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the journey so far

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EDITORIAL

Eileen Kinsman

Time to build a better world

The latest reports from the Intergovernmental Panel on Climate Change (IPCC) make for difficult reading. They set out in black and white how the climate emergency is already having an impact around the world, especially on those who have contributed least to the problem.

But they also offer some hope – there is still time to limit global temperature rise to 1.5°C and avoid dangerous climate breakdown, if we act now.

Let's be clear. This is a huge challenge. But it is one we can meet if we work together.

That's because complex problems like climate change aren't solved by a single person making one big effort. They are solved by many people taking action, day after day. Side by side, we have an impact far greater than any of us could have alone.

In my recent letter to supporters, I explained that action is required at all levels: individuals, communities, businesses and governments. And at all these levels, people need skills, knowledge and understanding.

Many of you have already responded with a donation to help empower a whole community of CAT changemakers to contribute to solving the global climate crisis. Thank you. By mobilising the most diverse group of people possible, we can harness the collective power of their different experiences, connections and capabilities to have the biggest impact.

There are so many important changes we can make to start to fix the system and stop climate catastrophe. And there are millions of people who are ready to work together to make these changes happen.

But these potential changemakers need the right tools and support.

In the pages of this magazine, you can read how across the UK and beyond, we are giving communities and councils the skills to take action locally towards a zero carbon future. We're sharing knowledge with individuals to fill the skills gaps around retrofitting energy efficient technologies. And we're working with researchers to find more sustainable ways to feed ourselves.

Thank you for your ongoing support that makes all this possible.

Interim co-Chief Executive Officer Eileen Kinsman



Keep in touch Write to us: Centre for Alternative Technology, Machynlleth, SY20 9AZ



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Helping faith groups cut emissions



Eglwys Llanbadrig Church, one of the oldest churches in Wales – reducing emissions in churches and other properties could have a significant impact.

The Church of England and the Church in Wales are learning more about how to reduce their environmental impact through bespoke training with CAT.

Our Zero Carbon Britain team organised a two-day training course for the Church of England in May. The team and guest speakers shared knowledge and advice about renewable energy, biodiversity, and climate justice, using case studies of churches that have carried out successful retrofit projects or installed renewable energy.

This bespoke training was recommended to the Church by a representative who took one of our Zero Carbon Britain: Live Online courses in a personal capacity. They recognised how useful the training could be to the Church and got others on board.

The impact of this training could be wide-reaching as the Church of England has a lot of property under its care, including housing, schools, churches and land. This provides a lot of potential for decreasing greenhouse gas emissions across the country, building on the Church's commitment to a roadmap to net zero carbon for 2030.

Similarly, a senior Church in Wales officer attended our online

Zero Carbon Britain course. Then in spring 2021, the Church declared a climate emergency and is now on a zero carbon journey. To help the Church act on this declaration, we will be running bespoke training sessions on Carbon Literacy, understanding the climate crisis, and ways in which the Church can help tackle it.

The Church in Wales has around 1,500 churches and 650 parsonage houses, so again there is a wide scope to reduce emissions and spread awareness of climate solutions among the church community.

Amanda Smith, Zero Carbon Britain Training and Engagement Manager, said:

“We are really pleased to be able to offer this training on the climate crisis and ways we can contribute to climate solutions for the Church of England and the Church in Wales. There is great potential for this work to increase understanding and knowledge of actions we can take to reduce greenhouse gas emissions across the two countries. Now we have developed the training, the Zero Carbon Britain team are looking forward to working with other faith groups and communities in the future, reaching the widest audience possible with this work.”

New Sustainable Leadership collaboration

CAT is in dialogue with Professor Reiji Ohtaki from Waseda Business School, Waseda University, Tokyo, about collaborating on new Sustainable Leadership courses.

In March, Professor Ohtaki, a passionate advocate of sustainability and an expert in organisational development and leadership, gave a presentation to CAT about his project at Nanso Gakusha in Chiba Prefecture (the peninsula neighbouring Tokyo). In this area of farm and woodland, he has founded a centre to teach leadership courses using design thinking and underpinned by the Sustainable Development Goals.

This is an exciting potential collaboration for CAT and we'll keep you updated on developments in future editions of *Clean Slate*.



Pictured on the visit to CAT (l-r): our unofficial historian and Graphic Designer, John Urry; Professor Reiji Ohtaki; Interim Co-CEO Eileen Kinsman; and Professor Ohtaki's UK liaison, Rodney Kelly.



Zero Carbon Britain Hub and Innovation Lab – evaluating impact

A recent evaluation of CAT’s Zero Carbon Britain Hub and Innovation Lab has highlighted how it helps local authorities, communities and businesses turn climate and biodiversity emergency declarations into action.

The evaluation by Collingwood Environmental Planning, which looked at the first full year of the project, was commissioned by CAT’s Zero Carbon Britain team to help gain an in-depth understanding of the impact of the work and to see how it can be improved and developed.

The first year saw the establishment of the project team and the planning and development of courses, materials and other content for the three main workstreams – training, the Resource Hub, and the Innovation Lab. Six two-day training courses, seven webinars and several bespoke sessions were delivered, with a total of 663 participants receiving Zero Carbon Britain training in year one. Other key achievements were the launch of our first Innovation Lab (see page 17) and the development stage of our online Zero Carbon Britain Resource Hub.

The report found that:

All courses were well received – 99% of participants surveyed said the courses were ‘good’ or ‘excellent’. They fed back very

favourably on the trainers, the relevance of the courses to their needs, and the materials provided.

All participants who gave feedback in the six months following the training said it had made them feel better equipped and more confident in taking practical action on the climate emergency.

88% of the participants feeding back said they had taken practical action following the training, and all but one indicated this was to some extent due to attending the training. Participants also reported sharing information and collaborating with others, as well as developing and implementing an action plan.

The report also provided insights into areas for improvement and future development, allowing us to evolve our training and resources to have the greatest possible impact in helping local authorities, communities and businesses respond to the climate and biodiversity emergency.

For more information on our Zero Carbon Britain training courses, events, research reports, Innovation Lab and free online Resource Hub, visit cat.org.uk/zcb

Buzzing about bees

The CAT eco centre was abuzz with excitement this half-term as families explored the amazing world of bees. With children’s pollinator packs, a bee-friendly garden trail, and planting workshops to get families thinking about how they can help insects in their gardens and window boxes, the whole site was a hive of activity.

We’ll be exploring more about the crucial role that bees play in our ecosystems, the threats they face, and how we can help them on a new ‘Saving the Bees’ short course on 25-26 June, while our ‘Gardening for Nature Experience Day’ takes a more general look at how to help wildlife thrive in your garden, backyard or community greenspace. Find out more at cat.org.uk/whats-on



CAT experience days – a great day out learning how to help nature thrive



Supporting communities to create ‘EarthArt’

Over the past few months, CAT has been working with Celf-Able, a Montgomeryshire-based community art group run by disabled and disability artists, on their new environment-themed project, ‘DaearGelf/EarthArt’.

The Arts Council of Wales funded project launched in February at CAT. Through a public Zero Carbon Britain talk, we facilitated discussions around sustainable living and how the climate and biodiversity crises and related social issues affect us all. Following this, throughout the spring, Celf-Able ran touring workshops in local communities (including several at CAT), sharing ideas about how creativity can help raise awareness and promote wider discussion. The project will culminate in an exhibition at CAT in the summer.

Project coordinator Amanda Wells said: “The project looks at the links between climate justice and social justice, using art as a way of exploring and communicating thoughts and feelings on the issues. We have been making all kinds of art, including animation, land art, shadow puppets, and lots more – and we’re looking forward to sharing the work with visitors to CAT this summer.”

A future CAT: the journey so far

By now, you will have heard about our plans to transform CAT's capacity to provide the skills, knowledge and understanding needed to address the climate and biodiversity crisis – shaped by community engagement and in-depth research which are well under way.

The valuable views and knowledge of our members, students, staff, volunteers, local people and businesses, and a wide range of other stakeholders, are already playing a huge part in ensuring

the project has maximum long-term impact – hand in hand with the expertise of a consortium of architects, ecologists, engineers, visitor experience designers and business consultants working closely with the CAT team to help bring the redevelopment to life.

We're pleased to be able to bring you an exclusive overview of the process to date – as told by some of the people who are helping shape the plans. From the design process through to ecological surveys – here's the story so far.



Architect Jessica Daly explores the CAT Quarry Trail with Head of Eco Centre, John Challen.

Ecological survey approach – Scott Roe, senior ecologist at Vital Ecology.

“ I am heavily involved in using regenerative practice to create immersive and ecologically resilient closed-loop systems – something which we hope to achieve at CAT.

We have so far mapped the whole of the site, gathered ecological records going back some decades and are now busy exploring opportunities for further enhancing the site's ecological potential and its ability to connect with the wider landscape.

From Vital Ecology's point of view, this is a huge opportunity to demonstrate how spaces can be beautiful, regenerative and provide for both humans and other species in equal measure. It is an exciting opportunity for CAT to become a world leader in regenerative, resilient and zero-carbon design whilst providing a wonderful and immersive visitor experience. We are very hopeful that our combined ecological vision for the site will be welcomed as both inspirational and transformative.



Gathering feedback – Andrea Kellegher, stakeholder engagement lead at Turley.



“ CAT is keen to gather input from a wide range of voices, taking a co-creative approach to help develop the best possible plans. I've been supporting the team in helping develop and deliver a range of in-person, remote and online events and surveys to ensure engagement is both in-depth and wide reaching – allowing us to gather as much feedback as possible from those who will help shape the future of CAT.

Key events have included: online sessions with students, members and supporters; a Community Open Day; drop-in sessions at Machynlleth's weekly market; displays at CAT to gather input from visitors; and one-to-one and group discussions with a wide range of other stakeholders, including schools, visiting university groups and local businesses.

At the end of March, around 50 CAT students joined an online discussion where the CAT team provided an overview of their vision for future developments. Attendees were invited to discuss their thoughts and provide feedback on what matters most to them and what they would like to see more of from CAT in the future. A similar event was also hosted for CAT members and supporters, bringing together people from across the UK – including a fantastic mixture of long-term and newer supporters of CAT, all feeding in their thoughts and ideas.

On 2 April, the local community was invited to come to CAT for a Community Open Day to share their thoughts on what they'd like to see from development plans. Interactive display boards and the chance to speak to the CAT team led to some great conversations and suggestions. This was followed up by two drop-in sessions at Machynlleth market, enabling CAT to get out into the community and have conversations with local people about the plans.

A survey was also conducted during April and May which gathered more than 300 responses from a wide range of stakeholders, providing useful insight and ideas. As plans develop, there will be further opportunities to have your say, so please keep an eye on cat.org.uk/futureplans and sign up to CAT's e-newsletter to keep up to date.

The design process – Lucy Picardo (director) and Jessica Daly (associate), Haworth Tompkins architectural studio.

“ As with any architectural project, it's vital to have an understanding of the site before getting started, as well as a cultural understanding of 'place'. Not only is CAT a historical quarry within its landscape setting, but the wealth of heritage that comes with it should be front of mind throughout the redevelopment process – from CAT's early days as a community experiment right through to its current hybrid form with both a visitor and education focus.

CAT has the unique advantage of being able to show first-hand environmental measures in action in real life, rather than being a mere exhibition space. It has the ability to demonstrate building techniques, approaches to food, waste, transport, materials and energy efficiency – all in situ at the Centre, which is a unique feature and should be maximised.

