



Centre for Alternative Technology
Canolfan y Dechnoleg Amgen

Policy Response

Achieving our low-carbon pathway to 2030

*A response from the
Centre for Alternative Technology (CAT)*

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Centre for Alternative Technology (CAT)

A response to the consultation: Achieving our low-carbon pathway to 2030

1. Introduction to the Centre for Alternative Technology (CAT)

The Centre for Alternative Technology (CAT) is a world-leading charity promoting solutions for sustainability. CAT covers all aspects of green living: environmental building, renewable energy, energy efficiency, eco-sanitation, woodland management and organic growing.

From its base in Mid Wales, CAT undertakes a range of education and research activities, all aimed at raising environmental awareness and facilitating effective action.

These include:

- A visitor centre that provides information, advice and inspiration to visitors from all over the world.
- The Graduate School of the Environment, with a range of postgraduate degrees in environmental architecture, renewable energy, sustainable food and natural resource management.
- Residential and one-day courses for the general public, as well as more in-depth training for builders, engineers, electricians and plumbers wishing to specialise in sustainable technologies.
- Curriculum-based education to visiting schools, colleges and universities, as well as educational outreach, including teacher training and school visits.
- A free information service answering enquiries on all aspects of sustainable living.
- A successful volunteer programme for those that want to gain hands-on experience.
- CAT's flagship research project, Zero Carbon Britain, looks at how we can get to net zero greenhouse gas emissions using technology available today.

2. Introduction to our response

We welcome the Welsh Government's commitment to action on climate change, and are broadly in agreement with the types of measures identified. However, the evidence demands more ambitious targets. CAT would like to see the Welsh Government adopting a target of net zero greenhouse gas emissions before mid-century in order to show the ambition needed to lead the world in effective action on climate change.

3. Question 3: Overall, to what extent do you agree with the potential actions for reducing emissions set out in this document?

3.1 Raising ambition – aiming for net zero

The Centre for Alternative Technology (CAT) welcomes the Welsh Government's commitment to urgent action on climate change. Wales and the UK led the world into fossil fuel use, and have a moral duty to show global leadership in addressing the challenges that this has created.

There is an increasing level of consensus amongst climate scientists that – if we are to stay within the internationally agreed 'safe' limit of 2 degrees C global temperature rise above post-industrial levels, and to aim to keep this within 1.5 degrees – we must aim for net zero greenhouse gas emissions globally by 2050.

The UK Government now recognises that a target of 80% cuts in greenhouse gas emissions by 2050 will not be enough to help us stay within 'safe' levels of global temperature rise, and will soon inform the UKCCC to explore a target of net zero emissions. CAT's 'Zero Carbon Britain' research has shown how this can be done using technology available today – without relying on the promise of future technologies and without investing in new nuclear (Centre for Alternative Technology, 2013).

The Welsh Government can show leadership by aiming to reach net zero greenhouse gas emissions on a faster trajectory – as has been done by the Swedish Government, with their cross-party commitment to cutting net carbon emissions to zero by 2045 (Swedish Government, 2018).

Whilst recognising the special challenges for Wales acknowledged by the UKCCC, we would like to see more ambitious targets with a detailed cross-sector roadmap showing how these targets will be achieved.

CAT's latest report, *Raising Ambition: Zero Carbon Scenarios from Across the Globe*, brings together zero- and low-carbon models that demonstrate how deep decarbonisation or net-zero greenhouse gas emissions can be achieved before the second half of the century using existing technology, whilst also supporting social or economic development (Centre for Alternative Technology, 2018).

3.2 Equity

Throughout the plan there should be more emphasis on equity in terms of climate justice to avoid the impacts of climate change affecting the most vulnerable in society.

3.3 Potential actions for reducing emissions

The key areas in the consultation document are similar to those covered by CAT's Zero Carbon Britain research, and many of the suggested emissions reduction measures are in line with our recommendations (albeit the evidence demands faster, more ambitious action). We are pleased to see the integrated multi-sector approach suggested by the Welsh Government.

