

A Low Carbon Route Map

Guidance for communities applying to the
Climate Challenge Fund



Community Buildings

It's our future



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Foreword

All over Scotland and beyond, people are working together in communities to reduce CO2 emissions. These are early days and there is still much to learn about what works – and lots of new approaches and ideas to be tried and explored. Any community thinking of developing carbon reduction projects will be at the forefront of the journey to a low carbon society. This means that while there is much to learn from others' successes (and occasional failures), some of this is uncharted territory in which you'll be pioneers.

The Route Maps aim to help you and your community develop projects that are relevant, engaging and have maximum chance of success. Most of the Route Maps cover four areas to help you start your community's low carbon journey:

Surveying the landscape: Before starting any new journey it's important to learn as much as possible about what lies ahead. Here you'll find an introduction to the topic, relevant carbon emissions, and how they can be reduced.

Choosing your particular route: There are many ways communities can reduce CO2, and many different routes to success. Here you'll find information to help you think through different approaches and to choose ones that are right for your community, and, ideally, not only reduce CO2 but have other benefits as well.

Planning your journey: Here you'll find advice to help you make the detailed plans for your journey – and how to keep track of where you are so you know if you're making progress.

Signposts: To sources of further information and advice.

There are currently six Low Carbon Route Maps covering Project Planning, Energy, Travel, Food, Community Buildings, and Feasibility Studies.

Two warnings:

- The Route Maps don't replace the detailed Climate Challenge Fund guidance on completing an application – read that as well!
- Not all the measures mentioned are eligible for funding from the Climate Challenge Fund – but they help present the bigger picture and you may want to include them in a project with funding from other sources.

Every community is different; the aim of the Route Maps is not to tell anyone the 'best' way to do any project (because there is no one 'best' way) but to help you develop projects that work for your community.

Good luck – enjoy the journey!

The *Low Carbon Route Maps* have been researched, written and designed by Footprint Consulting Ltd; Environmental and Resource Economics Limited; and Alan Speedie Associates Ltd for the Climate Challenge Fund, July 2009.

Surveying the landscape

CO2 emissions from energy use in non-domestic buildings account for around 18% of total emissions in the UK so there is considerable scope to reduce emissions in this area.

Community buildings are no exception. In fact, there are arguably more opportunities to improve community buildings, since many were built when CO2 – or energy performance – wasn't a concern. Often, little money has been spent on up-to-date heating, insulation and equipment. Community involvement and control provides an opportunity to remedy these deficiencies.

In this Route Map, we focus specifically on reducing emissions from community buildings by:

- Improving existing buildings;
- Building from scratch;
- Influencing users of the building;
- Encouraging shared use of buildings.

The following Route Maps also provide information relevant to reducing emissions from community buildings:

- Energy – this provides information about different approaches to energy efficiency and generating low carbon energy.
- Feasibility studies – how to plan and carry out a feasibility study for a carbon reduction project, including community buildings.
- Project planning – planning a carbon reduction project.

New or old? – some common issues

You might know what you want from your building, but aren't sure how to achieve it. Start with a shopping list of what you want to achieve. This can be based on guidance material for other buildings, for instance, housing, where there is now a very substantial body of literature available on 'low-carbon' and 'zero-carbon' homes. This then allows you to look at a range of factors including light, power, heat, shelter, air, waste, and water. (See the Energy Route map for further information.)

What outcomes do you want from your building? Obviously you want it to serve its purpose well. But you also want it to be a low carbon building; that gives you a very clear objective. So you will want to consider the CO2 impacts across the whole life-cycle of the building; that will lead you to set a few general rules.

Space doesn't allow us to go through all the factors to look at when designing a new or refurbished building. But there are basic points to get right if you are to minimise its CO2 emissions. These include location, siting, orientation, design and materials. While there may have to be some compromises with these, it is possible to save CO2 at very little cost if you get these basics right. Only then do you need to think about the more expensive bolt-on technologies like on-site renewables.