To inspire real behaviour change in tackling the climate crisis, learning needs to be relatable and also enjoyable so that it does not feel like a choice between joy and environmental responsibility – and this is the balance we hope to strike.

We are especially excited to be working with CAT on this project as it builds upon our own experience and interest to go further – adopting regenerative principles to achieve long-term positive (rather than neutral) impacts for both the community and environment.

2023 will mark 50 years of CAT, and our mission for this project is to support CAT to continue to educate audiences, provoke conversations and inspire positive change for the next 50 years and beyond.



Scaling up for the climate and nature emergency – Eileen Kinsman, Interim Co-CEO at CAT.

“ As the climate and biodiversity crises deepen, there's a pressing need to rapidly scale up solutions, ensuring that everyone has the skills, knowledge and inspiration to play a part in rising to the key challenges of the 21st century, so we have big plans to expand our impact and activities over the next few years.

During the past few months we've been taking an in-depth look at how best our new visitor experience, sustainable skills hub and outreach programme can help us deliver on our mission, with input from a wide range of people, including CAT members and supporters – huge thanks to everyone who had fed in so far. We're being supported in this by a fantastic project team who have been helping to develop a robust business plan and site and visitor experience masterplans.

We're delighted to introduce you to some of the team that we have been working with, and to give you an insight into developments to-date.



The visitor experience – Jinny Sheffield, masterplanning at Metaphor.

“ CAT has been welcoming visitors to the site for almost 50 years, and we see masses of opportunity for further enhancing the visitor experience in line with the Centre's vision for a sustainable future for all humanity as part of a thriving natural world.

CAT's founders believed in an alternative way of living and established the Centre to both experiment with technology and demonstrate a more sustainable way of life. In today's climate crisis, this mission is more important and relevant than ever before – and so we think the story of CAT should be front and centre of the visitor experience, immersing visitors in its journey from the moment they step on site.

Likewise, collectively we have the technology and the expertise to make a zero carbon Britain possible – both as individuals and communities – and so an opportunity within the visitor experience to look at some of the solutions that can help the zero carbon journey could provide visitors with valuable context before they go on to explore the rest of the site.

As a country, we can power down our demand for resources, power up our clean energy sources and put systems in place to use energy more intelligently – all of which could be visualised in real life using spaces within CAT to demonstrate the technology and materials in use. We can also take a more mindful approach to our natural environment, to protect and restore biodiversity and promote wellbeing for ourselves and all life forms by immersing visitors in outdoor adventure – harvesting energy as we go. The possibilities are endless!



Approach to landscape – Natalie Simmons, Director at Jonathan Cook Landscape Architects.



“ Part of such a special wider landscape, we believe there is an incredibly powerful landscape story at CAT that deserves to be better understood by everyone. We have identified key threads running through the site that can help to shape the future of CAT’s landscape, and a number of ecological opportunities developed in collaboration with Vital Ecology who are currently conducting a baseline ecological assessment.

So far, we have identified six main areas of opportunity drawn from the site that can enhance CAT’s landscape and ecology:

- The landscape experience: celebrating unique moments on site where the Celtic stream valley topography meets a sense of deep geological time in the formation of rock and slate, tied in with stories of Welsh language, mythology and folklore – helping visitors to place themselves in a wider narrative.
- The story of food: going beyond permaculture to explore more immersive, bountiful and biodiverse growing environments; growing more in less, preserving local heritage varieties and reducing food miles.
- Playfulness and skill building: recognising that skills start with play, and including playful opportunities for all ages throughout the site that engage with water, rock, earth, sky and the hidden underground world.
- Enhancing connectivity: establishing super-abundant wildlife corridors, pollinator routes and edible threads that run throughout the CAT site and link to wider surroundings.
- Maximising habitat value: giving over even more areas to species protection, enhancing habitat and foraging potential, extending species range and redressing the balance between humans and nature.
- Sensitively addressing threats: such as invasive species which may negatively affect overall species diversity, soil health and invertebrate populations on site.

Thinking about energy – Innes Johnston, senior partner at Max Fordham, building services engineers.



“ My role is to look at the site’s current energy and water systems and suggest which assets would be appropriate to maximise within the future plans – as well as ways to increase renewable generation.

Currently, there are times when CAT has to closely manage its off-grid water supply to ensure sufficient reserves. Water use has already been minimised using compost toilets, low flow systems and rainwater harvesting. However, with the likelihood of longer periods of drought as climate change impacts intensify, combined with an expected rise in demand with increased footfall, we’re exploring additional ways to control and reuse water.

Another future consideration is establishing more heat pump systems around the site, as well as any newer buildings, if built, being up to higher fabric standards than some of the existing older buildings. Some buildings of course will be refurbished to higher energy standards, and some will remain unheated, but overall, the goal is to improve overall energy efficiency, increase storage and maximise renewable electricity supply. CAT already has a range of renewable energy sources, including solar PV, hydro and solar thermal – all of which we will add to, to maximise the site’s potential.

I’m also working with the team to identify energy, water and building techniques that might be appropriate to showcase for visitors – even when not used directly for the site.

A leading skills hub – Amanda Smith, Training Manager at CAT.



“ Here at CAT, we already offer a wide range of courses through our Graduate School of the Environment, Zero Carbon Britain Hub and Innovation Lab, and short courses programme – all of which are playing a vital role in supporting individuals, communities, councils and other organisations to act on the climate and biodiversity emergency.

However, to tackle the climate emergency at the speed and scale required, we need to close a major skills gap, by equipping people with essential environmental skills and knowledge across every sector – and that’s CAT’s mission.

From creating new facilities and enhancing existing ones to exploring outreach and partner working with wider organisations both in-person and digitally – we’re confident that our current offer, combined with what we will soon have here at CAT, can play a crucial role in turning declarations into action.



An inspirational visitor centre – John Challen, Head of Eco Centre at CAT.

“ *The Visitor Centre plays an integral role in CAT’s mission, allowing a wide range of people to explore first-hand how we can help address the climate and biodiversity crises. There is so much potential to develop the experience, allowing us to inspire, inform and enable many more people.*

What we’re trying to achieve here is a world-leading, multi-purpose visitor attraction which is not only educational, but also enjoyable and accessible to everyone – so that people are inspired to take action, no matter their initial level of environmental awareness.

We’re excited to be working with Metaphor Communications, JCLA and all project partners, who are bringing additional time, experience and expertise to help bring this vision to life.



Regenerative design – Michael Pawlyn, architect at Exploration Architecture.

“ *The biggest opportunity in regenerative design and the circular economy in my opinion is rethinking our human-made systems so that they become more like biological systems. In other words, our aim is to ensure everything interacts so that all elements become as optimised as possible within CAT.*

Human-made systems are generally quite simple, disconnected, wasteful, resistant to change, fossil-fuel dependent, extractive and often only maximise one goal. Biological systems on the other hand are more complex and interconnected, generate zero waste, can adapt to constant change, utilise current solar income, and are regenerative.

We’re therefore exploring regenerative design principles, taking a systemic and ecosystems-centred approach to the development plans. This could include, for example, making more use of materials already present at the site – such as trees, quartz and slate waste – aiming for a positive impact on biodiversity and reinforcing connection with place, which is so important for a site like CAT which has such a rich history.



A community open day in April collected feedback and suggestions.

We hope you’ve enjoyed hearing about the project’s progress to date and look forward to bringing you further updates, soon! **CS**

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Finding poetry in climate solutions

Dr Anna Bullen, Innovation Lab Manager, explains how a collaboration between CAT and Aberystwyth University is finding new ways to communicate about the climate and biodiversity crises.

CAT has recently been part of a collaborative partnership with Aberystwyth University through a Natural Environment Research Council (NERC) funded project called 'Discipline Hopping'. This project has seen five eminent poets from the university being immersed in life at CAT, with a view to understanding more about the climate and biodiversity emergencies and translating what they learn into a series of poems.

Activities have included: three immersive tours of the CAT site, focusing on biodiversity and water; a practical building workshop, in which the poets learned to make earth bricks; attendance at lectures delivered by staff from our Graduate School of the Environment; and a bespoke Zero Carbon Britain training session.

Following this, through facilitated deep-dive conversations, the poets explored their interests and identified specific areas that they would focus on for their poetry. Through one-to-one conversations with CAT's experts in those areas, they explored the topics in greater depth and expanded their knowledge and understanding.

On 7 April, the poets delivered a poetry recital to students and staff at CAT. Next, the poems will be displayed at our visitor centre and we hope to create a book of the poems.

We would like to express our thanks to all the poets – Professor Matthew Jarvis, Professor Mererid Hopwood, Mr Eurig Salisbury, Dr Hywel Griffiths, and Dr Gavin Goodwin – for embracing this work with such vigour and passion and then sharing the results with us.

Mererid Hopwood is one of the poets taking part in the project. Here are some words from her on the experience.

"Stepping into the CAT courtyard that morning in February, the senses were on high alert. Sounds, in particular, were demanding attention. The wind carried invisible rain, the clouds invisible fighter-jet-planes and the streams ran over their own invisible banks. It's well-known that we use 'clywed', our Welsh word for 'to hear', when we sense touch, taste and smell as well as sound. Perhaps it's little wonder then, that what I heard, and didn't hear, on that visit is what has stayed with me more than anything.

The discussion with the CAT team as we 'hopped' between the disciplines of literature and alternative technology, was, I feel sure, a rich prelude. There is much more to share and to learn. I think we all felt that. It has led me to a half poem about the 'clawdd', that vibrant place between two fields. But until that's ready, here's an englyn from our first visit. It suggests how we might recall the summer to the earth and the plants to life by



Mererid Hopwood gives a recital to CAT students

*giving them back their native names.
A'u hen enwau dihunaf – dawelwch
y dail nes y'u clywaf,
a'u galw hyd nes gwelaf
yn y tir hwn eto'r haf.
Diolch o galon am gael bod yn rhan o
gynllun mor gyffrous.
[Thank you so much for being part
of such an exciting scheme.]" *

Inspiring artists

Eight artists awarded Future Wales Fellowships, funded by a collaboration between the Arts Council of Wales and Natural Resources Wales, are finding inspiration at CAT. The artists will explore climate emergency-related themes, including food, energy and transport, and how to engage more people in thinking and talking about the future of the systems that provide us with the important parts of all our lives.

We are supporting the Fellows with a wraparound programme that started with a two-day residential visit to our visitor centre, helping to build this new community and stimulate their thinking about the topics by hearing from innovators in each field. We'll be sharing updates as the projects develop so keep an eye on the CAT website to see what emerges!



CAT's Paul Allen (right) talks climate solutions with some of the Future Fellows.

Welsh volunteering charity looks to take climate action

We recently designed and ran a mini Innovation Lab for Skills and Volunteering Cymru (SVC), helping them identify ways to work with their partners and local communities to address the climate and biodiversity emergencies.

SVC is a volunteer-led charity offering volunteering opportunities across South Wales. Their mission is to enhance the lives of disadvantaged and vulnerable members of the local community through volunteering.

Having attended our two-day Zero Carbon Britain training, SVC came to us with some specific requirements. Broadly, they wanted to understand how they as an organisation could better address the climate and biodiversity emergencies. More specifically they wanted to explore practical areas of impact, identify readily available resources and lessons from similar organisations, and consider how they could improve their public-facing communications and commitments around environmental awareness and sustainability.

