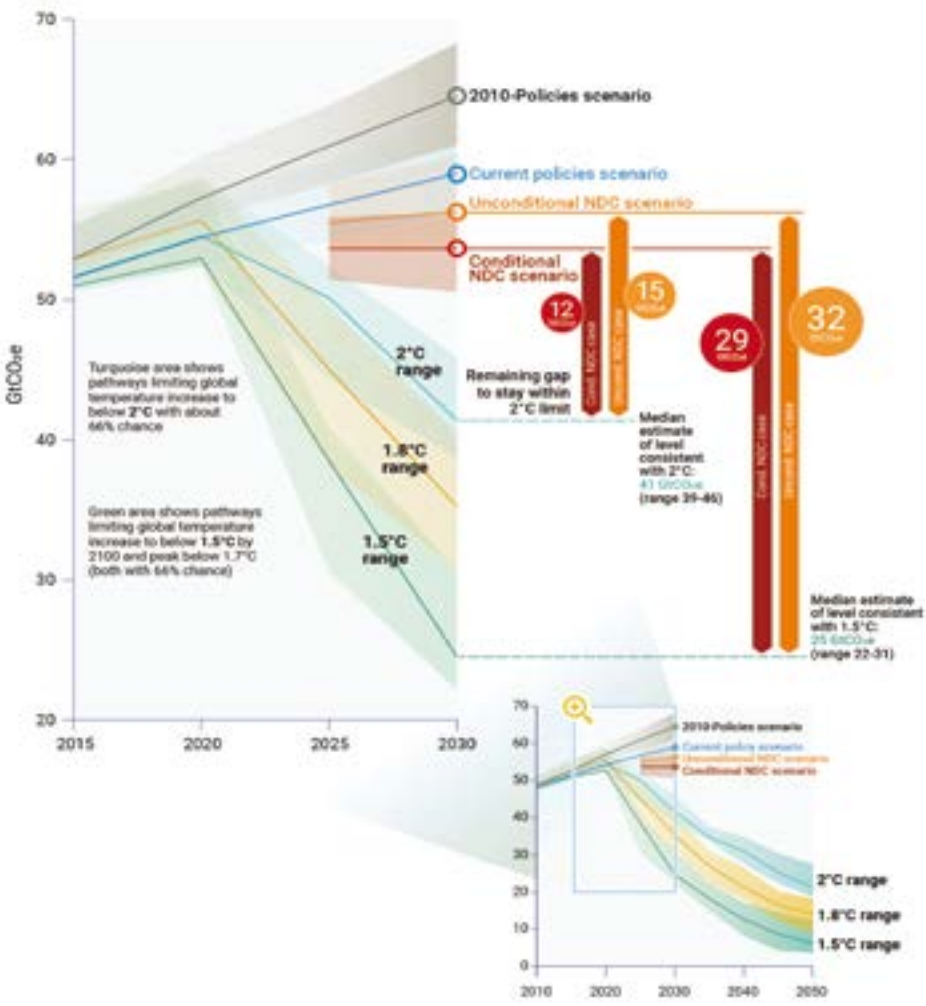
In 2018, the Intergovernmental Panel on Climate Change (IPCC) special report 'Global warming of 1.5°C' stated that CO_2 emissions need to decline by about 45% from 2010 levels by 2030 and reach net zero around 2050.

So, as countries offered their initial voluntary pledges (NDCs), net zero by 2050 became a growing narrative.

In 2019, the UK has enshrined net zero by 2050 in law by amending the 80% reduction target of the Climate Change Act 2008 to 'at least 100%'. The updated Act requires the UK government to set legally-binding five-year 'carbon budgets' towards this net zero target.

Carbon budgets are set at least 12 years in advance to allow policymakers, businesses and individuals enough time to prepare for the necessary changes. The advisory body established under the Act, the Climate Change Committee, is not yet happy with the rate of progress on budgets four (2023-27), five (2028-2032) and six (2033-37).

To influence the ambition of negotiators in the run up to COP26 (much of the



The UN Emissions Gap Report 2020 shows the gap between current policies and where we need to be to stay within 1.5 and 2 degrees C of warming.

The state of the climate

The Intergovernmental Panel on Climate Change (IPCC) report, 'Climate Change 2021: The Physical Science Basis' released in August summarises the 'physical science basis' for climate change.

Drawing together findings from more than 14,000 peer-reviewed studies, the report concludes: "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred…The scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years."

Described by the UN chief as a 'code red for humanity', the report warns that in almost all emissions scenarios we are expected to hit 1.5°C of warming in the early 2030s, with the IPCC going on to say that, "unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach."

So while the global focus has been on net zero by 2050, it's absolutely imperative that we act as quickly as possible to cut greenhouse gas emissions – we cannot afford to delay action.

A report on 'The Global Climate Crisis and the Action Needed' published earlier this year by the Climate Crisis Advisory Group suggests: "While steps to achieve carbon net-zero pledges are crucial, there is one problem: net-zero greenhouse gas emissions by 2050 is no longer enough to halt the irreversible and long-term impacts of the climate crisis and it is essential to consider aiming to reach carbon net zero by 2035 to 2040."

The Climate Crisis Advisory Group is led by former Chief Scientific Advisor to the UK Government Sir David King, with an international membership of 14 experts from 10 nations across every continent. Inspired by the 'Independent Sage' pandemic advisory group, it will issue monthly reports on global efforts to tackle the climate and biodiversity emergency.

You can read more about the findings of the IPCC report on pages 15-16.

negotiations take place before the actual conference), the UK must publish robust policies which will meet our carbon budgets in transport, buildings, land-use, and energy.

Mind the gap

So far, the collective total of the NDCs offered from countries across the globe is insufficient to meet the Paris Agreement target. This has become known as the 'emissions gap' – and it is large.

The 2020 UN Emissions Gap Report estimates current NDCs would lead to a global average temperature increase of *at least* 3°C by the end of the century.

The agreed 'Paris Ratchet Mechanism' must now be used through COP26 negotiations to bring emissions reduction pledges more in line with the target, as the first five-year period since the Paris Agreement is over.

Leading climate scientists such as Professor Kevin Anderson warn us that many current NDCs incorporate a massive use of negative emission technologies. These are still unproven and uncosted at scale, but are being used to avoid urgent actions needed now and so transfer a significant proportion of the mitigation burden on to future generations. If the hypothetical benefits of such technologies are removed, then much higher rates of emission reduction are required immediately, yet this is rarely discussed.

A recent study by Prof Anderson and others found that even meeting the 1.5-2 degree target within the more 'climate progressive' nations such as the UK requires an immediate doubling of their proposed annual emissions reductions to over 10% across all sectors.

Our understanding of both the problems and the solutions has developed over the six years since the signing of the Paris Agreement, and the negotiating process must recognise this. Failing to act at the scale and speed demanded by the problem will increasingly lock-in devastating climate impacts to both the international community, and to natural ecosystems.

The road to Glasgow

What happens in the run up to and during COP26 will have a huge impact on the delivery of a stable future climate for everyone on Earth.

We must 'keep 1.5°C alive' and continue to push for the ambitious action that keeps this target within our reach, even though the pathways for achieving this are narrowing rapidly. The difference in impacts between 1.5 degrees of warming and 2 degrees of warming is stark, and every fraction of a degree makes a difference.

