

The background of the cover is a soft-focus photograph of a field of wildflowers. In the foreground, several white daisies with bright yellow centers are in focus, growing on green stems. A single, vibrant red poppy is also visible, partially obscured by the daisies. The overall tone is natural and serene, with a mix of green, yellow, and red colors.

The Practical Journal of Sustainable Living

Clean Slate

No 116 Summer 2020 £2.50

Coronavirus
– where do we go from here?

**New Zero Carbon
Britain Hub**

CAT at Home
– online activities and events

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12

IN THIS ISSUE...

9. Meet CAT Graduates: decarbonising design

CAT Graduate **Karen Ridgewell** talks to Alis Rees about working with the Scottish Government and local authorities to rethink the built environment.

10. Sir John Houghton

Dr Saskia Pagella pays tribute to the global leader in climate science who put Wales and the UK at the forefront of environmental decision-making.

12. Bringing the outdoors in – CAT at home family nature fun

Hands-on family activities that can be enjoyed from your living room or garden.

17. Collaboration, innovation and inspiration

Introducing CAT's Zero Carbon Britain Hub and Innovation Lab – a major new project that will share resources, knowledge and experiences to help with decarbonisation planning.

22. Where do we go from here?

As we begin to think about what a post-COVID-19 world might look like, CAT CEO **Peter Tyldesley** argues for investment to help tackle the climate and biodiversity crises.

25. Growing community resilience

Simon Griffiths introduces an inspiring new community food project on CAT's doorstep.

26. Energy saving retrofits

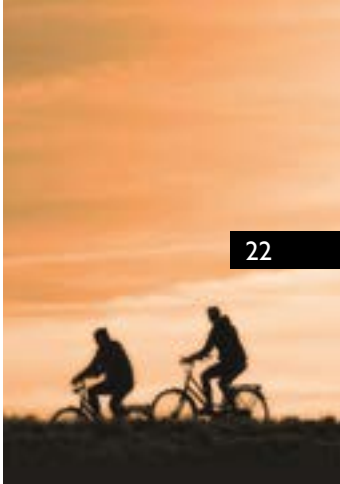
CAT Information Officer **Joel Rawson** looks at different approaches to refurbishing homes to high energy standards.

30. Refuse, reuse, repair and share – cutting the carbon footprint of 'stuff'

How can we cut emissions from the things we buy? In the second in a two-part series, **Judith Thornton** explores the options.

36. A legacy for life

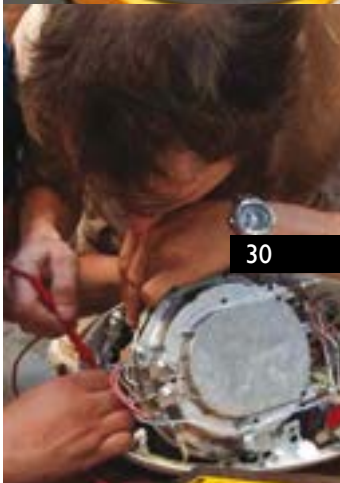
Tanya Hawkes looks at how leaving a gift to CAT in your will can help us work towards a sustainable world.



22



26



30

Regulars

3. Editorial

With CAT Chief Executive Officer, **Peter Tyldesley**.

4. CAT news

All the latest news from the Centre.

11. Your views

Over to you for your views, advice, ideas and suggestions...

35. Cryptic crossword

Stretch your brain with **Brominicks**.

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**DISTANCE
LEARNING
AND
PART-TIME
OPTIONS AVAILABLE**



Together for a better tomorrow

Kindness, solidarity, community, cooperation, hope. The past few months have been traumatic, and at times overwhelming, but they have also offered profound lessons in the generosity of the human spirit. From care workers to mutual aid groups, to neighbours looking out for neighbours, our communities have come together in a way that most of us have never before experienced.

I know from talking to CAT members and supporters that many of you are frontline workers or are involved in your local community support groups. Thousands more of you have stayed home to keep others safe. In this time of crisis, we have experienced terrible losses but we have also seen first-hand the resilience of our communities and the kindness of strangers, and this has given us hope during the toughest of times.

There's cause for hope, too, in the speed at which radical change can happen. Manufacturers switching to PPE production, offices moving to remote working, hospitals built in a matter of weeks.

But there are also lessons to learn about how painful these changes can be when they are sudden and unplanned, particularly for the poor and vulnerable in our society. We see the importance of listening carefully but not uncritically to experts, understanding risk, and planning ahead with care and compassion.

These are crucial lessons for the climate and biodiversity emergencies.

As countries around the world begin to plan their economic recovery, we have a unique chance to protect lives and livelihoods not only from COVID-19 but also from the current and future impacts of climate change.

We can choose to invest and create employment in renewable energy, efficient buildings, cleaner transport, greener industry, and a food system that provides nourishment for us all and space for nature. We can choose skilled jobs, clean air, better health, improved wellbeing, reduced poverty, enhanced biodiversity and a safer climate.

We can take the lessons of today and use them to create a better tomorrow, one built on the foundations of kindness, solidarity, community, cooperation and hope.

Peter Tyldesley
Chief Executive Officer

Keep in touch



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www.cat.org.uk



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Read the CAT blog:
<http://blog.cat.org.uk>



Or give us a call!
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CAT at Home

In mid-March, a few days before lockdown officially began, we took the decision to close the CAT site. The safety and wellbeing of our staff, volunteers, guests and the wider community was our top priority, and it was clear that closing the doors was the right thing to do.

With the CAT site very much at the heart of our education work, this posed a real challenge. We were clear from the start that it was crucial that our work didn't pause. Researching and sharing solutions to the climate and biodiversity crises is as urgent as ever, and there's no time to lose.

So, as people across the UK stayed home to keep themselves and others safe, we set to work moving as much as possible online to allow everyone to access CAT's information, advice, training and activities from homes and gardens around the world.

Online courses, free webinars, virtual open days, family nature fun, and easily accessible information and advice have all been developed over the past few months, allowing people to access environmental education and experience 'CAT at Home'.



Samuel Borges Photography

Family nature fun

Whilst much of our digital development over the past couple of months has been focused on adult learning, CAT has always offered environmental education for all ages.

With schools closed and parents and guardians looking for ways to support their children's learning whilst easing the stress of lockdown, we created a range of fun educational activities based around nature and environmental solutions.

Our Engagement Team, who would usually be focused on developing and delivering on-site school holiday activities, have created a bank of free resources that can be enjoyed whilst staying safe at home. From family climate summits to getting to know your wildlife neighbours, there are activities for indoors and for in the garden, with many that can be enjoyed in even the smallest of spaces.

For a taste of what's on offer, see pages 12-14, and for the full selection visit our website at www.cat.org.uk/catathome

Zero Carbon Britain: Live Online

Our first online Zero Carbon Britain course took place at the end of April, replacing the planned on-site event. 'Zero Carbon Britain: Live Online' saw around 100 people joining us from the comfort of their own homes to explore the radical changes needed to rise to the climate challenge. The diverse group included campaigners, business owners, teachers, GPs, local councillors and students.

We used a range of online platforms to offer live lectures and discussions on a range of topics, from providing a reliable energy supply for the UK to how we can deliver a modern lifestyle, create employment, improve our wellbeing and ensure that the future we leave for our children and generations to come is safe and sustainable.

The live interactive nature of the course made for a rich online learning experience, and allowed networking between attendees during group sessions. It also offered an all-important chance for people to come together with fellow citizens and others working in the field.

Delegate Rosie East said:

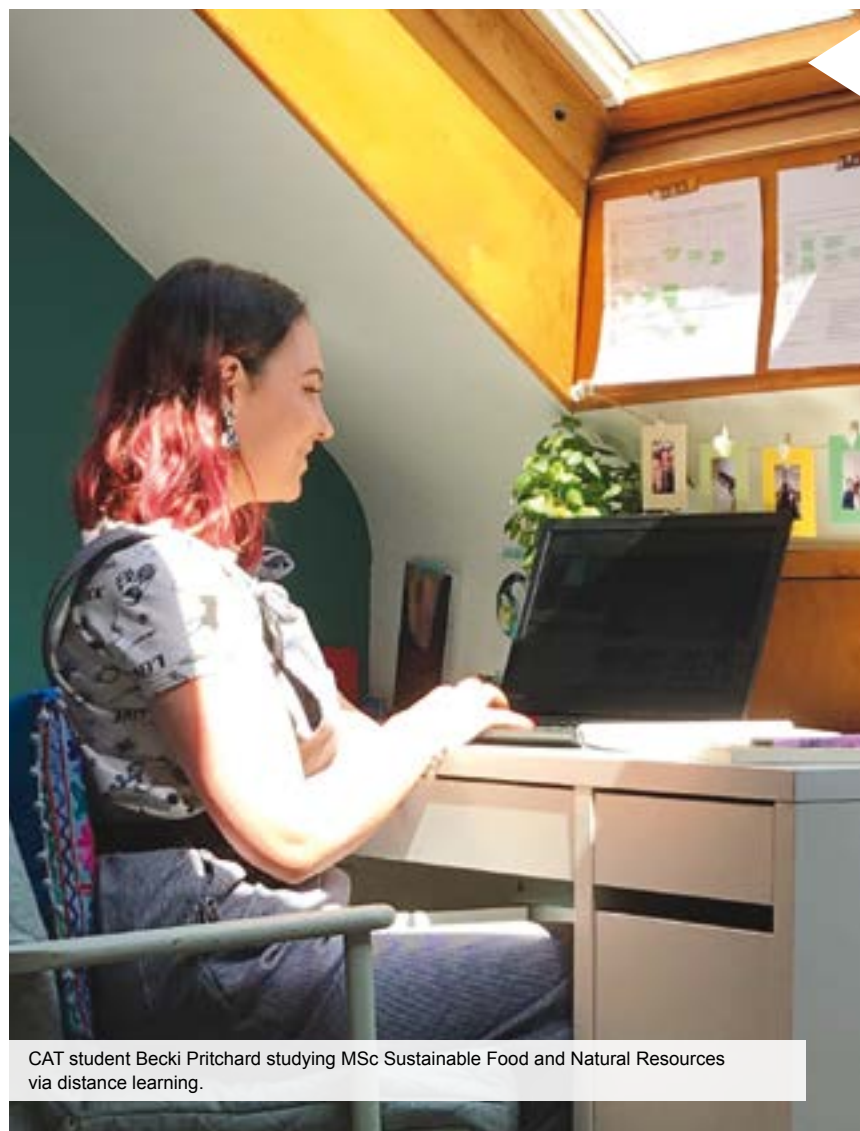
"It was brilliant! You somehow managed to create a really strong and supportive atmosphere.... All the presentations were brilliant, and the breakouts and chat function worked really well. Will be recommending to many people."

After the success of this online course, we added another sell-out course in May, and have further dates planned for later in the year. The next course is scheduled for 21-22 July – if you would like to join us please

visit www.cat.org.uk/zero-carbon-britain-live-online/ for more information and to book your place.

Online training courses are just one aspect of the work of our new Zero Carbon Britain Hub and Innovation Lab. Find out what else we have planned, and meet the new team, on pages 17-21.





CAT student Becki Pritchard studying MSc Sustainable Food and Natural Resources via distance learning.

Learning at a distance

In some ways, CAT's Graduate School of the Environment was better placed than many universities to make the switch to online delivery.

All of our MSc courses are offered via 'blended learning', allowing students to choose whether to study on site at CAT, entirely by distance, or via a mixture of the two. For example, a student might choose to include a residential week at CAT for three of their modules and study the remainder of the course entirely from home.

This means that we have delivered the majority of modules through distance learning already, so we hold an extensive archive of videoed presentations and activities that we can draw on. It also means that our teaching staff and many of our students are already familiar and comfortable with online learning formats.

However, this spring we were due to deliver a series of modules for our new MSc programmes for the first time, so our teaching staff had to adapt quickly to create distance learning modules from scratch.

The past few months have seen lecturers delivering talks, virtual tours, tutorials and seminars online, and even recreating experiments in their back gardens so that students don't miss out on the more practical elements of their course.

We've received some fantastic feedback on how smooth this transition has been, and we've been impressed by how well students have adapted and looked out for each other during this difficult time.