Twelve participants, including representatives from their staff, the Board of Trustees, volunteers and partner organisations, took part in the Lab. They worked together to explore the current barriers to them achieving their goal, their vision for a viable future in which they were actively addressing the climate and biodiversity emergencies, and the interventions and solutions that might enable them to reach their goal. The outputs from this bespoke mini Innovation Lab will be available on our website soon.

Local energy solutions training

In May, we ran a full-day workshop on community energy and local energy solutions for the North West Local Energy Hub and Electricity North West. This bespoke workshop was designed to help participants understand the role of community energy in delivering a zero carbon Britain, understand community energy through real-life case studies,

and take an in-depth look at the issues community energy groups need to consider, such as legal issues, grid connection and stakeholder engagement. The workshop also provided a session on action planning and an opportunity to meet people from other groups working on community energy projects from across the North West.

Kate Gilmartin, Community Energy Investment Lead for Rural Community Energy Fund North West (and a CAT graduate) and Helen Seagrave, Community Energy Manager, Electricity North West, are networking in partnership on community energy solutions that involve low-carbon technology. Part of their roles is to engage councils and the wider community around collective energy solutions for energy use.

Looking for community energy training, and inspired by our Zero Carbon Britain Local Energy Solutions training in May 2021, they approached CAT to commission a bespoke regional course that would target councils and community engagement groups across Lancashire. Zero Carbon Britain Training Manager Amanda Smith met with them and developed a programme of content to meet their needs. The training was by invitation only and free – funded by Electricity North West and Lancashire County Council.

Following the successful implementation of this training, we will be running another session for them in June and carbon literacy training is planned for the autumn.

Improving the Carbon Literacy of councils

More than 100 councils across England and Wales have now completed our Zero Carbon Britain Carbon Literacy training. This training, which incorporates our own Zero Carbon Britain content and aspects of a Carbon Literacy Project toolkit, is helping councils at all levels – county, town, city and parish – in urban and rural areas, to imagine what a more sustainable future for their area could look like.

Feedback has been fantastic, with participants recommending that more colleagues join our courses or approaching us to work together in other ways, including through further bespoke training. Climate officers from some councils have booked blocks of training sessions for people in roles across the council. And we've been invited to present at staff meetings.

We were commissioned by the Royal Borough of Kensington and Chelsea to develop and deliver bespoke training for 35 staff, representing a range of roles and responsibilities, working closely with their Climate Lead. This training incorporated the borough's Climate Emergency Plan and Council Green Plan. Following the training, staff said they had a better understanding of what is needed to achieve net zero and why it is important, the role of individuals and organisations, and how their organisation can take action.

We've had so much demand for this training that we have appointed an additional trainer/facilitator to support our Carbon Literacy Project work.

If you're interested in Zero Carbon Britain Carbon Literacy training for your council, please contact zcb@cat.org.uk

County-level climate forums

Our County Communities Climate Action Forum continues to support people and groups working at county-level on tackling the climate and biodiversity emergencies. So far this year we have covered: land and biodiversity; transport; consumption, waste and resources; and small businesses.

We've seen increasing participation by local authority officers in these online forums, an encouraging sign that councils are looking to engage with community groups and understand how they might be able to work together.

These interactive forums are free to join and themed on a different topic each month. Find out about all of our online events at cat.org.uk/whats-on



CAT students get hands-on with sustainable materials

In May we were delighted to once again be running our highly practical sustainable materials module at CAT. One of the highlights for students on our MSc programmes, the week gives in-person learners the chance to get hands-on with a range of low-impact and natural building materials, whilst learning about their properties and applications in in-depth lectures (and where better for these lectures than our beautiful rammed earth lecture theatre?).

Alongside CAT's expert tutors, a range of specialist guest speakers and workshop leaders joined us, covering lime, earth, straw, timber, cork and other materials that can help to create environmentally sensitive, low impact buildings.

If you'd like to learn more about the benefits, properties and application of natural materials, we have short courses coming up on building with straw, cob building, using locally sourced materials, and an introduction to sustainable and healthy materials. Take a look at our short courses programme for details: cat.org.uk/whats-on



Students experiment with hemp and binder, learning about properties and applications.

Retrofit Masterclass pilot programme launched

In April and May we ran a new Retrofit Masterclass to help build skills and knowledge within the building industry. This pilot programme was designed to test out a new in-depth hands-on immersive programme specifically aimed at the construction sector. Taking a whole house approach to retrofit, it covered both improving the energy efficiency of buildings and installing renewable energy systems and heat pumps.

Findings from the pilot programme will be fed into the development of future courses aimed at helping address the green skills gap, one of the key barriers to reaching zero carbon.

You can read more about the Retrofit Masterclass, which was funded by the UK Government through the UK Community Renewal Fund with the support of Powys County Council, on pages 25-27.



Tutor Nick Parsons (right) with students on our Retrofit Masterclass.



Visitors from the Moondance Foundation with some of the CAT team.

Zero Carbon Britain funders' first visit to CAT

In early spring, we were delighted to host a visit from Diane Briere de l'Isle Engelhardt, chair and founder of the Moondance Foundation, as well as trustee and Founder Henry Engelhardt, Director Rebecca Watkins and her husband Richard Watkins. In 2019, the Moondance Foundation presented CAT with the vital funding needed to establish our Zero Carbon Britain Hub and Innovation Lab, enabling us to meet the rising demand for bespoke training and support for individuals, policymakers, communities and organisations.

It was a first-time visit to CAT for Henry and Diane, who kindly offered their time to learn of our future plans and receive some key updates on the successes of the Zero Carbon Britain Hub and Innovation Lab.

We'd like to take this opportunity to thank Rebecca, Diane, Henry and the trustees of the Moondance Foundation for all their support. Over the past two years, their generosity has marked a step-change in the way CAT has been able to respond to the climate and ecological emergencies. Their belief and investment in our work has opened up opportunities for CAT to become bolder, wider-reaching and more ambitious, offering more hope for the future. We're incredibly grateful.



Dulas founding member, Research and Development Engineer Jo Gwillim with one of their solar-powered refrigerators.

CAT-founded renewable energy company is 40

In May, Dulas Ltd, a pioneering renewable energy company founded at CAT in 1982, celebrated its 40th birthday. This is a landmark anniversary for a business that has been at the forefront of the renewables industry for nearly four decades.

Dulas’ history has seen the company pioneer solar, hydro and wind renewable energy in the UK and across the globe, innovations that are still leading the field today. Over the years, the company has applied its expertise to developing the world’s first mass-produced solar powered vaccine refrigerators, operating lamps, and blood banks, improving medical care across the world’s poorest countries.

Dulas is a story of trail-blazing pioneers, trained and inspired at CAT. We would like to congratulate them on reaching 40 and look forward to seeing what the future holds for them.

Low-carbon building materials company grows with new investment

Adaptavate, a company developing and manufacturing sustainable and low-carbon building materials, founded by CAT graduate Tom Robinson, is going from strength to strength. The company, which is helping to reduce the emissions of a traditionally high carbon-emitting sector, has been awarded over £2 million in investment to scale-up production of Breathaboard, a carbon-sequestering plasterboard.

This funding will allow Adaptavate to

build a world-first pilot production line, enhance its research and development lab facilities and teams, and complete testing and licencing programmes for Breathaboard.

Tom Robinson, Managing Director and Founder of Adaptavate said: “This investment will enable us to revolutionise the way construction materials are made.... We’re using industrial carbon absorbing processes to produce a healthier, high-performance product that is better for the health of people and planet, and a genuine drop-in replacement for gypsum plasterboard. It’s a fundamental re-think and re-design of the current system and we are excited to scale this approach around the world.”

Plasterboard is one of the most widely used building products globally, so the impact of this innovation could be far reaching.

Earlier this year, Adaptavate was named in the PwC Net Zero Future50 report as one of its top 50 emerging climate tech companies in the UK for their work helping to decarbonise the built environment sector.

This is another success story that started at CAT, with Tom’s dissertation providing the research for initial product development. In April, Adaptavate tweeted: “We are so proud of our @centre_alt_tech foundations. So many alumni are part of @Adaptavate, we have supervised theses, lectured, visited and now work in the industry with so many people that pass through this transformative quarry. @Adaptavate would not be here without them.”

We are incredibly proud to have played a part in the Adaptavate journey and look forward to continuing to work with them as they help the construction industry transition to a zero carbon future.

Graduate School courses revalidated

We are pleased to announce that four of CAT’s postgraduate courses were recently updated and revalidated, following a review by our validating partner, the University of East London (UEL).

Through consultation with students, CAT graduates and industry leaders, we have been able to update the

courses to reflect the evolving skills and knowledge needed to address the climate and biodiversity crisis across a wide range of sectors and scales.

One of the courses that has seen the most change is Sustainability in Energy Provision and Demand Management, which, through three new modules, now offers further focus on global energy provision and the application of renewable energy.

Our Sustainability and Adaptation course has been broadened to cover a wider variety of topics and now covers energy, adaptation, buildings, food systems, social change, ecology and more. Green Building has been updated to offer a distinct pathway for those interested in sustainable construction and the built environment, while a new Applied Research Design module will also allow students to develop further research and employability skills through individual and group projects. CAT’s MArch Part 2 course in Sustainable Architecture also underwent small amendments and was revalidated following the review.



Changes to our MSc programmes allow students to access a wider range of topics. Image shows a sustainable materials lecture at CAT.

The updated versions of these courses will offer students the knowledge and skills to transition into new careers in sustainability, renewable energy, and sustainable construction and architecture, and complement our suite of other MSc courses in food, ecology and behaviour change.

Students will be able to take these newly updated courses from September 2022. More information on the updates and our postgraduate courses can be found at: cat.org.uk/gse



A tribute to David Lea



David Lea (right) with long-time collaborator, Pat Borer.

We were deeply saddened to hear that architect David Lea has died, aged 82.

David played such an important role in CAT's development over the years, as co-architect of our WISE building, a creative influence and guest lecturer on our architecture degree, and as a friend and inspiration to so many of us.

Born in Edgbaston, Birmingham, David had a lifelong love for the natural world, sparked during his childhood holidays in Scotland. In 1958, he studied architecture at Pembroke College, Cambridge, and went on to design council housing in London.

With environmental consciousness growing in the 1970s, David decided to change the way he lived his life. He made the move to Wales, following six months learning techniques with the self-sufficiency pioneer John Seymour in Pembrokeshire. Ogoronwy, a smallholding in the foothills of the Snowdonia National Park, became home in 1976.

Writing in the Architects' Journal, Patrick Hannay called David "Wales's finest contemporary architect", adding: "Lea's lifelong search was for a profound simplicity, that form, space and presence

were made by the direct natural selection of the earth's material ideally from the surroundings of the site, and assembled so that joints, structure and the surface were made of that legible unadorned set of materials."

David first made his mark at CAT with 'Lower Station', built in 1992 to house the platform for our water-balanced cliff railway and the main ticket office. Following this, a collaboration with Pat Borer, designer of many of our buildings, led to the 'AtEIC' building, featuring sheep's wool insulation, rammed-earth structural walls, and limecrete floor slabs and foundations, as a lower-carbon answer to concrete.