It is vital that we use this moment to push for higher ambition, accelerating action, the provision of the finance needed for mitigation, adaptation, and support for countries experiencing loss and damage from climate impacts and for nature protection (see page 25 for details of the 'Glasgow Action Plan', which includes some of the key areas that we need to see progress on at COP26).

Momentum is building. A wide range of activities are being planned across the globe to call for ambitious action at COP26; active citizens, businesses, artists, doctors, architects, academics, religious leaders, parents, young people and NGOs are calling for deeds not words. Take a look at page 22 to see some of the planned activities and to find out how you can get involved.

About the author

Paul is CAT's Zero Carbon Britain Knowledge and Outreach Coordinator. He has been involved with our research into net zero scenarios since the beginning, coordinating the development of research reports and liaising directly with government, industry, NGOs and the arts to share findings.

CAT at COP

After a long period of uncertainty around whether, when and how COP26 would take place, plans are now evolving rapidly.

CAT has 'observer status' – the means by which NGOs gain entry to the COP process. We have been invited to present our research at official side-events and we are working with a number of coalitions and partner organisations to keep tried and tested solutions at the heart of the conversations.

To keep up to date with what's happening at COP26, take a look at the CAT blog at cat.org.uk/news, sign up to our newsletter at cat.org.uk/sign-up and follow us on social media.

Time for action

What happens in the run up to COP26 is every bit as important as the conference itself. This is a vital moment to push for ambitious climate action. Here are just some of the ways that you can get involved.

THE GREAT BIG GREEN WEEK

Great Big Green Week

From 18 to 26 September, communities across the UK will join together for the 'Great Big Green Week'.

This will be the UK's biggest ever event for climate and nature to help build momentum for COP26. Thousands of grassroots events will celebrate how communities are taking action to tackle climate change and protect nature, to encourage others to get involved, and to show the groundswell of support for ambitious climate action.

The week is organised by The Climate Coalition, the UK's largest network of organisations working on climate change, of which CAT is a member.

CAT will be running events online and in our eco centre as part of the week, including a free webinar with leading climate scientist Professor Kevin Anderson on 22 September. Hosted by our Zero Carbon Britain team, the event will offer an honest overview of current climate science, suggestions for policy and key goals for negotiations at COP26, and provide an overview of CAT's work helping communities and councils take effective action on the climate emergency.

At our eco centre, we'll be hosting events and activities for visitors and the local community.

Keep an eye on www.cat.org.uk/whats-on for details of what's coming up, and visit https://greatbiggreenweek.com/ to see what's happening in your area and for advice on planning your own event.

Voices from Wales

CAT is also a partner in Climate.Cymru, a Wales-wide campaign launched by the Stop Climate Chaos Cymru coalition that is gathering voices from all over Wales ahead of COP26.

The voices will be used to send a message to world leaders: make strong and meaningful commitments to protect what we love, and create a better future for communities in Wales and around the world.

You can add your voice and find other ways of getting involved at https://climate.cymru

Carbon Literacy global climate action training day

On day one of COP26, our new 'Zero Carbon Britain: Carbon Literacy for Local Authorities' course will be part of a global climate action training day.

Taking place online with hundreds of participating organisations, thousands of learners will complete their Carbon Literacy training at the same time and meet virtually to celebrate.

Drawing on our Zero Carbon Britain research, attendees on the course will look at low carbon objectives in the Local Authority sector and create an action plan to influence others.

You can read more about this on pages 26-27.

Zero Carbon Britain Local Climate Action conference

In the run-up to COP26, CAT is co-organising a free online conference aimed at helping local authorities respond to the climate and biodiversity emergency.

'From Inspiration to Practice: Delivering Net Zero through Local Government' will showcase the most ambitious and transformative zero carbon local authority led projects from across the UK and Europe. You can read more about this and how you can get involved on page 4.

Launching the Manifesto for Education for Environmental Sustainability

On the first day of COP26, we'll be launching a new 'Manifesto for Education for Environmental Sustainability'. Produced in partnership with the British Education Research Association (BERA), Strathclyde University, University of York, the Black Environment Network and the Liverpool World Centre, the manifesto is aimed at transforming the way sustainability is taught in schools. Find out more on page 8.

Get involved

Keep an eye on our website for updates on these events and other ways to get involved in the run-up to COP26 – cat.org.uk/news

CAT is a partner in Climate.Cymru, taking the voices of the people of Wales to COP26.

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Our members tell us that grappling with the urgency of and scale of environmental issues, like climate change, can feel overwhelming and huge. Being part of CAT and a wider community of people who are working on positive solutions to environmental problems can help.

Becoming a member of CAT is a perfect way to help CAT continue its extensive educational work and ensure that we can plan the future with confidence.

Buy someone the gift of membership today by calling **01654 705988** or visiting **cat.org.uk/giftmembership**

For more information please contact us at **members@cat.org.uk**

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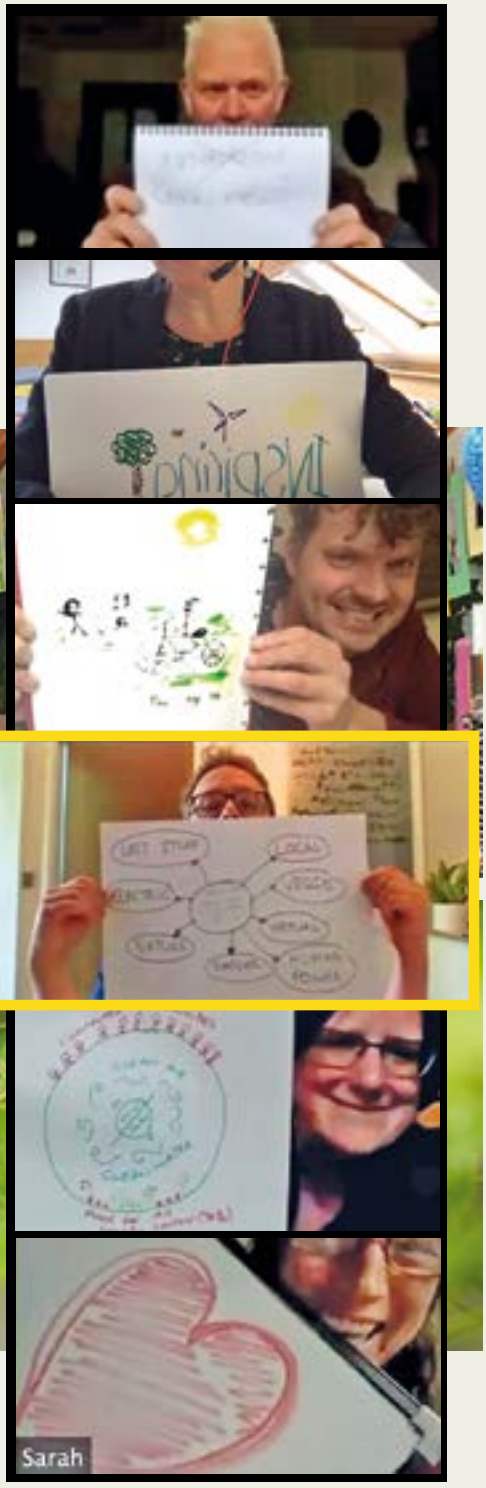
CAT AT HOME

