

Sustainability Committee

SC(3)-05-07 (p3): 11 October 2007

Sustainability Committee Inquiry into Carbon Reduction in Wales

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October 2007

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Accelerated Carbon Reduction in the light of Recent Climatic Research :- Global and UK Context

The terms of the Climate Change debate are changing rapidly and have major policy implications.

The UK government deserves credit for its role in the formulation of the Kyoto Protocol. It demonstrated even greater commitment by adopting the recommendations of the Royal Commission on Environmental Pollution of a 60% cut in CO₂ equivalent by 2050. Now in UK legislation, this represents an accepted benchmark target and is generally ahead of the other developed countries.

The Stern Review of 2006 was based on the same assumptions in respect of the climate science. Coming from an economist, it was admirably forthright ("climate change is the greatest market failure in history") and it mapped out a plausible programme for change at a cost of less than 2% of GDP per year.

Most debate within the UK policymaking community is based on the understandings contained in these documents. They raise eyebrows, but do not rock the boat.

Unfortunately these understandings have already been superseded.

More recent findings from the climate science community have confirmed the existence of powerful feedback effects in the climate system. Evidently there exist very large reservoirs of greenhouse gases (GHGs) in the oceans, in biomass, in soils, and in arctic tundra. These are presently inactive, but can be released by a warming of just 1°-2° C, which is exactly what humanity's emissions are set to provide in the next decade or so.

Once these natural reservoirs start to release their contents, an unstoppable mutually-reinforcing process will begin that will almost certainly take the global temperature as far above today's level as an ice-age is below it.

A further feedback effect concerns the melting of polar ice. Ice reflects solar energy efficiently back into space and helps keep the global temperature down. As the ice melts, darker land underneath reflects less energy, contributing to rises in temperature that will melt more ice, and so on.

Taken together, these two classes of feedback put human GHG emissions in a completely different light. Up till now we have supposed that the degree of climate change was approximately proportional to anthropogenic emissions, minus absorption by certain natural sinks such as the oceans and tropical forests. We were free to set generous and rather fuzzy targets for the ultimate levels of GHGs in the atmosphere. (The RCEP/UK Government/Stern Review level was 550ppm) and it gave reasonable time to respond without fundamental changes to the structure of modern economies or the tenor of modern life.

The recognition of feedback effects changes this model completely. We must now view anthropogenic emissions as merely the 'detonator' of a much larger 'climate bomb'. It is imperative that the detonation point is not reached, because after that the process will be self-deteriorating and the climate systems will be committed to 'runaway' effects; human emissions will be irrelevant.

According to our reading of the definitive Fourth Assessment Report of the IPCC, this new understanding implies a reduction of global emissions to essentially zero within at most twenty years.

Let us repeat that: "Zero within twenty years".

If this comes to be accepted as the physical reality that has to be dealt with, the policy implications are of a completely different order from those we have only just become used to. The "do" rock the boat. We would be talking of an emergency war-style transition in which ordinary politics and economics are, to some degree at least, suspended. If this really became necessary, it would be better that we had a few years to prepare for it, and undertook it in a planned and controlled fashion rather than have it forced on us suddenly by

world events.

In our report "ZeroCarbonBritain" we attempt to outline what this transition might mean for Britain as a whole. The report identifies the necessary targets and describes (by way of illustration) one of many possible strategies to get there. The key elements are:

Maximum diplomatic pressure for a global agreement on an action plan for climate safety

Acceptance of 'contraction and convergence' as a global framework for reduction of GHG emissions

A cap on UK emissions declining gradually to zero

Harnessing of market forces to drive a 'race out of carbon'

Allocation of Tradable Energy Quotas to ensure fair access

'Power down' of primary energy demand through systematic efficiency improvements

'Power up' of low-carbon energy sources.

Among the implications of the strategy are the following:

Gradual changes in personal behaviour as emission quotas decline

Unprecedented development of new energy infrastructure

A highly electric economy involving both a strengthened national grid and a great deal of local generation

Particularly intensive development of marine energy resources including wave, wind and tidal.

Householders and business enterprises intimately involved in energy load management

Transport shifting largely to electric propulsion, and serving as an energy storage medium

Rapid shift to new zero-carbon buildings

Comprehensive retrofits for existing housing stock

Shortening of supply chains, and re-localisation of supply for many goods, especially food

A substantial reduction in livestock, and increase in bio-energy fuels

Changes in the appearance of the landscape

Effects on biodiversity, both positive and negative

Changes of diet

It is both terrifying and exciting, but we believe we have shown that in principle it can be accomplished safely while leaving the essential institutions of British culture intact

What might this mean for Wales?

Let us candidly admit that in terms of the normal conduct of public affairs here in Cardiff, and in ordinary homes throughout the Principality, the implications of our work are completely off the radar. This does not release us from the obligation to call attention to them, but we have to think how, practically, they can best be carried forward—some kind of adaptor-plug between present-day reality and the other reality that we believe is just around the corner.