In 2010 we opened the doors on the Wales Institute for Sustainable Education (WISE) building, another collaboration between David and Pat. The WISE building comprises teaching spaces, accommodation, restaurant seating, and our beautiful circular rammed earth lecture theatre. All of this is enclosed by thick walls made of 'hempcrete' (hemp and lime) concealing a timber structural frame. Between the various parts of the building are pools of water, paved terraces and timber-slatted access galleries. As architect Adam Voelcker wrote in the Guardian: "It feels more like a Mediterranean hill town than the damp slate quarry reclaimed by the centre when it was established in 1973."

The WISE building is David's legacy on site – a shining example of architecture that is both beautiful and environmentally responsible – and we're incredibly lucky to be able to use and enjoy it here at CAT. Patrick Hannay described the WISE building as "the pinnacle of Lea's philosophical positions on architecture



made flesh... a shout of responsible and also beautiful architecture for a climate emergency."

Once again alongside Pat Borer, David also guest lectured on and helped shape our MArch architecture course, the pair generously sharing their years of experience and creative influence to inspire a new generation of climate-conscious architects.

David epitomised the values of CAT, saying: "When we build we reveal our vision of the future. One moment the design is inside our heads, the next it is grounded in all its solid reality. This imposes a responsibility which is impossible to avoid. Our vision surely must include the truth of rapidly accelerating climate change and the imperative to preserve the natural habitats of all the creatures with whom we share the Earth."

Thank you, David, for putting this vision at the heart of your work with us here at CAT.

Our thoughts are with David's partner, Sylvia, his children, Trystan and Teleri, his sister, Fiona, and former partner Awel Irene.



The WISE building, co-designed with Pat Borer – "a shout of responsible and also beautiful architecture for a climate emergency."

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New report shares climate recommendations for councils

Dr Anna Bullen, Innovation Lab Manager, introduces our new report on how councils can take action together on Climate Emergency declarations, based on learning from the Staffordshire Councils Innovation Lab.

Across the UK, councils have been making Climate Emergency declarations to demonstrate that they acknowledge the urgency of tackling climate change and are committed to taking action. At the time of writing, Climate Emergency UK shows that 336 councils out of 409 have declared a Climate Emergency and 306 of these have an action plan to reach net zero. Despite these commitments, local authorities still need to understand how these targets will be met and put monitoring and evaluation processes in place to measure and report on progress.

In 2021, CAT, in partnership with Keele University, worked with 10 councils across Staffordshire to explore the challenges they face in reaching net zero and co-create an approach to achieve their climate goals. A Zero Carbon Britain Innovation Lab brought together 32 representatives from the 10 councils for three full days of workshops to explore how they could work together to take climate action. The process helped the participants to better understand the barriers to reaching net zero, create a vision for the county, and set out objectives towards achieving their individual and collective aims.

An Innovation Lab approach was chosen due to its ability to help tackle complex issues or challenges using collaborative problem solving. The process is:

- Co-creative – Drawing on a range of perspectives and experiences to inform the process and ultimately co-design solutions that are fit-for-purpose and feasible.
- Experimental – Taking an iterative approach, prototyping interventions and amending them until they are right (learning from failure along the way).
- Sense-making – Helping participants understand what’s happening and why, let go of preconceived ideas and be open to new approaches.
- Design thinking-based – Taking a user-centred approach, based on the experience of those impacted by the problem and those who deliver the solution.
- Systemic – Ensuring the ideas developed go beyond dealing with the symptoms to address the root cause of the problem.

The participants used this approach to investigate opportunities in:

- Infrastructure
- Legislation, stakeholder support and funding
- Improving information flows, knowledge and expertise
- New rules for systems working and co-benefits
- Collaborative working and beliefs and mindsets

By working collaboratively across the county to address the climate and biodiversity emergencies, the councils hoped to save money, work more efficiently, and have a better chance of making progress at the speed and scale needed.

This month, we are launching a report that shares the findings and recommendations from the Staffordshire Councils Innovation Lab. The report aims to provide guidance to other councils across the UK in developing their climate action plans and working towards net zero, by helping them understand the areas that need to be addressed to maximise impact and provide examples of actions that can be taken within those areas. These findings and recommendations are the direct output of the participants, who between them covered a broad range of roles (including officers, CEOs and elected members).

The recommendations sit within the following five themes:

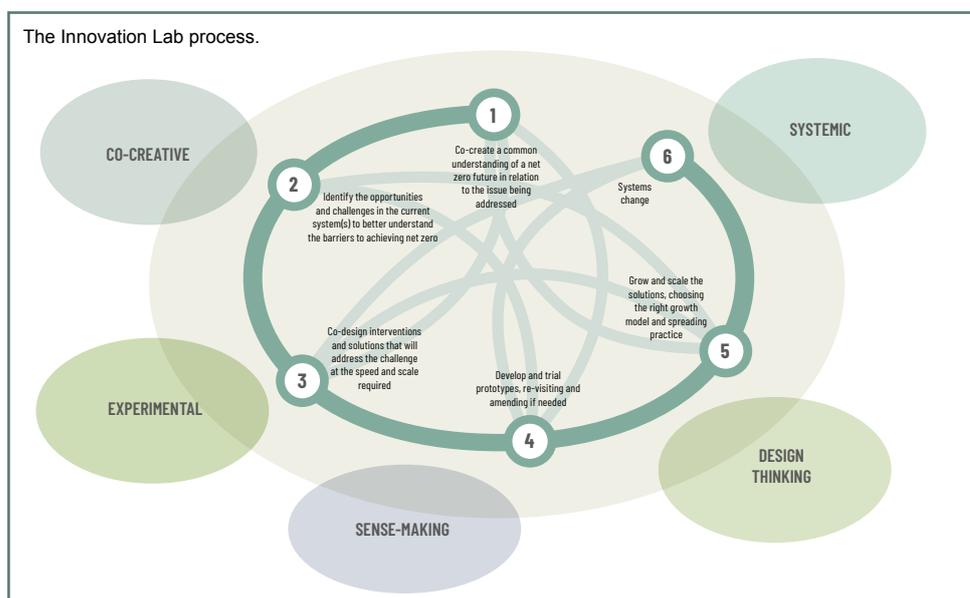
- Governance
- Collaboration and impact
- Stakeholder engagement
- Resourcing
- Shared learning and knowledge exchange

Through the process, the participants recognised the complexity and enormity of the challenge that lies ahead and understood that such a challenge cannot be overcome alone. But, by working both with other councils and a range of stakeholders across the county, they are now much more likely to develop and deliver realistic and effective solutions that will enable them to achieve the net zero vision at the speed and scale required.

To read the report, visit cat.org.uk/zcb-innovation-lab/ 

About the author

Anna is CAT’s Zero Carbon Britain Innovation Lab Manager. She is an experienced and qualified facilitator and project manager, with 25 years’ experience in the sustainability sector, and is a firm believer in the use of co-creation methods in order to design effective and meaningful solutions to issues such as climate change. She has a PhD in Sustainable Citizenship.





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Latest IPCC reports offer a stark warning, and some hope

The Intergovernmental Panel on Climate Change (IPCC) released two landmark reports this spring, focusing on the urgent need to adapt to and mitigate the impacts of the climate crisis. **Paul Allen** and **Catriona Toms** highlight that while these offer another stark warning, they show there is still time to avoid temperature rise above 1.5°C – if we act now.



Extreme weather events such as flooding will become more frequent and more intense. Image shows a woman and child wading through flood waters in East Jakarta.

KompasHendra A. Setyawan / World Meteorological Organization

The IPCC has been releasing a series of reports over the past year as part of its 'Sixth Assessment' cycle, looking at the scientific, technical and socio-economic information on climate change. The first of these, 'Climate Change 2021: The Physical Science Basis', presented evidence of the impact of human activity on global temperatures, and the effect this is having in every region on Earth. In February, the 'Climate Change 2022: Impacts, Adaptation and Vulnerability' report was released, focusing on the natural and socio-economic impacts of climate change. Then in April, 'Climate Change 2022: Mitigation of Climate Change' examined the urgent actions needed to reduce greenhouse gas emissions in line with the goals of the Paris Agreement. These will all feed into the final 'Synthesis Report', due for

release this September.

The IPCC reports are detailed scientific papers compiled over several years by hundreds of expert contributors, with thousands of pages of detailed analysis. Here, we share some of the key findings and explore the headline implications for action on the climate emergency.

The physical science

The first report in the series (covered in detail in Clean Slate 121) presented evidence of the changes already happening across different regions around the world, and their unequivocal attribution to human influence. These included:

- 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 2,000 years.
- Global surface temperature was 1.09°C higher in 2011–2020 than in 1850–1900.
- Global mean sea level has risen faster since 1900 than over any preceding century in at least the last 3,000 years.
- Hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s, while cold extremes (including coldwaves) have become less frequent and less severe.

The report also provided new scenarios based on different levels of future greenhouse gas emissions, using the most up-to-date datasets and climate



Heatwaves have become more frequent and more intense. Image shows wildfires in Evia Island, Greece, August 2021.

models. The authors concluded that, ‘Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.’ They warned that at 1.5°C of warming, we will see increasing heatwaves, longer warm seasons and shorter cold seasons, while 2°C would result in heat extremes that would more often reach ‘critical tolerance thresholds’ for agriculture and health.

The report made clear that every additional 0.5°C matters, increasing the intensity and frequency of extreme rainfall and flooding events, as well as the intensity and frequency of droughts. Additional warming will amplify the 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.

The authors also reported that 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. They left no room for doubt that the warming of the oceans, an increase in the frequency of marine heatwaves, ocean acidification, and reduced oxygen levels are all linked to human activity.

Impacts, adaptation and vulnerability

In February, the evidence was followed up with a new report on the impacts of these physical changes, the urgent need to adapt to and mitigate them, and the vulnerability of both people and nature.

With over 40% of the world's population (3.3 billion people) ‘highly vulnerable’ to the climate crisis, UN Secretary General

Antonio Guterres describes the report as an “atlas of human suffering”. The report stresses the need for climate justice, recognising the need for adaptation to be informed by concepts of justice and equity.

It highlights existing widespread impacts from a changing climate system, such as worsening floods, droughts and storms, and warns that even if we manage to limit warming to 1.5°C, we will still see increasingly extreme weather, with these events becoming more frequent if temperatures rise above this level.

There is explicit reference to the effect of these extreme climate events on health – not just risks to physical health, such as billions more people being exposed to mosquito-borne dengue fever, but mental health too, such as climate change-induced stress and trauma.

As well as the devastating human consequences, the damage to the natural world is also exposed, including the bleaching of coral reefs and death of trees due to drought. The authors warn that beyond certain limits these impacts will be irreversible.

However, the report also offers hope. Investment in mitigation and adaptation will save lives. And the cost of action in the form of adaptation and mitigation measures is far less than the cost incurred by delays and inaction, which will result in further loss and damage. Any mitigation efforts will help reduce (but not eliminate) the effects of climate change. Once again, every fraction of a degree matters.

The role nature has to play in combatting the climate crisis is also covered – but it can only help if we can stop the spiralling decline of wild species and habitats. The IPCC recommends that 30 to 50% of land globally is put into conservation measures to help with nature’s restoration.

Tipping points

‘Climate Change 2022: Impacts, Adaptation and Vulnerability’ looks at the risks posed by ‘tipping points’ – moments when abrupt and possibly irreversible changes occur.

One example of such a tipping point is the melting of Arctic permafrost, which is currently storing large quantities of methane – a powerful greenhouse gas. Melting would release this methane, leading to increases in temperature and therefore more melting and more methane release. Because the methane has accumulated in permafrost over long periods of time through natural processes, there is no easy or quick way to lock it away again. The resulting temperature increases would also have other irreversible knock-on effects leading to further warming.

