



A 10 year Regional Carbon Budget for the South West

February 2007

A paper by Sustainability South West - the region's sustainable development champion body.



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Sustainability South West (SSW) is the region's independent sustainable development champion body. It is an awareness raising and advisory charity supporting action on sustainability. Its strategic aims are to:

- Promote leadership for sustainability
- Facilitate engagement with sustainability
- Champion policy and partnerships that deliver action on sustainability

SSW supports a cross sector membership, provides advice, independent assessments, presentations, workshops, develops and manages partnership projects.

Sustainability South West's membership brings together the experience and expertise of a wide range of sectors. To maintain independence, Members join as individuals, not as representatives of their 'day job' organisation, though their membership may be as a result of the professional position they hold. The current membership is:

Julian Dennis (Wessex Water) *Chair*

Gareth Allen (ITV Westcountry)
Bob Bewley (English Heritage)
Mike Birkin (Friends of the Earth)
John Blewitt (University of Exeter)
Philip Bostock (Exeter City Council)
Tim Boyes-Watson (Learning South West)
Richard Cresswell (Environment Agency)
Colin Drummond (Viridor Waste Management)
Paul Gompertz (Devon Wildlife Trust)
Mark Harold (National Trust)
Chris Hines (Eden Project)
Simon Hooton (South West Regional Development Agency)
Bryony Houlden (South West Regional Assembly)
Brian Kennelly (Geo Science)
Cate Le-Grice Mack (South West Regional Assembly)
Anita Longley (RWE Npower)
Jackie Longworth (Trade Union Congress)
Judith Reynolds (Co-Active)
Amy Robinson (Bordeaux Quay)
Andrew Slade (Observer; Government Office for the South West)
Hazel Stuteley OBE (Strategic Health Authority)
Louise Thornhill (Natural England)
Janette Ward (Natural England)
Brendan Yates (Department of Health)

Partners and Funding organisations:

Sustainability South West is supported by a wide range of organisations to promote independence. Regular funders include: English Heritage, Environment Agency, Government Office for the South West/Defra The National Trust, Natural England, South West Regional Assembly and South West Regional Development Agency. Support for specific projects has been received from South West Tourism, Eden Project, ITV Westcountry and Wessex Water.

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1. Summary

How our region responds to sustainable development is the biggest challenge and opportunity we face. The Region's Sustainable Development Framework Mission is that *'People in the South West of England choose to live healthy, productive, socially just lives within environmental limits.'* (www.shapersw.net)

The Framework offers a set of operating principles for all activities to maximise sustainability. Of the priorities to be addressed, **the need to reduce our carbon dioxide emissions in order to reduce the risk of dangerous climate change is the most urgent** and expert advice is that action over the next ten years is crucial. Delivering against the priority of carbon reduction will require at the regional level:

- Strong leadership and governance
- Well informed decision making
- Integrated partnership working

Achieving a low carbon approach to delivering the wider regional agenda has always been a priority for Sustainability South West. This has been strongly reflected over many years in its assessments and recommendations to regional organisations and in its partnership projects. Now, increased awareness and recognition means it has become a priority for other sectors and agencies too.

In order to inform and assist the region with this priority, Sustainability South West has been developing a DEFRA funded carbon reduction initiative ***Fair Shares, Fair Choice***. The initiative is underpinned by the Contraction and Convergence model.

As an independent, cross sector, charitable organisation, our members support the Contraction and Convergence model because it provides a scientifically sound calculation of 'safe' CO₂ limits but is applied in an equitable way. (An explanation of this widely respected model is provided in section 2). ***Fair Shares, Fair Choice*** will offer help to individuals, businesses, organisations and community groups to reduce CO₂ emissions in ways that will also help to deliver the wider regional agenda.

In applying the model to the South West region an overall 10 year carbon reduction budget can be calculated. The methodology and full calculations are provided in Section 2. The calculations show that in broad terms the region's current CO₂ emissions are approximately 10% above its Fair Share Carbon budget for 2007 and that CO₂ would need to be reduced by approximately 30% on today's levels by 2016.