- **Power**

- The suggested target of 70% electricity from renewable energy by 2030 is laudable. However, we would like to see a stronger commitment to investment in renewable energy, with a particular emphasis on off-shore and on-shore wind. We would recommend a target of 100% renewable electricity by 2030, together with a clear roadmap on how this will be achieved. Scotland has already achieved 54% of gross electricity consumption from renewables (2015) and are aiming for 100% of electricity demand from renewables by 2020 (Scottish Government, 2018).
- Whilst the cost of renewable heat and power are expected to reduce over the next decade they still need support to ensure the volume to reach cost reductions. Whilst the Welsh Government do not have direct powers for financial support of renewables, supporting small and medium sized companies involved in the development, construction, installation and maintenance of these and storage equipment is key. We would like to see a clear indication of this support.
- We welcome the commitment to local ownership of renewable energy. Community ownership can be a powerful way of helping encourage positive public attitudes towards renewable energy, and allowing a rapid scaling up of installed renewables – as has been seen in Germany and Denmark, for example (Barton *et al.*, 2015). This and other ways of overcoming barriers to action on climate change are explored in CAT's *Zero Carbon Britain: Making it Happen* report (Centre for Alternative Technology, 2017).
- We would like to see a firm commitment and a clear timeline for phasing out coal power as soon as possible.
- We welcome the suggestion of a moratorium on gasfired power stations.
- CAT's research shows that we can reach net zero greenhouse gas emissions without new nuclear (Centre for Alternative Technology, 2013).

- **Transport**

- We welcome the suggestion of an expansion in publicly available ev charge points to help reduce range anxiety.
- Whilst improving emissions from buses and taxis is an important measure, we were disappointed to find very little detail/commitment to improvements in public transport, particularly in creating a joined up public transport system.
- The commitment to biofuels may be counterproductive in that they perform very poorly in terms of energy return on energy invested. For example, wind and hydro power are around 20-30 times better in terms of energy return on investment than biofuels, and photovoltaics are three times better than biofuels (Hall & Day, 2009).
- The planning system is key to identifying and developing low carbon mobility conscious developments. The primary question of where developments take place can impact community place, transport and economic options. A clear commitment to this is not evident within current planning guidance and practice.

- **Buildings**

- We particularly welcome the suggestion of developing a long-term, evidence-based residential retrofit programme. CAT's Zero Carbon Britain technology scenario shows that, on a UK level, we need a 50% reduction in energy demand from buildings, alongside other measures (Centre for Alternative Technology, 2013). High standards for new builds are helpful, but the vast majority of today's buildings will still be in use in 2030, and beyond. Retrofitting our poorly insulated, draughty, damp housing stock should therefore be a top priority, helping address both environmental and health issues. CAT's 2017 report, *Zero Carbon Britain: Making it Happen*, looked at different models for how this could be financed, including the Dutch Government-supported 'Energiesprong' model of whole-house refurbishment (Centre for Alternative Technology, 2017).
- When looking at both retrofit and new build, we need to consider the types of materials and components used. Ideally we would choose materials that have low embodied energy and carbon, materials that store carbon (such as wood or hemp) and materials that have been and/or can be recycled.
- The current system of energy minimisation in the planning and building control process is easily circumvented. It is important that developers show a genuine buy-in to the commitment outlined in the paper.

- **Agriculture**

- We were pleased to see the inclusion of agriculture and land-use in the consultation document, as these are essential to reaching net zero greenhouse gas emissions.
- Agricultural greenhouse gas emissions can be dramatically reduced through changing the mix of foods in our diet: less meat, more fruit and vegetables, pulses and starchy foods (such as pasta, bread and potatoes). These proposed dietary changes would have positive health outcomes, reducing levels of obesity and diet-related diseases (Centre for Alternative Technology, 2014).
- Reducing how much beef, lamb and dairy we eat not only reduces greenhouse gas emissions significantly, but also frees up large amounts of both grassland and cropland (*ibid*).
- Reducing the amount of food wasted on the farm, throughout the supply chain and at home would greatly reduce food production burdens, and hence greenhouse gas emissions (*ibid*).
- We recognise the cultural implications of any proposed changes to Welsh agricultural, as well as the challenges and opportunities provided by Brexit. However, bold action is needed. We would like to see behaviour change programmes to facilitate healthier, more sustainable food choices, combined with changes to farming support mechanisms to favour low-impact agricultural production.