Once this crisis passes, we look forward to returning to CAT, and returning to supporting students face-to-face as we work together to build the skills and knowledge needed to tackle the ongoing climate and biodiversity crises.

You can find out more about CAT's postgraduate degrees at www.cat.org.uk/gse

Virtual open days

New online CAT open days have been developed to allow people to explore studying sustainable solutions from their own homes.

In a normal year, around once a month we give people who are interested in studying with us the opportunity to visit CAT for a day, take a tour of the site, meet lecturers and students, take part in a taster seminar, and generally get an idea of what it's like to study at CAT.

In March, when it became clear that the site would need to be closed for some time, we decided to recreate this experience online, and quickly set about developing virtual open days. The new 90-minute online open day provides a mix of video tours of CAT, talks on the course content, student interviews, and the chance to ask questions in an interactive Q&A session. So far over 300 people have taken part, joining us from across the world.

Adrian Watson, Head of the Graduate School, said:

"We've all really enjoyed meeting our attendees and talking with them (albeit

virtually) and it's been wonderful to be able to give an overview of CAT's postgraduate courses to prospective students from as far away as Colombia and Hong Kong, as well as people closer to home."

As they have proved so popular, and are accessible to a much wider group of people, we are making plans to continue offering an online version of our open days alongside in-person visits when the CAT site re-opens.

Find out more at www.cat.org.uk/open-days

Free webinars explore sustainable solutions

In May, we launched a new series of free interactive webinars designed to help people explore sustainable solutions from home.

Featuring speakers from our Graduate School, short courses and Zero Carbon Britain team, the series covers a wide array of topics related to environmental sustainability.

Take a look at our website to see what's on offer, and sign up to our enews to be kept up to date. www.cat.org.uk/catathome

Digital development

We're looking forward to being able to return to our beautiful site and resume the hands-on practical learning that's a core part of what we do. At the same time, we also plan to keep developing our digital resources so that people across the UK and beyond can continue to make the most of CAT's expertise in environmental solutions.

If you'd like to support this work, you can do so online at www.cat.org.uk/donate or by calling Penny on 01654 705988. Thank you.

Meanwhile, back at the Quarry....



In early June gardener Petra returned to CAT – she took this selfie on her first day back with her beloved plants.

*While CAT has been closed, the site has not been abandoned entirely. Head of Eco Centre **John Challen** gives us an insight into managing the gardens, buildings, energy systems and IT infrastructure during lockdown.*

In these strange times, when the majority of CAT staff are working from home or on furlough, it feels good to remember that there is still life on site.

Our Estates Manager Neilson and electrician Guy continue to visit the site on alternating days, carrying out essential safety checks and ensuring that our programmed maintenance is kept up to date, ready for the future reopening of the site. They've also been attending to some essential watering, keeping our gardens and polytunnels alive during this dry spell.

In a similar vein, Rob, Tim and Tom of the CAT IT team have been on a rota working to maintain our servers and IT infrastructure, supporting staff and students who are working from home.

The lockdown hit just as the growing season was getting into its stride. Rather than waste all the work that had been put in by the gardens team, CAT was able to offer its main horticultural field for use by local growing group Mach Maethlon to support the

community food growing effort – you can read more about this on page 25. This was possible because of an existing arrangement with the group in support of their 'Pathways to Farming' project, delivering small scale horticulture training.

Of course, alongside these human visitors are the wild residents of CAT: swallows returning from Africa to build their nests in barns and workshops; tadpoles transforming into frogs in the shallows of the CAT ponds; cuckoos calling across the quarry; and bees and butterflies feasting on the flowers. It's as much their space as it is ours, and it's wonderful to think of them continuing to do what they do while the human activity on site pauses for a while.

As this issue of *Clean Slate* goes to press, the site team are keeping a close eye on the emerging UK and Welsh Government advice and making tentative plans around the adjustments that will need to be made to allow the site to re-open. As CAT is a many-faceted organisation this has meant that we have been taking part in a wide variety of sector discussion groups, including those bringing together the worlds of visitor attractions, tourism, events and higher education providers. Like many of you, we have all become very familiar with virtual meetings, through which lots of new contacts have been made which will be useful for CAT as we move forward and the world gradually recovers from the traumatic events of this year.

Thank you for your support

Whilst we have moved quickly to ensure that our essential education work continues online, closing the centre, cancelling visits and refunding course fees has created a financial challenge for CAT. We are looking at a loss of around 40% of our income this year.

Thank you so much to everyone who has made a donation to help lessen the impact of this, particularly at a time that is so difficult for all of us. We are so grateful for your support, now and always.

If you would like to help and are in a position to do so, you can donate online at www.cat.org.uk/donate or call Penny on 01654 705988. Thank you.



Ambitious plans to scale up solutions

The next five years are critical for action on the climate and biodiversity



STRATEGIC FRAMEWORK 2020-2025

WHO WE ARE
The Centre for Alternative Technology (CAT) is an educational charity dedicated to researching and communicating positive solutions for environmental change.

OUR VISION
CAT's vision is a sustainable future for all humanity as part of a thriving natural world.

OUR MISSION
Our mission is to inspire, inform and enable humanity to respond to the climate and biodiversity emergency.

HOW WE WORK - WE ARE:

- INSPIRING**
We spark the imagination, helping people to envisage a future in which humanity has risen to the climate challenge.
- EVIDENCE-BASED**
From understanding the scale of the challenges to being realistic about the effectiveness of solutions, all of our work is informed by scientific evidence and expert research.
- EMPOWERING**
We provide people with the tools they need to play their part in creating a positive future.
- INCLUSIVE**
We believe in the transformative power of diversity, inclusion and equality. Only by actively engaging different perspectives can we challenge and stretch our thinking and empower people, policy makers and organisations to make the radical changes we need to deliver a sustainable and regenerative future as well as to enrich the experiences of our employees and volunteers and members.
- POSITIVE**
Whilst acknowledging the scale of the environmental challenge, we remain optimistic and hopeful about the future, providing people with the motivation to make change happen.
- SOLUTIONS-FOCUSED**
We move quickly from challenges to solutions, focusing on the changes that can provide the greatest positive impact.

emergencies. As we begin to imagine a post-coronavirus world, it is vital that climate solutions are at the heart of decision making. It is essential that there are enough people with the skills, knowledge and understanding of these solutions to allow them to be rolled out at the scale and speed demanded by the urgency of the environmental crisis.

With this in mind, CAT has ambitious plans to greatly expand our environmental education work over the next five years.

Earlier this year, with input from staff, volunteers and a sample of CAT members and students, we refined our vision, mission and values, and outlined a set of key audiences and priorities.

- CAT's vision is a sustainable future for all humanity as part of a thriving natural world.
 - Our mission is to inspire, inform and enable humanity to respond to the climate and biodiversity emergencies.
- Our key priorities include: increased public engagement; providing skills and

knowledge for a zero carbon future; influencing the development of policy; and supporting communities and local authorities to make the transition to a zero carbon future. To deliver on this we're also focusing on increasing CAT's financial resilience, and building the capacity and capability of the organisation to deliver its objectives now and in the future.

You can view our new Strategic Framework in full at www.cat.org.uk/strategy

Working within this framework, we are now developing a strategy that will guide our work for the next five years. Our ambitious plans include our new Zero Carbon Britain Hub and Innovation Lab, which you can read about on pages 17-21, but this is just the first step in an exciting new phase for CAT. Keep an eye on our website and newsletters to find out how you can be involved as plans develop.

Thank you so much for your ongoing support at this critical time.

Caroline Lucas discusses zero carbon solutions at CAT

Caroline Lucas MP visited CAT earlier this year to discuss climate solutions and find out more about our research into how the UK can reach net zero greenhouse gas emissions.

On the pre-lockdown visit in early February, the Green Party MP met with our Zero Carbon Britain team to discuss ways in which we can reduce energy use, switch to 100% renewables, and transform land use.

Speaking during the visit, Ms Lucas said:

"One of the most inspiring things about Zero Carbon Britain is the way everything it proposes is perfectly possible right now. It doesn't rely on technologies we haven't yet even thought of and haven't developed, that we don't have at scale.

"What Zero Carbon Britain does is to look at what we know now, and how we can use what we know, to ensure that we do

reach that zero carbon target as soon as possible, and I think that the detail and the analysis that CAT brings to that job is second to none."

CAT Head of Development Eileen Kinsman said:

"This year CAT is greatly expanding our work with policymakers and local authorities, and our new Zero Carbon Britain Hub and Innovation Lab will be working with politicians from all the main parties to help them to build zero carbon action plans at local, regional and national levels.

"We welcomed the opportunity to share our work with Caroline Lucas MP, and to discuss the policies that could help the UK to tackle the climate emergency."

You can read more about the work of the Zero Carbon Britain Hub and Innovation Lab on pages 17-21.



Caroline Lucas visited CAT in February to learn more about our Zero Carbon Britain research. Pictured (l-r) are: Sarah Jenkinson, Paul Allen, Caroline and Eileen Kinsman.

CAT Conference postponed until spring

Our annual conference was due to take place in the autumn, but with the uncertainty around coronavirus we have decided to postpone the event until April next year.

We considered moving it online, but we really hope to be able to see people in person at CAT in the spring.

Please mark on your calendars 23-25 April, and we will let you know when booking opens.

Make sure you're signed up to our newsletter for updates – www.cat.org.uk/sign-up

Ethel and Gwynne Morgan Trust Bursary

In April, we launched the Ethel and Gwynne Morgan Trust Bursary, a new fund that provides up to £4,500 towards studying climate change solutions with CAT's Graduate School.

The bursary is available thanks to a generous donation from the Ethel and Gwynne Morgan Trust, which is focused on the advancement of education in science in Wales.

On awarding the donation to CAT, the Trust said:

"Climate change is a challenge for us all. The aims of the Ethel and Gwynne Morgan Trust include environmental improvement, so we are delighted to offer a bursary with a focus on learning and research to reduce climate change and develop a sustainable future for generations to come."

This year's bursary closes on 30 June. For more information, visit www.cat.org.uk/gse

Short courses gift vouchers

Gift vouchers for short courses are now available on the CAT website. Perhaps you'd like to give someone a place on an online Zero Carbon Britain course, or let them choose a course at CAT in the future. Vouchers start at £20 and can be delivered via email on the date of your choosing with a personalised message.

Find out more and select your voucher at www.cat.org.uk/course-voucher

CAT awarded Bee Friendly status by Welsh Government



A bug wall offers lots of hiding places to help pollinators thrive.



On this year's World Bee Day on 20 May, CAT was awarded Bee Friendly status as part of a Welsh Government initiative to make Wales a pollinator friendly country.

Bee Friendly is part of the Welsh Government Action Plan for Pollinators in Wales, which works to halt and reverse pollinator decline.

The scheme is aimed at communities and community organisations, schools, public bodies, town and community councils, businesses, universities, colleges and places of worship. Its vision is to empower communities to take action to help pollinators in their area.

To win accreditation groups must take action on harmful chemicals and create forage opportunities and habitats for bees.

CAT already meets many of Bee Friendly's requirements: our organic gardens are pesticide and herbicide free; we sustainably manage the surrounding woodland leaving some areas undisturbed; we provide nectar-rich flowers and have bug hotels and refuges hidden away.

We plan to do more, including:

- reducing mowing and disturbance further to encourage wildflower meadows
- continuing pollinator friendly wild plant management
- restoring, improving and maintaining existing bug hotels
- providing information and activities on pollinators
- surveying and monitoring pollinator activity
- connecting with our local community and other Bee Friendly organisations

Bee Friendly at home

Visit our 'CAT at Home' webpages for pollinator-friendly family activities, including surveys, garden tips and bug hotel building. www.cat.org.uk/catathome

Stay in touch

Send us an email: members@cat.org.uk

Give us a call: 01654 705988

Sign up to our enews: www.cat.org.uk/sign-up

Follow us on twitter: @centre_alt_tech

Like us on facebook: @centreforalternativetechnology

Follow us on instagram: [centreforalternativetechnology](https://www.instagram.com/centreforalternativetechnology)

Write to us: CAT, Machynlleth, SY20 9AZ



Meet CAT Graduates: decarbonising design

Karen Ridgewell completed CAT's MSc in Sustainability and Adaptation Planning in 2018, and is now working with the Scottish Government and local authorities to rethink the built environment. Graduate School Marketing Officer **Alis Rees** caught up with her to find out more.