It's important that any building work you commission – new build or renovation – is done properly; a building can only perform as well as it's built. It's worth noting that up to 30% of properties being built would fail existing building regulations¹. The message is: don't expect the

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council's building inspector to act as your clerk of works. So keep a close eye on what work is being done. And get expert help if necessary and look to get the best skills and know-how available.

A word or two on permissions. Whether you are planning a new building or renovating an existing one – always speak to your local Planning and Building Standards officers. Even small scale works are likely to need planning permission and a building warrant. In a historic building or a conservation area further restrictions apply.

Planning your journey

You should now have an idea of the possible actions you might take to reduce the emissions from an existing community building, or the main issues to think about if you're considering a new, low carbon community building.

You now need to plan the next stage of your journey.

Improving existing buildings

In most buildings there will be many improvements you can make – in theory. In practice some might be very straightforward and others might be too complex, too disruptive or too costly for various reasons.

To work out what is possible for your situation, what it will cost, and what the carbon savings will be, the next step is to carry out a feasibility study. See the Feasibility Route Map for more details. Don't be daunted – for many projects the feasibility study is something your group could easily undertake using information in the Energy Route Map. For more complex projects you may be able to get financial support to engage specialist consultants to carry out a feasibility study.

Looked at in terms of whole-life CO₂ costs, upgrading an existing building is likely to be better than a new build. By bringing a building back to life, you avoid the CO₂ emissions that result from the extraction and manufacture of new building materials, from cement and timber to copper wiring. You also avoid transport emissions from construction and demolition. And CO₂ remains locked up in timber within the building.

This is likely to involve working with another organisation, as the owner of the building, to secure CO₂ reduction improvements.

The types of buildings might include:

- A community or village hall. This could be a building already in the community's own control (for example, handed over to the community for management in the long-term) or it could be a local authority owned building with a local management committee.
- A church hall. This is likely to remain in church ownership, with some restrictions on its use.
- A redundant building, where you are changing its use. This could be an office, a school etc.

Whatever the building, there are likely to be some common issues when planning its improvement.

It may well be in a poor condition, at least in terms of 'carbon efficiency' – with life-expired or out of date heating and lighting. It may have little or no insulation (loft, pipes, hot water tanks or cavity wall) or draught-proofing. And windows and doors may be poorly fitting. A particular word of caution – there may be asbestos in the building, which must only be handled by a specialist licensed contractor.

No doubt you will have already thought about most of these points and taken expert advice, but:

- Always check with the local authority to see what permissions are needed – planning or building standards.
- Always get a survey done to tell you what's there – and what isn't!

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- Always have a clear arrangement on leasing or purchase from the owner.
- Always seek expert help with asbestos.
- If taking over a building, don't get stuck with a liability for asbestos – make this a condition of sale or lease.
- Use a solicitor to deal with the legalities of any lease or purchase.
- Get advice from the Energy Saving Trust about energy saving.

The Climate Challenge Fund and other similar funds are not designed to provide funds for doing work that is required by law. For example in the area of CO₂ reduction, local authorities have a duty under the Carbon Reduction Commitment to reduce emissions. So if you are negotiating to run a council-owned property, make sure that you aren't relieving them of costs they should be covering.

With a building refurbishment, depending on the scale of your project, there are several generic steps you can take that will bring benefits in terms of reduced CO₂ emissions.

For a large-scale project, where major refurbishment is involved, it's important to plan the process from the start, with a clear idea of how you will tackle each stage. The Carbon Trust provides excellent material on how to go about a refurbishment. Figure 1 sets out the steps in the process.

By following this framework, your resulting building should achieve your CO₂ ambitions.

For refurbishment on a smaller scale, you won't need to follow as extensive a process. It still helps, however, to have a plan in place from the outset, to guide you through the work. This can be adapted from the Carbon Trust's model, using the four stages above.