The region is anticipating a period of high growth and has an agenda to increase sustainable prosperity, reduce inequalities and enhance environmental assets. Adopting a socially equitable low carbon approach which reduces the need for carbon, delivers more energy efficiency, generates more secure local renewable energy and a low carbon approach to transport, accessing goods and services, construction and tourism would give the South West leader status in achieving genuinely sustainable prosperity and communities.

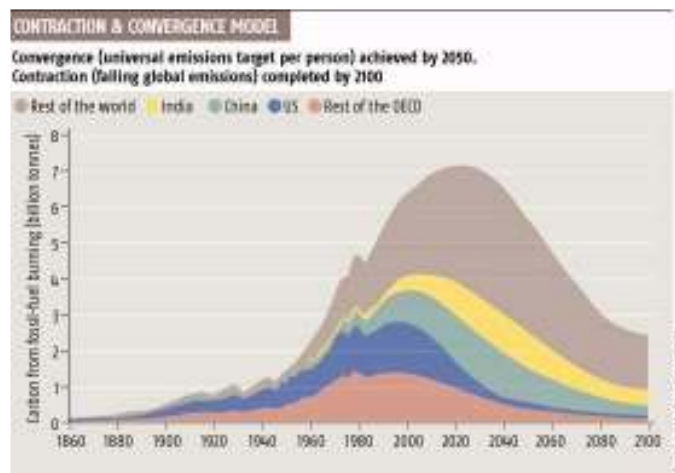
As the Stern report has demonstrated, the region cannot afford to miss out on the low carbon economy agenda. We strongly commend this approach and propose that it informs regional strategies, investment criteria and delivery plans (see section 3).

2. Regional Carbon Reduction Budget & Annual Reduction Targets

2.1. THE CONTRACTION & CONVERGENCE MODEL

Developed by the Global Commons Institute (www.gci.org.uk), Contraction and Convergence (C&C) is a widely accepted framework for creating an international agreement to reduce greenhouse gas emissions ((GHGs) in a socially just way. The framework calculates annual targets for emissions based on levels considered safe to avert dangerous climate change (figures in this report are set at a ceiling of 450 parts per million of CO₂). Based on this, C&C provides a global emissions 'carbon budget'. However, once in the atmosphere, GHGs can take up to two hundred years to decay, which means that to stay within safe levels it will be necessary to continue to reduce, or '**contract**' annual emissions year-on-year, to near zero by around 2080. The diagram below illustrates the scale of worldwide reductions required to achieve C&C.

Global equity is a governing principle of the C&C model. Historically, levels of emissions have related to a nation's wealth. As a result, per capita emissions in rich countries are well above the global average and in poor countries, well below. In the C&C Framework everyone is given an equal right to emit CO₂. In order to resolve current inequities, individuals in developing countries would initially be entitled to emit relatively more CO₂ and those in developed nations relatively less until per capita emissions from all countries '**converge**' at an agreed annually reviewed level.



2.2 METHODOLOGY FOR CALCULATING THE SOUTH WEST'S CARBON BUDGETS FOR THE TEN YEAR PERIOD 2007-2016

The C&C model and principles underpin the calculations for:

- Personal 'carbon budgets' for 2007-2016
- Annual overall carbon budget for the South West region 2007-2016

Methodology for calculating personal 'carbon budgets'

- The C&C model has been used with a pre-set scenario of 450ppm.
- Projected worldwide population statistics have been used to determine each country's permitted emissions.
- The UK's permitted emissions are divided by its projected population to give a per capita figure. This figure indicates how much carbon individuals within the UK are entitled to emit, otherwise referred to as our 'carbon budget'.
- Data extracted from the model provides a set of annual personal carbon budgets.
- The 'personal' CO₂ per capita figures are based on an assumption that individuals directly control approximately 50% of their emissions. This judgement is informed by the latest UK emissions figures (Defra 2006), which show that domestic energy use accounts for about a third of all CO₂ emissions and transport another 30%. As a

result it is possible to suggest that approximately half of all emissions are those that we may have direct control over, for example how we heat our houses, how we choose to travel etc. The remaining 50% is attributed to CO2 emissions not directly (although often influenced by consumption behaviours) controlled by individuals i.e. those created by industry, commerce, agriculture and public sector services.