Karen is currently a Senior Design Officer in the Place Planning for Decarbonisation team at Architecture & Design Scotland. She has previously worked at Sustrans Scotland and is a Board Member of Creative Carbon Scotland.

How did you find out about CAT and our postgraduate courses?

I had not been aware of CAT until a chance meeting with a current student in 2011, and I have always lamented missing the opportunity to have carried out my Part II [architecture course] at CAT.

I kept an eye on the programme development and, when the opportunity arose, I applied for a distance learning course because it offered the flexibility I was looking for. The Sustainability and Adaptation Planning course allowed me to apply my knowledge and experience to an in-depth subject matter that would benefit my own working practice as well as current and future employers.

What appealed to you about studying via distance and blended learning?

I chose distance learning because the curriculum delivery was not necessarily tied to traditional 9-5 hours, which allowed me to continue working. As lectures were recorded and uploaded to a virtual learning platform, I could access information at times that

suit me, prior to taking part in pre-arranged online seminars to discuss thoughts, reflections and queries.

I also chose the Masters course because the content is not readily available elsewhere and the freedom offered by CAT to utilise distance learning or a blended learning approach (some modules on site, some distance learning) is reflective of the open, collaborative and forward thinking approach of the institution. This freedom allowed me to maintain a healthy balance between study, work and caring for my young family.

You work as a Senior Design Officer at Architecture & Design Scotland, tell us a bit about them and your work there.

Architecture & Design Scotland (A&DS) were set up in 2005 by the Scottish Government with the purpose of helping people create a well-designed built environment that supports sustainable, resilient communities.


I joined in June 2019 as a Senior Design Officer and have been contributing to a new pilot project called 'Place Planning for Decarbonisation', supporting the Scottish Government's commitment to tackling climate change and achieving the target of net zero emissions by 2045.

With numerous local authorities declaring a Climate Emergency, A&DS are helping, through facilitation, to translate that driving force into tangible place plans, an approach we believe is unique, but one we wish to encourage others to adopt, and at pace. We hope our pilot project findings can be used to demonstrate the successes and challenges identified by each of our project partners, offering timely peer-to-peer support to local authorities and community groups across Scotland.

We will also be assisting the Scottish Government with the consultation, development and delivery of National Planning Framework 4 (NPF4), contributing to the Just Transition and the Climate Change Plan consultations and updates, and working with our colleagues to implement 'Creating Places', Scotland's Policy for Architecture and Place.

One final question, what impact have your studies at CAT had on your work and life?

I believe my CAT studies led to my successful appointment at Sustrans, A&DS and to the Board of Creative Carbon Scotland. The course offered me an opportunity to enhance my existing qualifications and experience, to challenge the impact of my profession, and to work towards inciting positive change by utilising my multi-disciplinary understanding. It has created employment and volunteering opportunities that I do not believe were previously available to me.

I thoroughly enjoyed my time at CAT over the last four years, my peers and the staff made me feel welcome and appreciated. Their open mindsets encouraged us to question and challenge, and to work together towards solutions that can positively impact ourselves, our families, our communities, our workplaces and the environment. I would recommend visiting or studying at CAT to anyone. 

Obituary: Sir John Houghton CBE FRS FLSW (1931- 2020)

Dr Saskia Pagella pays tribute to the global leader in climate science who put Wales and the UK at the forefront of environmental decision-making.

Sir John Houghton died on 15 April, aged 88, owing to complications linked with COVID-19. John was a major driving force behind the formation of the Intergovernmental Panel on Climate Change (IPCC) in 1988, serving as chair and co-chair of the scientific assessment working group until 2002. John's



contribution to atmospheric physics and chemistry and the emerging science of climate change was significant, as was his tireless work communicating the science to policymakers and the public globally.

He was a loyal supporter of CAT, as well as the universities in Wales, throughout his career. Paul Allen, CAT's Zero Carbon Britain research coordinator stated upon hearing the sad news:

"Sir John Houghton was a great inspiration for CAT's Zero Carbon Britain research, and a good friend. Years before net-zero carbon became a goal of governments around the world, Sir John encouraged us to explore solutions rooted in what the physics of the climate science demands, rather than what is judged to be politically palatable".

John Theodore Houghton was born on 30 December 1931 in Denbighshire to Miriam and Sydney Houghton. John was the second of three sons, who all followed careers in science and engineering. His love of science started at an early age while attending Rhyl Grammar School in North Wales, a region that remained close to his heart throughout his life. After reading physics in Jesus College Oxford in 1948 at the tender age of 16, he completed his DPhil in Atmospheric, Oceanic and Planetary Physics in 1955. John went on to work as a professor of atmospheric physics at Oxford from 1972 to 1983, and was Chief Executive of the Met Office from 1983. The list of his prestigious roles, awards and honours is extensive, and include his election as a Fellow of the Royal Society in 1972 and the award of a knighthood in 1991.

I worked with John from 2011 to 2015 on the Welsh Government funded project, the Climate Change Consortium of Wales (C3W), for which he was Chief Scientific Adviser. During our time working together, I learned of John's early interactions with policymakers. He recounted when he and his colleagues were briefing Margaret Thatcher's government about the risks of the rising levels of carbon dioxide in the atmosphere, how readily Thatcher had understood the science. Being a chemistry graduate, she initially took it very seriously and her attention only turned when powerful

vested interests pulled her and her cabinet's focus back to the economy.

Nevertheless the publication of the first IPCC report in 1990 heralded an enduring assessment process, applying the judgement of global experts to the existing climate change evidence base to provide scientifically credible answers to policy-relevant questions. In 2007, John was amongst a panel of scientists who accepted the Nobel Peace Prize on behalf of the hundreds of scientists involved in the IPCC.

When the C3W scientific community were engaging with decision-makers in the early 2010s, a general air of climate change scepticism prevailed. I did think of Sir John when I sat in the Special Gallery of the House of Commons witnessing the 2019 debate on Corbyn's motion to declare a climate emergency, when the Conservative MP for Ludlow, Philip Dunne, asserted that what government should be doing is speaking to organisations like the Centre for Alternative Technology about a Zero Carbon Britain.

John was a devoted husband and father, marrying his first wife Margaret in 1962 with whom he had two children. Following her death he established the Margaret Houghton Memorial Fund dedicated to research on medical nursing. In 1988, he went on to marry his second wife Sheila, who I had the pleasure of meeting during the C3W days. John was a devout Christian and actively engaged with the interface between science and religion throughout his life. In 2013, he published his autobiography *In the Eye of the Storm* which documents his life in this regard.

Following his retirement from the Met Office, John and Sheila moved to Aberdyfi in West Wales. As a near neighbour to CAT, John became a valued adviser, helping guide and support our research and education work. In 2016 he made a generous donation that allowed CAT to create the annual Sir John Houghton Bursary for our postgraduate students, helping support the next generation in exploring climate solutions.

John is survived by his wife Sheila, his children, Janet and Peter, his grandchildren, Daniel, Hannah, Esther, Jonathan, Jemima, Sam and Max, and his brother Paul. [CS](#)

Get in touch We'd love to hear from you. Email members@cat.org.uk, and if you would like your letter to be considered for inclusion in Clean Slate, please use the subject 'For publication'.

Solar for every roof

Dear CAT

What would be the impact on emissions from fossil-fuel power stations if every building in the UK were fitted with solar panels?

Could a calculation be done using some broad assumptions, such as maybe 10% of properties excluded in conservation areas or otherwise unsuitable (e.g. thatched roofs), a factor for those buildings that are sub-optimum in terms of aspect, and so on?

I'm interested in this, if only because the debate is so focused today on economics and whether it 'makes financial sense' to the individual, rather than something that we need to do given the much larger costs of dealing with climate change.

Steve Doughty

In CAT's Zero Carbon Britain report we use a figure of 74 TWh per year from solar PV, based on 90 GW (peak output) of PV covering about 15-20% of UK roof area.

That contribution of solar is part of an overall electricity mix in our Zero Carbon Britain scenario of about 780TWh per year, with several other sources feeding in – especially offshore wind, which is a good source of energy in the UK climate.

One TWh (terawatt-hour) is one billion kWh (kilowatt-hours), with the kWh being the standard unit of measurement for household bills. 1 GW (gigawatt) is one million kW (kilowatts).

For comparison with household systems, a domestic PV roof of about 3.5 kW peak output will be around 25 square metres and yield about 3,000 kWh per year.

You could change these figures to get a different contribution from solar – but it's important to have an overall mix that works well through the whole year, based on the weather patterns in the UK. For the Zero Carbon Britain report our researchers modelled different energy sources to get a good mix – you can read more in the report.

In terms of carbon savings, a modern gas-fired power station will lead to around 0.4 kg of carbon dioxide per kWh of output, although this could be 0.5 kg per kWh for older sites.

So one domestic PV roof output of about 3,000 kWh would avoid about 1,200 to 1,500 kg (1.5 tonnes) of carbon dioxide from those gas-fired power stations.

The figure we use in Zero Carbon Britain of 74 TWh from solar would replace something like 30 to 35 million tonnes of carbon dioxide compared to using gas-fired power stations. The overall figure of 780TWh would then save about 10 times that.

Joel Rawson, CAT Information Officer
info@cat.org.uk

Working together towards adaptation

Dear CAT

In the face of climate change and Brexit I believe there needs to be a working partnership with farmers, climate change activists and the general public.

At the moment that is far from happening. Farmers are feeling beleaguered and persecuted. They are facing a very uncertain future and the prospect of their homes and livelihoods threatened. A lot of the general public want to keep the status quo and their burgers, bacon and bangers remaining on the table and are fed up of 'being lectured to'.

If we're not careful this will become toxic. We need to come together and work towards adaptation. Farmers have changed their agricultural methods before, firstly at the onset of mechanisation and then after the world wars. By working together it can be done again to create a self-sufficient and sustainable food supply.

Reducing meat and dairy consumption is not easy and can be an expensive learning curve. I do not want lab meat and vertical farming to be in the control of the likes of Jeff Bezos but if we don't act quickly that is what will happen.

I would like CAT to work with the NFU and its members to start looking at the viability of creating multiple centres of vertical farms around towns and cities by working with scientists, universities, entrepreneurs, etc. There are massive opportunities out there and we need to harness them for the good of all.

Jan Williams

Emissions on green tariffs

Dear CAT

In his reply to Beryl Wright's question (Your views, *Clean Slate* 115), Joel Rawson says: "We wouldn't promote direct electric heaters, as at present this leads to higher carbon emissions than a gas boiler (plus higher running costs)." Living in an old cottage with a large modern extension, both with all-electric heating, I would agree with the statement in brackets, but would like to ask whether Joel's statement about emissions would apply to a 100% green electricity supply?

Percy Mark

Buying electricity through a green tariff, and in particular from a company that only offers green tariffs, is definitely something we recommend. It is great for promoting more of those zero-carbon energy sources. So we do encourage people to be with a supplier that is driving on the installation of more renewable energy.

However, if someone on a green tariff uses more electricity, then less renewable energy



will be left to be 'allocated' to someone who is not on a green tariff – meaning more gas will be burned in power stations to meet their needs. So gas will still be burned within the overall picture.

We need to be as efficient as possible when using mains electricity. This still applies on a green tariff, or even if the grid is completely zero-carbon. With a 300% efficient heat pump, a house would only consume one-third as much electricity compared to running 100% efficient direct heaters. Scale that up across millions of homes, and we can see that using heat pumps would mean we'd only need to build one-third as many wind farms to supply the electricity. So it has implications for infrastructure, land use, and so on.

Joel Rawson, CAT Information Officer
info@cat.org.uk

Calm reflections

Dear CAT

It has been my pleasure to notice the difference this spring where I live in Crete, with its well observed lockdown. Traffic virtually stopped, and did so completely over Easter. The garden has perfumes I never knew before. For example, not only do broad bean flowers smell nice, but so do the pods!

The lack of traffic noise means that we hear bee-eaters and hoopoes regularly, instead of never and seldom. Only in the mountains have I seen bee-eaters before. Birds feeding on insects above the river are legion, and the moths around our outdoor light were like a snow storm last night, 9 May. Last year I thought the predatory geckos would go to bed hungry, but not this year.

