

Living within environmental limits: From science to practice

SGR conference and AGM, 4 October 2014

Halton Mill, Halton, Lancaster, UK

Summary by Paul Marchant and Stuart Parkinson

About 65 people attended SGR's 2014 conference and AGM in October. The event took place in Halton Mill – SGR's new home – an eco-renovated industrial building, part of the award-winning Lancaster Cohousing development. The Executive Director, Dr Stuart Parkinson, welcomed participants to both the Annual General Meeting (see below) and the conference sessions. The main conference session was chaired by Dr Jan Maskell, SGR's Vice-chair, while the AGM was chaired by Dr Philip Webber, SGR Chair.

The case for urgent and radical carbon emission reductions

The first main speaker was Dr Maria Sharmina, Research Fellow at the Tyndall Centre for Climate Change Research, University of Manchester. The speaker presented work carried out with colleagues Dr Alice Bows-Larkin and Prof Kevin Anderson.

She began by pointing out that decisions made now on reducing carbon emissions will determine how much we will need to adapt to future climate change. The earlier and faster we reduce carbon emissions – the action termed 'mitigation' – the less adaptation will be needed later on. The UK signed up to the Copenhagen Accord in 2009 to make a contribution to *"...hold the increase in global temperature below 2 degrees Celsius, and take action to meet this objective consistent with science and on the basis of equity"*. A temperature rise of 2°C above the pre-industrial level has been accepted by policy-makers as a threshold between 'acceptable' and 'dangerous' climate change. Nevertheless, some of the effects of a 2°C rise are likely to be very serious: widespread mortality of corals; increased risk of extreme weather events; increased water stress and wildfire frequency; and hundreds of millions of people suffering coastal flooding. A graph of global carbon dioxide emissions over time showed that the annual emissions have almost doubled since the early 1980s to 35 billion tonnes per year, despite a flurry of international climate change negotiations between 1992 and now. Emissions urgently need to be curbed. Current policies and trends are in line with 4°C-6°C rise by 2100, which is a very dangerous prospect.

Dr Sharmina then stressed the inertia of changing major infrastructures, e.g. power stations generally last for up to 50 years. Buildings, pipelines and electricity networks now could last for 30 to 100 years. Therefore it is important to act now to put in place low carbon systems. However, it is important not just to think about energy supply but also the demand side as this is where near-term emissions reduction will come from. It is possible for the UK (and others) to make the necessary changes. The Committee on Climate Change, the government's advisory body, has stated that *"To keep ... global average temperature rise close to 2°C ... the UK [must] cut emissions by at least 80% ... the good news is that*

reductions of that size are possible without sacrificing the benefits of economic growth and rising prosperity.” However, some Tyndall Centre researchers do not agree that economic growth will be unaffected. Wealthy countries like the UK need to make rapid reductions and even undergo a period of ‘planned austerity’, so that poorer countries can increase their emissions as they develop and improve human welfare.

If the world does miss the 2°C target and allows a 4°C increase, the consequences would be dire. The hottest days in Europe would see an increase of more than 8°C. There is likely to be a 40% reduction in maize and wheat yields in tropical regions and a 30% decrease in rice yields in south Asia. There is a widespread view that 4°C would be disastrous and be incompatible with an organised global community. In short, adaptation would not be possible. Eco-systems would be devastated and the climate system would be highly unlikely to remain stable if ‘tipping points’ are crossed.

But not all people would need to reduce emissions, as it is estimated that 40%-60% emissions come from just 1%-5% of the world’s population. Therefore it is these groups of high-emitting people who need to be targeted immediately.

One route to the reduction of carbon emissions is through increased energy efficiency. Dr Sharmina used the example of a domestic fridge in order to work back through all the losses in the systems; from extracting the fuel, through the electricity generation and supply to its use. A loss factor of about 13 was derived.

She questioned the conventional notion of ‘growth’ concluding that economic growth itself has no meaningful value. She stated that a sum of money similar to the billions given to fix the banks through quantitative easing could reduce fuel poverty (in over 5 million homes), reduce energy bills, reduce vulnerability to volatile energy prices, provide mass skilled and semi-skilled employment, as well as to reduce emissions and increase resilience to a changing climate. In order to meet the commitment and requirement of keeping the temperature rise below 2°C we need to be candid about the timeframe. Major changes need to start happening immediately, with the UK (and other industrialised countries) needing to achieve reduction rates for carbon emissions of at least 10% per year. We need to escape the dogma of price/finance as the principal mechanism for delivering 2°C. We must acknowledge that it is just the initiative and courage to reallocate wealth to bring about a low-carbon society that is needed. We must avoid 4°C at all costs. The UK and the rest of the wealthy countries need to decarbonise their economies by about 70% over the next decade.