We understand of course, that at least for a while there will be no extra money to actively pursue these issues. Perhaps a start can be made by altering or extending the terms of reference for those bodies within Wales already charged with addressing the implications of a low-carbon economy. Hitherto their brief has been to articulate a model based on the outdated assumptions behind the Kyoto Protocol or the Stern Review. Understandably, they choose 'reasonable' targets such as 'how to shave off ten percent here and there without upsetting anybody' or 'how to achieve 20% penetration of renewables in the electricity supply mix'. These were appropriate under the old dispensation and these groups have done excellent work, but now need to roll up their sleeves and explore the implications of the new paradigm. The Assembly Government should firmly instruct them to do so.

Alternatively, or perhaps as well as, some kind of 'Zero Carbon Wales' forum or institute should be formed, where the new assumptions and their implications for Wales can be debated in somewhat protected spaces without the need to trim constantly to political, bureaucratic or media agendas. The new forum would explore what an emergency transformation of Wales would look like once it became obvious that such a transition was necessary.

After all, it might "not" be necessary. There is a possibility that the general trend of worsening news from the climate scientists will go into reverse and we'll find things are not so bad after all. Some incredible new source of energy might be found, low-carbon but cheap and plentiful. Some clever scheme for capturing and locking away CO₂ from the atmosphere might be discovered. Yes, there might well

be 'silver bullets' of this kind. But it would seem prudent to plan for what now appears to be the scientists' best guess rather than sit on our hands and hope that it will all go away.

'ZeroCarbonWales' has to start from the overall UK context, but Wales has a distinctive contribution to make. It could for example

Be a net exporter of electricity. It could develop its enormous marine resources of tidal, wave and wind energy. Just as the tiny Danish Island of Samsø (population 4300) exports more energy than it uses, so can Wales.

Pioneer new patterns of land-use, combining production of biomass and building materials, waste treatment, carbon sequestration and habitat creation with food production. There will be enormous new opportunities for farmers to provide new products and add value .

Use its traditional manufacturing and engineering skills to invent, design and produce the wide range of new equipment required. It doesn't all have to go to China. Denmark has a similar population to Wales and still dominates the wind turbine market.

Become the principal retraining centre for ZeroCarbon Britain. There are going to be enormous skills gaps that will need to be filled quickly in building, architecture, household services, heavy and light engineering, food technology, materials processing, electricity supply systems and so on. Welsh colleges and universities could be Europe's teachers.

Transform its universities into new centres of excellence in research on low-carbon systems, in the physical, biological and social sciences

Explore new kinds of settlement and community life, drawing on a long history of collective solutions and community solidarity

Encourage new low-carbon lifestyles, both among well-off 'early adopters' and culturally pliant 'downshiffters'

Find inspiration in its awkward geography for more sustainable patterns of mobility. The vehicles of Zero Carbon Wales will gradually switch to electric propulsion, but private mobility will be expensive. What other ways shall we find of getting about, or of not having to get about so much?

Inspire its SMEs to create new products and services, especially in ICT and the knowledge-economy

Become Europe's principal destination for eco-tourism, without aeroplanes. Wales will be the place for low-carbon festivals such as Presteigne's electric bike Grand Prix.

Create new symbioses between urban and rural Wales, with much greater localisation of food production and distribution.

WAG should not hide behind its as-yet limited powers. True, Wales could only operate a Zero-Carbon strategy in the context of Zero-Carbon Britain, and Britain itself can only operate within the context of Europe and indeed the world. If China, India and the USA do not join a global zero-carbon transition, then of course all bets are off. Some would say this is the most likely outcome, but it would be unforgivably cynical to do nothing on the grounds that this is a foregone conclusion. The world is going to need courageous or foresighted, 'first mover' countries or regions to take unilateral action even in advance of a global agreement. It would be ridiculous to say 'Wales can save the world', but somewhere has got to make a start. Why not us?

Carbon Reduction in Welsh Residential Sector

Using its devolved planning powers, in many ways the WAG is ahead of prevailing UK carbon reduction standards in the building sector. However, in the context of the radical assumptions described above, the principal driver will be the reducing caps on carbon quotas. Households and businesses would be highly motivated to 'get out of carbon'. Probably the planning system could then become a positive, enabling force, rather than the restrictive, inhibiting force it is widely seen to be. It would proactively foster low-carbon development and conversions and help householders, builders and developers find optimum solutions. Planning officers might become heroes.

"ZeroCarbonBritain" envisages a twin-track strategy of 'powering down' energy demand and 'powering up' renewables. In the housing sector the 'powering down' side of the equation is far more important, and in the case of Wales would be matched by a national 'powering up' of marine renewables. The 'Merton Rule' of 10% on-site renewables has been stimulating but does not need to be adhered to in the context of a truly radical transition plan. Having said this, in particular circumstances there might well be opportunities for building-integrated energy generation, and solar water-heating would be mandatory in all new buildings and in suitable retrofits.

Financing of the envisaged changes is admittedly problematic and we offer no particular analysis or solutions at this stage. At the very least there would be huge economies of scale.