There is a saying here – nothing matters if you have your health. How truly that has been reflected in the quietness and calm of both town and country.

Juliet Green

Opinions expressed are not necessarily those held by CAT. We reserve the right to edit letters where necessary.



Bringing the outdoors in – CAT at home family nature fun

While everyone is staying safe at home, we have been creating lots of new hands-on family activities that can be enjoyed from living rooms and gardens across the country. From family climate summits to wildlife spotting, there's lots to keep children connected to nature and engaging with environmental solutions. Here's a taste of what's on offer.

Build a Tiny Pond

There are many ways you can attract wildlife into your garden or backyard but creating a healthy water source is probably one of the best things you can do.

What you will need

- A large container that will hold water
- Some clean gravel and rocks
- Some small pond plants or plants in pots to surround your pond

Step by step

1. Find a large watertight container

It could be a bucket, or even a large washing-up bowl. It needs to be strong to withstand being outside.

2. Choose your spot before you add water

Once it's full of water it will be difficult to move! Ideally put it somewhere that gets a good amount of light but isn't in full sunlight all day. You can sink it into the ground or leave it standing on the surface, but if the edges are level with the ground more creatures can get in and out.

3. Get started

Put a layer of small stones in the bottom, this gives your pond an interesting texture and helps plants to root to the bottom. Don't use soil – it is too full of nutrients.

4. Make sure your pond has a wildlife ladder

Use bricks, rocks or logs to create stepping stones in and out of the pond. It is vital that the pond is not a trap for creatures such as hedgehogs.





5. Hooray, now you can fill your pond

If you have a water butt use the rainwater from that. Tap water can contain many chemicals that do not allow a healthy new pond to grow. If you only have tap water then that's ok too – the pond may just take longer to find its natural balance.

6. Plant up your pond

This is the trickiest bit if you want to avoid buying things for your pond. Over time, aquatic plants may appear on their own and eventually you may be able to swap some healthy pond plants with a neighbour or a friend, but for now you can transform your pond into a safe haven for wildlife with marginal plants.

Have you got some plants in pots that you could move to sit around your pond? Marginal plants create shelter for visiting wildlife and some shade for your pond.

7. Share your pond with everyone

Take a picture of your fantastic new pond and let us know when you see wildlife using it. To share your pictures, post them on CAT's facebook page or tag @centreforalternativetechnology on instagram. #CATatHome

Note to parents and guardians: Even a tiny pond can be a hazard for small children. Position your pond in a safe place and make sure children are supervised at all times.





Bringing the outdoors in – CAT kids at home

Sarah Dietz from Pixels



Draw your zero carbon view

Life through your window: draw your view of a zero carbon world

We can all make green choices at home, but if we are to reduce the effects of climate change, we need a big, world-sized plan. What do you imagine a greener, healthier, zero carbon world might look like?

Choose a window. What can you see? If you reimagined that view in an eco future, what would it look like? How would it be different? What would stay the same?

Can you draw your exciting new view and share it with us?

What you will need

A window

Paper

Pens, coloured pencils, paints or any art materials you have.

Step by step

1. Find your window view

Take a walk around your home and look out of each window. Is there a tree, a street or cars that you can see? Can you easily see out of it when you're sitting comfortably?

2. Frame your work

Looking out of a window gives your work a ready-made frame and makes your view unique to you. Start your drawing by looking at your window frame. What is the frame made from? Are there curtains? Draw your frame around the edge of your piece of paper. Think about colour, texture and 3D shape.

3. Imagine a new world

Now take a close look at what you can see through your window. Could any of the things you can see be affected by climate change? Now imagine what your view might look like in a zero carbon world and how things might have changed. We've suggested a few things to think about below but let your imagination go wild to create an exciting, positive and healthy new world.

- **Food** – Are people growing food locally at home or as a community? What types of food are there? What is it packaged in?
- **Travel** – How are people getting to work, school and to see their friends and families? Are they using public transport, green energy electric cars, cycling, walking or something else entirely?
- **Holidays** – Where are people going on holiday and how are they getting there?
- **Homes** – What do our homes and other buildings look like? Where does their energy come from? How are they heated?
- **Nature** – What do our natural spaces look like? Are there more of them? Are our cities greener? Are our natural habitats healthier, stronger and more diverse?

4. Draw your zero carbon view

Now it is time to put pencil to paper and draw your exciting new zero carbon view.

5. Share your designs with us

We would really love to see your vision of a sustainable future! Why not take a photo of your picture and post it on CAT's facebook page or tag @centreforalternativetechnology on instagram. #CATatHome

Discover more online nature fun
You'll find lots of more activities online at
www.cat.org.uk/catatathome. We're posting more
all the time, so make sure you're signed
up to our e-news for regular updates,
and do send us photos of the
little ones getting stuck
into nature fun.
#CATatHome

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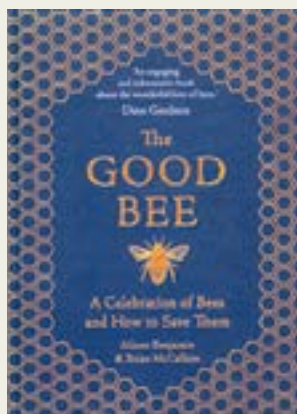
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Bee Field Guide £6.00

Learn to recognise some common species. Guides also available for birds and butterflies.

GARDEN DAYS

Create a busy buzzy wildlife haven that's brimming with home grown fruit and vegetables.



The Good Bee: A Celebration of Bees – And How to Save Them £9.99

By Alison Benjamin

Discover the complexities of bee behaviour, the part they play in the natural world, their relationship with people, how they are threatened and what we can all do about it. Hardback



Bee and Bug House £20.00

Provide a luxury home for solitary bees, ladybirds and other beneficial insects such as lacewings.

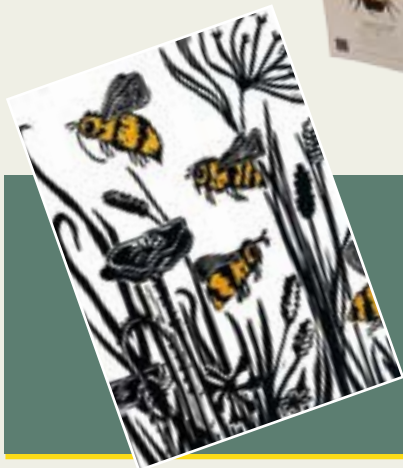


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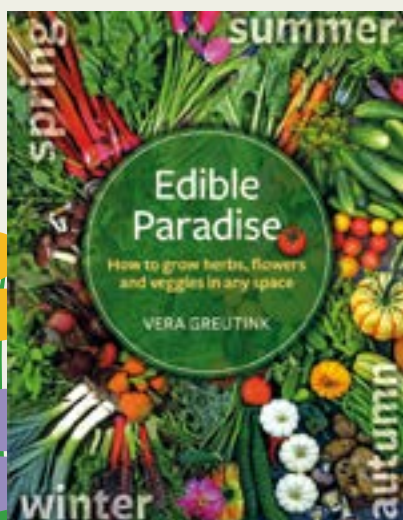
Seed Bird Feeder £21.00

All metal, super strong seed feeder for bird seed. Designed for maximum ease of use and practicality.



Beautiful Hand-Painted Bee Card £5.00

This card comes with bee-friendly flower seeds, a wooden label and a guide to bee-friendly gardening.

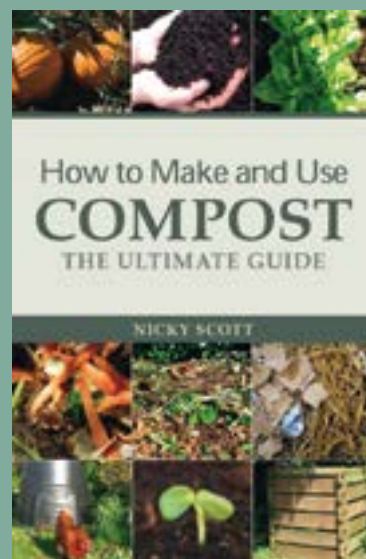


Edible Paradise: How to grow herbs, flowers, and vegetables in any space £16.00

Learn how to create your own no dig, organic garden with permaculture design and techniques.

Visit our online shop for more garden and wildlife inspiration:

<http://store.cat.org.uk>



How to Make and Use Compost £9.95

How to compost everything that can be composted – at home, work or school, and in spaces big or small.



Centre for Alternative Technology
Canolfan y Dechnoleg Amgen

BUY SOMEONE THE GIFT OF SUSTAINABILITY

CAT membership is the perfect gift for anyone who cares about climate change and other environmental issues and wants to know what they can do to help.

“It’s always inspiring to hear people from CAT talking. You’ve inspired us for decades.”

Eluned Morgan AM

Buy someone a membership gift pack today and they’ll become part of CAT’s thriving and growing community of changemakers, plus:

- A gift welcome pack, explaining how to make the most of CAT membership
- Clean Slate magazine, packed full of news, views and practical tips – four times a year
- Unlimited free entry to our award-winning Visitor Centre – all year round
- A gift to unwrap on the special day
- And knowledge that your support helps create positive solutions to the challenge of climate change



MEMBERSHIP OPTIONS

Individual £30

Joint £36

Family £40

Why become a member of CAT?

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

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

Contact Penny Rowland at CAT for more information 01654 705988.

Collaboration, innovation and inspiration – unveiling CAT's new Zero Carbon Britain Hub

CAT's Zero Carbon Britain Hub and Innovation Lab is a major new project that will share resources, knowledge and experiences to help others in their decarbonisation planning. We caught up with the team that is leading on this work to find out more about their plans and how CAT members and supporters can get involved.



How do we want to live? What kind of a future can we help create?

Clean Slate: Why has CAT created the Zero Carbon Britain Hub and Innovation Lab?

Sarah Jenkinson: For the past 13 years, CAT's Zero Carbon Britain project has been building on the charity's 45 years of experience of developing and sharing positive solutions.

Over the past couple of years, as awareness of the climate emergency has spread across society, increasing numbers of active citizens, councils and businesses have been contacting CAT asking for information, training and local presentations on Zero Carbon Britain.

Thanks to a generous donation from the Moondance Foundation, CAT is now much better resourced to respond to these requests by developing a Hub and Lab to share good examples of what works, build new alliances, offer training and get to grips with the key unanswered questions.

A new project team was fully in place just a few weeks before the coronavirus lockdown, and has been working remotely to get the Hub's training delivery online and consider how the project can respond in the most creative way possible in the light of the new challenges thrown up by the pandemic.

Sarah Jenkinson

**Head of
Policy and
Communications**



Sarah worked in CAT's media team in the late 1990s. Young and determined, Sarah springboarded from the immersive practical solutions on site to begin a career campaigning for governments around the world to take action. She has now come full circle, overseeing the strategy for the new Zero Carbon Britain Hub and is excited by the key role towns and cities will play in delivering ambitious zero carbon plans.

Sarah is passionate about engaging and mobilising people from all walks of life to help make change happen. With 20 years' experience of campaigning to influence policy, Sarah has helped mobilise millions of people around the world on issues such as climate justice, emission reductions, arms trade control, access to education, health and air pollution.

More recently, she has been helping diverse organisations and communities accelerate solutions to climate change in their own countries, by providing dedicated, tailored advocacy, campaign and communications support. She has also played a role working 'behind the scenes' within the international climate movement to help develop communications tools and aligned interventions to positively influence the public debate on climate change, and shift policies. From Greenpeace to Oxfam and from the UK's Climate Coalition to Rewilding Britain, Sarah is a highly driven, strategic and collaborative leader inspired by the emergence of 'climate emergency declarations' and the huge momentum for countries, cities and communities to get to net-zero.

Sarah has recently returned to Machynlleth. Weary of working virtually, she has come full circle to bring her skills and networks home to CAT, and return to working physically with 'real people!' Sarah can often be found swimming or enjoying a good sauna. She has recently been learning archery, and is embracing home-schooling her seven-year-old son with the help of deep breathing exercises!