Table A: Individual total and personal carbon budgets for 2007-2016

| Year | Total CO2 per capita (Tonnes) | Personal CO2 per capita (Tonnes) |
|------|-------------------------------|----------------------------------|
| 2007 | 8.43 | 4.22 |
| 2008 | 8.26 | 4.13 |
| 2009 | 8.09 | 4.04 |
| 2010 | 7.90 | 3.95 |
| 2011 | 7.70 | 3.85 |
| 2012 | 7.50 | 3.75 |
| 2013 | 7.29 | 3.65 |
| 2014 | 7.08 | 3.54 |
| 2015 | 6.84 | 3.42 |
| 2016 | 6.63 | 3.32 |

Source: GCI C&C Model Version 8.6

Methodology for calculating an overarching South West total Carbon Budget

- Annual per capita figures are extrapolated to provide an approximate individual carbon budget. This is the basis for calculating the region's total carbon budget.
- **The formula used for calculating the total carbon Budget for the South West:**
The annual total per capita figures are multiplied by projected South West population figures (sourced from the Office of National Statistics) to provide year on year overall total South West Carbon Budgets.

Table B: Overall Carbon Budgets for the South West for 2007- 2016

| Year | C&C UK CO ₂ per capita figures | SW projected population (ONS) Millions | Total South West Carbon Budget (Kilotonnes) |
|------|---|--|---|
| 2007 | 8.43 | 5.15 | 43,387 |
| 2008 | 8.26 | 5.18 | 42,791 |
| 2009 | 8.09 | 5.21 | 42,125 |
| 2010 | 7.90 | 5.24 | 41,398 |
| 2011 | 7.70 | 5.27 | 40,629 |
| 2012 | 7.50 | 5.31 | 39,811 |
| 2013 | 7.29 | 5.34 | 38,946 |
| 2014 | 7.08 | 5.37 | 38,041 |
| 2015 | 6.84 | 5.41 | 36,981 |
| 2016 | 6.63 | 5.44 | 36,086 |

2.3 How the UK and SW is currently performing on a per capita basis against the C&C budget

UK per capita carbon emissions in 2004

- The latest (DEFRA, 2006) figures (see notes below) reveal that the UK (including aviation and shipping) emitted 588,277 (Ktonnes) of CO₂.
- Dividing the total UK CO₂ emissions by UK 2004 population statistics (58.785 million) **reveals that the UK per capita CO₂ emissions (in tonnes) for 2004 were 10.01.**

SW per capita carbon emissions in 2004

- The latest (2004) DEFRA figures (including domestic aviation and shipping) show that the South West emitted 46,981 (Ktonnes) of CO₂.
- Dividing the SW total CO₂ emissions by SW 2004 population statistics (4.928 million) **reveals that the SW per capita CO₂ emissions for 2004 (in tonnes) were 9.53.**

At a high level this illustrates that in 2004 SW individuals were (on average) emitting a marginally lower per capita CO₂ figure and so are slightly closer to the per capita figures we need to achieve according to C&C. * Detailed tables illustrating these figures are provided in the notes below.

Notes on data used in this paper

- All emissions figures are quoted in 'Tonnes', or 'Kilotonnes' of CO₂. Where data has been provided in tonnes of carbon, standard methodologies have been used to convert to CO₂ equivalence.
- No account has been made to make an allowance for the effects of emissions at altitude from aviation – 'radiative forcing'.
- The 2004 emission figures are the most recent CO₂ figures available for the UK and the SW region, published in November 2006. They are considered 'experimental'.
- The statistics are reported under two different methods:
 - *Electricity User basis* = Emissions are located at source except for electricity generation, which is allocated to the point of consumption.
 - *End User basis* = Emissions are distributed according to the point of energy consumption (or point of emission if not energy related). E.g. all emissions from the energy production sector are allocated to the end users of the fuel. These figures are higher than *Electricity User basis*. **The end user basis figures have been used.**
- Emissions from the production of goods are assigned to where the production takes place – thus emissions from the production of exports will be included, and emissions from the production of imports are excluded.