Explore climate solutions from your home or garden



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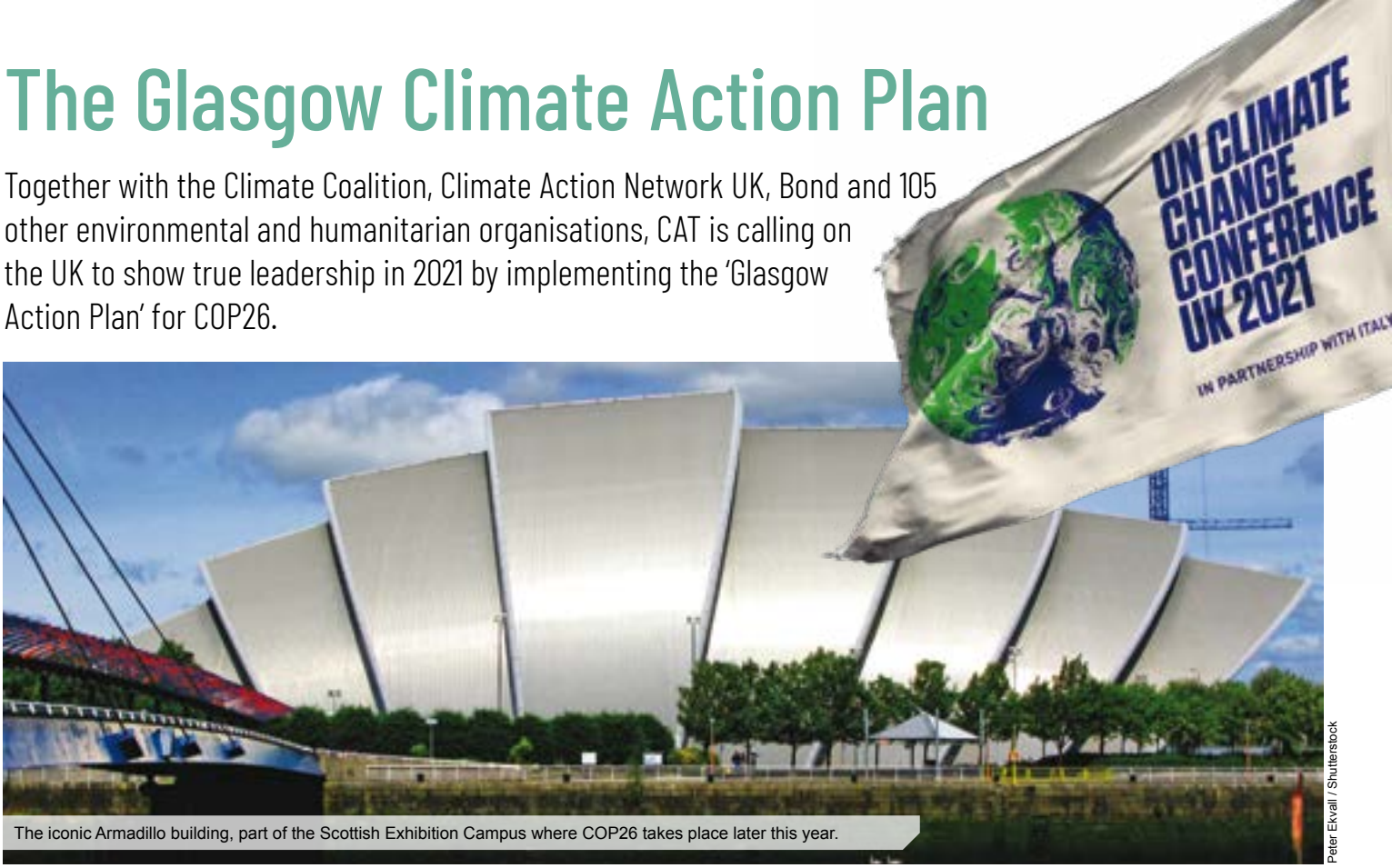
JOIN THE CHANGE

The Glasgow Climate Action Plan

Together with the Climate Coalition, Climate Action Network UK, Bond and 105 other environmental and humanitarian organisations, CAT is calling on the UK to show true leadership in 2021 by implementing the 'Glasgow Action Plan' for COP26.



The iconic Armadillo building, part of the Scottish Exhibition Campus where COP26 takes place later this year.

Peter Ekvall / Shutterstock

1. Close the gap to 1.5°C: The UK must use every diplomatic effort, and political leadership at the highest level, to ensure countries close the gap between existing nationally determined contributions (NDCs) and what is needed to keep the goal of limiting global temperature rise to 1.5°C within reach, with every country taking on their fair share.

2. Address loss and damage: The UK must facilitate a constructive process that concretely advances action on loss and damage at COP26 – including scaling up finance to address loss and damage, and acknowledging it as the third pillar of climate action on a par with mitigation and adaptation.

3. Increase climate finance for adaptation: The UK must lead global efforts to ensure climate finance is urgently and significantly scaled up, and access improved for poor and vulnerable countries and communities, in particular grant-based finance. This includes maintaining the UK's commitment to provide 50% of its climate finance for adaptation, and supporting the call for other countries to do the same. This also means championing a new global adaptation finance goal and the scale-up of locally-led adaptation and support that is accessible and responsive to the needs and rights of women, children, Indigenous Peoples, people with disabilities, and other marginalised groups.

4. Scale up high quality nature-based solutions: As well as deep and immediate decarbonisation of the economy, the UK must support and drive the incorporation of ambitious and rigorous ecosystem protection, restoration, and sustainable management, into the enhanced nationally determined contributions (NDC), long-term strategies (LTS), and adaptation plans of all countries in ways that support poverty alleviation and the protection of human rights.

5. Support a just energy transition: The UK government must ensure robust implementation of the policy to end public support for fossil fuels overseas. It must champion similar policies with other countries, and scale up support for renewable and efficient energy systems to help deliver universal access to energy.

6. Unlock the green recovery to get on track to net zero: UK leadership and credibility also rests on introducing the policies and investment to get the UK on track to net-zero as fast as possible, without the use of international offsets. Top priorities include:

- Putting in place the policies needed to get on track to the UK's legally-binding climate targets, especially on housing and transport, and through aligning public and private spending with a fossil fuel free future.
- Take concrete steps to protect and restore nature in the UK, through an ambitious Environment Bill with binding targets, and by delivering on the 30% by 2030 pledge [To ensure that, by 2030, 30% of UK land is managed primarily for nature, and is protected in perpetuity for that purpose, and that 30% of UK seas are fully or highly protected.].
- Deliver a just transition for workers in the UK, creating millions of green jobs, through investment and training.

You can read the full Glasgow Action Plan on the Climate Coalition website at www.theclimatecoalition.org/cop26

Working together for change

At this unique moment in history, with COP26 approaching we have an important opportunity to show the world how much we care and to push for more ambitious climate targets. In the run up to the conference we're stepping up our events, training and activity and working extra hard to make sure we reach as many people as possible – including those in positions of power.

If you received our recent appeal letter about supporting this work and have already responded, thank you. You're helping people across the UK to seize this crucial moment to create change. If you haven't yet added your support, there's still time to return your donation form to us in the post. Alternatively please visit cat.org.uk/donate or call us on 01654 705988. Thank you.

CARBON-CUTTING CASCADES

A new selection of train-the-trainer courses from CAT combines our solutions-focused approach with Carbon Literacy accreditation to help embed evidence-based action planning across a range of sectors. **Amanda Smith** reports.

We are delighted to be launching a new training offer as part of our Zero Carbon Britain programme, working with the Carbon Literacy Project to offer accredited Carbon Literacy training with a zero carbon flavour.

