

Carbon reduction trajectories: the Scottish story

In this essay, I imagine a world where a few countries (Scotland among them) have attained a 80% reduction in their greenhouse gas emissions in 2050 from a baseline of 1990 emissions. Given Scotland's achievement in reaching this target a national representative has been asked to speak at a World Carbon Forum in 2050 to inspire those present, many of which have fallen short of their targets on greenhouse gas emissions reduction. The world in which the speech is being delivered is one where dangerous climate change has been unleashed, albeit that the full impact of this has yet to be experienced. Scotland is, therefore, still going to be subject to global climate change despite its reduction achievements.

Ladies and gentlemen, I am delighted to have been asked to contribute this virtual gathering to provide an account of how Scotland has, almost uniquely among developed countries, significantly reduced its greenhouse gas emission levels. Our journey has not been an easy one, nor is it any comfort to have attained our goal at a time when world emissions have risen by such an extent that the scientific consensus is that dangerous climate change has started and will accelerate in future years. Despite this, I believe that our own journey has many important lessons for others, who are still seeking to reduce emissions despite our current situation. Indeed, the impetus to reduce emissions becomes more pressing because of the changes that we are starting to experience.

If I had to choose one word that best describes the impetus for our journey to a low carbon¹ economy I would use the term resilience.² The way we achieved our reduction target was to focus on what would make a resilient society that could absorb and adapt to what has become an increasingly turbulent world (both in physical and social terms). While the creation of an economy, ecology and society with greater resilience had many aspects, three components stand out. These are: the role of technology; the importance of individual and collective behaviour change; and changes in culture, values and expectations. I will briefly address each of these areas in turn.

Some of the decarbonisation of Scotland arose from the evolutions and revolutions that took place in technologies used to generate energy, move goods and people around the country, produce food and operate the likes of our water infrastructure. We used new technologies as they became viable and, in many instances, supported research and development to ensure viability was enhanced.³ In doing this we backed some 'losers', that is, some technology created unintended adverse consequences (with the first generation of biofuel technology being an example) or did not contribute to de-carbonization as much as we had anticipated. The early estimates of the cost curves for greenhouse gas reduction⁴ were helpful, but in the early days we

¹ The term 'carbon' is often used as a shorthand refer to greenhouse gases, of which carbon dioxide is the largest element. Greenhouse gases, however, are often measured in terms of carbon equivalent impacts and hence the shorthand of carbon is often used.

² Resilience refers to the ability to recover from or resist adverse effects of (for example) a setback or disease. An example of conversations about resilience can be found at <http://resilienceblog.blogspot.com/>.

³ For example the support provided to the European Marine Energy Centre test facility on Orkney.

⁴ See, for example, "A cost curve for greenhouse gas reduction", The KcKinsey Quarterly, number 1, 2007.

tended to believe the priorities they indicated. Over time we came to realise that if we waited until all the economic signals and incentives were in place then we would not move fast enough. Given climate change had been described as ‘the greatest market failure’ we have experienced,⁵ we knew that we had to (wherever possible) shape the market to achieve our objectives. For us, given our geography, the longer term ‘winners’ were tidal, solar (once the technology improved in about 2025) and heat pumps. We made many small scale and some large scale technological innovations to achieve our objectives in this area.

Towards the end of our journey we gained more knowledge about what the most powerful next steps were in terms of the physical bits of technology. More importantly, however, we thought about technology very broadly. In particular, we didn’t limit our focus to electricity generation technology, transportation innovations or such like. Rather, we believed that ‘social technologies’ had a huge role to play. This sort of technology encompassed the rules we use to make decisions, the models of thinking that we typically adopted in Government, the taxation approaches we used (with the move in 2017 to a ecological tax base⁶ being a key turning point) as well as how individuals and groups interacted with each other to pursue Scotland’s carbon purpose.

We tried to innovate with regard to decision making in particular, involving wider groups of people in longer and more extensive discussions. This approach also resulted in a sea change of attitudes of the populace towards the political process. Early on we created a virtual parliament that was accessible to all, our political leaders became respected and trusted and we hot-housed them through a series of active ecological, economic, social and cultural think tanks. In short, our democracy became more democratic. This was very effective in helping to develop partnerships that delivered the second and third component of our journey.

At the outset of our journey we knew that technology change alone would not take us to the 80% reduction that we knew was necessary. For example, we had the technology to produce energy from wind but were witnessing high levels of resistance from many communities to have wind clusters or wind farms sited near to them. We also knew that just because it made great economic sense to install further layers of insulation in roof spaces it didn’t mean that people would do it. As a result, a big part of our success is down to individual and collective behaviour change, with collective behaviour change being by far the more important of these two.

Early in 2009 we witnessed a series of movements that came from groups of citizens joining together to support and empower each other in moving towards lower carbon lives. There were many layers of formality to these movements, from the transition movement⁷ to carbon rationing action groups.⁸ These movements were supported by

⁵ See Stern, N. (2006), *The Economics of Climate Change: The Stern Review* (Cambridge University Press: Cambridge).

⁶ A google search on ecological tax reform yields many sources of information. Professor Paul Ekins is one of the UK’s leading writers on this topic, but many other individuals and organizations have considered this topic as well.

⁷ See <http://transitiontowns.org/Main/HomePage> for more information. The transition movement is focused on asking the following question: "for all those aspects of life that this community needs in

the Government but their activities were not prescribed by Government which resulted in a huge array of social experiments that were and continue to be as diverse as Scotland's people. A focus on low carbon lives, we believe, unleashed creativity on a grand scale (and a step change in resource productivity). This was not new to us as a nation. Scotland has long been the birthplace of ideas that rocked the world, we went back to what we had been good at and adapted it for contemporary challenges.