- **Land use and forestry**

- We welcome the inclusion of land use and natural sequestration in the low carbon pathways planning. Whilst this should never be seen as a substitute

for reducing energy demand through energy efficiency measures and replacing fossil fuels with renewable energy, it is a vital part of the picture in attaining net zero greenhouse gas emissions.

- CAT's recently published report, *Raising Ambition: Zero Carbon Scenarios from Across the Globe*, which examined 130 zero- or low-carbon scenarios, found that only those models that included sequestration through changes in land-use were able to reach net-zero (Centre for Alternative Technology, 2018).
- Wales can become a steward of the land not only for sustainable agriculture, healthy diets, tourism and recreational uses, but also for carbon management.
- We therefore welcome the commitment to increasing afforestation.
- Afforestation programmes must be delivered in a way that protects and enhances biodiversity, providing wild spaces where nature can flourish and where people can have the opportunity to reconnect with the natural world.
- CAT offers training in sustainable woodland management as well as an MSc Sustainable Food and Natural Resources, which could help to provide training and expertise for new entrants into this area.
- The use of timber in construction to 'lock-in' carbon has been an important aspect of CAT's message and training programmes for many years. We welcome Welsh Government support for utilising this and other low-embodied-energy materials.
- We would welcome more detailed information on strategies and plans for the protection of peatlands.

4. Question 4: Please tell us if you have any ideas for how we should deliver the potential actions for reducing emissions.

4.1 Zero Carbon Britain: Making it Happen

CAT's 2017 report *Zero Carbon Britain: Making it Happen* explores the barriers to action on climate change, and how these can be overcome, looking at the challenges for key sectors and exploring solutions from psychology, behaviour change, economics, finance, communications and governance (Centre for Alternative Technology, 2017).

Examples of policy mechanisms that could be adopted/supported by Welsh Government include:

- The introduction of low and zero interest loans for home energy improvements;
- Support for zero carbon projects and community energy through local or municipal banks and citizen finance;
- A 'polluter pays' principle, which would ensure that the costs of environmental damage are no longer externalised;
- Taxes on unsustainable options across all sectors, with the money raised being ring-fenced for investment into financing renewable energy, retrofit programmes, and investment in ecological public health;
- Delivering clean air zones in cities;
- Introducing congestion charging and road pricing to reduce car journeys;

- Reducing subsidies for livestock and increasing environmental subsidies and training programmes to help livestock farmers to grow a wider variety of protein sources and diversify their income away from animals alone.

4.2 Learning from zero carbon models from across the globe

CAT's new 'Raising Ambition' research offers vital international perspectives. We have collated the work of hundreds of researchers around the world who have developed both snapshots and deep visions of possible climate-stable futures at the global, regional, national and sub-national scales. The report takes an in-depth look at 18 case studies, and maps over 130 scenarios, drawing on cutting-edge modelling work for net zero, deep decarbonisation, and up to 100% renewable energy (Centre for Alternative Technology, 2018).

4.3 Carbon literacy programmes

There is the potential for a roll out of a basic Zero Carbon Literacy training programme across Wales. CAT is currently exploring collaborations with Manchester's 'Carbon Literacy' group to develop such a programme. The Carbon Literacy Project offers people a day of Carbon Literacy learning: climate change, carbon footprints, how you can do your bit, and why it's relevant to you and your audience (Carbon Literacy Project, 2018).

More than just small, personal changes, Carbon Literacy highlights the need for substantial change and supports individuals to have a cascade effect on a much wider audience – whether it's in their workplace, community, school, university, place of worship, or other setting.

CAT welcomes engagement with Welsh Government to explore how we can offer this training to everyone who lives, works or studies in Wales.

4.4 Skills development

To create the radical changes that are required to get us on a zero carbon trajectory, a skilled workforce will be needed who can roll out renewable energy and retrofit projects and a transformation in agriculture at the required speed and scale.

There is the potential to create thousands of green jobs across the Welsh economy, but we will need to train a new generation of engineers, architects, builders and growers, equipping them with the skills and knowledge to implement solutions.

CAT specialises in education for sustainability – providing professional training courses for engineers and installers, and offering postgraduate degrees in a wide range of sustainability subjects, including sustainability and adaptation, architecture, energy, food and natural resources. In 2019 we are launching new Masters programmes in behaviour change for sustainability, green building and ecology. We attract students from within Wales and from across the world, and our graduates go on to have a significant impact in roles across government, industry and civil society.