The Carbon Literacy Project has always been about collaboration, right from its inception in 2013. It involves people and organisations from all sectors and walks of life working together and contributing time, materials and funding to advance understanding on the climate emergency and the solutions it demands.

The project aims to advance the education of the public in the conservation, protection and improvement of the physical and natural environment through the dissemination of Carbon Literacy.

This aligns closely with the aims of CAT's Zero Carbon Britain Hub and Innovation Lab, which are to improve the capacity of councils, communities and other organisations to turn climate emergency declarations into action, reduce emissions and create systemic change in support of mitigation of and increased resilience to climate change and biodiversity loss.

Building knowledge, skills and confidence

Across all sectors, from health and safety to data privacy, changing how we do things requires training – rising to the climate challenge is no different.

The training that we offer through CAT's Zero Carbon Britain project is inspired by our research into net zero scenarios, and is designed to increase knowledge, skills and confidence in tackling the climate emergency.

Our collaboration with the Carbon Literacy Project offers a 'train the trainer' model, with the aim that training then 'cascades' through an organisation as it is shared widely by course participants on successful completion of their own training.

What is Carbon Literacy?

Carbon Literacy is described by the project as:

'An awareness of the carbon costs and impacts of everyday activities and the ability and motivation to reduce emissions, on an individual, community and organisational basis.'

It's about relevant climate change learning for everybody. As of July this year, 19,000 citizens had been certified as Carbon Literate.

Exploring solutions

CAT's Zero Carbon Britain scenario offers an end-point vision of what energy, buildings, transport, industry, diets and land-use could look like in a zero carbon future, enabling people to visualise how we might rise to the demands of climate science. It helps to reduce fear and misunderstandings and open new, positive, solutions-focused conversations.

Our new Carbon Literacy Project accredited online course will explore

the solutions offered by the Zero Carbon Britain scenario. Drawing on case studies and real life examples, we'll look at practical steps to reach net zero. Our initial course looks at this from a local authority perspective, and we are developing other courses including Carbon Literacy for individuals, Carbon Literacy for the retail sector, and other customised, audience-specific training.

Each of the Carbon Literacy courses that we offer follows a similar format. Key elements include delivery by peers and group enquiry and discussion. Critically, the training is all solutions-focused.

During the course participants commit to two carbon reducing actions, one as an individual and one that will influence their organisation. We encourage these to be work-based actions in order to support low carbon culture change within the sector that participants work in.

Training is often more effective when it comes from colleagues familiar with a sector so that conversations around solutions can be tailored to suit specific circumstances. Actions will be evaluated by the Carbon Literacy Project in order for participants to be certified as Carbon Literate, enabling them to go on to train others in their sector or area of work.

We are a small team and we know that we can't train everyone! The train the trainer model enables our Zero Carbon Britain training to reach further into every sector.

Training for local authorities

Our first Zero Carbon Britain Carbon Literacy course has been specifically developed for those working in local authorities. This online course covers the science of climate change, local and global impacts and how these will affect the work and duties of local authorities.

Drawing on our Zero Carbon Britain research, we'll look at low carbon objectives in the local authority sector, and participants will begin to create an action plan to influence others.

This online training is suitable for all roles within a local authority, including elected members, officers and leaders. Across the day there will be timetabled discussion and reflection sessions, Q&As, networking and offline breaks to keep the online format refreshing and engaging.

COP26 Carbon Literacy Action Day

Our first courses run over two mornings on 8 and 9 September 2021 (participants need to attend both sessions) or as a full day on 1 November.

The November course joins the first Carbon Literacy Action Day, which is the largest ever live climate action training event and is being held on the first day of COP26. Training will take place throughout hundreds of organisations with thousands of learners completing their Carbon Literacy training at the same time (17:00 GMT).

If you would like to be part of the Carbon Literacy Action Day but would prefer to do the training in September, you have the option of joining for the last half hour on 1 November to join this event.

About the author

Amanda is CAT's Zero Carbon Britain Training Manager. She has over 20 years' experience in teaching, school leadership, adult training and organisational improvement.

Get involved

To find out more about our new training and other ways that CAT's Zero Carbon Britain project is sharing solutions to the climate and biodiversity emergency, visit www.cat.org.uk/zcb

Would your local council or workplace benefit from this training? Please get in touch at zcb@cat.org.uk

Resources for local authorities and communities

As well as our solutions-based training programmes, CAT also offers a Zero Carbon Britain Resource Hub. This brings together a wide range of freely available inspiration, tools, reports, guidance, training, webinars and more to support local authorities, communities and businesses to take action on net zero.

Visit www.cat.org.uk/zcb-hub to find out more and to get involved.

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Shropshire's countdown to zero

CAT works with a number of county-level community groups to help build action on the climate and biodiversity emergency, including the Shropshire Climate Action Partnership. **Kevin Oubridge** gives us an overview of the group's impressive achievements and ambitious plans.

At the end of 2019, various people from in and around Shrewsbury attended a presentation by CAT's Paul Allen on Zero Carbon Britain. It was a strange and life-changing experience for many of us – informative, challenging, terrifying, enraging and, ultimately, uplifting. It gave the audience a potted history of how, over the last couple of hundred years, humans have merrily burned fossil fuels, pumping out huge volumes of carbon dioxide that has caused the climate of the planet to change, threatening humanity and much of life on Earth. It was uncomfortable listening.

However, Paul went on to say that we could do something about it. All is not lost, it isn't too late, too difficult or too expensive. We have the knowledge, technology and ability. We just need the will.

Building an action group

Inspired by this, and perhaps a little driven by the fact that we're all doomed if we don't do something, a small group of people set up Shropshire Climate Action Partnership (SCAP), involving local councils, businesses, charities, farmers - basically whoever agreed that reducing the county's greenhouse gas emissions to zero by 2030 was a good idea.

This turned out to be something like 100 people from a variety of backgrounds and locations within Shropshire, all giving their time freely as volunteers working on SCAP's first project, Zero Carbon Shropshire.

A plan for zero carbon

By the time I joined the group in October last year, SCAP was already up and running. We had our overall aim of achieving zero carbon in Shropshire by 2030 and there was already a steering committee attended by council members, leaders from local organisations and businesses, and other interested parties.

Our short-term goal was to develop and publish a zero carbon plan by the end of the year. We used CAT's Zero Carbon Britain scenario as a starting point, and CAT and others provided additional support and training along the way.

Working groups – such as consumption and resources, transport, land and biodiversity, energy and buildings – met weekly via Zoom to discuss what to put in the plan. We also had communications, editorial and other groups thinking about how to present the plan and engage with the people of Shropshire, and a website containing supporting information. And, vitally, we had lots of connections and friendships between organisations and people throughout the county.

We hit our target and published the zero carbon plan on 31 December 2020 – much to everyone's relief!

Changing gear

We were all exhilarated and exhausted by our efforts so far but also keen to build on what we had done. If the pre-2020 activity had been frantic and invigorating, the early 2021 activity was complicated, complicated, complicated.

We had set up a big organisation, with the biggest and most important of goals, and we were developing big plans as to how to get there. But we didn't have all that we needed to support this. We were all volunteers, working without premises, policies or procedures – and without any funding.

To help address some of these issues, we've now decided to set up Zero Carbon Shropshire as a Charitable Incorporated Organisation (CIO), which will require us to have a stated aim, trustees and at least a few paid employees. It will enable us to apply for funding to undertake all the projects we've identified as needing doing, such as recruiting more volunteers, building a better website, energy mapping across the county, supporting local projects, and so much more.