In summary:

- It is only a small percentage of the global population need to change behaviour radically.
- Low carbon energy supply cannot deliver early reductions in industrialised countries.
- The principal response must be to reduce energy demand now.

We must escape the shackles of a twentieth century mind-set if we are ever to resolve

twenty-first century challenges. This will demand leadership, courage, innovative thinking, engaged teams and difficult choices.

The powerpoint slides of this presentation are available at:

<http://www.sgr.org.uk/sites/sgr.org.uk/files/SGRconf14-Sharmina-radical-carbon-reductions.pdf>

How can we live well within natural limits? Case studies of 'one planet living'

The second main speaker was Sue Riddlestone OBE, Chief Executive of BioRegional, a registered charity specialising in sustainability issues.

She began her talk on One Planet Living by pointing out that if everyone on Earth consumed resources at the same level as the UK, we would need three planets to cope. This was followed by a graph showing how the planetary resource requirements have increased over the last 40 years. Then a bar chart showed the vastly different per capita burdens imposed in different countries through their lifestyles; the United Arab Emirates and the USA requiring the equivalent of about six Earths, yet many poor countries, e.g. those in Africa, only require a small fraction of one Earth.

However what is required is a world where we can live happy, healthy lives within its natural limits and only take our fair share of the world's resources, leaving space for wildlife and wilderness. A good living for 7 billion within our planet's limits is possible but those demanding too much of the Earth need to change. This is the idea behind One Planet Living.

She described the BedZED (Beddington Zero Energy Development) eco-village in south London, where she lives, whose design and construction was based on strong sustainability principles. The aim of the project, which provides 100 homes, was to make it easy to do the right thing and difficult to do the wrong thing; e.g. cars are not encouraged with 0.6 of a parking space per unit and by having narrower roads that encourage cycling.

Follow up has shown that those living there report a high quality of life and a strong community sense. The village has significantly lower use of energy for heating (77% lower than local average), and electricity usage (45% lower than local average). Water consumption was reduced (58% lower than local average) and there was a lower rate of car ownership with annual mileage reduced by 64% compared to national average. Further lifestyle changes arise through the strong sense of community, including high recycling rates (60%) and largely sustainable food choices. Overall, personal carbon emissions were 71% less than the national average.

The ten principles behind One Planet Living are:

1. Zero carbon - Making buildings more energy efficient and delivering all energy with renewable technologies.
2. Zero waste – Reducing waste, reusing where possible, and ultimately sending zero waste

to landfill.

3. Sustainable transport – Encouraging low carbon modes of transport to reduce emissions, reducing the need to travel.
4. Sustainable materials – Using sustainable healthy products, with low embodied energy, sourced locally, made from renewable or waste resources.
5. Local and sustainable food – Choosing low impact, local, seasonal and organic diets and reducing food waste.
6. Sustainable water – Using water more efficiently in buildings and in the products we buy; tackling local flooding and water course pollution.
7. Land use and wildlife – Protecting and restoring biodiversity and natural habitats through appropriate land use and integration into the built environment.
8. Culture and community – Reviving local identity and wisdom; supporting and participating in the arts.
9. Equity and local economy – Creating bioregional economies that support fair employment, inclusive communities and international fair trade.
10. Health and happiness – Encouraging active, sociable, meaningful lives to promote good health and well-being.

BioRegional encourages organisations and communities to adopt the One Planet Living principles by following a three-stage process for their implementation:

1. Gathering information;
2. Development through workshops, from which an action plan is devised;
3. Implement the plan and report its progress annually.

One Planet Living projects have been adopted by 17 organisations and communities in the UK and across the world. The London borough of Sutton in which BedZED is situated has signed up to One Planet Living. Internationally, there are projects in the United Arab Emirates, Brazil and Tanzania, with some linked to the UN Sustainable Development Goals.

One Planet Living activities have also been taken on by the company B&Q. They sell products which can reduce a household's 'eco-footprint', e.g. recycled plastic loft insulation and household renewable energy technologies. It is estimated that there is the potential for a 10% customer eco-footprint reduction. The company itself plans to reduce its own carbon emission by 90% over the period 2007 to 2023.

In summary, in order to live within environmental limits, given the current global population, we need to reduce our personal consumption-based eco-footprint and One Planet Living can put us on the right path.