Here we summarise some of the features of the transition to a Zero Carbon Wales as they affect the residential sector.

There would be a 2-3year national debate regarding the necessary response to a zero-emission requirement. During this period the WAG should encourage as large a range as possible of very low or zero-emission buildings in order to 'learn by doing' so that all active parties would gain experience and accumulate the monitoring data necessary to scale up the process effectively. This could possibly be done by a series of WAG-sponsored competitions, both for individual buildings and larger developments

The largest task would be upgrading the existing housing stock, which would be both expensive and disruptive—but absolutely necessary. This would be complemented by demolition-and-replacement, and a considerable programme of new dwellings. Near-zero-emission heating is feasible with new-build but virtually impossible with older buildings. To give an idea of the scale of activity, in very

round figures we estimate that every year for twenty years there would be:

20,000 new homes

20,000 old dwellings demolished and replaced

100,000 old dwellings refurbished.

Obviously this would be disturbing, but would also be refreshing and rejuvenating, giving a chance to rethink some of our moribund settlements. A common pattern might be to build, say 100 exemplary new units adjacent to an existing settlement (a Valleys terrace for example), move a similar number of households temporarily into the new buildings and refurbish their old homes, after which they would be able to move back. Then another group would take their turn, and so on, until all the local stock had been brought up to standard. The 'new' houses would then be available for permanent occupation.

Tackling groups of buildings together would permit the installation of collective and more efficient systems like district heating, CHP, biofuels or shared heat pumps. In fact both in new developments and refurbishments every opportunity should be taken to promote collective solutions that can be 'wired in' to make them accessible and convenient. This will hold strongly in the case of transport, often ignored in supposedly green developments. If residents are offered an efficient car-share scheme for example, they might use it for long enough to learn how to use it, overcome old attitudes, and be persuaded of its superiority. New settlements should address the entire carbon-emissions spectrum of a community, not just housing energy.

Careful monitoring during the early stages of a local stock-renewal process would provide necessary corrective data for continuous improvement. Plenty of work for building inspectors and academics—and for students needing some real problems for thesis work.

The Planning system might have to learn new habits and ditch some Holy Cows. No longer would decisions hang on the right quality of slate cladding: there are far bigger fish to fry. Demolish-and-rebuild would be a frequent best option. Offsite fabrication and 'Modern Methods of Construction' would often be the best option and a completely new aesthetic would have to be accepted. 'Tradition' and 'Vernacular' would be minor considerations, just as landscape values would often change in the power-up aspect of the strategy. The distinction between brownfield and greenfield sites might be less important: many greenfield sites would emerge as good for zero-carbon buildings and might actually benefit in terms of local biodiversity. The use of electrically-powered heating systems such as heat-pumps might appear counterproductive until the supply system has been fully decarbonised, but should be regarded as necessary investments.

There are going to be enormous skills gaps in many aspects of design and construction. Lack of training facilities could delay projects or compromise their quality. The Wales Institute for Sustainable Education in Machynlleth is designed to address these gaps but many more will be needed throughout Wales. It is important that these centres are not merely ivory towers but involve active partnerships with developers, contractors, architects, planners and manufacturers of materials.

In conclusion, we would like to see the WAG and the Local Authorities in Wales develop a comprehensive plan for transition to a Zero Carbon Wales, as if it were necessary. In ten years time we will probably know whether or not it was indeed necessary, but unfortunately by that time it might be too late. At the very least we would like to see it on the agenda for active discussion

The UK government has signalled that new dwellings should be 'zero-emissions' by 2016. Using its devolved planning powers, WAG plans to do much better than this. But what is a zero-emission building? We think there should be national standards defined in terms of measured emissions. SAP and BREEAM ratings are widely used, but we would prefer

The 40% house. This is plausible.

New zero-emission buildings. AECB standards, silver, passivhaus, gold.

Retrofits

Extremely difficult under normal circumstances

Need to get people out, do it, then move back. Expensive.

Need for temporary accommodation which will later serve as permanent and demonstrate new pathways.

This needs to be well-prepared. Like compulsory purchase it needs to be firm, but it can be done in a civilised fashion. Some buildings better demolished. The public purse: need to explain to everyone what is going on. It's like a war.

Need to redefine what is a Greenfield site.

New settlements that address the entire lifestyle-related emissions spectrum

Smart meters, beyond smart meters, cunning meters

Inspiring models for different segments of the community

Bypassing the building industry - factory houses, offsite fabrication, MMC

Post-occupancy evaluation

More inspectors

Involvement of forward-looking developers

Merton rule? Yes, but not beyond 10%. Concentrate on reduction and support larger-scale RE initiatives.

Seek to encourage solutions that work at neighbourhood level. Car share or 'white car' systems. Cycling as a short-range alternative. Electric-assist bikes as a medium-range. Presteigne has the Grand Prix.

DH and CHP, like at CAT. Llanwddyn. Development of bio-energy crops and heating systems.