There is increasing concern in the scientific community that these kinds of tipping points may be close. They could lead to rapid changes in the Earth’s environment and its ability to support human life. They have not been considered in such detail in previous IPCC reports and they are still not well understood in terms of their possible timings or the interactions between them.

Mitigation of climate change

The third and most recent report focuses on the urgent action needed to mitigate the impacts of the climate crisis. It warns that to have a higher than 50% chance of limiting temperature rise to 1.5°C with no or limited overshoot, greenhouse gas emissions must begin to fall immediately, with a 48% reduction in CO₂ emissions by 2030, reaching net zero CO₂ globally in the early 2050s, and with methane emissions falling by a third by 2030.

The IPCC highlights that this will require “substantial” reductions in fossil fuel use, including a complete phase out of unabated coal, large scale roll-out of energy efficiency measures, electrification, the rapid uptake of renewable energy, and the use of alternative fuels.

The report stresses that *without immediate and deep emissions reductions, limiting global warming to 1.5°C is beyond reach*. Even if all the national plans and

policies in place at the end of 2020 were enacted, we would still be heading for a 3.2°C warmer world by 2100.

While the authors say that overshooting 1.5°C is now 'almost inevitable',* temperatures could be returned to 1.5°C by the end of this century if countries make urgent greenhouse gas emissions reductions this decade.

The use of carbon capture and storage (CCS) technologies to take carbon dioxide from fossil fuel power plants and directly out of the air are discussed. But the report highlights that these technologies are likely to be expensive, and are currently still in the early stages of development.

Instead, the entire global economy must change dramatically and rapidly. We need a new approach to energy, buildings, transport, food and industry.

Jim Skea, the Co-Chair of the group that compiled the report, said:

"Climate change is the result of more than a century of unsustainable energy and land use, lifestyles and patterns of consumption and production... it's now or never, if we want to limit global warming to 1.5°C. Without immediate and deep emissions reductions across all sectors, it will be impossible. This report shows how taking action now can move us towards a fairer, more sustainable world."

Time to act

For decades, CAT has recognised that climate change is the greatest risk to human health and wellbeing, and ultimately survival on Earth, and that rapid reductions in greenhouse gas emissions remain the only way to limit this risk.

Our 15 years of Zero Carbon Britain research provides a holistic vision for how the UK could provide itself with sufficient energy as well as a modern standard of living whilst delivering cleaner air, cheaper-to-heat homes, meaningful jobs and healthier diets.

Some of these ways to dramatically reduce emissions include high levels of insulation in buildings, changing what we eat and how we use our land, rapidly scaling up investment in renewable energy, and changes to the amount and ways we travel.

The new IPCC report argues that in addition to reducing greenhouse gas emissions, we need to develop technologies for capturing emissions, such as direct air CO₂ capture. Given that these technologies are not yet proven at scale, CAT has always argued that such tools must only be relied on for mopping up historic emissions, not as a justification for continuing to pump greenhouse gases into the atmosphere. This is all the clearer



now, given the decreasing likelihood of limiting temperature increase to 1.5°C. Any overshoot in temperature early in the century will require concerted efforts by future generations to reduce atmospheric concentrations of greenhouse gases to levels safer for humans and nature.

Climate justice is key to successful delivery. The massive shifts in how we live must not unfairly burden already vulnerable people and communities. We need to transform the systems that have caused the problems, backed by the resources, training and overarching policies required to make it happen on the ground in ways that offer real and lasting benefits to people and communities around the globe.

We are all part of the solution

CAT is working to equip people with the knowledge, skills and confidence to play their part in taking urgent climate action and building a better, safer world.

Building on our Zero Carbon Britain research, our Hub and Innovation Lab is supporting practical action on Climate Emergency declarations in councils, communities and other organisations, to increase the speed and scale of action.

Our training courses are helping people to take action across all levels of society. We are bringing together people from different sectors and with different perspectives on the challenges we face and ways to deal with them to make a bigger impact. In this way, we can collectively find the best methods for transforming the systems that hold us back from the sustainable future we all so urgently need.

Our Graduate School of the

Environment looks at approaches to transformational adaptation to give students the tools to better understand and transform the systems that keep us locked into a warming world. Modules cover approaches to climate change mitigation and adaptation, including how these could be implemented in ways that address the root social, economic and environmental vulnerabilities.

The latest IPCC reports make for difficult reading, but they should not be a reason for hopelessness. Instead, they must be a spur to act at the scale and speed demanded by the evidence, and to prepare for the unavoidable impacts that can no longer be prevented.

Find out how CAT can help you play your role in tackling the climate crisis at www.cat.org.uk 

* In May, a month after the report's publication, the World Meteorological Organisation issued a new climate update, warning that there is a 50:50 chance of temporarily reaching 1.5°C in at least one of the next five years.

About the authors

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

Catriona oversees CAT's communications and marketing team and is Editor of Clean Slate. She has a Masters in Food Policy and is currently studying part-time for a CAT MSc in Sustainability and Adaptation.

Get warmed up to install a heat pump

As gas bills soar and the need for climate action becomes more urgent by the day, measures to reduce our heating needs and switch away from fossil fuel heating are more important than ever.

Joel Rawson runs through recent changes to financing home heating upgrades and some things to bear in mind to make installing and running a heat pump straightforward.



Heat pumps are a sustainable heating solution that offers long-term carbon and energy savings, with emissions about 80% lower than from a gas boiler. With many of us living in houses that were built long before awareness of the climate emergency and energy efficiency, retrofitting buildings with the latest heat pump technology needs investment and some planning.

Government support in the UK and across Europe for developing the heat pump industry should eventually lead to reduced costs, as happened with solar photovoltaic (PV) technology. But for now, moving to heat pumps and high levels of insulation does require investment.

So, if you're a homeowner, what funding is available to you and what should you consider before joining the heat pump revolution?

Catch the BUS

The new Boiler Upgrade Scheme (BUS) has replaced the Renewable Heat Incentive (RHI) and is due to run for the next three years (the name is a change from the proposed Clean Heat Grant). It covers England and Wales – with Home Energy Scotland offering different funding.

Now, homeowners should need to do very little, because the installer claims the grant and subtracts it from their quote. You still need to choose

from installers accredited under the Microgeneration Certification Scheme (MCS), and it's worth getting a few quotes to compare. Ofgem runs the scheme and will contact you to confirm that you agree to any work going ahead.

The BUS grant is £5,000 for an air source heat pump or a modern biomass boiler, or £6,000 for a ground source heat pump. Each must be fully replacing either a fossil fuel boiler or direct electric heating (like storage heaters).

Biomass heating is only funded in rural areas without mains gas. For this, rural means anywhere other than settlements of more than 10,000 people (defined by an Office for National Statistics tool).

As a fixed amount, the grant covers more of the cost of a smaller heat pump, whereas for a larger heat demand it's probably going to give much less than the RHI did. The new grant is less attractive for ground source heat pumps, as the RHI offered a much more generous rate. And solar water heating is no longer funded.

Share the warmth

For some dense housing, finding space for an air collector might be tricky. Instead, shared heating may work well for small terraces or blocks of flats; for example, one borehole shared by several homes, each with their own internal heat pump unit to upgrade the heat. The BUS

covers shared ground loops, but only up to total of 45kW – perhaps five to 10 homes.

Developers of larger heat networks (for hundreds of homes) can apply to the 'Green Heat Network Fund' for financial support. One new heat network is using old coal mines near Gateshead as the source (about 15°C) for a large heat pump, with the potential to heat thousands of homes.

Insulate for the future

You don't necessarily need high levels of insulation for a heat pump to work well. However, insulation and other measures to reduce energy demand enable us to reach a zero carbon grid much more easily and quickly. To cut carbon and running costs we need to do more than just replace boilers with heat pumps on a like-for-like basis.

At present, a well-designed heat pump can have running costs similar to a gas boiler for the same heat demand. The balance would tip in favour of heat pumps if changes were made to the way levies are applied to energy bills. These levies fund useful programmes but are almost all added to electricity bills rather than gas – making the comparative running costs of a heat pump slightly worse than it should be. But ultimately, the main way to reduce bills is to cut heating demand.

Save your energy

Unlike the heat pump grant, support for insulation and other energy saving measures is mostly means tested.

In England, there's support for households with a gross annual income less than about £30,000 who own or privately rent a house with an EPC rating of D or worse. This 'Sustainable Warmth' programme combines the 'Local Authority Delivery Phase 3' for homes with mains gas and the 'Home Upgrade Grant Phase 1' for those without. Your local authority will have details of how to apply for this funding in your area.

In Wales, the Nyth/Nest scheme gives grants to households on low incomes. Home Energy Scotland offer zero-interest loans with additional cashback offers across a range of energy saving and renewable energy measures.

Cut the VAT

A zero VAT rate on both installation and materials is now applicable across energy saving measures and renewable energy (such as heat pumps, solar, wind and hydro power). Also, the '60% test' has been dropped – this previously prevented applying a low rate of VAT on materials (such as solar panels) if they came to more than 60% of the total installation cost.

Planning on installing a heat pump?

Here are some recommendations and important things to consider.

- The installer must do a room-by-room heat loss assessment to ensure the heat pump is not over or under sized. A properly sized unit will run more efficiently.
- 'Monobloc' air source heat pumps make installation easier because these have all the workings in the outdoor unit, so you don't need a separate indoor unit.
- To reduce running costs, most of the time you can heat your domestic water cylinder to a lower temperature that meets household needs – and only cycle it up to about 60°C once or twice a week to meet legionella regulations.
- To get a very high efficiency, aim to get a system designed and sized so it can heat your home on flow temperatures of 40 to 45°C when it's -3°C outside.
- To improve efficiency, use emitters that have a decent amount of mass, such as radiators with a high water volume or underfloor heating pipes in a thick screed. This can then avoid the need for a buffer tank and make it easier to keep flow temperatures lower.
- Microbore (very narrow) pipe is not a barrier with good design (a buffer tank may be needed).
- Modern air source heat pumps are very quiet, and with sensible siting (not under your bedroom window) the noise should not be an issue. They do vibrate slightly, but ground mounting will avoid any risk of vibrations from wall brackets.
- A hybrid of heat pump and boiler could give more flexibility for a large house, but it does mean more servicing fees and more standing charges, as well as higher carbon emissions. Moving away from gas completely (including for cooking) could save about £100 per year on standing charges. There's a charge for disconnecting, but some electricity providers may not pass this on to customers.
- For space heating, a heat pump is often set to be operational all the time, but this doesn't mean it's actually running all the time – just that it's 'on call'. And you can set lower temperatures for different times, such as overnight.

However, as with previous low VAT rates, this is for professional work not DIY insulation. There's also a separate new issue for planned micro hydro projects, as it looks like much higher abstraction fees could make small schemes less financially attractive (outweighing VAT savings). 

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.

CAT's free information service

Still have questions? Visit cat.org.uk/info for information and advice on a wide range of areas related to homes, buildings, energy and more. You can get in touch with Joel at info@cat.org.uk or call him on 01654 705989.



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Retrofit for the future

Rising bills, concerns about energy security and escalating climate impacts mean more people than ever now support making UK buildings more energy efficient. **Paul Allen** explains what needs to be done to retrofit existing homes and workplaces to cut costs and carbon.