In addition, all aspects of life were affected. Food was often the focus for thinking about carbon impacts. For example, the now internationally famous 'Fife Diet'⁹ pioneers started a wider movement that spread throughout Scotland. This approach to eating really took off when Rangers and Celtic football teams agreed to eat a 'Glasgow Diet' (of course this diet is now synonymous with healthy, low carbon eating but in the early part of the century this was not the case). Given that world population has reached 9.5 billion, we now eat a largely vegetarian diet, with meat being eaten sparingly, but with great relish. We also started buying products that locked up carbon and supported further carbon reduction in Scotland, for example, by buying hardwood furniture made in Scotland from timber grown in Scotland.¹⁰ We also paid very particular attention to our land use policies to ensure that carbon was sequestered in soils and carbon rich soils were protected from adverse changes that would cause them to release carbon. Likewise, rethinking how to achieve the mobility (without having to own the means by which mobility was achieved) became important and led to car clubs¹¹ flourishing. We also integrated waste and energy policies from the outset.¹² These examples also provide a link to the final element of the Scottish carbon enlightenment, that of the importance of culture in achieving our goals.

In the early part of this century society was driven by culturally embedded values that based self esteem on the level of consumption that an individual could attain. Values in Scotland have evolved since that time so that many individuals' sense of value arises from their relationships with the friends, family and their local, global and virtual communities. While everyone still consumes in order to meet their needs, consumption is seen much more as a means to an end rather than an end in itself. This was a crucially important element of the transformation and one that was (like many aspects of behaviour change) generated from within the populace. We believe that if one could reliably measure 'gross domestic happiness'¹³ then Scotland is currently a happier place than it once was, in spite of the global challenges that we are facing.

Of course, while we are proud of our achievements there is no room for complacency for three reasons. First, we did not make this journey alone. Rather, we had the

order to sustain itself and thrive, how do we significantly increase resilience (to mitigate the effects of Peak Oil) and drastically reduce carbon emissions (to mitigate the effects of Climate Change)?"

⁸ See <http://www.carbonrationing.org.uk/> for more information.

⁹ More information on the Fife Diet can be found at <http://fifediet.wordpress.com/>.

¹⁰ See Woodschool Ltd in the Scottish Borders for an example of this type of activity - <http://www.woodschoolltd.uk/>.

¹¹ Rather than own a car, car clubs provide a structured way to access motor vehicles on a pay as go basis. For a Scottish example of a car club see <http://www.citycarclub.co.uk/>.

¹² For example, see http://www.sd-commission.org.uk/pages/scot_zero_waste.html.

¹³ An extensive discussion of gross domestic happiness can be found at http://en.wikipedia.org/wiki/Gross_national_happiness.

support of many others. The most significant partnership was between ourselves and India and their infusion of technological and cultural knowledge to us was critical. Second, there was considerable conflict and compromise on the way to achieving greenhouse gas reductions and we lost a proportion of our population to emigration. Of course we also attracted people to us (and, indeed, some Scots are coming home more recently) but we can't and don't discount the loss we feel about not being able to take everyone with us. Third, collectively we are living in a time of profound change, given the broader carbon performance of the globe. Like many of your own countries we have had to adapt to more severe winter storms, to more flooding, coastal erosion and also rising sea levels. We limited the effects of some of these impacts by banning building in high risk areas (some 20 years before the actual impacts were felt), progressively investing in strengthening our infrastructure and making a managed retreat from vulnerable coastal locations. This was still a painful experience, especially as we lost many historical sites on coasts (for example, many of you will remember the sorrow at the last British Open played in St Andrews).

Our minds are now turning to how we can play a role in the world going forward and we hope that there are many layers on which we can assist. Perhaps most obviously, we can contribute a wealth of knowledge about how a low carbon economy can be achieved. We have a huge amount of technical know how in low carbon technologies but more importantly we have a broad and deep appreciation of the social and cultural aspects of moving to low carbon living.

At the same time we have a limited, but still significant ability to provide a home to more climate change refugees (having already taken some 580,000 allocated to us by the World Climate Change Migration Programme). We are able to meet much of our need for food in a low carbon manner but still trade with the rest of the world for those things that we cannot grow locally. We are able to heat our homes and move about in low carbon ways as well. Perhaps more importantly, as part of broader social change we have more experience in living with change and accommodating the needs of others when those changes happen. We believe that we are more resilient as a result of this and hence are in as good a shape as anyone can be for what the future may hold.

Like everyone dialing in today, we do not know what lies around the corner as the earth systems go through tipping points. Our best scientific brains are unable to tell ahead of time what new systems equilibriums (or indeed dis-equilibriums) we will be living with. What we do have, however, is an understanding of how the human social systems can evolve to cope with whatever environmental, economic or social shocks arise. We have not got all the answers for all societies at all time. Our journey worked for us (eventually) but it may not be possible or ideal for everyone: our template for change will need regional and cultural adaptation. What we have, however is the confidence, courage and (here is that word again) resilience to find ways to live, live well and live well with others in this chaotic world we have made for ourselves. In closing, our message to you is that a combination of technological change, behaviour change and cultural adaptation will provide a platform for building a low carbon and hence more sustainable society.

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Acknowledgements: Comments are gratefully acknowledged from Eoin Cox, Hugh Raven, Maf Smith, Georgina Stutchfield and Rehema White. I am also indebted to Tim O’Riordan for sharing his thinking with me on pathways to sustainability, this has strongly informed elements of this essay.