Through this education and training, CAT can play a key part in helping Wales deliver on its climate change commitments.

4.5 Collaborative work

There is the potential to explore collaborative work with Greater Manchester, building on the SCATTER (Setting City Area Targets and Trajectories for Emission Reduction) tool. Developed in partnership with the Greater Manchester Combined Authority (GMCA), The Tyndall Centre and Anthesis Group, and funded by BEIS, the tool supports cities across the UK to set emission reduction targets and to define appropriate pathways to achieve them (Anthesis Group, 2018).

The implementation of the model has been piloted by Greater Manchester and will support their vision to develop an ambitious science-based carbon reduction target as part of becoming a leading Green City.

4.6 Planning policy and implementation

We welcome the requirement on all local authorities to identify targets and suitable areas for renewable energy and the strengthening of policy objectives of reducing travel by private vehicles. We would like to see a clear plan of how these are to be financed and supported as most local authorities do not have in-house expertise in renewable energy planning, for example.

4.7 Behaviour change

Understanding how and why people behave the way they do is critical to decarbonisation goals. Change needs to take place at all levels – personal, societal and structural – and all of these need to be integrated to effect the best possible interventions. CAT is developing a Masters course around behaviour change for sustainability in order to develop the skills to identify and carry out the most suitable policy interventions.

5. Question 5: What other ideas do you have for reducing emissions between now and 2030?

CAT's Zero Carbon Britain: Rethinking the Future provides a technology scenario showing how net zero greenhouse gas emissions can be achieved using technology available today.

Zero Carbon Britain: Making it Happen explores the social, cultural, psychological and economic barriers to change, and looks at how these can be overcome.

We would welcome the opportunity to work with the Welsh Government to explore the solutions that would best work for Wales.

6. Question 6: Considering the opportunities and challenges in each sector, what are your views on whether action should be prioritised in some sectors over others?

To achieve net zero greenhouse gas emissions, integrated action across all sectors will be required. Looking at issues or sectors in isolation runs the risk of missing opportunities or creating problems elsewhere. A whole-system approach is the most effective response.

Having said this, stopping burning fossil fuels as soon as possible (particularly a clear roadmap to phasing out coal), replacing these with renewable sources, rolling out a nation-wide housing retrofit programme, and protecting natural sources of carbon sequestration such as peatlands, soils and woodland are key priorities.

7. Question 7: How could we encourage more collaboration and innovation between sectors?

CAT's Zero Carbon Britain team have been involved in a number of 'Convergence' events, which bring together those working on food, diets, transport, housing energy and arts to share ideas and multi-solve. Our eco-centre in Mid Wales offers an ideal location for such events.

We recommend that multi-solving should become a vital part of all zero carbon scenario development in Wales, acting as a tool to identify and optimise co-benefits, and helping build coalition across a range of sectors.

The shift to zero carbon holds the potential to be one of the most exciting opportunities in human history. Whilst there are clear challenges, there are also huge opportunities to develop net zero pathways that also offer solutions for adaptation, resilience, employment, health, wellbeing, economics and natural systems, as well as for achieving our agreed Sustainable Development Goals.

8. Question 8: How do you think the potential actions to reduce emissions might affect you or the organisation you work for?

As an environmental charity with a significant existing investment in renewable energy, CAT's operational energy requirements are already in tune with the ambitions of the consultation.

However, with additional investment CAT could be an independent source of support to individuals, communities and industry in achieving their zero carbon aims. CAT could provide the exemplar of best practice for Wales and beyond, becoming an embodiment of the 'Power down – Power up' strategy, by illustrating what the best in building design, sustainable retrofit and smart energy management can deliver, matched with a showcase for blended on-site and grid based renewables.

CAT's Graduate School of the Environment currently enrolls around 150 Masters students a year, offering training in the energy, sustainability, design, construction and food sectors,

and has the capacity to double this number in the next few years. This can provide a critical mass of trained postgraduates in Wales that can work within public and private sectors to help deliver sustainability targets.

However, we also recognise that training and educational gaps are wider than just the postgraduate market. We aim to expand and share our expertise, acting alongside schools, colleges and universities in a coordinating role to provide an environmental education pipeline from primary schoolchildren through to university study.