In terms of what you might want to do to make the most of an existing building, with modest resources, there are four areas you could look at. These are draught-proofing, insulation, the heating system and lighting. Work on these will normally provide the best CO₂ reductions in terms of cost per tonne of carbon. For information about these measures, see the Energy Route Map.

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Phase	Low Carbon Refurbishment Process	Page	RIBA Work Stages ¹
Prepare  	<ul style="list-style-type: none"> ■ Commit to a low carbon refurbishment 	7	Preparation
	<ul style="list-style-type: none"> ■ Establish a low carbon vision for the refurbishment 	7	A Appraisal
	<ul style="list-style-type: none"> ■ Develop a low carbon outline brief 	7	
	<ul style="list-style-type: none"> ■ Establish the current carbon footprint of the building 	8	B Design brief
	<ul style="list-style-type: none"> ■ Set carbon targets for the refurbishment 	8	
	<ul style="list-style-type: none"> ■ Undertake a pre-refurbishment assessment 	9	
	<ul style="list-style-type: none"> ■ Consult stakeholders 	10	
	<ul style="list-style-type: none"> ■ Consider a budget for low carbon elements 	10	
	<ul style="list-style-type: none"> ■ Appoint a carbon champion 	11	
	<ul style="list-style-type: none"> ■ Choose an appropriate design team 	11	Design
	<ul style="list-style-type: none"> ■ Empower the design team 	12	C Concept
	Design  	<ul style="list-style-type: none"> ■ Keep the low carbon theme up front 	13
<ul style="list-style-type: none"> ■ Develop an integrated low carbon design 		13	
<ul style="list-style-type: none"> ■ Encourage exploration of a wide range of low carbon options 		14	
<ul style="list-style-type: none"> ■ Allow flexibility in design 		15	
<ul style="list-style-type: none"> ■ Use energy modelling data 		16	E Technical design
<ul style="list-style-type: none"> ■ Use whole life costing to support low carbon solutions 		17	
<ul style="list-style-type: none"> ■ Manage the budget and scope 		17	
<ul style="list-style-type: none"> ■ Approve the integrated design 		18	
<ul style="list-style-type: none"> ■ Include targets in contracting arrangements 		18	Pre-construction
Construct  		<ul style="list-style-type: none"> ■ Ensure effective project management 	19
	<ul style="list-style-type: none"> ■ Choose an appropriate contractor and subcontractors 	19	H Tender action
	<ul style="list-style-type: none"> ■ Get buy-in from site workers 	19	Construction
	<ul style="list-style-type: none"> ■ Monitor site progress against objectives 	20	J Mobilisation
	<ul style="list-style-type: none"> ■ Ensure high quality commissioning 	20	K Construction to practical completion
	<ul style="list-style-type: none"> ■ Set up energy monitoring 	20	
Use 	<ul style="list-style-type: none"> ■ Make sure the occupants understand the building 	21	Post practical completion
	<ul style="list-style-type: none"> ■ Make sure the building operator understands the building 	21	L Post practical completion
	<ul style="list-style-type: none"> ■ Conduct a post-occupancy evaluation 	22	
	<ul style="list-style-type: none"> ■ Check energy use and comfort conditions and make changes 	22	
	<ul style="list-style-type: none"> ■ Make the most of the low carbon building 	22	

Figure 1: Project Plan - Low Carbon Refurbishment Process²

Building from scratch

'Green plating' principle

If you are interested in saving CO₂, the prospect of developing a new building is a fantastic opportunity. It's difficult, because there's so much to think about. But it's exciting, because the results are going to be much better if low CO₂ is the driving principle.

If you're considering a new, low carbon community building you will certainly need a feasibility study – see the Feasibility Route Map for more information. Remember that the clearer you are

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now about what you need from the building, and what you want in terms of low carbon emissions, the better the final building will be.

Planning and constructing any new building will take time. It might be worth thinking about other carbon reduction projects that your group could get up and running right away while the building project is moving forward.