Paul Allen
B.Eng (Hons)
FRSA

**Knowledge
and Outreach
Coordinator**

*Paul has lived
with and
worked with
renewable
energy
technologies*

*for over 30 years. His background
and training is as an electrical and
electronic engineer. Paul joined the
Centre for Alternative Technology
in 1988, developing a wide range of
renewable energy systems including
solar powered medical systems for use
overseas.*

Offering 30 years' experience initiating 'ahead of the curve' research projects, backed by strong technical and practical experience, Paul has led the ground-breaking Zero Carbon Britain research for over 12 years, leading on the development of six reports and liaising directly with government, business, public sector and the arts to share their findings. He has a wide breadth of public speaking experience from UNFCCC COP conferences to local council training.

In 2013 Paul was awarded a Winston Churchill Memorial Trust Fellowship grant to explore rapid decarbonisation research across the USA. He has been a member of the Wales Science Advisory Council (2010-14) and the Climate Change Commission for Wales (2007-2015), as well as a board member of the International Forum for Sustainable Energy (2008-2013). He was co-author of the 'Culture Shift' report for Arts Council Wales, and is a qualified 'Carbon Literacy' trainer (2018).



The Hub and Innovation Lab team, pictured at CAT in February, will support people to take action for a zero carbon future.

CS: How will the Hub help get the UK on the road to zero carbon?

Paul Allen: Our response must be in keeping with the times. The pandemic has made some aspects of the zero carbon transformation more tangible, such as changes to transport or food supply, whilst others, such as retrofitting homes, have perhaps become more challenging. Today, in this time where normality is interrupted, we have the chance to truly ask ourselves: How do we want to live? What does a world look like in which people live in a net zero way? What opportunity do we have to rethink our personal decision-making and local supply structures in food, land, buildings, transport and energy?

The new Zero Carbon Britain Hub will help CAT support its growing range of clients working to build a positive vision of a net zero future. The changes needed are so much more than just ideas, they are actually happening now. Dappled rays of a zero carbon future have been growing, here in the present, and the new Hub and Innovation Lab aims to connect them up and share the skills to replicate them.

We aim to support people to use this unique time to get better prepared and skilled to take action to transition to a zero carbon future.

CS: What will be the Hub's main activities and who will you be working with?

Anthony Hurford: Now that the old normalities have changed beyond recognition,

there is a real chance for people to gain a deeper understanding of a fundamental 'system change' towards a culture ready for the next challenges we face.

The new Zero Carbon Britain Hub team is working hard, albeit remotely, to define the 'what' and the 'who'. We are in the midst of running a web-based research programme, exploring 'theories of change' and asking key questions of both existing and new collaborators to allow us to best determine what support councils and communities already have, and what additional support they need. This will be followed up by detailed interviews to help us to better understand how the Zero Carbon Britain Hub can inform, influence and support councils, communities and businesses, and tailor our provision to what they actually need. This strategic process will conclude in July, when we will switch to delivery.

CS: What is an Innovation Lab, and how can it help to tackle climate change?

Anna Bullen: An innovation lab is a form of collaborative problem solving, drawing on the insights and experience of key stakeholders to address institutional, legal, business, economic, cultural and technical barriers to rising to the climate emergency.

Innovation labs can scale and sustain their impact through a process of experimentation and learning, drawing on diverse stakeholders across and within various sectors and fields.

A successful innovation lab should create knowledge from and for the system, build capacity for implementation, build networks to sustain results, and create solutions with a deeper understanding of root causes.

CAT's Zero Carbon Britain Innovation Lab aims to incubate the people, ideas and skills needed for transforming infrastructure and behaviour in ways that serve both people and planet and address the challenge of reaching net zero by 2040.

We aim to engage and support innovators developing cutting-edge thinking including infrastructure and behaviour transition models, campaigners and councils calling out for change, and professionals working for change from the inside.

The Lab is composed of the core CAT team, plus a range of expert fellows from academia, business, creative industries, practitioners and active citizens. It builds on the extensive network of those who have engaged with CAT's research work over the past 13 years, bringing together those actively working to support the rapid transition demanded by the climate emergency.

A key role for the Innovation Lab is to work with the Hub community and CAT's network of expert thinkers to identify synergies between investments in the changes needed to reach net zero and investments to improve health and wellbeing, enhance biodiversity, create jobs, reduce poverty, stabilise our economy, and increase our resilience to climate, biodiversity and other emergencies, such as present and future pandemics. Maximising the benefits beyond carbon can help empower diverse constituencies, building the necessary engagement and a coalition of support across society.

CS: How do the Hub and Lab fit into CAT's wider work?

Amanda Smith: CAT has a long held reputation for offering positive solutions, focusing on both the training and the research needed to continue pioneering solutions. The Hub and Lab will build on this.

We plan to deliver training on site at CAT and in regional locations across the UK, as well as offering bespoke training for organisations. Alongside this we are developing a train-the-trainer programme

to widen the impact of the training we can offer both geographically and through specialist knowledge of sectors. The idea is that specialists will be enabled to deliver training to their own organisations and networks.

During the lockdown, training has been continuing to support those rising to the climate emergency. The team has been offering a series of online short courses, with the next courses taking place on 21-22 July and 23-24 September. We plan for this online training to continue beyond lockdown, and we are looking at options for more in-depth training on the issues and themes covered in our Zero Carbon Britain research.

We are also offering custom online training events for specific regional groups. For example, we recently delivered a workshop to Shropshire, Telford and Wrekin councils. If you would like to explore such an event, please drop me a line - amanda.smith@cat.org.uk

CS: It's initially a three-year project – what does success look like at the end of this period?

Anthony: CAT's Zero Carbon Britain research developed in many unexpected ways over the past 13 years in order to remain ahead of the curve. By the end of the first three years the Hub and Lab will have built on this, scaling it up and developing new conversations with a diverse group of participants from a range of disciplines and backgrounds.

The Hub will have trained thousands of people in the basic skills they need as changemakers, and will have exchanged knowledge and learning across hundreds of real life examples of what we know works.

The Innovation Lab will have offered people a space – away from their everyday work routines – to immerse themselves in collaborative processes in order to understand the radical, systemic changes we need to bring to life, and to uncover innovative solutions.

CS: How can CAT supporters get involved?

Sarah: We cannot do this without CAT members and supporters, we need you to come and join us. The Hub and Lab needs CAT's active citizens to work with

Dr Anthony Hurford

Zero Carbon Britain Hub Project Manager



Anthony believes in the power of collaborating and acting at the level of whole systems to address the biggest challenges we now face and find ways to live happier, healthier lives. He is excited about supporting positive change through CAT's Zero Carbon Britain Hub and Innovation Lab.

Anthony came to CAT from managing large research and consultancy projects at the University of Manchester; building capacity and online technical tools for integrated analysis of infrastructure investment in water-energy-food-environment systems. This analysis was the subject of his previous PhD and postdoctoral research.

For over 15 years, Anthony's work in governance, ecology, water management and conservation focussed on developing countries, where he felt the fundamental challenges for humanity lay. He came to recognise that the power of advanced technical analysis was more than matched by that of convening groups of well-informed people from diverse backgrounds to lead change at system scale.

Anthony sees that for all its progress, the industrialised world has led us down a developmental cul-de-sac, and the technology we need most here and now is social, i.e. ways to empower change in human systems which inadvertently undermine natural systems of which we are part.

Anthony believes CAT's legacy of leading the world with technology and showing how a zero carbon future is possible places it at the heart of efforts to inform, inspire and educate people to work together in new ways for the benefit of all.

Anthony is inspired by all forms of the natural world and most enjoys exploring them with his wife and two boys, whether on foot, by bike, paddling or dangling from a rope.

Dr Anna Bullen

Innovation Lab Manager

Anna is committed to climate and social justice and the power of effective collaboration to create positive



change. Having spent 20 years working with a huge range of individuals, groups and organisations to address climate change she has now joined CAT to run the Innovation Lab.

Anna is an experienced and qualified facilitator and project manager with 20 years of experience working in the sustainability arena.

Anna is passionate about bringing key stakeholders together to deliver sustainable solutions that address climate change. She has facilitated numerous collaborative processes throughout her career, in a wide range of settings, having worked in the public, third and private sectors.

Anna is a firm believer in the use of co-creation methods in order to design effective and meaningful solutions to issues. She is particularly experienced in facilitating processes of a potentially contentious or sensitive nature, bringing together a wide range of stakeholders with diverse views and supporting them to move forward in developing solutions.

Prior to joining CAT Anna was a partner at CAG Consultants, where she led multiple projects for a variety of clients including WWF, JNCC, the GLA, BEIS, Power to Change and multiple Councils across the UK.

Anna has an academic background, with a degree in Environmental Management and Resource Development, an MA in Space, Place and Politics and a PhD in Sustainable Citizenship.

When not working, Anna loves spending time in her allotment, walking in the Welsh mountains (with her dog Bella), and hanging out at the beach with friends and family



“

The Zero Carbon Britain model allows us to imagine a net zero future, and the Hub and Lab provide the tools and support for us to make a significant contribution to achieving it.

– Anna Bullen

us, feeding in your examples of real-life projects that can be scaled up across the UK to rapidly reduce emissions, whilst also increasing our resilience.

We need you to sign up for interactive online learning, and hopefully before too long come to visit CAT for face-to-face training. We need you to connect us to the organisations you feel we should be working with. We need more people to sign up as Graduate School masters students, building innovative new career paths that will help us deliver the net zero transition.

We need connections to people of influence at all levels of society, within the UK and internationally. We need our supporters to raise the profile of the Hub and Lab across your many networks.

In addition, we always welcome connections with new funding and resources that can help us scale-up and develop CAT offerings.

CS: What excites you most about this project?

Paul: Now that the old normalities have changed beyond recognition, there is a real chance for people to gain a deeper understanding of a fundamental ‘system change’ towards a culture ready for the real-life challenges of the 21st century. I am proud to be part of the Hub and Lab team helping us all rise to this.

Amanda: As a qualified teacher, the driving force for me throughout my career has always been making a positive difference to children’s lives and improving their life chances. What excites me most about this project is the opportunity to do this on a massive scale – working with others to make a difference to the future that children and young people will inherit.


Sarah: The emergence of ‘climate emergency declarations’ and of protest movements such as Fridays for Future and

Imagine a net-
tools to enable
ing that goal.

Extinction Rebellion, have clearly shifted the public discourse, and all eyes are on governments to truly act. At the same time, change is coming from the bottom up. Delivering Zero Carbon Action Plans in our local communities has never been more important!

Anthony: CAT's Zero Carbon Britain Hub and Innovation Lab really aims to tackle head-on some of the key barriers to the healthier, happier, materially comfortable and more connected future we can imagine for all, without betting on new technologies, just new ways of doing things.

Anna: The Hub and Innovation Lab provide an incredibly exciting opportunity to work on the most pressing issue of our time with a highly experienced team and in a way that ensures equitable and effective outcomes. The Zero Carbon Britain model allows us to imagine a net-

zero future, and the Hub and Lab provide the tools to enable us to make a significant contribution to achieving that goal. 

A new vision for CAT

The Zero Carbon Britain Hub and Innovation Lab is the first stage in exciting plans to develop CAT's impact over the next few years, helping reach more people with information, advice and inspiration on solutions to the climate and biodiversity emergencies. You can find out more about how plans are taking shape on page 7.

Thank you for your support in helping make this possible.

Amanda Smith

Zero Carbon
Britain
Training Manager



The strong belief that sustainability and environmental issues have always been important but never more so than today brought Amanda to CAT.

Amanda is passionate about the power of education to change lives and outcomes for both children and adults, encouraging them to understand that the choices they make in their everyday lives, as individuals, policymakers or business people, are important at a global level.

Amanda has over 20 years' experience in teaching, school leadership, adult training and organisational improvement. She is a highly qualified and experienced educator, with Qualified Teacher status and the National Professional Qualification for Head Teachers, and is a Specialist Leader of Education. Her expertise includes the design and development of high quality education materials, assessment of impact on learners, and provision of an environment to support learning and retention of key skills, as well as monitoring and quality assurance of programmes.

Prior to joining CAT Amanda was a Head Teacher, and she also worked in an advisory capacity for her local education authority from 2003, working with schools and other organisations in challenging circumstances to enable them to develop effective action plans and bring about organisational change and improvement as a result.