Our engagement team currently offers a range of well received and successful training activities to a variety of communities, from school groups wishing to understand more about sustainability to individuals wanting to retrofit or build new homes. Our environmentally ethical reputation allied to our network of education providers and environmentally conscious groups, means that we are well placed to coordinate and deliver a suite of activities designed to train, encourage and support the societal behavioural changes that will be needed to realise and embed the ambitious carbon emission reduction targets outlined in the consultation.

9. Question 9: How do you think the potential actions to reduce emissions might affect the following?

9.1 Public health:

CAT's Zero Carbon Britain work highlights many of the co-benefits that action on climate change could bring. In terms of public health, there are multiple potential benefits:

- Changes to the food system to make it more environmentally sustainable can also help change people's diets to bring them more in line with dietary guidelines. Our *People Plate and Planet* report looks at the benefits in both health and climate impacts from changes in diet (Centre for Alternative Technology, 2014).
- Retrofit programmes to improve the energy efficiency of Wales's housing stock could help people out of fuel poverty and reduce the incidence of ill-health relating to cold, damp, mouldy homes.
- Policy and fiscal mechanisms that encourage and facilitate walking and cycling over car use have obvious benefits in terms of increased exercise.
- Air pollution in cities, linked to increased morbidity and mortality rates, can be reduced by: cutting car use through increasing support for walking, cycling and using public transport; providing infrastructure for electric vehicles; ensuring buses and taxis meet stringent pollution standards.

9.2 Communities:

Low-Income communities are disproportionately exposed to climate impacts, whilst being less responsible for the levels of emissions that cause it, as their lifestyles tend to be less carbon heavy.

CAT's *Zero Carbon Britain: Making it Happen* report highlights the benefits for communities of locally owned renewables, including reduced energy bills, increased energy awareness, energy advice for those at risk of fuel poverty, the use and development of local skills and

expertise, improvements to energy efficiency of local buildings using dividends from renewable energy, and greater local energy self-reliance (Centre for Alternative Technology, 2017). There is the potential for much more substantial growth in community energy if ambition is increased.

Through the work of CAT, Bro Ddyfi Community Renewables, Energy Local, ReNew Wales, TGV Hydro, etc. Wales has amassed a great deal of experience in community ownership. This needs a framework to be scaled up and rolled out at scale. Wales would then be well placed to take this expertise out to the rest of the world.

9.3 The Welsh language

The Welsh Government should guarantee, through appropriate funding, that language is not a barrier to action on climate change. We recognise the cultural implications of any proposed changes to Welsh agriculture as well as the challenges and opportunities provided by Brexit. Consultation events need to encourage and welcome contributions made through the medium of Welsh and English, using simultaneous translation if there is sufficient demand. Where there is sufficient demand and suitably qualified Welsh speaking trainers, training should be provided through the medium of Welsh as well as English.

9.4 Equality

To gain wider engagement and social licence, there is an urgent need for the zero carbon transition to embrace a shift in economic ideology away from an outdated economic model that has exacerbated environmental problems and inequality towards a fairer and more ecologically sustainable economic paradigm.

CAT's *Zero Carbon Britain: Making it Happen* report explores equality as both a co-benefit and a tool for building support (Centre for Alternative Technology, 2017).

9.5 Children's rights

This is deeply embodied in the Wellbeing of Future Generations Act. The commissioner and her team must be fully supported and well-resourced to play an active part in the zero carbon transition for Wales.

10. Question 10: How do you think the potential actions to reduce emissions might contribute to achieving the national well-being goals?

The national well-being goals and the Sustainable Development Goals must play a key part in enabling the zero carbon transition, and should form a significant element of a national zero carbon literacy programme.

10.1 A prosperous Wales

- There is the potential to create thousands of green jobs across all sectors in Wales – from renewable energy engineers to architects specialising in zero carbon homes.
- Through its practical training courses and specialist Masters degrees, CAT can help provide this workforce with the necessary skills and knowledge to meet the climate challenge.

- Investment in community renewable energy schemes can help generate income at a local level, keeping fuel bills low and ensuring that income is ploughed back into the Welsh economy.

