



ZEROCARBONBRITAIN2030 for Teachers

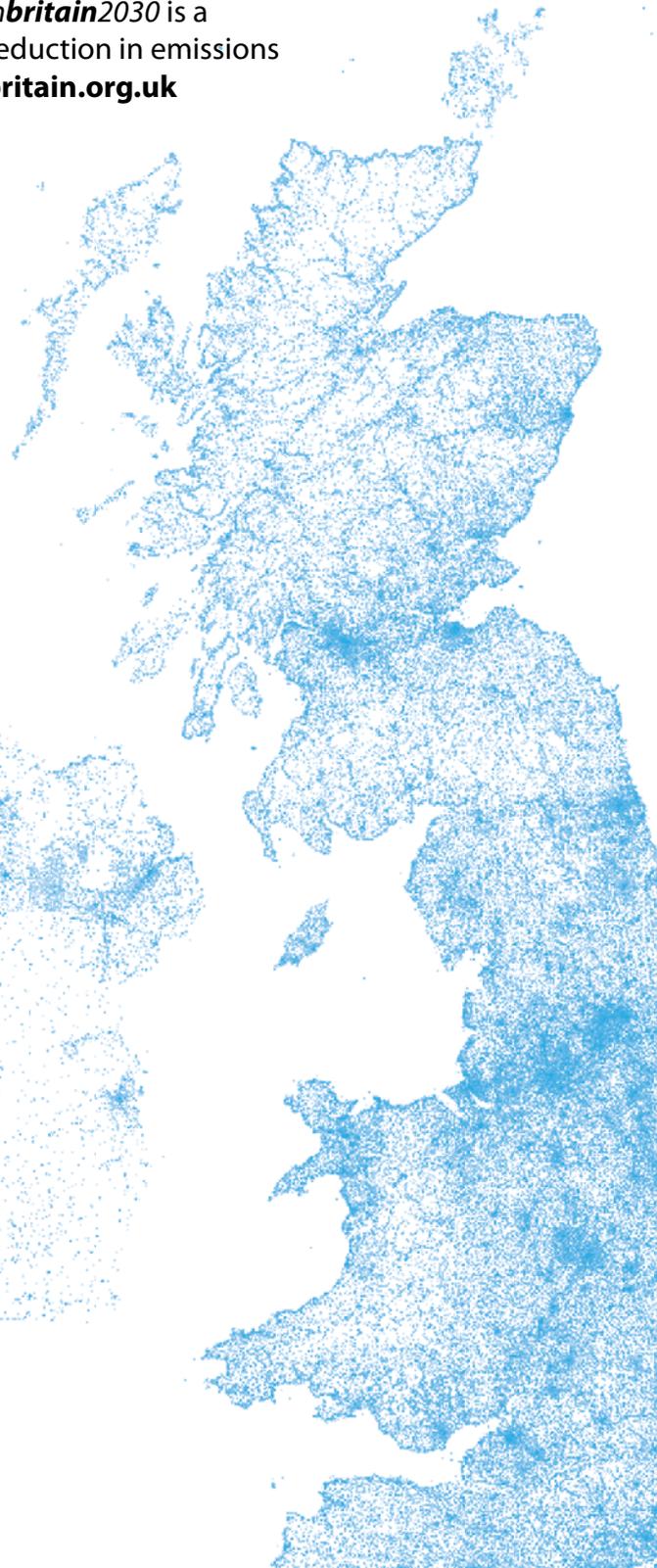
What is *zerocarbonbritain2030*?

There is a global recognition that decarbonisation is necessary. The UK government has already committed us to an 80% reduction in emissions by 2050. The Welsh Assembly's targets are similar but at 3% reduction per year. Welsh Assembly government ministers recognise this isn't enough. *zerocarbonbritain2030* is a technical scenario, showing how the UK could make a 100% reduction in emissions by 2030. You can download a free copy at www.zerocarbonbritain.org.uk

- It looks at a 20 year horizon.
- It is an information tool for policy makers.
- It is the first fully-integrated solution to climate change, that assimilates the energy, transport, built environment and land-use sectors of society.
- It takes carbon dioxide, methane and nitrous oxide emissions into account, the three main greenhouse gases.
- There are many ways to get to zero – this is CAT's vision for a sustainable future.
- It suggests only technology that is currently technically available.
- It has been written by CAT in partnership with universities, NGOs and industry leaders.