It will also enable us to act as an organisation that connects organisations – there are so many charities, companies, not-for-profits and public institutions out there, all offering advice and support, there is an urgent and vital need for something or somebody to connect the dots for people and signpost them to where will be of most use to them. For example, a resident in Pontesbury might want advice on recycling, a company in Telford might want support with switching their fleet of vehicles to renewables, and a charity in Oswestry might want help with rewilding.

The journey to date has been energising, positive, painful, frustrating, exhausting, interesting, and a whole lot of other things. And we've only just begun!

Generation Zero Carbon Shropshire

Keen to get more young people involved, we set up 'Generation Zero Carbon Shropshire'. Connected to but independent from SCAP, the group is run for and by 16-30 year-olds. With a fantastic website, they are engaging with young people all over the county via social media, blogging, running competitions and developing a schools' pack on sustainability for KS3 students.

https://zerocarbonshropshire.org/generation-zero-carbon/

About the author

Kevin has been a learning specialist for nearly 40 years, working for BT, the NHS and Mercer. He now runs Accelerated Success with business partner Sue Burnell, providing sustainability training, consultancy and coaching for SMEs. You can find out more about SCAP at https://zerocarbonshropshire.org

If you're involved in a county-level climate action group and looking for support, you can contact our Zero Carbon Britain team at zcb@cat.org.uk

Low carbon heating choices

CAT's Zero Carbon Britain scenario mainly uses heat pumps for heating, but it's not the only option being championed for a zero carbon future. **Joel Rawson** looks at the potential of some other technologies in the frame.

One of the biggest challenges we face in a zero carbon transition is moving away from the fossil fuels that most homes still rely on for heating.

In our Zero Carbon Britain report, heat pumps replace gas or oil boilers or electric heating in most homes, plus a sliver of biomass heating for some rural areas. But other options are being promoted, including hydrogen, heat networks and direct electric heating of various kinds. Can these offer the same level of carbon saving? And what are the implications for infrastructure to support them?

Heat pumps

There's already much more about heat pumps on our website and in previous issues of Clean Slate, so I won't go into much detail here, but the key thing to keep in mind when comparing with other options below is that a well-specified heat pump should give three or four units of heat for every unit of electricity consumed.

There's a useful case study on the website of Trystan Lea, one of the researchers for the energy modelling in CAT's latest Zero Carbon Britain report. Monitoring of Trystan's own home heat pump system shows how with the right choice of radiators the annual electricity-to-heat ratio is 3.9. And that's without high levels of insulation. Through a careful choice of tariff they buy electricity at about 11p per unit (kWh), so the effective heating cost is less than 3p per unit. This is about two-thirds as much as they'd pay to heat with gas, but perhaps the most important thing is that the carbon emissions are about 80% less than they'd be on gas. You can read more at https://trystanlea.org.uk/heatpump2020

The main barrier is the higher upfront cost, but this should drop with investment and mainstream adoption, as happened with solar PV and wind farms. A new 'Clean Heat Grant' is due to replace the Renewable Heat Incentive (RHI) in April 2022. The proposed £4,000 grant will focus almost entirely on heat pumps, with biomass supported in a few special cases.

Are there other zero carbon options?

Various different heating systems come up in questions to the information service and in the media, and here I run through some of the key points to bear in mind. I'll be adding more detail to the CAT website, to help people make balanced choices. I'd also like to hear if you've had either good or bad experiences with any of these.

Any system can be mis-sold, and a potentially good option could be sized incorrectly, or have the wrong choice of controls, or be overpriced. Salespeople may make over-optimistic claims about carbon savings or running costs, and perhaps even disingenuous comparisons with other systems.

Of course insulation and related measures are the most important investment whatever the heat source. We must reduce nationwide heat demand so that's its feasible to move as

quickly as possible to only zero carbon energy sources. To complement the Clean Heat Grant, we're waiting to hear about a replacement for the withdrawn Green Homes Grant, which was stymied by administrative problems. See CAT's information service web pages for updates, and for more on insulation and retrofit plans.

Heat networks

A heat network, or district heating, takes heat produced at a central point and pipes it around many buildings. Clearly this isn't something you can just choose, as it depends on planning across a number of homes. It can be a great solution, especially for denser housing. However, the carbon intensity of heat networks will vary, depending on where the heat comes from. It could be a by-product of industrial processes, from a shared heat pump, from true geothermal energy, from anaerobic digestion of agricultural and domestic green waste, or incineration of municipal mixed waste.

The potential for a heat network could be identified and developed as part of a zero carbon action plan for a region or town. If you think it could work for you and your neighbours, you could spur action by getting involved in local zero carbon action planning. CAT's Zero Carbon Hub and Innovation Lab is working to support communities and councils, so check online to see how they could help your community.

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Hydrogen

There's currently a fair amount of promotion of 'hydrogen-ready' boilers, which seems to be led by the fossil fuel industry. At the moment only 'grey hydrogen' is being produced, from the steam reformation of natural gas. So it's still a fossil fuel and leads to higher carbon emissions than gas. The main industry proposal is for 'blue hydrogen', made by the same process but adding in a not yet invented way of capturing and storing the emitted carbon. There are questions about how this will be achieved.

'Green hydrogen' is made from the electrolysis of water using electricity from renewable sources. The Zero Carbon Britain model allocated excess electricity to make green hydrogen and other synthetic fuels. These are important for certain purposes – such as manufacturing, larger vehicles and planes, and running 'peaker plants' at times of high grid demand.

Using hydrogen to heat homes raises questions, given how valuable it is for those other uses and the difficulty of making it. A heat pump can use 1 unit of electricity to give 3 or 4 units of heat. Whereas via hydrogen, 1 unit of electricity might give only 0.6 units of heat (if hydrogen generation is 70% efficient and the boiler 90% efficient).

Overall, the heat pump would then be 5 or 6 times as efficient as hydrogen at delivering heat from renewable electricity. In theory it could all be zero carbon, but if hydrogen is more than an occasional top up option it will demand far more electricity generation (and so several times as many wind and solar farms).

CAT's Zero Carbon Britain model avoided 'silver bullets' – including technologies not yet developed and with uncertain timescales. The current proposals for hydrogen do have a silvery look. We know that heat pumps will work and will reduce carbon emissions, but a 'hydrogen-ready' boiler might never actually reduce carbon emissions.

Direct electric

In theory, direct electric heating (such as an electric boiler, radiator or underfloor heating) has the potential to be 'zero carbon', and a careful choice of tariff can reduce the running costs a bit.

However these can't be more than 100% efficient, and therefore consume 3 or 4 times as much electricity as a heat pump for the same heat demand. As well as much higher running costs, there's the issue again of the infrastructure needed to generate all that electricity.

We therefore treat with caution any claims for these sorts of electric heating as an energy saving measure. A little electric heating might be part of a heat pump system, to top up in the coldest weather, but we really want to minimise the use of direct electric heating.

Infrared

The direct electric options mentioned above deliver heat in the same way as water based radiators or underfloor heating. The claim for 'far infrared' heating is that because it heats people and surfaces rather than the air, the electricity use will be much less while delivering the same thermal comfort.

However, at the moment it's hard to find a detailed breakdown of performance - it's something we're continuing to pursue. Comparisons need to be evaluated carefully, for example they might be with a heat pump that has a lower electricity-to-heat ratio than should be achievable with proper design.