A low carbon building is certainly going to be one where the current building standards are of much less help – other than as targets to beat. You want to go beyond that. This is often referred to as ‘gold-plating.’ In this instance we prefer to call it ‘green-plating.’ For example, in terms of energy, you’ll want a building comparable in emissions terms to an ‘A’ rated house under the Energy Performance Certification scheme – or one rated ‘excellent’ or even ‘outstanding’ under the Building Research Establishment’s (BRE) recently launched BREEAM Communities scheme (this looks at a range of sustainable development criteria in addition to energy).

Green-plating means going beyond current standards to achieve more sustainable design and construction in your project and there is a large and growing literature on this. See Signposts for sources of further information. There are some basic principles to follow.

Get a good architect who really understands what low carbon building is about. Initial contact might be with the Scottish Ecological Design Association, or SUST at the Lighthouse shown in the Signposts section below. Check their credentials for real experience – don’t be taken in by statements about their green convictions, which are easy to crib. Don’t take no for an answer – press the professional to deliver what you want. You might also want to consider an ‘off-the-peg’ building, in kit form. Although these don’t have the same unique design as a bespoke building, there are buildings available from Europe with very good standards of energy efficiency.

There are a number of factors to look at when specifying a new building. Obviously its purpose will have a major influence on the eventual design, layout, size and so on. With your low carbon imperative, that makes decisions about the building’s site and orientation more important. Similarly the materials used are important, since (in terms of CO₂ emissions across the life cycle) some, for example timber, are better than others. Lastly, the equipment is important – how you specify heating, plumbing and lighting to minimise emissions.

Timber is a fantastic low carbon building material, so add that to your list of principles. There is a lot of current advice available on using timber for construction³.

Seek out all the advice, support and funding you can from the various government programmes. In turn, look to make your building a shop-window for any programme that supports you.

Generate a multiplier effect from your building. In developing the building, encourage any decision-makers involved – like planners, building standards officers and councillors – to see the building and learn from the results. This can help overcome the ‘compliance’ mentality, where people aren’t encouraged to go beyond the minimum standards. It can also give them confidence and satisfaction from having a ‘green building’ in their area. See the Project Planning Route Map for advice about working with other organisations.

Best practice guides?

It isn't easy to find impartial advice on low carbon buildings for community use online. Advice tends to be topic-specific, or relates to housing, or is very technical. The position is similar with books. Sites which do offer help may well be commercial or semi-commercial, with links selling goods and services. Their impartiality is therefore at least open to question.

One area of help is case studies. There are a number of low carbon buildings in Scotland. Good examples include Scottish Natural Heritage's Great Glen House in Inverness⁴. Look at what these have achieved to help you decide what you want for your own building. The Sustainable Development Commission also features a number of case studies on materials (see Signposts for details).

A second source of help is the BRE's (Building Research Establishment) 'Green Guide to Specification Online'. This is aimed more at the technical rather than community audience, and:

'...provides designers and specifiers with easy-to-use guidance on how to make the best environmental choices when selecting construction materials and components.'

It may therefore provide some help when setting out on a building project, looking as it does at the life-cycle costs and impacts. The guide also includes a range of environmental impacts, including carbon emissions expressed in CO₂ equivalent units.

In addition there are some 'best practice guides' on building and running a community building. A selection of these is listed in Signposts below. It's also worth seeking advice from the Energy Savings Trust, or your local authority before making any financial commitments. They, unlike some online sources, do not have a particular 'agenda' and should be able to provide impartial advice.

You are not alone! - encouraging multiple uses

It's tempting to see your building – new build or refurbishment – as 'yours' - proudly and exclusively. After all, you've put a lot of everything into getting it to this stage. If you think about your CO₂ life cycle, you'll realise that to minimise this, it's better to get the maximum use out of the buildings. Think of how school facilities in some places lie unused over the summer and at weekends and evenings.

By sharing your building, you'll prevent duplication of facilities. You will make additional capacity available in your community. And you will let people see the benefits of a low carbon building. You will almost certainly make contact with people who have complementary skills and knowledge who you might not otherwise have met.