The powerpoint slides of this presentation are available at:

<http://www.sgr.org.uk/sites/sgr.org.uk/files/SGRconf14-Riddlestone-one-planet-living.pdf>

More information on BioRegional can be found at: <http://www.bioregional.com/>

More information on BedZED can be found at: <http://www.bioregional.co.uk/flagship-projects/one-planet-communities/bedzed-uk/>

Sustainable living: what does it look like?

There were three afternoon sessions, which ran twice in parallel. SGR's Dr Stuart Parkinson ran a workshop on sustainable living – with a particular focus on reducing carbon emissions.

Dr Parkinson began by pointing out that the UK average emissions per person are about 12 tonnes of 'carbon dioxide equivalent' when many indirect emissions are included. (Indirect emissions include items manufactured or grown abroad but brought to the UK.) Current average emissions need to be reduced by at least 75% to bring them down to levels consistent with a maximum 2°C global temperature rise. There are four main areas of concern when considering sustainable living: home energy; transport; food; and other/ indirect emissions. Dr Parkinson looked at each of these areas in turn, assessing the current technologies and behaviour changes which could be used to bring emissions down to a sustainable level. He emphasised that all these options had wider implications than just carbon emissions, and so they had to be considered as well.

Average emissions due to home energy use are about 2.3t per person. This can be brought down to virtually zero by living in an eco-housing project such as Lancaster Cohousing, with houses designed to the 'Passive House' standard and electricity sourced via local renewable energy technologies. Of course, this option is not widely available, so Dr Parkinson considered the potential savings from retrofitting an existing house with energy efficiency and renewable energy technologies. Data from the SuperHomes programme indicated that carbon savings of 70% are often possible. Another option (which could be used in combination with those above) would be to change behaviour by either living in a smaller home or sharing with others.

Moving on to consider transport, the big issue is to avoid flying. The average annual UK person's flying contribution amounts to 1.2t: the equivalent of one return flight to Rome. It is sobering to think that one return flight to Washington DC is the equivalent of all of the average UK person's home energy use for one year. Therefore the recommendation is to take holidays by rail, cycle etc. Car use is another problematic area. Average reductions of about 1.0t can be achieved by a combination of using a small/ high-efficiency car, reducing car mileage by using public transport, cycling, walking etc, and lift-shares if car use really is needed. Higher reductions could be achieved with an electric car run from renewable energy and supplied via a car club – but again this option is not widely available yet.

Carbon emissions resulting from food were then considered. A key issue here was dietary choice. Moving from an average diet to a vegetarian one or 'fish-eater' saves about 0.6t, while moving to a (near) vegan diet can save about 1.0t. A high meat diet has 2.5 times the carbon emissions of the vegan one. Other ways to reduce food impacts are to ensure that what is bought is eaten (giving an approximate 25% saving if food waste in the UK were curtailed) and by using local produce in season, which reduces transport emissions. It is also wise to avoid air freight and produce from heated greenhouses.

Dr Parkinson then highlighted other actions which can significantly reduce personal emissions – but whose effect may be indirect. For example, buying electricity on a renewable energy tariff helps generators use low carbon technologies. Buying less (or second hand) ‘stuff’ can be significant. For example, the production of a new car leads to emissions of 6t-35t. For a new computer, the range is 0.2t-0.8t. A careful choice for investing your savings or pensions can have a very large effect, as conventional options are often used to fund carbon intensive projects. For example, it is estimated that investing £10,000 in an energy efficiency or community renewable energy project can lead to an annual reduction of about 5t. The decision to have children has important environmental implications as well. With the average number of children per UK family being just over two, if a couple decided to have only one or zero children that would lead to major savings for a household.

Combining these measures, two examples were given for two very low-carbon lifestyles. One set of options brought personal emissions down to 2.9t, with the other a mere 1.6t.

Dr Parkinson stressed that reducing carbon emissions to sustainable levels can also lead to significant quality of life benefits. For example, living in a highly insulated house means high comfort and low energy bills. Less car use can mean less stress from driving, while joining a car club can free you of maintenance worries. Diets low in animal produce tend to be healthier. Sharing stuff with friends and neighbours is more sociable and generally cheaper too.

The powerpoint slides of this presentation are available at:

<http://www.sgr.org.uk/sites/sgr.org.uk/files/SGRconf2014-Parkinson-sustainable-living.pdf>

Community renewable energy: overcoming obstacles

The second workshop was led by a panel of speakers: Dr Anne Chapman, MORE Renewables (Morecambe Bay Community Renewables); Dr Philip Webber, YES (Yorkshire Energy Services) and the University of Leeds; and Kevin Frea, Halton Lune Hydro and LESS.