"To build a zero carbon Britain, in addition to building new houses to a high standard of energy efficiency we need a nation-wide retrofitting programme"



To reduce the UK's greenhouse gas emissions and reach zero carbon, we must rapidly transition from fossil fuels to renewable energy. But to make this viable, we must also make our buildings more energy efficient so they need less energy in the first place.

New buildings can be built that require very little heating. Passivhaus-standard homes – air-tight and properly insulated – only need around 10% of the energy consumed by an average existing building. However, new builds make up a small percentage of the UK's housing stock. For this reason, heat loss from existing buildings must also be reduced to make these suitable for the 21st century and beyond.

What is retrofitting?

Retrofitting means putting energy efficiency measures in buildings that have already been built – in some cases hundreds of years ago. Making often straightforward physical changes can cut energy bills, reduce carbon emissions, and create healthier, happier and more comfortable spaces.

Heat loss from buildings can be reduced by:

- Improving insulation;
- Reducing draughts;
- Recovering heat from air leaving the building through ventilation.

This can be achieved through reducing the 'fabric heat loss' of a building by retrofitting cavity-wall or solid-wall insulation, floor and loft insulation, and improved glazing, and 'ventilation heat loss' by draughtproofing.

Improving shading and ventilation in existing buildings is also important to prevent heat accumulating inside and allow the fabric of the buildings to cool at night. Improved insulation can also help keep buildings cool in summer by keeping heat out rather than in.

Why do we need to retrofit buildings?

Most of our homes and workplaces are old and draughty, making it impossible to meet our current energy efficiency goals. Many were built long ago before people thought about using energy efficiently, with features that made sense then but are no longer fit-for-purpose, such as the solid stone walls of cottages from the 1800s. But equally, many buildings designed much more recently have not been constructed to the optimum energy efficiency standards. A policy introduced in 2006 would have required all new builds to be zero carbon from 2016 onwards, but this

A guide to retrofitting

1: Do your research

Contacting your local council or energy action group is a good first step towards understanding what support is available locally. Investigate the history of your house, when it was built, and any energy saving measures that have been introduced so far. Then compile a list of your ideal outcomes. It's useful to understand the current performance of your home, so you can evaluate the benefits of your retrofit. This includes looking back over your past bills to make a baseline of your annual current energy consumption and costs for electricity, oil or gas. Make sure you have actual readings rather than estimates. If you can gather seasonal records of room temperature or humidity, that will also help – a thermometer-hygrometer costs around £20.

2: Get advice

Get impartial advice from trusted certified professionals, such as a Retrofit Co-ordinator or Retrofit Assessor, and compare what they offer and the projected energy savings. CAT's information service can also provide initial advice. A retrofit survey will help identify important actions to take and any repair work you might also need. You can then get several quotes from trusted installers and compare their offers, with support from your experts. It's good to ask about what behaviour change they suggest you undertake post-completion. And it's also worth finding owners who have had work done on a similar home locally or even on your street, asking which installer they used and what worked and why.

3: Make a detailed project plan

Commission a detailed technical design describing the work in full, including what types of materials you want to use. This then informs a schedule of work that trusted contractors can quote to deliver. You or your advisors can negotiate the best deal with your chosen installer and agree scope, timelines and budgets. It's good to get everything down on paper. It's also worth being clear on any potential for cost over-runs. If several households in the same street agree to retrofit together, this can help you negotiate a better price.

4: Work closely with contractors

Work closely with your contractors to a pre-agreed timescale. This is a complex process, so do be prepared to be flexible if challenges arise. It is a crucial time to keep up with what's happening and ask any questions. Regular communication and requests for expert support if you have concerns are key ingredients to a quality retrofit.

5: Review and handover

As work finishes but contractors are still on-site, you have an opportunity to go back to your retrofit survey and quotations to check the actions have been carried out. Remember to get the required certificates, manuals, warranties and guarantees, and make sure you and your assessor are happy with the work. A handover is crucial, so that you hear from the experts how to operate, check and maintain the systems they have installed. After the job is done, it will be useful to record your energy consumption and humidity levels over the coming years and compare them with your past records and the goals you set.

You'll find more advice and information on our website at cat.org.uk/info

was scrapped before it came into effect, meaning even homes and workplaces being built today will need to be retrofitted to reduce heat loss.

To build a zero carbon Britain, in addition to building new houses to a high standard of energy efficiency we need a nation-wide retrofitting programme, supported by government financing, to cut our buildings' carbon emissions as quickly as possible.

A whole-house retrofit approach

What energy efficiency improvements our homes and workplaces need depends on when and how they were built, any later changes made – such as extensions, what materials have been used, and how the building is currently being used.

Retrofitting energy efficiency measures one-by-one, without thinking about how they interact, can lead to problems. For example, adding better glazing and

Retrofit training: Closing the skills gap

Amanda Smith, Training and Engagement Manager for our Zero Carbon Britain team, explains how our retrofit masterclass is allowing people in the construction industry to gain new knowledge and skills to carry out successful retrofit projects.

To achieve the retrofit revolution needed to cut carbon emissions and create sustainable jobs, we need thousands of multi-skilled tradespeople working on homes and buildings across the UK. There is currently a huge skills gap in this area, holding back progress and keeping many of us stuck in draughty, energy inefficient homes.

This spring, CAT piloted a five-day immersive training course for people in the building industry in Powys. The project was funded by the UK Government through the UK Community Renewal Fund and supported by Powys County Council. The tutors included Nick Parsons, with over 35 years' experience in energy-efficient and sustainable building; Nathan Goss, a historic buildings specialist with over 30 years' experience; Peter Draper, a building surveyor, retrofit coordinator and whole-house-approach specialist; Tim Brewer, with many years' experience in renewable energy technologies; and CAT Graduate School lecturer Dr Alan Owen, an engineer/researcher with 30 years' experience in renewable energy.

Participants developed their practical skills and learned how retrofitting buildings will help to save energy and reduce emissions.

The course covered areas including the whole-house retrofitting approach, airtightness, insulation, damp, working with lime and lime plaster, renewable energy technologies, and heat pumps. On completion of the five-day course, the participants gained CPD certification.

Upon finishing the course, Jason Morrissey, Retrofit Coordinator at SWG Group, said: "The Retrofit Masterclass really was a fantastic experience and a pleasure to be a part of – I truly hope this is the start of something huge.

"My purpose for joining the course was to add some practical skills to my learning journey and to get a more detailed understanding of the practical processes. The sessions with Nick and Nathan were excellent and a real eye-opener.

"It's clear to me now that while we need to upskill the existing construction workforce, there's a need for retrofit apprentices too, in order to deliver the large-scale retrofit required to meet the urgency of the climate crisis. I believe there's potential here for CAT to play a leading role – it could even become the 'Retrofit Centre of Excellence' for Wales, in my opinion!"

Want to find out more about retrofitting? Join Retrofit Masterclass tutor Nick Parsons for our online Eco Refurbishment course, which runs over two Saturdays, 15 and 22 October. Details at <https://cat.org.uk/short-courses>

draught-proofing without providing suitable ventilation can increase damp problems. The 'whole-house retrofit' approach, where the impacts of changes on the rest of the building are considered, is intended to avoid these pitfalls.

A specialist architect or retrofit expert looks carefully at all aspects of insulation, draught-proofing, ventilation and heating to create a structured plan. Even where a retrofit can't be done in one go, improvements can be planned and prioritised with the whole building in mind.

Is retrofitting expensive?

While retrofitting is a good investment in a building, reducing running costs in the long term and adding value to the property, many home and business owners lack the upfront funds needed. Some private installers build funding into their offering, financing retrofits through taking a share of future energy savings and planned maintenance and repair budgets. And depending on where people live and their financial circumstances, they might be able to access other sources of funding, such as interest-free government loans.

There are ways to reduce costs – for example, while each building will have different requirements, looking at houses in rows or blocks together makes



Participants on CAT's Retrofit Masterclass take a tour of our buildings and energy systems.

measures like external insulation easier and more cost-effective.

Making it happen

A more standardised nationwide financing scheme is urgently needed that makes retrofitting more accessible to everyone. Retrofitting all our existing homes with the improved insulation, draught reduction measures, and heat recovery technology they need could reduce the average heat loss of the UK's housing stock by 50%. Renewable energy could then be scaled up to meet our heating needs, as well as the energy demands of electricity use, transport and industry. 

About the authors

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

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

Slugs and snails – friend or foe?

Slugs and snails get a bad rap when it comes to our gardens, best known for chomping through some of our favourite vegetable plants and colourful blooms. **Claire Thorpe** considers whether this reputation is justified and explores what we can do to protect our plants without harming wildlife in our gardens and green spaces.

The rather magnificent Leopard slug eats dead plant matter and fungi.

Slugs and snails are a group of molluscs known as gastropods, characterised by their tentacles, muscular foot and radula, their feeding structure that is comprised of hundreds of tiny teeth, which they use to scrape up their food. There are more than 100 species of slugs and snails in the UK, but thousands worldwide, all in different shapes and sizes, from the African giant snail measuring close to 40cm in length to species smaller than a grain of sand. Snails have their shell to hide away in, making them less vulnerable to predators than slugs, but slugs' thin bodies can fit into a wider variety of habitats to find food.

Harmful or helpful?

Gardeners have long seen slugs and snails as the enemy, as well-tended plants

are eaten by the invertebrates. Lettuce, beans, dahlias, delphiniums and hostas are common victims of the slimy animals, often found with the tell-tale holey leaves and slime trails that reveal the culprits.

However, slugs and snails have an important role to play in the ecosystem. They are low down in the food chain so provide lots of other species with a tasty meal, including toads, hedgehogs and many bird species. Piles of snail shells are a good sign that you have a local song thrush, as these birds flick the snails against a rock to smash the shell and get to the soft insides.

They are also important in the decomposition of dead and rotting materials, mainly vegetation, but some carnivorous species hunt down other slugs or eat carrion. New research shows that far from being universal pests, garden plants are eaten by just nine of around 44 species of slug in the UK. As a group, our gastropods are understudied, with the number of species found in Britain far from certain. They can even be a help in the garden, with some slugs eating the algae that grows around greenhouses and eating decomposing material so recycling nutrients back into the soil.

Prevention is better than a cure

It's understandable to want to stop slugs and snails in their slimy tracks, but it's unlikely that any deterrents will completely prevent them from damaging your plants. Luckily there are ways to put them off or limit their impact. And with wildlife-friendly gardening becoming more and more popular, to the benefit of many of our urban species, it's

increasingly easy to get your hands on the materials you might need.

One thing that is key when it comes to protecting plants from slugs, snails or other invertebrates is to use only organic methods. Chemical pesticides are not only unnecessary, but they can also have a huge impact on the wildlife that eats the contaminated animals. Toxins from pesticides build up in the system of larger species, which may interfere with breeding success and can prove fatal. One of the most damaging chemicals that used to be in slug pellets is a molluscicide called metaldehyde. The pellets have caused deaths in pets and other wildlife, from consuming both metaldehyde and the dead slugs and snails. The use of metaldehyde was banned in Britain earlier this year and many other countries look set to follow suit soon.

Changing your mindset is the first step to living with slugs and snails – if you can stop thinking of them as 'pests' and instead as part of a happy and healthy garden ecosystem, you may be less inclined to want to remove them. Along with slugs and snails come their predators, and other 'undesirables' like caterpillars and aphids also bring a whole host of more desirable species such as ladybirds, blue tits and wrens. With wild populations crashing, these species need all the help they can get and your garden can play an important role in providing a home for hundreds of species, given the right conditions.