10.2 A resilient Wales

- The measures are designed to help combat climate change in a way that enhances biodiversity and supports local communities. To build in a higher level of resilience, we would recommend a stronger commitment to reaching net zero greenhouse gas emissions before mid-century.

10.3 A healthier Wales

- Low carbon options can help reduce rates of overweight and obesity, helping combat diseases of over-nutrition such as heart disease, diabetes and some cancers (Centre for Alternative Technology, 2014).
- Changes to the food system to increase environmental sustainability of agriculture and food production can also help improve the nation's diet, decreasing calories from meat and dairy products and increasing those from fresh fruit and veg and starchy foods (*ibid*).
- Changes to transport infrastructure to facilitate an increase in walking and cycling over private car use offers the potential for increasing rates of exercise, helping create a healthier Wales – whilst also reducing illnesses from air pollution (Centre for Alternative Technology, 2017).
- Action to improve the energy efficiency of Wales's housing stock can help reduce the number of people living in cold, damp housing – reducing rates of respiratory problems, respiratory infections, allergies and asthma. It is estimated that cold homes cost the NHS £1.3 billion every year by causing or exacerbating cold-related illnesses (Washan et al., 2014).

10.4 A more equal Wales

- A national retrofit programme designed to make all housing energy efficient will help pull thousands of people out of fuel poverty.
- Community ownership of energy can reduce energy prices and create more equitable access to the means of production (Centre for Alternative Technology, 2017).

10.5 A Wales of cohesive communities

- Community groups across Wales are developing practical, positive examples of the zero carbon transition, ranging from waste food cafés to community energy schemes. While many of these community-scale projects are small, they empower and connect people, give people a sense of agency and help normalise sustainable behaviours.
- Government support is needed for community action on carbon in the form of a long-term strategy and the provision of necessary resources.

10.6 A Wales of vibrant culture and Welsh language

- There is the potential to build a stronger economy, capitalising on identity, culture, heritage and natural resources. The story of Llynwgwern Quarry, where CAT is located, is the story of Wales – the story of an industrial nation reclaimed. Once the greatest exporter of fossil fuels in the form of coal, today Wales is leading the way with its ground breaking Well Being of Future Generations Act.

- We have plans to increase our visitor numbers by developing a renewed high quality sustainable tourism product focused on engaging the public and educational audiences with green technology and sustainable living. There will be opportunities to partner with businesses to showcase sustainable technologies. As part of these plans we will showcase the relationship between Welsh industrial history and the new, green industrial revolution, reinforcing the landscape and culture.

10.7 A globally responsible Wales

- Along with the rest of the UK, Wales has a moral duty to lead the world into a post-carbon future. We benefited from being one of the first countries to experience the industrial revolution and now have the opportunity for substantial social, economic and environmental benefits by leading a green revolution. Wales's climate ambition needs to reflect this moral imperative.

11. Question 11: Do you have any other comments about this consultation?

We would welcome the opportunity to explore potential solutions with Welsh Government.

CAT's Zero Carbon Britain research reports are available to download at <http://www.zerocarbonbritain.org/en/zcb-publications>

Zero Carbon Britain: Rethinking the Future (2013)

Integrates detailed research on managing the variability in supply and demand of a 100% renewable energy system, and on balancing our land use requirements to provide a healthy low carbon diet.

People, Plate and Planet (2014)

Adapting the model developed for the scenario in *Zero Carbon Britain: Rethinking the Future*, CAT's *People, Plate and Planet* report details the impact of various dietary choices on health, greenhouse gas emissions and land use today.

Zero Carbon: Making it Happen (2017)

Explores the barriers to getting to net zero greenhouse gas emissions and how these can be overcome. Working within an interdisciplinary framework, the report brings together thinking from researchers working in psychology, sociology, political science, economics and other social sciences, as well as faith and spiritual practice, arts and culture. Drawing on a wide range of peer-reviewed journals, books, reports and articles, as well as stories from real-life projects, it explores ways that we can overcome barriers in innovative ways.

Raising Ambition: Zero Carbon Scenarios from Across the Globe (2018)

Brings together an international range of scenarios exploring climate-stable futures at global, regional, national and sub-national scales, offering an in-depth look at 18 case studies of scenarios, drawn from 130 scenarios modelling net zero, deep decarbonisation, and up to 100% renewable energy.

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