Influencing users

Funders are keen to see carbon reduction projects that have a range of benefits, and that engage a wide range of people. Whether you're improving an existing building or starting from scratch, think about how your project can influence users. The other Route Maps can help you develop your ideas, and to calculate the carbon savings.

Good Housekeeping

Any building will work better if its day-to-day running follows some basic good housekeeping rules. These are probably familiar to you already, but just in case here's a reminder of the types of things you should be encouraging all users to do to minimise CO2 emissions:

- Switch off lights in empty rooms;
- Switch off electrical and equipment and appliances when not in use;
- Boil only the water that you need;
- Clean inside of fridge and freezer;
- Clean the condenser coils on the back of fridge;
- Reduce the number of light sources being used to the minimum required;
- Switch computer/monitor off at night;
- Take the stairs instead of a lift;
- Switch off all office equipment at the end of the day;
- Reduce the use of electric fans;
- Turn heating off in rooms that are not being used regularly;
- Close doors;
- Turn boiler/heating down by one degree;
- Set thermostats at different temperatures depending on the requirements of the room;
- Recycle drinks cans;
- Return/recycle all glass containers.

Travel to venue

A low carbon facility needs low carbon users. And travel to the facility plays an important part. So encourage people to use the building with the minimum of travel - see the Travel Route Map for more information). In the case of somewhere in a city or town, active travel or public transport may well be the best option. The writer Bill Bryson points out the nonsense of a woman driving rather than walking the short distance to the local gym to walk on a treadmill⁵. When asked why she did this, she responded 'I have a programme for the treadmill' which she didn't have for the walk to the gym!

Walk, cycle or take the bus. And if needs be, give people a programme for their journey – in terms of carbon cutting. Encourage hall users to record their carbon cutting on a carbon savings board, with a target – see the Project Planning Route Map for information on influencing behaviour change.

In a more rural area, walking or the bus might not be an option. However, cycling might well still be reasonable and can be encouraged by providing facilities like a covered bike stand.

Where car travel is the only option, you can still minimise this by encouraging car sharing.

Encourage others

Don't hide what you've done: put signs up about the work that's been done and charts showing what CO2 and energy has been saved over time. Make the building a showcase as well as a workplace. Help it tell the story.

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There's a great opportunity to multiply your efforts by getting users of your building to do the same themselves – see the Project Planning and the Energy Route Maps for ideas.

Looking Forward

If you need to choose between improving an existing building, or building a new one, a feasibility study can help you make the right decision. See the Feasibility Route Map for details. Table 1 provides an overview of some of the issues you should consider.

Building Type	+ Factors	- Factors	Carbon Effect
New build kit	Energy efficiency built-in		+
	Likely ease of build		
		Less local employment	
	Lower fee costs		
		Lower design quality	
New build bespoke		More materials input	-
			+
	Energy efficient specified		+
		Needs client 'expertise'	-
	Suits local surroundings		
		More materials input	-
	Designed to fit purpose		+
Lower running costs		+	
Control over materials		+	
Local employment			
Building conversion	Fewer materials needed		+
	More local employment		+
	Suits local surroundings		
		Some features won't fit	-
	Control over materials		+
	Local employment		

Table 1: Carbon Emissions – Overview of Influencing Factors

The carbon 'pluses' and 'minuses' are complemented by other sustainability considerations like ease of building, providing local employment and fitting the local surroundings.

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It is of course just an indication – a much more in-depth examination will be needed when you get to the stage of specifying a building. Costs will always be a major determinant of what can be done. In addition, as already mentioned, there are a number of other things that will affect the overall CO₂ arising from a building – like where it's sited, how people get there, how well they understand and use the features and how well the building is maintained.

As a general principle however, when it comes to CO₂, you can always achieve more, whatever you are doing and whatever budget you have, if you are clear about what you want to do, and weigh up what things are going to bring you the best CO₂ results for the money and effort you invest.