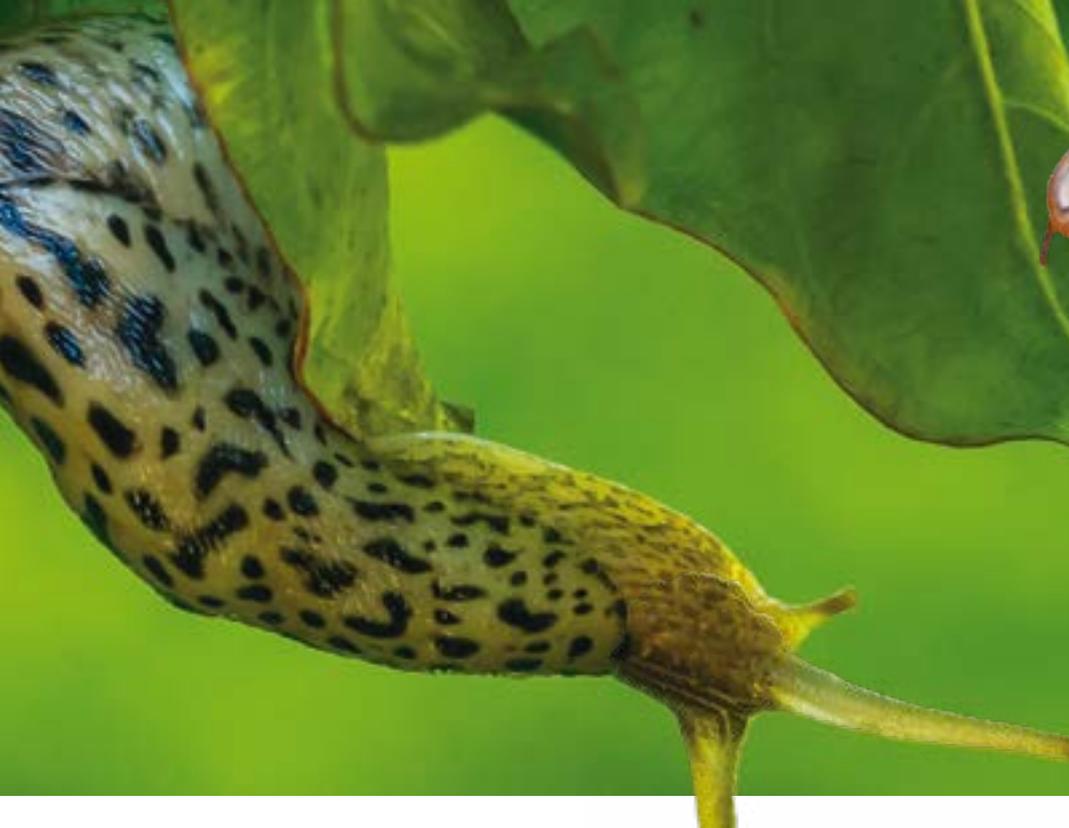
Top tips

Here are some tips from the gardens team at CAT for keeping slugs and snails at bay.

Coalesy / Shutterstock



Slugs and snails provide many species with a tasty meal, including hedgehogs and toads.



Petr Ganaj/Shutterstock

Common species to look out for in the garden

Grey field slug – one of the most common species, they are hugely variable in colour but often have a blotchy pattern and milky slime.

Garden snail – grey body with a grey/brown to yellow shell. Garden snails are our most common species and will eat plants but are also a favourite snack of song thrushes.

Green cellar slug – dark olive green with pale mottling. These slugs do not eat plants, but they are often found in compost heaps as they eat mould and algae.

White-lipped snail – the white colouration around the edge of the shell differentiates it from other species, and the shell is striped yellow and brown. They eat plants but favour those that can be harmful in some cases, such as hogweed and ragwort.

Leopard slug – this fashionable slug is not considered a pest as it eats dead plant matter and fungi.

Common chrysalis snail – this tiny snail is just 4mm in height, with a brown conical shell. They are found in damp places such as under bark, stones and clumps of ivy.

force for good by putting them into the heap or bin. Don't expect all of them to stay put though!

- Sometimes we all have to admit defeat, and if there really are lots of slugs and snails in your garden then there may well be some plants that you won't be able to grow. But a little trial and error should reveal the plants that work for you and your garden. 🐌

The white-lipped snail.



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- Put any plant you want to protect next to plants that slugs and snails love, like some of those mentioned earlier. That way, the invertebrates will go for these sacrificial plants and the ones you want to protect should be relatively safe.
- Provide homes and food for the wildlife that eats slugs and snails. Bird feeders and a birdbath, a hedgehog house and a pond are some features that will draw in predators that will do the hard work and keep your plants safe.
- Rough or very dry barriers may work to deter the soft, slimy bodies of

gastropods. Some gardeners' favourites include eggshells, pine needles, bark and wool. Copper tape around pots has also been shown to put off slugs in some studies.

- Plants are most vulnerable when they are still a seedling, so wait until they are a bit bigger before you pot them out. Keep your young plants in a greenhouse or under a cloche if you can, to deter predators.
- Slugs can help in your compost heap as they eat decaying matter, so collect up any slugs you find and turn them into a

Growing potential for 'humanure'



Katie in the early days with her wheat seedlings.

Last year, CAT and the University of Leeds began a new four-year partnership investigating the potential of composted human manure (known as 'humanure') to provide a sustainable alternative to chemical crop fertilisers.

Using resources from CAT and facilities at the University of Leeds Research Farm, Leeds PhD researcher Katie Allen is conducting field trials investigating the impact of using humanure as fertiliser for the three most commonly grown crops in the UK: wheat, barley and oilseed rape.

Thanks to the multiple compost toilets we have on site (see box), CAT is able to supply approximately 500kg of humanure every two years to help with the trials; 455kg of humanure already supplied has now been added to around 70m² of test beds at the University of Leeds Research Farm.

Katie will examine a variety of outcomes, including yield, carbon content, nutrient load and soil microbiology. At the end of the growing process she will investigate root

structure, density and earthworms in the soil, and she is also looking at the impacts of herbicide and fungicide treatments on the productivity of the wheat growth.



Katie emptying a compost toilet resting chamber at CAT.

Composting humanure at CAT

CAT's Water and Waste Officer
Fin Jordao

Some of the composting toilets at CAT appear to be regular low-flush toilets but are in fact backstage composters, using an ingenious centrifugal separator system called the aquatron. Others are urine-diverting twin-vault composting toilets, which is still the recommended approach for complete treatment in the smallest space, with the lowest maintenance and maintaining the greatest hygiene.

The aims are broadly the same: creating a contained leak-proof composting chamber that diverts the bulk of the liquid portion of excreta into a reed bed or soakaway, while maximising the volume available for the containment and decomposition of the solid portion. This makes it easier to maintain aerobic conditions, gives you more control over the composting process, minimises smells and keeps the experience of maintenance pleasant.

Humanure at CAT is contained in a composting chamber for a year, then moved to a maturation chamber for another year, then finally added to the flower beds... and now to a field-scale trial in Leeds!

If you have used our compost loos during a visit to CAT over the last two years, thank you for your contribution to the research!

As various sectors look to drastically cut their emissions and the UK Government has a target for halting and reversing nature's decline by 2030, the scaled-up use of humanure could be one part of the solution to both the climate and biodiversity crises. By replacing chemical fertilisers and providing an alternative way of dealing with human waste, the use of humanure in agricultural applications has the potential to reduce fossil fuel use, lessen pollution of waterways, cut overall water use, and help limit the amount of valuable nutrients that are wasted by being flushed away.

Increasing the evidence-based understanding of humanure as an effective soil improver could lead to producing standards, clear guidance and even training for making and using this nutrient-rich resource. [CS](#)

Somersaulting sky-divers

For many of us, they are the joyous sound of a summer evening as they hurtle around rooftops, but our beloved Swifts are in serious decline. **Joe Downie** looks at ways to give them a helping hand.



Emi / Shutterstock

Swifts lift our spirits. Their prehistoric look, incredible aerial acrobatics, unmistakable screeching and mysterious “life on the wing” adds up to create one of the most alluring of all birds.

They are the fastest bird in level flight, reaching speeds of almost 70mph. They are also among the more well-travelled: an average bird might fly 4 million miles in its five-year lifetime.

Swifts bring joy! A raucous “screaming party” zooming above our heads is perhaps the most thrilling urban nature experience of the British summer.

Because they live alongside us, and nest in the nooks and crannies of buildings (in place of the now much harder to find nooks and crannies in ancient trees), they are a species that we are more able to give a helping hand to.

And this is a species which really does need our help. Like many migratory birds, the Common Swift (*Gwennol Ddu* in Welsh) is in big trouble. Swift numbers have crashed in recent years, with a 58% decrease since 1995 across the UK, and a whopping 72% drop here in Wales.

In common with many migrating birds, each year their perilous journey gets harder, with fewer individuals successfully making it. Climate change is thought to be playing a role, with unreliable conditions and extreme weather events becoming

more common, leading to exhaustion and birds finding it harder to get their timing right. Neither are they helped by the plummeting numbers of insects and habitat loss.

For Swifts, another major challenge is our changing housing stock, with our older buildings being replaced by new homes and office blocks, which leave little space or opportunity for them to nest.

Thankfully, help is coming! There are now more than 100 community groups across the UK dedicated to giving Swifts a helping hand. Here in Mid Wales, The Dyfi Biosphere Swift Project has recently been established. This is a new partnership between wildlife lovers, volunteers and carpenters, supported by local organisation Ecodfyfi.

As well as educating people about these amazing birds, the project is also installing Swift boxes on suitable buildings, giving the birds a hand with the vital business of raising a successful brood.

To date, almost 100 boxes have been built and installed. Here at CAT, two boxes have recently been put up by local Swift Project volunteer Elfyn, along with a “Swift caller” which plays the sounds of screaming Swifts through a speaker every evening, when the chance of attracting other passing Swifts is highest.

There’s never a bad time to install a

Swift box. If you put one up now, there’s a chance that it will be inspected by juvenile Swifts before they leave for Africa, with an eye on using it next year. Swifts remember.

I’ve been volunteering in the Woodlands team at CAT for the past six months, and getting involved in this project has been really exciting, as we’re always looking at ways to boost biodiversity and give nature a helping hand.

So we’re crossing everything that Swifts take up residency here at CAT, to complement our large community of Barn Swallows, which love swooping down from under the beams of the water balanced railway’s Top Station.

Swifts are site-faithful, so we hope that if they nest here, they’ll come back year after year, and we’ll all be able to enjoy their screaming, somersaulting fly-pasts for years to come. 

About the author

Joe is a one of our long-term residential volunteers, helping with woodland and other habitat management on the main CAT site and in our neighbouring woodlands, Coed Gwern. He has a background in environmental campaigning, working most recently as social media manager at Friends of the Earth, and is a keen walker, runner, cyclist and (bad) birder.



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Clean Slate
the journal of sustainable living

CAT's members, volunteers, supporters, graduates and students form an inspiring community. People like you are making a real difference, finding a whole host of ways to tackle the climate and biodiversity emergencies in their daily lives. Here are some of their stories.