When not at work, Amanda enjoys spending as much time as possible outside, walking and cycling in the beautiful Snowdonia National Park.

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Where do we go from here?

As we begin to think about what a post-COVID-19 world might look like, CAT CEO **Peter Tyldesley** argues for a green stimulus package to help tackle the climate and biodiversity crises whilst improving people's health and wellbeing.

Better infrastructure for cycling and walking can help reduce transport emissions whilst allowing greater physical distancing.

In only a few short months, all of our lives have been changed in ways never before experienced. For some we are in a 'global pause', where work, travel and social lives have ground to a halt. For others, life is more pressured than ever. COVID-19 has cut lives short, devastated livelihoods and caused long-term damage to the global economy.

One thing that is abundantly clear, however, is that our society has not been fundamentally changed by the pandemic. We remain locked into a carbon-based economy, and there is a real risk that recovery from the pandemic will mean a return to business as usual.

The sudden brake on travel and the disruption to industrial activity may have caused a drop in carbon emissions, but the world remains on track towards a disastrous level of global heating.

Nature may have tentatively emerged into some of the space created by lockdowns, but the sixth mass extinction that has seen species and their habitats around the world vanish at an unprecedented rate continues unabated.

What this crisis has done is created a period of enforced reflection, a moment to recognise what is really important, and the chance to consider how certain some of the old certainties are after all.

Kick-starting the green recovery

Recent opinion polls in the UK show that two-thirds of people view the climate crisis as being as serious in the long term as

COVID-19, with nearly 60% supporting the idea of a green recovery. This sentiment is echoed in countries across the world, with over 80% of people in India, Mexico and China supporting prioritising climate change in the economic recovery.

As governments around the world look at ways to rebuild, it is vital that we push for investments to be made in the best interests of people and planet. The global recovery must be kick-started by a green stimulus package, not by shoring up oil companies and bailing out airlines.

A nationwide programme of retrofitting the millions of homes that currently lack decent insulation, thus reducing carbon emissions and tackling fuel poverty, would be a good start.

The switch of large amounts of manufacturing capacity over to making PPE and ventilators for the NHS demonstrates how a comparable re-tooling and re-skilling could switch capacity in 'dirty' industries to the products that will be needed to set the country on the route to zero carbon.

A report commissioned by WWF, and produced by Vivid Economics last month, suggests that the UK can unlock up to £90 billion in annual benefits by spurring a green recovery from the coronavirus pandemic that focuses on the net-zero transition. Stimulus packages that enable the manufacture of wind turbines, heat pumps and insulation, for example, offer a multi-solving solution, helping tackle the climate emergency whilst creating jobs across the UK.

Similarly, changes to infrastructure to allow increased social distancing whilst travelling can be planned hand-in-hand with the long-term changes needed to reduce emissions from transport. We are beginning to see plans for making more space for walking and cycling, and even the President of the AA has argued for funding to be redirected from roads to broadband, saying: "People travelling up and down motorways just to hold meetings is inefficient, expensive and not good for the environment."



Jlreux Hiroé - Pixabay

In many places nature has flourished during lockdown, but without a radical plan for change we will not see long-lasting improvements.



We need a resilient food system that is good for both people and planet.

If done well, the myriad benefits of these changes could go well beyond reducing the spread of coronavirus, bringing with them reduced emissions, improved air quality and the enhanced health and wellbeing that comes with increased exercise.

The fragility of our food system has also been highlighted as never before, with the threat of devastating global famine and disruptions to UK agriculture leading many people to examine – perhaps for the first time – where their food comes from and whether there are better, more resilient ways of feeding ourselves.

As we begin to examine the lessons learned, we can look at what changes are needed to create a food system that improves global health, protects and restores biodiversity, and helps us achieve net zero greenhouse gas emissions.

The future we choose

The pandemic and the resulting disruption to normal life has brought us to a point where we can reassess what we want the future to look like.

We can either opt for a return to business as usual or we can choose a path towards a different future: a future in which the working day does not need to be preceded and followed by an hour or more stuck in traffic or crammed into a standing-room-

only commuter train; a future in which our worth is determined by who we are rather than by what we own; a future in which we value community and human contact all the more for having been forcibly deprived of them; and a future in which we have risen to the climate challenge.

There is no getting away from the awfulness of the COVID-19 pandemic and its impact on people's lives and livelihoods as well as the appalling number of lives lost. The challenge we now face as a society is how to construct a future that is a fitting memorial to those we have lost, so that 2020 is looked back on as a key turning point in the history of humanity. [CS](#)

About the author

Peter joined CAT as CEO in September 2019. He has previously worked in a range of conservation organisations, including the Bradgate Park Trust in Leicestershire and the Brecon Beacons National Park Authority.

STOP PRESS!

As we go to print, media reports suggest that Chancellor Rishi Sunak is planning a package of measures to kick-start a 'green recovery'. The announcement is expected in early July.

Keep an eye on our website for updates – www.cat.org.uk

What could a green recovery look like?

Some of the investments that could help tackle the climate and biodiversity emergencies whilst creating jobs, reducing poverty and improving health and wellbeing.

1. Support a nationwide programme to insulate the UK's housing stock, allowing us to power down our energy demand whilst tackling fuel poverty.
2. Invest in renewable energy, including on-shore and off-shore wind, powering up our clean energy supply.
3. Install energy efficient heat pumps powered by renewables in homes across the UK.
4. Invest in joined-up affordable public transport.
5. Improve infrastructure for walking and cycling, helping reduce transport emissions, supporting physical distancing and enhancing physical and mental wellbeing.
6. Build electric vehicle charging networks.
7. Invest in a food system that supports human and environmental health.
8. Increase tree cover and restore peatlands to absorb emissions whilst providing flood protection, space for nature and wild areas to enhance human wellbeing.
9. Invest in measures that build resilience against the climate change that's already in the system whilst helping get us to net-zero.
10. Support retraining programmes to equip people with skills to enable the transition to a Zero Carbon Britain.
11. Attach strong environmental and social conditions to government bailouts.

Many of these measures can create job opportunities in regions across the UK, allowing regeneration in areas of economic deprivation.

We also need to think globally and support poorer countries to transition, acknowledging the UK's contribution to historic carbon emissions as a long-industrialised nation. We must pay our fair share.

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Growing community resilience

In CAT's home in the Dyfi Biosphere an inspiring new project has emerged as part of the community response to coronavirus. **Simon Griffiths** explores how growers are working together to help build a more resilient and sustainable food system.

Years of innovative work by various local organisations, projects, growers and vendors, including Mach Maethlon (Edible Mach), the Fresh and Local producers' coop, and more recently CAT's own MSc Sustainable Food and Natural Resources, mean that the Dyfi Biosphere is well prepared to lead the conversation around local food production.

Planna Fwyd! (Plant Food!) is a new group established in conjunction with Mach Maethlon and the Machynlleth Coronavirus Community Response group, with a remit to increase local food production and strengthen the resilience of the Dyfi Biosphere's food economy.

The panic buying and empty supermarket shelves that greeted the opening stages of the COVID-19 pandemic woke a lot of people up to the reality that our global food chains are increasingly vulnerable. Planna Fwyd! came about as a result of this surge of interest in growing food and they quickly established an amazing variety of projects and schemes to help the local area to feed itself in the coming years.

Education is key, and Planna Fwyd! is providing a range of resources to help growers. A webpage offers lots of useful information and online growing courses for home growers, whilst a weekly online video conference provides the opportunity for peer-to-peer field-scale knowledge exchange. A virtual seed and seedling swap, the Tyfu Dyfi (Grow Dyfi) Family Seed Pack project, has distributed 200 packs to local families, each of which included growing instructions drawn by local school children.

The practical side of growing field-scale veg for the local community is a major aim. One Planna Fwyd! project has so far helped to bring eight new plots of land into use for veg growing, including an area of the CAT site, while another has established a Land Army and organised volunteer workdays on local farms.

Students, graduates and staff from CAT have been involved in many of these initiatives. A community compost group has been set up with help from CAT Natural Resources Water Officer Fin Jordao, who says: "We want to make soil together, close



Two hundred seed packs have been distributed locally, helping families to grow their own veg.

organic cycle loops and cut transport miles!" The group will develop a patchwork of different composting styles and ingredients, focusing on local materials such as bracken and wool.

Helen Freudenberg, a CAT MSc Sustainability and Adaptation graduate, is working on resources for growers, digital media and administration. She's found Planna Fwyd! to be a positive and vital response to the current situation.

Chris Jackson, permaculturist and CAT Masters student, has helped local grower Kate Fenhalls expand her market garden at Melindwr Farm. This has involved assistance from Hamish, a local working horse, who has harrowed and ridged a quarter acre in preparation for planting potatoes.

There's no doubt that challenges remain: supermarket food is unnaturally cheap and yet food poverty remains a major issue, veg growers find it difficult to access land, and there's a real lack of financial support from the government for small producers. But with several articles in the national mainstream press focusing on this flourishing local economy, it's hoped these lessons from the Dyfi Biosphere can provide inspiration for other communities, and furthermore that such developments and conversations can pressure the authorities to provide meaningful support for small

food producers.

And perhaps the most important role in these entwined and mutually beneficial relationships is the one that many of us can play. Whether or not we have the time and energy to sign up to join local growing schemes, we can support our local food producers wherever possible. We can buy their produce and we can buy it for a fair price. After all, it's only through earning a living wage that these producers will be able to continue putting food on our plates. [📖](#)

About the author

Simon Griffiths is a writer, poet and chef. His short stories, essays and poems have appeared in various publications, including Unthology, Sarai and Lumpen. He is currently writing a poetry pamphlet focused on the catering industry.

<https://plantfood.machynlleth.wales/>
<https://plannafwyd.machynlleth.cymru/>

Online learning

CAT's MSc Sustainable Food and Natural Resources explores how we can build resilient, sustainable food systems. The course is available full-time or part-time and is offered via distance, on-site or through a blend of the two. www.cat.org.uk/gse



Energy saving retrofits

To address the climate crisis we need to rapidly reduce energy use, and refurbishing homes to high energy standards is one of the key measures that can help. CAT Information Officer **Joel Rawson** looks at some different approaches to transforming UK housing.

As highlighted in CAT's Zero Carbon Britain reports, reducing our heating demand is key to a rapid decarbonisation. By allocating much less energy to heating, we're able to make a much more realistic case for using a mix of renewable energy sources to meet energy needs across homes, transport and industry.

To achieve a high number of home retrofits very quickly, simple approaches that can be applied *en masse* are clearly important. However, retrofit shortcuts can lead to damaging and expensive failures – a carefully planned approach, considering the whole house, is vital. Older houses or those with more complex shapes will require more individual attention and specialist support.

As we'll need to refurbish possibly a million houses every year for the next few decades, we urgently need a co-ordinated national programme. This will involve trained installers and advisors to ensure communities and individuals can get good advice, find specialists, and be confident of high-quality work. At the moment there are some projects dotted around the UK that we can look to for ideas and inspiration, and to evaluate different approaches.

Whole house retrofits

Taking individual measures without proper attention to detail and consideration of the ways different elements interact can make a house worse rather than improving it. Upgraded glazing and draught-proofing can increase damp problems if there isn't suitable ventilation. Leaving 'cold bridges' through a thick insulation layer will concentrate heat loss and may be prone to condensation.

The 'whole house retrofit' approach is intended to avoid these pitfalls. Instead of piecemeal efficiency measures, this systematic approach looks at all aspects of insulation, draught-proofing, ventilation and heating to create a structured plan. Such a retrofit is a big job, and you can treat it like a new build by engaging a specialist architect or retrofit expert to oversee the project and tailor the plan to your home. Houses in rows or blocks can be looked at together, as this should make accurate detailing easier as well as reducing costs.

Research has shown that spending more money and time on a deeper level of retrofit actually decreases the payback time when compared to measures added without consideration of how elements will interact.

The Government's TrustMark scheme

now covers professionals who carry out energy efficiency work including retrofits. It's being linked to a new standard – 'PAS 2035: Specification for the Energy Retrofit of Domestic Buildings'. The Association for Environment Conscious Building (AECB) focuses on environmentally-conscious materials, and their member listings can be filtered for 'Carbonlite graduates', from their own retrofit training. See also the pilot projects listed below.