Dr Chapman summarised her experiences with MORE Renewables, which is a co-operative. It aims to develop a range of renewable energy installations in the Morecambe Bay area, in order to reduce carbon emissions, to provide a return to investors (the co-op’s members) and to gain funding to help people reduce their energy use and live more sustainably. She considered the main issues for the organisation. Technically suitable projects need to be identified that have a willing site owner and are financially viable. Additionally, the projects must be likely to get through the planning process. One of the key difficulties has been that government policy and regulation have not been stable. These need to be stable to deliver a reliable environment for investment in renewable energy and enable smaller companies to sell electricity to private households. There also needs to be more recognition of the value of community ownership in the planning process. A peer mentoring scheme is available to

help new community energy projects get off the ground.

Dr Webber spoke about his experiences overcoming obstacles in the implementation of energy conservation and renewable energy projects in West Yorkshire. One problem is that sometimes home insulation is badly installed and so can have a poor public image. This is compounded by insulation not having a high social status. The recent dependence on market mechanisms and very variable government grants has resulted in an unstable situation. The topic has also become a political and media football, which does not help either. He said home insulation was not sold in the way that products like cars are with 0% finance and in fact expensive products like solar photo-voltaic (pv) panels seem easier to sell. The question is what about those in society who are not well off. Government subsidy and grant schemes must be made to give longer term certainty. He spoke of multi-agency work to find people to 'bank', who would possibly be suitable for when funding does become available. There needs to be a good guaranteed deal with incentives for those able to pay, whereas those who are not well off need grant support or low interest loans. He was quite optimistic about the future in that the culture is gradually becoming more positive, coupled with the fact that Energy Performance Certification for housing has become standard. However, to combat climate change, a rapid ramping up of the current slow progress is needed. (Utilisation of new energy sources, e.g. biogas and also community generation are needed.) A major need is to have a government which understands the issues properly and supports the sector, which can provide lots of useful jobs and save money as well as carbon emissions. This is the way to go rather than further exploration for fossil fuels.

Kevin Frea discussed his experiences with community renewable energy and energy efficiency projects in Lancashire and elsewhere. He summarised how, with persistence, obstacles related to land ownership, local interests and permissions from the Environment Agency could be overcome.

The powerpoint slides of these presentations are available at:

<http://www.sgr.org.uk/sites/sgr.org.uk/files/SGRconf14-Chapman-MORE-renewables.pdf>

<http://www.sgr.org.uk/sites/sgr.org.uk/files/SGRconf14-Webber-community-energy-efficiency.pdf>

For more information about mentoring for community energy projects, see:

<http://energymentoring.org.uk/>

Tours of Lancaster Cohousing

In parallel with the workshops, there were tours of Lancaster Cohousing (LCH) and local renewable energy projects. LCH residents Jan Maskell and Steve Wrigley led the tours, visiting one of the eco-houses, the shared community facilities, and the micro-hydro plant, which is nearing completion. The eco-houses have been built to the exacting 'Passive House' standard, which minimises the amount of heating required, and the houses also have energy and water saving measures installed. The small amount of heating and hot water

that is required is provided by a biomass boiler (fuelled by wood chips from local sustainably managed forests) and solar hot water panels. Electricity is generated onsite by solar pv and - by the end of the year - the hydro plant.

SGR's Annual General Meeting

Philip Webber opened the AGM. Stuart Parkinson presented the highlights of the year ending February 2014, including the publication of a new in-depth report exposing how the Ministry of Defence spends its R&D money, working with peace campaigners to feed our research on nuclear weapons into intergovernmental conferences, high profile media articles, numerous external lectures, and the move to our new office in a low carbon workspace. Treasurer Alasdair Beal summarised SGR's accounts, noting that our finances were in a healthy state.

The election for the members of the National Co-ordinating Committee for the coming year were then held. The following were elected:

Chair: Dr Philip Webber

Vice-chair: Dr Jan Maskell

Treasurer: Alasdair Beal CEng

Secretary: Dr Charalampos (Harry) Tsoumpas

Committee members:

Martin Bassant MPhil; Dr Tim Foxon; Dr David Hookes; Dr Paul Marchant CStat

Stuart Parkinson then gave an update on SGR's activities between March and September this year. One particular highlight was an education event for 30 school children, organised by Jan Maskell, aimed at teaching them about science and technology for sustainability. We plan to expand this event next year. Another key activity was the publication of a new briefing on fracking. Lead author Gwen Harrison summarised the findings of the report and how it is being used to feed into policy-making.

The AGM concluded with a discussion on SGR's future activities, including education work with schools, and continued campaigning on issues such as climate change, military involvement in science, and fracking.