Anecdotally, some have found that far infrared works well in a bathroom, but they've preferred warm air heating elsewhere. But this doesn't mean it couldn't work in some circumstances, and we need better data to make fair comparisons.

I'd really like to hear more about what our readers, or your contacts, have found in real-life examples. In particular, data about the performance of far infrared options will help us to make better comparisons with what we know is possible with a heat pump. You can contact me on info@cat.org.uk or via our website: https://www.cat.org.uk/info. CS

About the author

Joel Rawson is CAT's Information Officer, providing free and impartial advice on a wide range of topics related to sustainability. He first came to CAT to volunteer in 2001, and graduated with a CAT Postgraduate Diploma in 2013. You can email Joel at info@cat.org.uk

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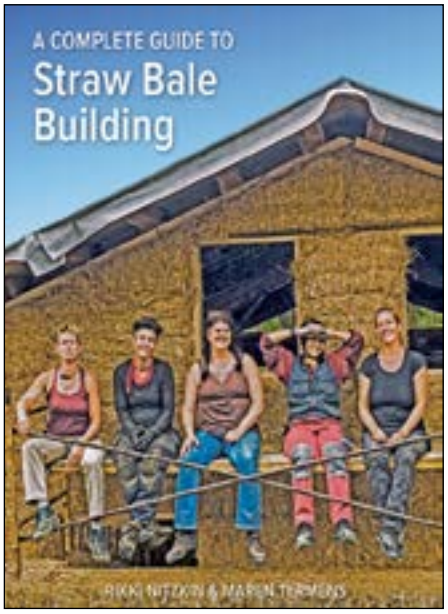

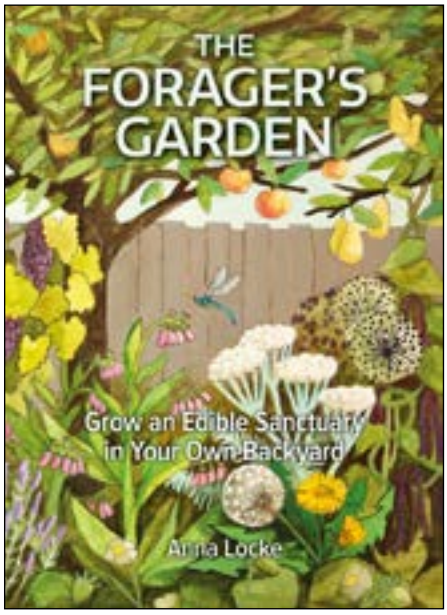

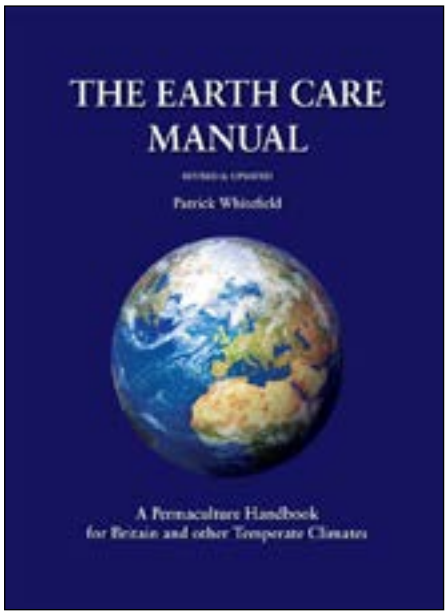

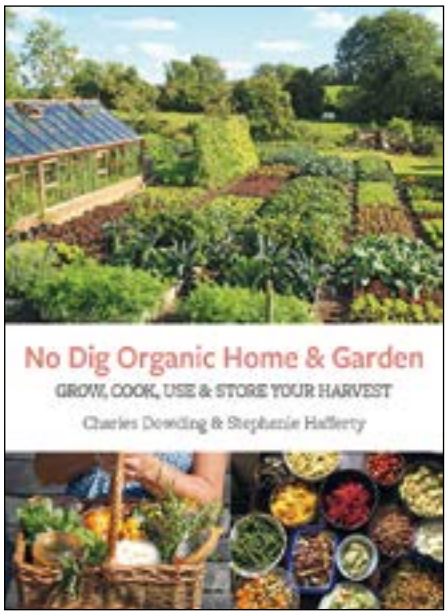

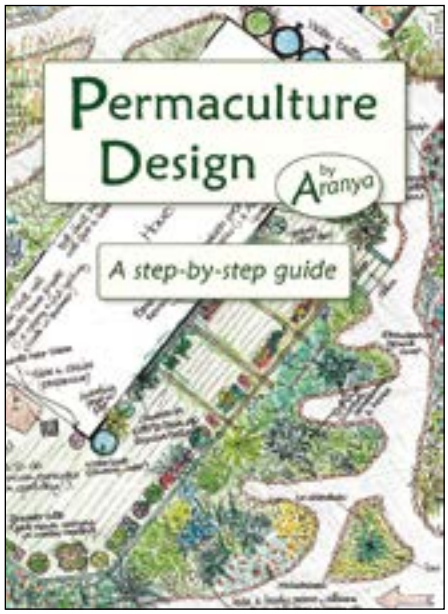

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CAT STORIES

Our members, supporters, students, graduates and volunteers are using inspiration, skills and knowledge gained at CAT to make a real difference in a range of sectors, working together to help tackle the climate and biodiversity emergency. Meet some of our changemakers – and let us know your CAT story!

Nathan Wearn-Hutter, CAT graduate
Nathan finished his MSc in Sustainability and Adaptation at CAT in 2020, graduating in our recent online ceremony. With a background in horticulture and organic farming, he decided to return to education as a mature student undertaking a BSc in Ecology and Conservation before starting his masters with CAT's Graduate School of the Environment.

Nathan says: "My MSc at CAT far exceeded my expectations. Taking my many years of practical experience of working within the landscape plus my ecology/ conservation studies, CAT enabled me to add the human element and consider multiple timescales, thus adding a thoroughly holistic outlook to how I now approach my life and work."

He now works as a Green Team Supervisor at Groundwork, a charity working to transform lives in the UK's most disadvantaged communities. Through this role, he manages a green skills training programme for a mixture of volunteers and paid young adults at risk of long term unemployment.

Diana Tarcatu, CAT graduate
Sustainable Architecture graduate Diana Tarcatu gained her degree in 2020. She is currently working as a Consultant Retrofit Designer for award-winning design and research consultancy URBED (Urbanism Environment and Design), where she focuses on retrofit projects, helping social landlords and householders decarbonise their homes.

Diana got involved in the technical side of Passivhaus following her CAT dissertation, which asked 'How can we use design tools to lower embodied emissions in domestic passive houses in Wales?' This, combined with the urgent need for government programmes to retrofit UK homes, led her to focus on retrofit, and she built on knowledge gained at CAT by completing a retrofit coordinator course after her degree.

She says: "I am convinced every designer should have these skills to make informed decisions which will impact our carbon emissions in the future. I plan to pursue my Part 3 [Architecture degree] and work within the retrofit sector to get further experience with retrofit at scale, which is fast becoming a necessity for designers. I hope to revisit CAT to share what I have learned and see how the role of retrofit will evolve in educating the next generation of sustainability graduates."

Oleksii Marianenko, CAT volunteer
Oleksii was an engineering volunteer at CAT in 2007-08, a role that allowed him to work with a range of renewable energy systems, including helping service our biomass heating systems, restore a micro-hydro turbine, repair the Polenko wind turbine, and much more. Many of the renewable energy installations Oleksii helped to install, service and restore can still be found at CAT today.