Step by step

A full whole house retrofit may currently be out of reach for many, as we lack a nationwide commitment and supportive financial mechanisms. However, the risks from a piecemeal approach can be avoided by applying the same principle of careful planning to a more incremental approach. If you can't do everything in one go, do still plan for the whole house – how one stage will lead to the next – and set priorities.

Take time first to understand the possible risks and how to avoid or monitor these. For example, don't assume that a damp problem will be solved once you've insulated – investigate and address the issue first. Look carefully at how insulation, draught-proofing, ventilation and heating will all



Thermal imaging cameras can help you to see where heat is being lost.

interact with each other and the building fabric. Check where issues such as cold bridging and thermal bypass could affect your plans.

Look into the use of tools such as a thermal imaging camera to see where heat is being lost and a door blower test to check airtightness, to give you better knowledge of what you're starting with. This helps you to allocate your budget to where it will have most benefit, and to set improvement targets. It's important to document and clearly communicate your targets to everyone you're working with so that they know exactly what you want to achieve and how you'll measure it.

Clear the air

If airtightness is not improved then increased insulation can fail to deliver the savings expected. It's not just about doors and windows, but all edges and corners where materials join – such as where joists penetrate a wall, holes for pipes and cables, and so on.

People can be resistant to the concept of airtightness, associating it with being stuffy. But the key is that it works hand-in-hand with suitable ventilation. In a home with excellent airtightness you're able to control ventilation properly, and people find that air quality actually improves.

In a well-sealed home, some sort of continuous ventilation is necessary to give fresh air while removing excess moisture and fumes from cooking, cleaning, washing and the like. You may not need a full heat recovery system unless you're going for the highest level of retrofit. Ventilation could be more passive, but perhaps with targeted heat recovery fans in the bathroom and kitchen. Getting the choice and operation of ventilation right is crucial for a successful retrofit.

Keeping cool

Even with rapid action to decarbonise, warmer summers are predicted for the coming decades. Retrofitting to high levels of insulation and controlled ventilation will also help protect from overheating.

Your location and the orientation and size of your windows will determine the sort of shading that will complement other measures – so you benefit from the lower sun from autumn to spring, but avoid the high summer sun. Along with night-time ventilation, how much heat-absorbing 'thermal mass' your building has will be a factor, and the choice of internal or external insulation affects this.

Inside out

External insulation is often seen as preferable, as you have less disruption indoors and keep room sizes. Walls on the warm side of the insulation act as thermal mass, which is useful for retaining heat in winter as well as keeping cool in summer.

External cladding is ideal for mass retrofit of whole rows or blocks. However, the detailing must be done well. This means

dealing properly with all the external pipes and other gubbins so you don't leave uninsulated cold bridges. A failed retrofit project in Preston mentioned in *Clean Slate* 113 had problems including roofs and guttering not extending over the external insulation. Water got behind the insulation, causing horrible damp problems. Extending the roof to cover the cladding is recommended – this could be combined with the installation of solar panels to share scaffolding costs.

However, older houses in conservation areas may have restrictions on changing their appearance, or there may be no space in an area with narrow streets. In some houses you'll find a combination may work – for example, internal insulation at the front to maintain the façade and external insulation across a mainly blank side wall.

Internal insulation may be preferable for old stone houses, where external cladding could actually result in too much thermal mass. It can be practical as part of a more spread out retrofit, with the house upgraded in stages.

Because thick internal insulation makes the walls colder, this can lead to the risk of interstitial condensation (condensation inside the walls). This may cause various problems, depending on the structure. It's possible to make a technical case under building regulations to justify a layer slightly below standards that minimises this risk. It may also be worthwhile to put in some monitoring to keep track of damp levels.

You should cut away the perimeter of any intermediate floors to allow for continuous internal insulation. Otherwise you'll get



Natural fibre materials have a lower impact in manufacture than synthetic ones.



CAT guest lecturer Judith Thornton has been keeping a blog about an experimental retrofit of her old stone house. Image shows CAT graduate and sustainable materials specialist Steve Cole helping with the refurb.

air leaks and heat loss (thermal bypass) between floors. This involves careful attention to joists running through the insulation layer into the cold wall. For a good airtight finish you'll want to fix internal insulation boards over a continuous plaster coat, rather than a 'dot and dab' method (which is prone to thermal bypass).

For both internal and external insulation, detailing at windows and doors is important to stop them being thermal bridges, vulnerable to damp and mould. If the shape of window leaves very little space for insulation, then a small amount of a very thin higher-specification material could be appropriate. For example a composite of plasterboard with high-performance aerogel insulation.

Natural choices

To avoid creating or exacerbating damp problems, breathable natural fibre insulation materials are ideal for solid wall insulation. Options include rigid wood-fibre boards and composites of lime and hemp, cork or other plant fibres. At CAT, we promote these materials for other reasons too.

By using materials with a low embodied energy in manufacturing (compared to plastic foam, for example) we narrow the gap between our energy demand and the amount we're generating from renewable energy, and can phase out fossil fuels more quickly. An additional benefit is that carbon

absorbed from the atmosphere as plant fibres grew will be sequestered within a building for many decades.

Judith Thornton, CAT guest lecturer and *Clean Slate* contributor, has been keeping a blog about her retrofit of an old stone house. She's been adding a mix of lime and miscanthus grass (to see how this does in place of hemp), plus corkboard in the window reveals and a cork-lime plaster in the fireplace. Take a look at our Free Information Service webpages for a link, and for more on these and other natural and low-impact materials.

Examples and resources

Finances can be a barrier, with a big upfront cost needed to unlock future savings. In some areas zero (or very low) interest loans are available, and there are a few local projects giving householders support on working out a retrofit approach that will reduce their carbon footprint and energy bills.

There are a number of trial retrofit programmes that have Government funding to evaluate different approaches. In general, the aim of these projects is to raise the knowledge of householders and building professionals, to link the two groups together and to ensure effective and good-quality refurbishments:

- People Powered Retrofit (Greater Manchester) – Carbon Co-op/URBED

- Futureproof (parts of the west of England) – Centre for Sustainable Energy
- Retrofit Together (London) – Parity Projects
- Warmer Sussex – Retrofit Works
- Oxfordshire RetrofitWorks – Low Carbon Hub
- Homeworks (Cornwall) – BRE

The Mayor of London has also recently launched a 'Retrofit Accelerator' programme for the capital's boroughs and housing associations. Another project is 'Energiesprong', which uses an industrialised model to minimise costs. Buildings are measured and bespoke insulating panels for walls and roof are manufactured offsite. They're concentrating on houses with simple shapes, in blocks or terraces, generally through housing associations and local authorities. [ES](#)

Find out more

For more advice and links on retrofit options see CAT's information service webpages at cat.org.uk/free-information-service.

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 MSc in 2013.

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REFUSE, REUSE, REPAIR AND SHARE –

cutting
the carbon
footprint
of 'stuff'



Second hand is often a better option, but how much better can be hard to quantify.

How can we cut emissions from the things we buy? In the second in a two-part series, **Judith Thornton** compares the effectiveness of different approaches.

In the last issue of *Clean Slate*, I tried to come to some conclusions regarding the total carbon impact of 'stuff'. The end point was that the emissions within UK boundaries were around 1.1 tonnes CO₂e per person across public and private sectors. We should then add to this around 1.5 tonnes CO₂e per person to account for the emissions associated with goods imported into the UK.

This is, at best, a very approximate answer, and it's also one of the reasons why I have neglected to provide a clear definition of what I mean by 'stuff'; I have no wish

to imply any precision. But it's a starting point for those of us who have worked to decarbonise the biggest impacts in our lives (generally home heating, transport and diet) and are wondering where to look for other reductions.

Reducing the impact of stuff – have less stuff

Hopefully this solution is obvious. The fewer material possessions we purchase, the less we contribute to the environmental problems that stem from manufacturing stuff.

So why is that we find this so difficult to achieve in practice? It's easy to blame our surroundings; we live in a society where material wealth is valued and is widely held as an aspiration. But psychologists regard the phenomenon as deeper than that; possession is rooted in our sense of self-identity as well as the fact that our conspicuous consumption acts as a signal to others.

Less stuff means less stuff – beware the eco-bling

Marketers are well aware that saying that



We certainly need some kind of societal shift to combat the desirability of ownership. We are embedded in a consumer society, in which governments and companies require us to continue buying stuff in order to maintain the system. Our response needs to be partly about possessions per se, but also about replacement rates and turnover. This means that we should act to avoid buying stuff wherever we can, keep items in use rather than replacing them, but we also need to be kind to ourselves and accept that we are at least partly constrained by the systems we are surrounded by.

A subset of eco-bling is products that are supposed to reduce our consumption of other products. Reusable coffee cups are an obvious example. What's interesting about these is that they are designed to incentivise you to buy your coffee on the go rather than make it at home. Whereas 10 years ago we'd have had insulated flasks that gave us the freedom to choose when we consumed a hot drink, we are now buying reusable cups that limit our options (e.g. they're not insulated, and the lids aren't watertight).

There certainly are instances where we can buy a product that decreases our environmental impact or use of resources (e.g. rechargeable batteries, low energy household appliances) but it's probably the exception rather than the rule, and is certainly more complicated than simply not buying an object.

Why own when you can share?

If we consider products in terms of what functions or services they give us, it can help us re-assess whether we need to own the product or not.

We already have formal and informal systems of sharing things that we only use sporadically (the public library being an obvious example), but it is worth assessing whether you can expand on these systems, encourage others to join them or improve their functioning. Technologies such as online booking diaries for facilities, or schemes such as freecycle can help. In a similar vein, repair cafes and reclamation projects are becoming more widespread, in order to keep items in usable condition for longer.

On a wider scale, paying for a service rather than a physical asset has been touted as a means by which we could incentivise companies to provide high quality assets, or at least de-risk a decision for the individual;

lease models for electric vehicle batteries are a good example of this.

Reducing disposability

A related issue is designing products for longevity and reducing the overall level of disposability of products. The EU is beginning to legislate in the area of planned obsolescence, the phenomenon of companies deliberately producing products that will fail.

Whilst this is undoubtedly a good thing, we should bear in mind that everything has an optimum lifespan, and excessive longevity is not necessarily a virtue. For example, there is little point in designing a mobile phone that lasts 20 years, because we could reasonably expect that technological advances would render it defunct over a shorter time period.

The same is true of appliances for which we expect energy efficiency to improve – if the energy in use phase of a product life cycle is high compared to the impacts of manufacture, then replacing an old machine with a more efficient or better designed one makes sense.

Kettles are a good example of this – 80% of the life cycle impacts of an electric kettle are in the use phase (i.e. boiling the water), and we routinely boil far more water than is needed. Many kettles are poorly designed in this regard, with visual fill indicators that are difficult to see. If this is true of your kettle, either develop a way of filling it by the correct amount (e.g. leaving a mug next to it and filling from that), or buy a new kettle.

Second hand stuff – better than new, but by how much?