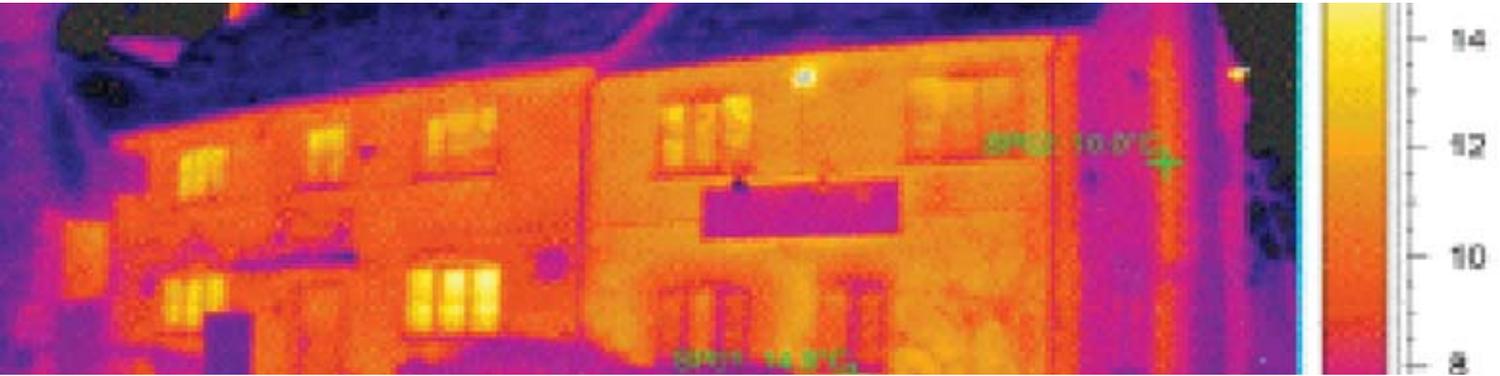
Why is it necessary?

- **Climate change** is already having devastating effects across the world, most notably in developing countries that do not have the resources to adapt.
- **Peak Oil** - We have used up about half of our global fossil-fuel reserves, and demand will soon be greater than supply.
- **Energy security** – Since the collapse of North Sea oil and gas reserves, the UK is now a net importer of energy much of it coming by pipeline from Scandinavia and Russia.
- **Economic stability** – in 2008 Britain spent £14 billion importing energy.
- **Global equity** – Britain has been emitting greenhouse gases for 150 years, since the start of the industrial revolution. As one of the richest nations in the world Britain has the money, technology and responsibility to help lead the way out of the industrial age, and into a renewable energy future. This will allow developing nations more time to cut emissions and benefit from developed nations' technological knowledge.



powerdown

Firstly, we need to go on a carbon diet. We can reduce our total energy use by over 50% in the following sectors:



Built Environment

- New buildings need to be built to the highest standards of energy efficiency.
- Building materials need to have low embodied energy - natural building materials such as wood, rammed earth, lime and hemp use much less energy to produce than materials like fibreglass insulation and concrete.
- Plant materials like timber and straw also play a role in 'sequestering' (locking up) carbon into the building.
- 80% of the buildings we have now will still be here in 2050. We need a massive refurbishment programme to provide insulation, draft proofing and double glazing to bring old buildings up to high energy efficiency standards.
- Energy Service Companies (ESCOs) will change the way we pay for heating our homes by providing a service rather than a product.