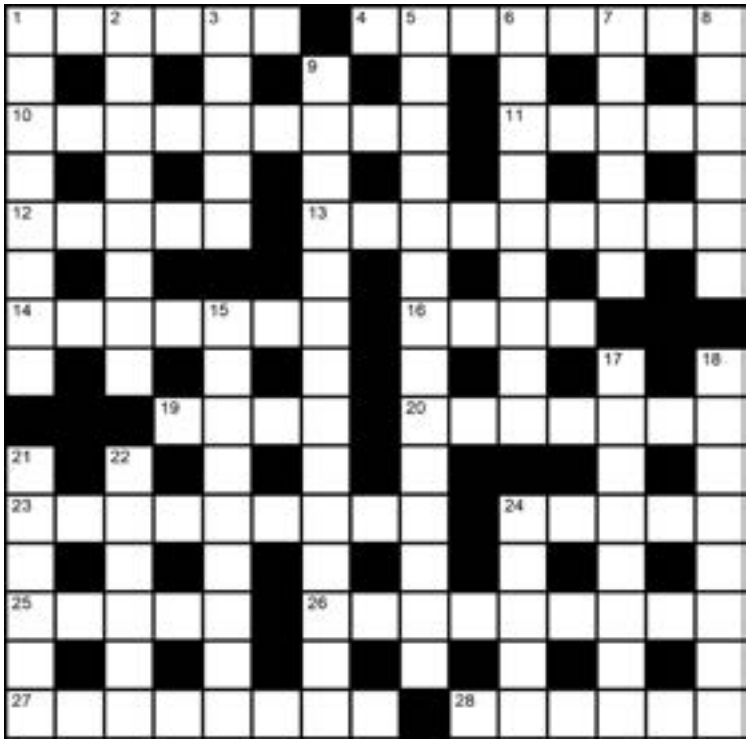
He has since worked in Cameroon on off-grid solar installations and later completed a Masters degree in solar PV, studying in Madrid. He is now a solar PV engineer in Hamburg, Germany working on projecting, installing and coordinating processes.

Oleksii says: "Being a volunteer at the Centre for Alternative Technology was a great chance for me to play my part in the eco movement. I would like to say thank you to CAT and all staff members, particularly to the Head of Engineering at the time, Tony Brown, for the opportunity."

We love hearing about the work you are doing, the groups you are forming and how CAT's practical work is guiding and inspiring you. Please get in touch to tell us what you are doing. Contact members@cat.org.uk with your CAT story.

Cryptic crossword by Brominicks

http://www.brominicks.wordpress.com



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The first correct entry pulled from a hat wins a £20 voucher for the CAT EcoStore – store.cat.org.uk.

Please send your completed crossword entry by 25 October 2021 to *Clean Slate* Crossword, Centre for Alternative Technology, Machynlleth, Powys, SY20 9AZ.

Solution will be published in the next issue of *Clean Slate*.

120 winner: **Richard Inverarity, Morpeth**

Across

1 Beachside Cafe distressed about graffiti inside (6)

4 Root about to exact retribution after miscue in the middle (8)

10 I'll argue violently with leader of republic! (9)

11 Stop two feet from animal, say (5)

12 Sign woodland creature is not completely finished (5)

13 Popular measures implemented by fashionable government (9)

14 Silly mid-on extremely annoyed one cuts so well (7)

16 Food from the East served up seconds later (4)

19 Territory you'll find it difficult to get out of without a hitch (4)

20 A troublemaker? Oh m'lud, nothing could be more incorrect (7)

23 It's his nibs decision to drink (without a sign of hesitation) (7-2)

24 Manufacturer of detergent concedes small amount of danger (5)

25 Fellow surrounded almost completely by oil! (5)

26 English detective recollects latino following removal of hair (9)

27 Desperate request to have food in doorway (8)

28 Issue Homer has with fine composer (6)

Down

1 One does a lot of work fixing Rover's chassis (8)

2 Time for military exercises, deadly, if badly organised (5,3)

3 Deliver cow, allegedly for sculpture (5)

5 Stick with bowler who was renowned for getting them out (7,7)

6 How you get to outskirts of Venice, to a port that's extraordinary (9)

7 Duck that's almost completely blue (6)

8 Excuse old English PM for upsetting Tory leader (6)

9 Anglo-Saxon leader had felt regret after such devastation (6,3,5)

15 A delicate situation compounded by Global Warming? (2,4,3)

17 Donor (ultra-well-off) is ultimately benevolent (8)

18 Where you'll find a Russian spy accompanying Poles in Slovakia (8)

21 Where you might find the oars he let go of? (6)

22 Relate with rascal – that's cunning (6)

24 Use another unknown beach in Spain where there's space for people to gather (5)

Clean Slate 120 Solution

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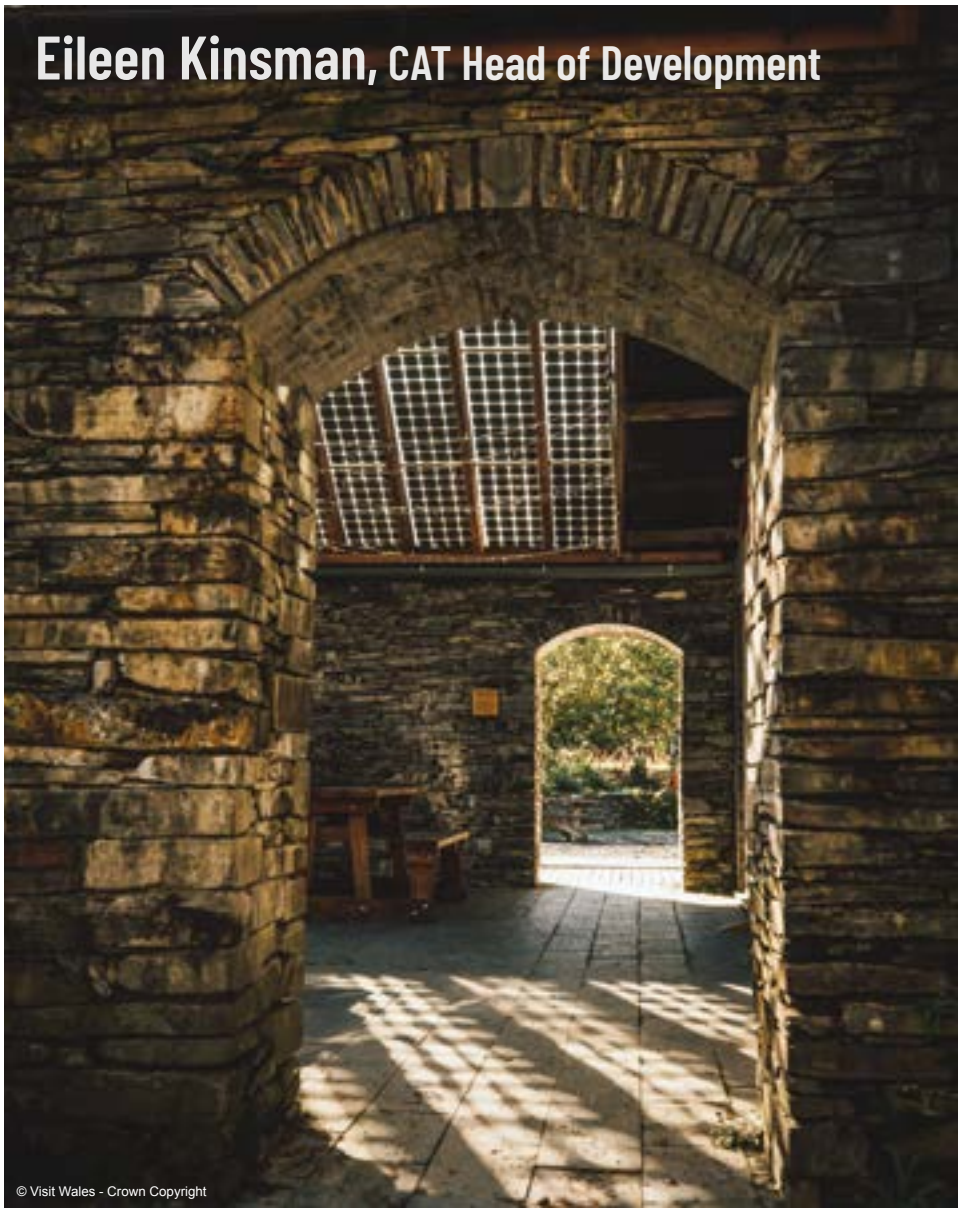