Signposts

General

Building Research Establishment – BREEAM Communities

<http://www.breeam.org/page.jsp?id=117>

Carbon Trust

<http://www.carbontrust.co.uk>

COSLA (Convention of Scottish Local Authorities)

<http://www.cosla.gov.uk>

Church of Scotland Climate Change Project

<http://www.churchofscotland.org.uk/councils/churchsociety/csclimate.htm#cc>

Eco-Congregations

<http://www.ecocongregation.org/scotland/>

RIBA

<http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/LowCarbonStandards.pdf>

Sustainable Development Commission – case studies

http://www.sd-commission.org.uk/communitiessummit/case_studies.php - search on 'materials'

SUST (sustainable design in architecture and the built environment web resource developed by the Lighthouse, Glasgow)

<http://www.sust.org/>

Retrofitting existing buildings

Carbon Trust

<http://www.carbontrust.co.uk/publications/publicationdetail?productid=CTV038>

General

Association of Environment Conscious Building

<http://www.aecb.net/index.php>

BRE 'Green Guide to Specification Online'

<http://www.thegreenguide.org.uk/index.jsp>

Low Carbon Buildings Programme Phase 2

<http://www.lowcarbonbuildingsphase2.org.uk/>

Scottish Ecological Design Association

<http://www.seda2.org/>

Draught proofing

The Draught Proofing Advisory Association Ltd
<http://dubois.vital.co.uk/database/ceed/wall.html>

Energy Saving Trust
<http://www.energysavingtrust.org.uk/content/view/full/392>

Insulation

Energy Saving Trust – Home Insulation and Glazing
<http://www.energysavingtrust.org.uk/Home-improvements/Home-insulation-glazing>

Heating systems

Energy Saving Scotland (formerly SCHRI)
<http://www.energysavingtrust.org.uk/scotland/Scotland/Energy-Saving-Scotland-home-renewables-grant-scheme-previously-known-as-SCHRI>

Renewables

Community Energy Scotland
<http://www.communityenergyscotland.org.uk/>
Scottish Government ‘Community Renewable Energy Toolkit’
<http://www.scotland.gov.uk/Resource/Doc/917/0082604.pdf>

Influencing users

Travel to venue (see ‘Travel Route Map’)

Showcase low carbon features

SNH Great Glen House
<http://www.snh.org.uk/pdfs/Great%20Glen%20House.pdf>

1 See comments by Philip Sellwood, Chief Executive, Energy Saving Trust reported by BBC - <http://news.bbc.co.uk/1/hi/sci/tech/7856185.stm>

2 Carbon Trust (2008) ‘Low carbon refurbishment of buildings – management guide’

3 For example see Forestry Commission Scotland ‘Sustainable Construction Timber – Sourcing and specifying local timber’ January 2009, viewed at [http://www.forestry.gov.uk/pdf/fcfc152.pdf/\\$FILE/fcfc152.pdf](http://www.forestry.gov.uk/pdf/fcfc152.pdf/$FILE/fcfc152.pdf) and ‘Greenhouse Gas Emissions Comparison – Carbon benefits of Timber in Construction’ August 2006, viewed at [http://www.forestry.gov.uk/pdf/Carbonbenefitsoftimberinconstruction.pdf/\\$FILE/Carbonbenefitsoftimberinconstruction.pdf](http://www.forestry.gov.uk/pdf/Carbonbenefitsoftimberinconstruction.pdf/$FILE/Carbonbenefitsoftimberinconstruction.pdf). For other publications see <http://www.forestry.gov.uk/forestry/infd-6b2jfb>

4 For information on this project, see ‘E-architect’ web pages at http://www.e-architect.co.uk/scotland/scottish_natural_heritage.htm and a summary of the project by SNH at <http://www.snh.org.uk/pdfs/Great%20Glen%20House.pdf>

5 See Bryson, B ‘Notes from a Big Country’ essay titled ‘Why No-one walks’, Black Swan Books, 1999, page 166.