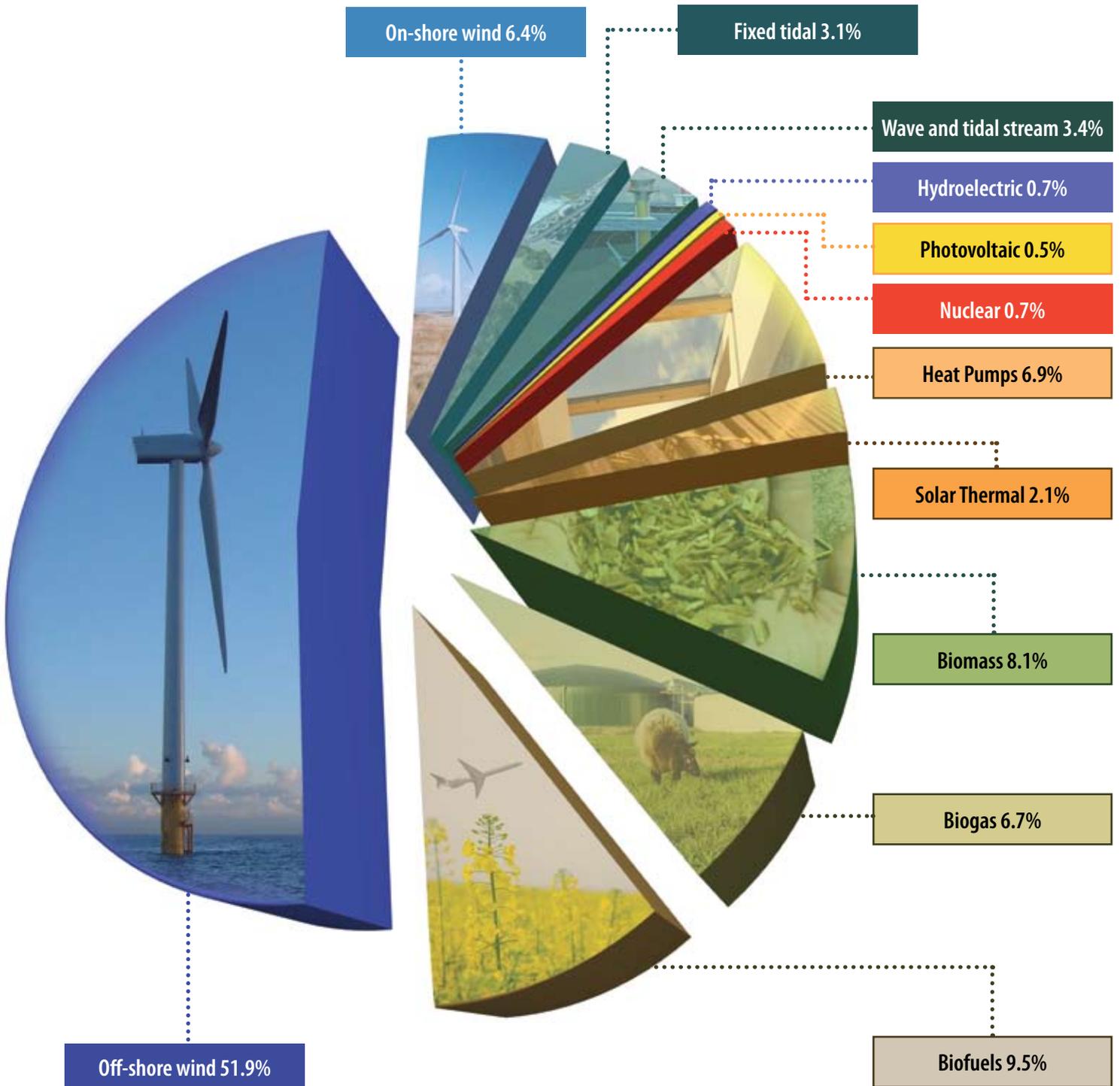
Transport

ZCB2030 recommends:

- More cycling and walking and better public transport facilities to make it easier for people to drive less.
- Electrification of the transport system – buses, cars, trains and motorbikes will all run off electricity.
- Agricultural vehicles, HGV's and ships (that cannot be run on electricity) should run on bio-diesel, made from plant based fuels, grown in the UK.
- There should be no domestic flights but aviation could continue at a third of today's levels, powered by bio-kerosene, made from plant-based fuels, grown in the UK.
- Land to grow these energy crops be freed up through a change in diet (see Land Use section).
- High speed rail will improve national and international travel.



After reducing energy use it becomes possible to replace existing fossil fuels with renewable energy. By far the greatest contribution would come from offshore wind, which would supply about 50% of Britain's total energy for electricity, heat and transport combined. However, we will need to produce about twice as much electricity as we do today in order to make up for fossil fuels used for heat and transport.