Leave a gift in your will to CAT

As I write this, the new Intergovernmental Panel on Climate Change has released their latest report to a fanfare of headlines ranging from apocalyptic doom to calls for more urgent action. My social media timeline is also full of people crying out for something to do that will help tackle the climate and biodiversity crises. As an environmentalist for twenty years I know the powerlessness of feeling like your actions are a drop in the ocean, but as a fundraiser for the Centre for Alternative Technology I also know the power of collective action and its multiplying effect. And I know that money can help achieve this.

Fundraising is about raising money – there's no getting away from that. Money given to CAT is an investment in sustainability, investing in the sharing and learning and skills required for a zero carbon society. Money that comes from legacy gifts is one of the most useful investments we receive.

Learn from history – protect the future

A legacy gift is a financial investment in CAT's work and staff, but it's so much more than that. It's a recognition that this work is needed now – and in the future. It's a recognition of our history, and an endorsement of our current work and a faith in tomorrow.

People who are serious about solving the climate and biodiversity crises know that it is a long game. Yes, there are urgent issues to solve now, but talking to CAT's huge community of supporters gives us hope and reminds us every day about the collective work they are doing in their communities, schools, universities, and businesses – work that creates solid foundations to build on. We share a collective belief in the urgency of climate change, but also the steady construction of collective and community action.

This is where your legacy gifts can really help

This climate crisis isn't going away soon, unfortunately. Creating the tools for society to prevent the worst of climate change, and adapting our societies to impacts that we may not be able to prevent, is vital.

All of CAT's networks – our students, our members, our visitors, our course participants, our school groups, our volunteers and all the policymakers, businesses, individuals and families that learn from us and share their knowledge – will be doing this work long into the future.

The gift you leave us in your will - whether a percentage of your estate, a fixed sum of money, or an item to sell - is one of the most useful and important ways you can support us. It allows us to plan our work, employ staff and develop courses. It means CAT can continue to steadily and confidently build the knowledgeable and skilled community required to transform society.

Help weather the storms long into the future

The climate change reports and the forthcoming international climate summit in Glasgow will generate a sense of urgency – and rightly so, but your gift to us in your will can help weather the storms and invest in a safe, equitable society long into the future.

Thank you and we look forward to continuing this lifelong journey with you.

If you would like to leave a gift in your will to CAT, please get in touch at eileen.kinsman@cat.org.uk to arrange to chat it over.

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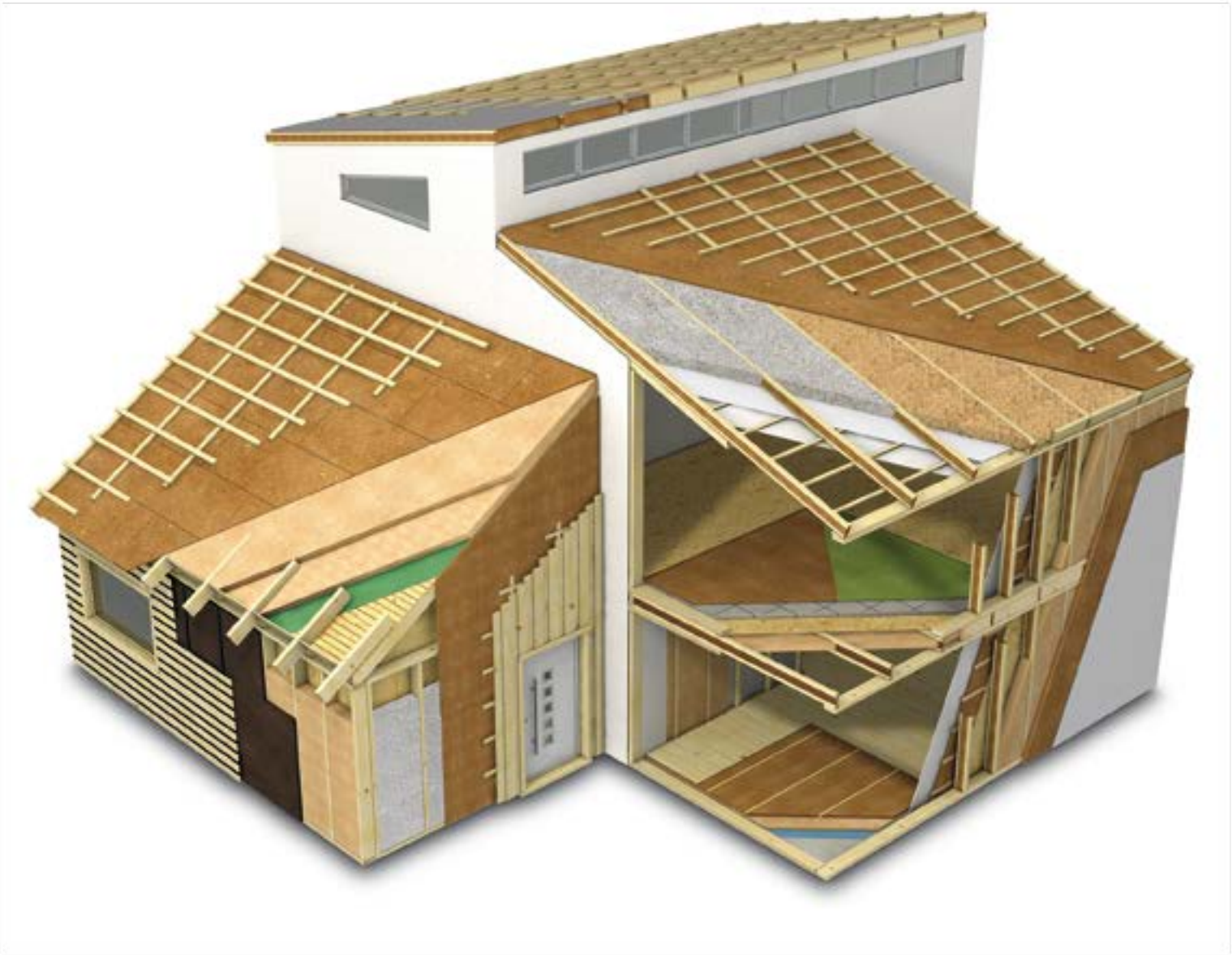

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