Guillermo Fernández Camacho

Guillermo studied at the School of Architecture of Madrid and had experience refurbishing historical buildings in Spain's World Heritage City of Alcalá de Henares before his studies at CAT. Yet he felt he lacked the technical knowledge to tackle environmental issues or implement sustainability strategies in his work. To fill this knowledge gap, he was part of the very first intake of students onto our Green Building MSc course in 2019.

"CAT was a wonderful place to start my journey on a fulfilling professional path. Having participated in international exchange programmes at the Welsh School of Architecture in Cardiff during my degree, I first saw CAT from afar during a road trip in Wales. The location of the place and its sustainability credentials stood out to me, which is why I chose to study there."

After finishing the Green Building course in 2021, Guillermo took a role at PYC, a construction company in Mid Wales with a strong sustainability ethos. He is currently an architectural designer at PYC and part of a team that designs and builds houses using sustainable materials (I-beam timber frame with cellulose insulation in closed prefabricated panels) with high energy performance (with airtightness and insulation levels up to the Passivhaus standard).

During Guillermo's studies, he was specifically interested in sustainable building techniques, vernacular architecture and identity, interests he has been able to continue exploring through to his current role. He hopes to learn more about construction and ways to integrate sustainable strategies into architectural design in order to manage construction projects that result in exciting places and identities that have sustainability as a core value.

Sandy Stevens

After attending a Zero Carbon Britain course, Sandy was inspired to pursue further studies with CAT and began our MSc in Sustainability and Behaviour in 2019. She graduated in 2021 and is now working towards a PhD at Aberystwyth University, pursuing further research within the area of environmental behaviour change.

Sandy is looking to include the Welsh farming community in her research, through discussions and conversations around climate change, and engaging local people in considering, exploring and critiquing more sustainable sources of income to safeguard their livelihoods.

"I taught English in Spain for years and lived and worked in five different European countries. So, it was a welcome surprise to discover that CAT's Masters programmes are accessible for all and that you don't need a background in climate science to join them. I signed up for a Graduate School open day in the month following the Zero Carbon Britain course I attended, and the rest is history!



"Studying at CAT has given me the confidence to pursue a career in research. During my MSc studies, I discovered a real passion for the world of research, which led to my decision to apply for a PhD. The MSc programme taught me the importance of having a solid study ethic and following a successful dissertation (thanks to some very insightful CAT tutors) I had the self-confidence to face the challenge of a doctoral thesis." 



After finishing the Green Building course in 2021, Guillermo took a role at PYC, a construction company in Mid Wales with a strong sustainability ethos.

Do you have a CAT story? Please get in touch at members@cat.org.uk to tell us about it and let us know what you're doing now - we love to hear about your work, the connections you're forming, and how CAT's work is guiding and inspiring you.

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- Future proof your new home today!**



If you're thinking of building a new home or undertaking significant renovations of an older property it's the perfect time to install a heat pump system as you are already installing new underfloor heating or upgrading your radiators as part of your project.

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We have been future proofing homes in Scotland, the North and the Midlands for over 20 years. We work with you, your architect or main contractor to specify the right heat pump system for your home.

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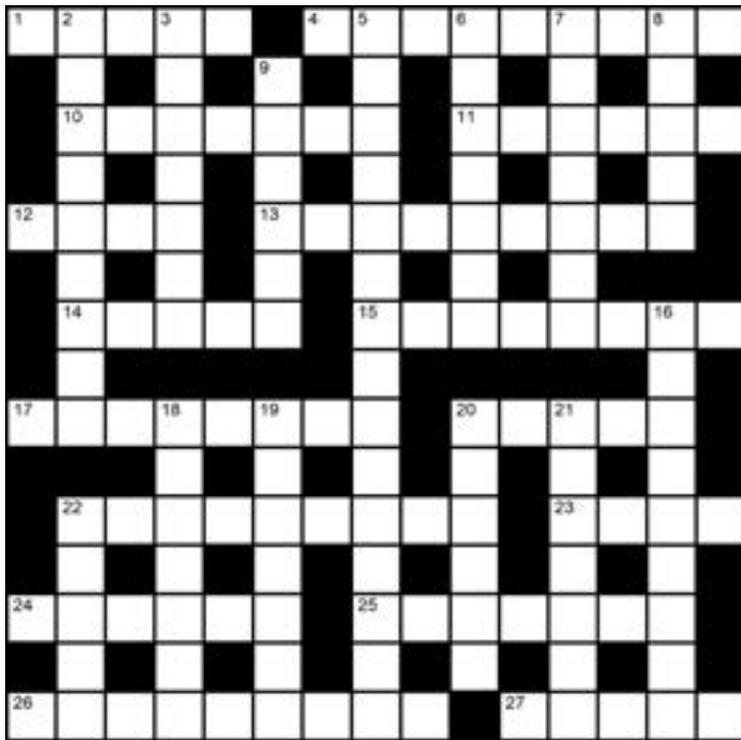
www.waterlesstoilets.co.uk



WooWoo
Waterless Toilets

Cryptic crossword by Brominicks

<http://www.brominicks.wordpress.com>



To enter:

Name: _____

Address: _____

Email: _____

Phone: _____

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 July 31, 2022 to *Clean Slate* Crossword, Centre for Alternative Technology, Machynlleth, Powys, SY20 9AZ.

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

Across

- 1 Reckon youngster is no longer in bed? (3,2)
- 4 One likely to criticize lousy nurse (9)
- 10 Where they make cars and parts, right in the middle of France (7)
- 11 Small burn running into river, possibly a sewer (6)
- 12 It's the wrong way to treat insect bite (4)
- 13 Nose around lake and loch perhaps, to find isolation (9)
- 14 Frequently found in temper, losing head (5)
- 15 Expressly mention wandering around island (2,2,4)
- 17 Rearing horses by the sound of it, behind wall? (8)
- 20 Very steep fine (5)
- 22 Headhunt act full-on about blundering (9)
- 23 11 loud after plugging in audio leads (4)
- 24 Volume found in Judea rarely seen before (4,2)
- 25 Where Greeks are heard making advances? (7)
- 26 Spoke incoherently, went too fast say, in the middle (9)
- 27 Admission guard rejected at first (5)
- 5 Serving behind bars often, mostly I'm brought in at the last minute (2,3,4,2,4)
- 6 Put pressure on relative to read Russian author (7)
- 7 Substance – one found in prison camp (7)
- 8 Likelihood No.7 shows up second to last (5)
- 9 Fancy French goods (6)
- 16 Bird in lake goes up north by end of summer (9)
- 18 Take away part of French political leaflet (7)
- 19 Close together, latter half of race could get thrown into confusion (7)
- 20 Pay rise in year, regrettably (6)
- 21 Show late goal Italy let in (7)
- 22 Consume power supplied by America and Europe (3,2)

Down

- 2 He's not even joining in, quite the opposite! (3,3,3)
- 3 Wound up at Oxford, drunk (7)

Clean Slate 123 Solution



Short courses & experience days

Here's a taste of what's coming up this summer...

July

- 2 July Renewables for Households: Heat Pumps
- 2-3 July Building Natural and Healthy Homes
- 16 July Gardening for Nature Experience Day
- 29 July - 1 August A Way of Building: Using locally sourced materials

August

- 6-7 August Build a Small Wind Turbine

- 12-15 August Eco Refurbishment
- 13 August Making Pallet Furniture
- 21 August Gardening for Nature Experience Day
- 22-26 August Building with Straw Bales

September

- 3-4 September Introduction to Bees and Beekeeping
- 10 September Gardening for Nature Experience Day
- 24 September Spoon Carving

October

- 1-2 October Fixing Your Damp House
- 1-2 October Self-build Project Management
- 8 October Gardening for Nature Experience Day
- 15-22 October Eco Refurbishment: Live online

Find out more and book your place at cat.org.uk/short-courses

Give hope for the future

Freya Randall, Fundraising Manager

Last year, a landmark study looked at young people's thoughts and feelings on climate change. Of the more than 10,000 young people aged between 16 and 25 surveyed across ten countries, 75% felt 'the future is frightening' and over 45% said their feelings about climate change negatively affected their daily life.

As a CAT supporter, you understand the big and complex challenges we face in tackling the climate and biodiversity crises. You likely share this concern for the future and may know young people who feel like those taking part in the survey. The road to a zero carbon society is long and uncertain. But while we cannot quickly reverse all the ecological damage caused by climate change during our lifetime, we can offer a beacon of hope to the next generations.

Wandering the winding paths rich in biodiversity around our eco centre and talking to the hundreds of students we train every year through our Graduate School, we see the difference hope can make every day. Your support allows us to capture the imaginations of present and future changemakers and inspire ambitious practical climate action by individuals, communities, businesses and government. You give us a reason to be positive about what the decades ahead could look like.

After taking care of your loved ones, making a gift in your Will is something you can do now to ensure your compassion for others and the natural world lives on. This simple but important

act can give today's young people a better chance of a safer, healthier, greener tomorrow.

What will your legacy be for the earth?

It may surprise you to learn that much of CAT's work over the past 50 years has only been possible due to gifts in Wills. Big or small, these gifts are special because they make it possible to invest in the future. They ensure we can continue to share positive solutions to the climate and biodiversity crises with our students, members, visitors, supporters, policymakers and the wider public – solutions that bring hope.

Making a lasting impact on the world and giving our loved ones something to remember us by is a legacy many of us would be proud of. If leaving a gift in your Will is something you've already been thinking about or an idea that's new to you, I'm here to listen and answer your questions.

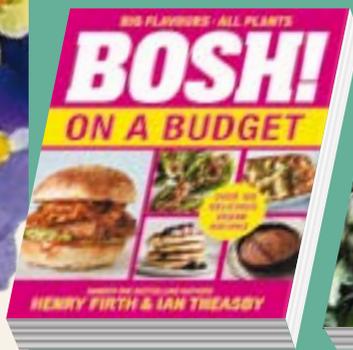
Whether or not you choose to leave a gift to charity, having an up-to-date Will is an important step you can take now to ensure those closest to you are protected in the future and offered a smoother journey during times of grief. If it would be helpful for me to go through the steps you need to take to access a Will-writing service, do get in touch.

Please feel free to email me any time at Freya.Randall@cat.org.uk 





Wonders of Nature Insect Viewer. £5.00



BOSH! on a Budget £16.99 pb



Happy Vegan Food: fast, fresh, simple vegan. £15.00 hb



Good Food Fast: delicious recipes for when you're in a hurry. £14.99 hb



The Flexible Baker: 75 delicious recipes with adaptable options for gluten-free, dairy-free, nut-free and vegan bakes. £20.00 hb



Children's Nature Trail Memory Game (40 Pieces). £7.50

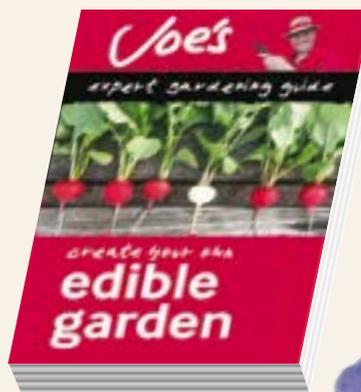


1,000 piece jigsaw puzzle, Garden Birds collection. £12.00



Nature trail magnifying glass. £3.00

The Modern Gardener: a practical guide to houseplants, herbs and container gardening. £12.99 hb



Edible Garden: create your own green space with this expert gardening guide. £9.99 pb

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