Energy Demand

- Off-shore wind - potential offshore wind reserves are 6 times our total energy use.
- Heat pumps are electrically driven pumps which use the low temperature, solar heat naturally stored in the ground and reverse-fridge technology, to pump heat into our homes.
- Anaerobic digestion - plant crops are 'digested' in big tanks without oxygen, which produce methane which can be used for heat and electricity generation. Their residues can then be used as natural fertiliser.
- In addition there would be a smaller amount of on-shore wind, hydro, tidal, solar electric and solar thermal.
- A small amount of marine energy has been included reflecting what is currently available but it is likely that this industry will continue to grow as Britain has a huge offshore resource.
- We have left small amounts of nuclear power in the scenario to reflect the phasing out of current production. We have not included any new nuclear or carbon capture and storage (CCS).

Energy Management

- The national grid is in need of overhauling, so the new grid should be designed intelligently to manage the variable nature of renewable energy sources.
- We would need a more intelligent way of managing energy which would include smart meters and micro-grids in some situations.
- Anaerobic digestion tanks can be used to store energy and release it when there is extra demand.
- A European high voltage direct current (HVDC) grid is needed to link up renewable resources and allow us to trade electricity with Europe. This would allow us to sell surplus energy and help manage variability.



landuse

Land management is very important. Land is needed to produce most of our food, sequester greenhouse gas emissions, and provide crops for energy and building resources, as well as continuing to be a habitat for our precious wildlife. The way it is being managed at the moment causes 18% of Britain's greenhouse gas emissions.

Food

- Most of the food we need can be produced within Britain. We would anticipate less imported food – about 7.5% from the tropics and 15% from within the EU. We still want our coffee, wine and chocolate!
- We would need to reduce the amount of dairy, beef and sheep products we produce by 80%. This is because of the methane and nitrous oxide emissions associated with ruminant animals, which cannot be reduced to near-zero in any other way.
- A very large amount of grazing land would be freed up by reducing, sheep, beef and dairy production. This land would be used for growing more vegetables, cereals and fruit crops.
- Rates of pork, poultry and egg production would be only slightly lower than today. As pigs and poultry are non-ruminants they do not produce large amounts of methane. They would be fed largely on crop surpluses and food wastes. There would be no need for imported feeds.
- The partial reduction of livestock products and increase in crops of many kinds will encourage healthier diets as well as improved food security.

Fertiliser

- Biomass crops need less nitrogen fertiliser and therefore foment much lower nitrous oxide emissions than grazing land. Nitrous oxide is 300 times more powerful a greenhouse gas than CO₂, and is the largest component of present-day agricultural emissions.
- The small quantities of nitrogen fertilisers required in Zero Carbon Britain would be made from carbon-neutral resources. Much of the fertility would be generated by 'organic' systems and by careful recycling of nutrients.
- Natural fertilisers such as compost, manure and residues from anaerobic digestion plants would return carbon and other nutrients to the land, building up the long-term health of the soil.



landuse

Energy

- Land that isn't needed for food could then be used for perennial biomass crops of various kinds – mostly grasses (energy crops like miscanthus) and trees.
- These crops would have many functions in the zero-carbon economy. Some will be used for energy in the form of bio-methane to back up the electricity system; some as liquid fuels for heavy goods vehicles, ships and aviation; some as solid fuel for heating and electricity production.
- There are no first-generation 'biofuels' in the scenario. There are no oil-crops or sugar/starch crops dedicated to energy production. The biofuels used would be grown in the UK from woody plants and grasses, using the Fischer-Tropsch process to turn them into fuels.

Sequestration

- Bio char added to the soil would act as a carbon sink
- As today, there would be many protected areas maintaining biodiversity and special habitats. Potential reservoirs of greenhouse gases also need to be protected, such as peat-bogs and forests.
- Plant materials used in buildings also store carbon

Resources

- Some of the crop products would be used as feedstock for chemical and other industries, replacing fossil fuels.
- The only arable biomass crop grown is hemp, mostly used for building materials, with a sequestration credit.

World of Work

The transition to a zero carbon Britain can drive investment and jobs in industry and provide a revitalisation of the rural economy.

- This scenario would see an increase of hundreds of thousands of new jobs, particularly in the land use, engineering, and building sectors.
- At peak build time, up to 300,000 jobs could be directly involved in off-shore wind.



To find out more, download a free copy of the report , or refer to the 'frequently asked questions', please visit www.zerocarbonbritain.org.uk

If you would like to book related activities, talks or training for your pupils or staff please contact education@cat.org.uk 01654 705983.