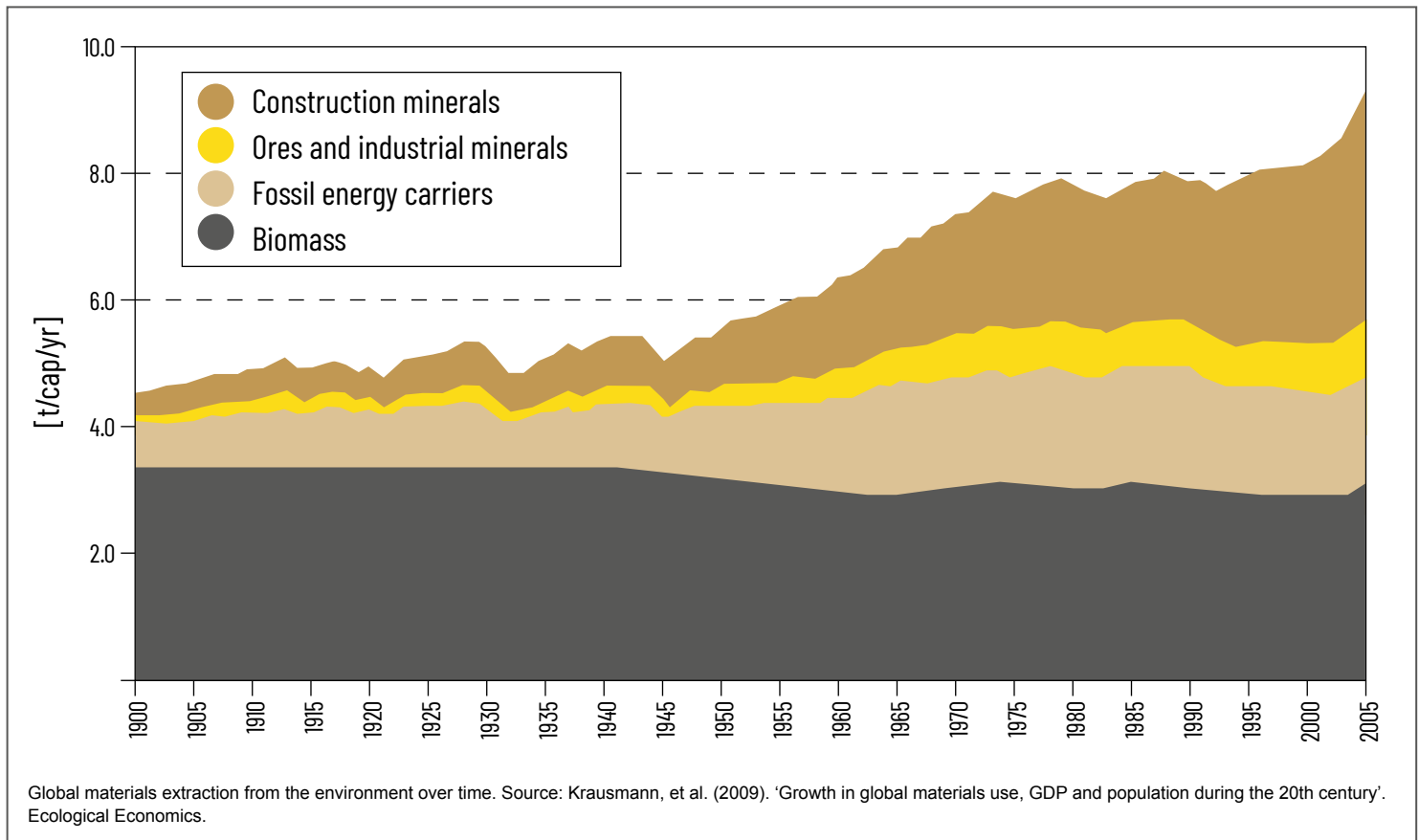
When you do need stuff, buying second hand intuitively seems like a good environmental option. Taken at a simple level, this is undoubtedly true. However, calculating just how much better this is for the environment requires us to know the counterfactual scenario. If we would otherwise buy the same object brand new and the second hand object was otherwise thrown away then the maths are relatively simple (we have a case of 'perfect substitution').

However, this assumption is unlikely to ever be true. In many situations, purchasing a second hand object only partially displaces the production of a new one. For example, if you buy a pair of shoes from a second hand shop, does this stop you buying new shoes,

a product is 'environmentally friendly' is a great way of boosting sales. So how can we cut through the greenwash? A couple of simple tips.

Firstly, the difference in environmental impact between product A and product B is almost always going to be smaller than the simple act of not having the product at all. I surely can't be the only one who has far more reusable shopping bags than I need?

Secondly, who is it that is telling you that a product is environmentally friendly and whose interests are served by you owning their product? Buying nothing is in most cases a much simpler option than choosing between items of stuff that we didn't really need.



or do you simply own more shoes? And what of the person who would have come into the shop an hour later and bought those same second hand shoes, might they now go out and buy new ones instead?

The level of displacement varies hugely between objects of different types. Whilst buying second hand shoes may simply result in you owning more shoes, it's highly likely that if you buy a second hand washing machine it is instead of a new one.

As is usually the case, scientists have studied the complexities of this idea, and a method for determining the environmental savings from second hand goods has been developed by WRAP.

Decarbonising production, and beyond...

In a world where catastrophic climate change is our major concern, the decarbonisation of our energy sources is paramount. Consequently at the moment, a very large part of the environmental impact of our stuff relates to the energy required to produce it. But once we live in a society where our energy is supplied from renewables, we will still have a problem, both in terms of the physical

resources used to produce our stuff, and the environmental impacts of disposing of it. This is particularly the case with a growing population and increasing affluence; the planet cannot support more rich people.

One of the proposed solutions is the Circular Economy. In a Circular Economy, objects are either designed in such a way that their components can be reused in new objects when they reach end of life, or are produced using renewable materials. Whilst the concept makes intuitive sense, it is largely being promoted by companies and institutions invested in selling us stuff, and seems to be descending into innumerate greenwash.

Physical resource flows – what and how much?

A good way of looking at the environmental impact of our stuff is to consider overall physical resource flows. This goes beyond the idea of completely decarbonised energy systems, and takes into account the physical limits of the planet.

For example, the figure above shows analysis of global materials extraction from the environment (i.e. the starting point for resource flows) over time; you can see

that our resource demand has increased significantly since 1900. Clearly, world population has also increased over the same time period, and to take account of this, the authors present the data as our 'metabolic rate' (tonnes of material extraction per person per year).

In this analysis resource flows are divided into four categories: *Biomass* – edible crops, roughage (animal feeds), wood; *Fossil energy* – coal, oil, natural gas; *Ores and industrial minerals* – 80% of the mass of this is tailings (the waste material left over after mineral extraction), with the major extractions being iron (95%) and most of the remainder being copper and aluminium; *Construction minerals* – cement, sand, gravel.

We can see that our per capita use of biomass resources has remained relatively constant. Our use of fossil energy and ores and industrial minerals has gone up a little, but the largest increase has been in per capita use of construction minerals.

Reasons for optimism?

The interesting thing about this analysis is that it suggests that despite a century of industrialisation, rising living standards and increased material goods, resource



Many towns and cities now have Repair Cafes, where you can learn how to fix things rather than throwing them away.

consumption across three of the four categories has not increased by nearly as much as one might have expected. We do seem to be uncoupling resource use from well-being, and the efficiency with which the resources have been used has to an extent kept up with increases in demand.

When we look at the total per capita resource flows since 1900, the big increase is in construction minerals. Since these are relatively easy to reuse and recycle without a deterioration in quality, perhaps we can imagine a future where our extraction of construction minerals (cement, sand and gravel) from the environment goes down.

In the meantime, we are well aware of the impacts of extracting fossil energy carriers

from the environment, and are taking active steps to reduce them. The extraction of biomass resources from the environment is also an area in which we have a relatively good understanding of constraints and options and the rate at which we can extract without conflicting with renewability. In the case of ores and industrial minerals, the part that we're interested in is the metals, which are relatively straightforward to recycle so we can imagine systems in place for this. Does this mean that the problem of resource extraction is solvable?

Perhaps, but not yet...


There are clear limitations with this type of material flow analysis. The tonnage

of materials in each category does not relate to the ease with which we can extract them from the environment, our requirements for small quantities of key resources such as precious metals are not well represented, and the analysis is only the supply-side of the equation, it says nothing about the impacts of anything that we return to the environment.

Per capita consumption tells us nothing about absolute physical limits, and neither does it help us much when we consider the scope for substituting one type of resource (e.g. fossil) with another (such as biomass), or say anything about equity and who gets to use a resource.

Final thoughts

The difficulty with the environmental impact of 'stuff' is that it is made up of so many individual items that it is difficult to know where to start when trying to reduce its impact in our own lives. It is also the case that most of it is beyond our control; we are not in control of whether or not another country producing manufactured goods is decarbonising its energy system, for example. But in terms of what we definitely can do, the most important thing is to calculate your carbon footprint to determine whether or not 'stuff' is a significant part of your impacts. If it is, then you can congratulate yourself on how much you've already done to reduce emissions elsewhere; you are in a minority. In terms of what next:

- Buy as little as possible;
- Avoid owning where you can – share instead;
- Prolong the life of goods wherever possible – repair and reuse things, or pass them on to other people with those skills;
- Do not buy 'eco' products when you didn't need a product in the first place;
- Buy second hand. 

About the author

Judith managed CAT's water and sewage systems for a number of years and was a tutor on CAT's MSc courses. After spells at the Universities of Padua, Cardiff and Leeds, she is now at Aberystwyth University and is a regular CAT guest lecturer. Judith blogs at lowcarbonbuildings.wordpress.com. This article is reproduced there, with links to other information sources.



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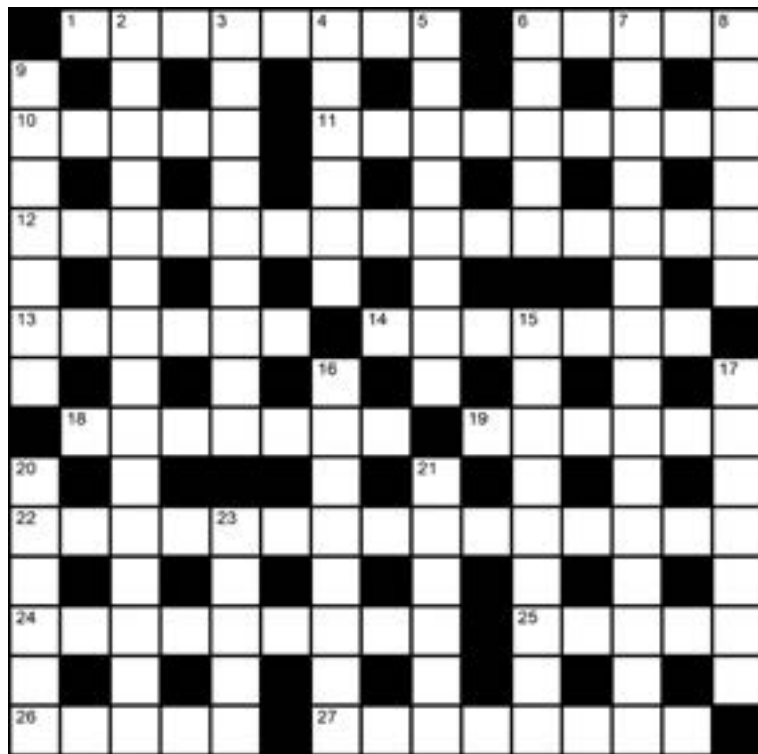


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Cryptic crossword by Brominicks

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

Clean Slate 115 Crossword Winner: Harvey Cox, Southport

Across

- 1 What could warrant an upright purple haircut, say (5,3)
- 6 Scared of American student getting hold of wife (5)
- 10 Welshman told a tall story to Brummie? (5)
- 11 What park-keeper needs a couple of jumpers for? (9)
- 12 See blue blotch transformed by extremely precise instrument (6,9)
- 13 Time spent in local jail gets reported (4-2)
- 14 ... 24 produces a rocky feature? (7)
- 18 Lower water content in drink, extremely likely to get squiffy (4-3)
- 19 Plain set on replacing safety apparatus (6)
- 22 Lacking in sense investigation broadcast the case for rogue (7,8)
- 24 Films iceberg breaking up around South Pole (3,6)
- 25 Wee parrot hit the ceiling (2,3)
- 26 Dryer and brighter but not initially (5)
- 27 PM made up with queen after tense opening (8)
- 5 Having a punch-up, run inside shedding tears (8)
- 6 Upsetting José, Pochettino maintains 'it's what a manager does' (5)
- 7 Resort saw more punters by the end of June! (6-5-4)
- 8 England's last struggles against Australia to get runs (6)
- 9 No.10's upending flashy fellow and dumping small outside left (3,4)
- 15 Low on battery? Ultimately, you'll charge it somehow (9)
- 16 French book about meeting English for a scrap (8)
- 17 Audio equipment picked up group right away (7)
- 20 Artificial ale said to cause anxiety (6)
- 21 Miss article on Nelson the Spanish cut out (6)
- 23 Mini hi-fi fitted here? (2-3)

Down

- 2 Play Oasis record – no don't! (4,4,2,5)
- 3 Large cat made off with quantity of meat (9)
- 4 Where snake hides, figured out in South America? (6)

Clean Slate 115 Solution



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