2004 UK Emission data ('End User' basis)

| | KTonnes of CO ₂ | Population Millions) | Per Capita emissions (Tonnes) |
|--|----------------------------|----------------------|-------------------------------|
| Total CO ₂ – Excl Aviation / Shipping | 548777 | 58.785 | 9.33 |
| UK Aviation and Shipping | 39500 | | |
| Total CO ₂ – Incl Aviation / Shipping | 588277 | 58.785 | 10.01 |

The 2004 figures are the latest 'experimental' CO₂ emissions data from the UK Government¹ from Defra. The figure for shipping and aviation is not included in the 2004 report (as it is outside of the Kyoto process), but is reported separately by Defra².

2004 Emission data for the South West of England

| | KTonnes of CO ₂ | Population (Millions) | Per Capita emissions (Tonnes) |
|--|----------------------------|-----------------------|-------------------------------|
| Total CO ₂ – Excl Aviation / Shipping | 43671 | 4.928 | 8.86 |
| Share of UK Aviation and Shipping | 3310 | | |
| Total CO ₂ – Incl Aviation / Shipping | 46981 | 4.928 | 9.53 |

The figures for emissions for the South West of England can be extracted from the Defra report, and on top of these, a very 'rough' regional allocation of the national aviation and shipping figures has been made. (SW Population = 8.38% of UK. 8.38% of UK Aviation & Shipping = 3310 Ktonnes).

Notes on data used in C&C model

- The C&C model only considers levels of CO₂ in the atmosphere, not the remainder of the 'basket' of greenhouse gases that are addressed by Government and international activity such as the Kyoto Protocol. These are commonly thought to account for some 15% of emissions.
- The C&C model was reviewed using a pre-set 'scenario', which aimed to stabilise levels of greenhouse gases in the atmosphere at 450 parts per million through to 2200. All inputs were set to the defaults for this model.
- 'Convergence' in this scenario is set for 2040.
- Population figures used by the model are allowed to grow until 2040, and then this figure is used for later years – to prevent population growth being used as a tool to increase levels of emissions in any particular country. Population figures include adults and children.

¹ Source: Defra / AEA Technology. (2006). 'Local and Regional CO₂ Emissions Estimates for 2004 for the UK'

² Source: Defra. (2006). *e-Digest of Environmental Statistics*

3. Regional 10 year Carbon Action Programme, Regional Carbon Action Agency and Partnership

For the SW region to take up the challenges and opportunities of adopting the 10 Year Carbon budget all the key regional agencies would need to:

- Sign up to an Action Programme for delivery informed by the Regional Carbon Budget that influences regional spending allocations and development investment, planning, transport (including aviation), energy, construction, tourism and procurement.
- Establish an overall Carbon Action Agency supported by specialist advisers to focus on the delivery of the Carbon Action Programme and coordinate the work of others contributing to delivery.
- Establish an independent, cross sector, Carbon Action Partnership to monitor and report publicly on progress on an annual basis.

Potential to support more effective regional leadership

All of the key regional organisations and agencies now have a strong remit and increasing interest in delivering a more genuinely sustainable south west.

Currently, leadership at the regional level is set up on the basis of shared responsibilities between several organisations and agencies. SSW's perception is that because sustainability relates equally to social, economic and environmental policy, its delivery risks being hampered by fragmented regional leadership and poorly integrated partnership working.

Working together to deliver the wider regional agenda by using a low carbon budget offers a significant opportunity to build stronger, more effective integrated leadership by working to achieve shared sustainability goals.