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HM Government

Scottish City Region and Regional Growth Deals

Carbon Management Guidance for Projects and Programmes

Contents

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1. Introduction

This document provides guidance for Project Owners on managing potential carbon emissions associated with Scottish City Region and Regional Growth Deal projects. It is designed to accord with HM Treasury Green Book requirements and to support the achievement of the following three key goals for all Deal projects:

1. *Quantification* of whole life carbon using appropriate and authoritative sources;
2. *Minimisation* of whole life carbon using relevant best practice methodologies; and,
3. *Identification* of potential barriers to achieving net zero, e.g. skills, materials, technology.

Achievement of the above goals will ensure that the Deals programme continues to effectively respond to local and national climate emergency declarations, aligned with a corresponding transition to net zero carbon emissions.

The consistent application of this guidance will accelerate low carbon innovation and the achievement of national sustainable development objectives beyond the Deals programme.

2. Definitions

The following definitions have been adopted for consistency. They are based on an internationally-recognised carbon management specification (PAS 2080: Carbon Management in Infrastructure, BSI 2016 [1]) and are equally applicable to all Deal project types.

- *Carbon*: Shorthand for all greenhouse gases emissions as defined by the Kyoto Protocol, measured in kg or tonnes of carbon dioxide equivalent (CO_2e).
- *Capital Carbon*: Carbon associated with the creation, refurbishment and end of life treatment of a project, e.g. construction materials and processes [2].
- *Operational Carbon*: Carbon associated with the operation of a project required to enable it to deliver its service or outcomes, e.g. electricity use or building heating.
- *Whole Life Carbon*: Sum of carbon from all stages of the life cycle of a project. For the purpose of this definition, this sum includes indirect changes in carbon expected to result from the project (decreases or increases), e.g. a reduction in atmospheric carbon or an increase in vehicular emissions (also referred to as End User carbon). Whole Life Carbon is equivalent to "*Carbon Emissions Impact*" within Green Book guidance, which requires to be stated in the Economic Case for projects seeking public sector funding.
- *Net Zero Carbon:* Where the sum of the carbon emissions resulting from a project and the carbon it removes from the atmosphere equals zero. Noting that carbon savings against a 'business as usual' scenario do not necessarily represent carbon removed from the atmosphere.
- *Carbon Control*: Where project owners have the ability to manage, through direct requirement of project design and operational approach, specific objectives for capital and operational carbon emissions.
- *Carbon Influence*: Where the project may affect carbon emissions beyond carbon control, notably through the use of project buildings or infrastructure. For example, a project owner can control the carbon associated with a new road (design, construction, maintenance, lighting, etc.) but can only influence the carbon emitted by users of the road.

[1] https://shop.bsigroup.com/ProductDetail?pid=000000000030323493
[2] The related term 'embodied carbon' is usually used at a product or material level, whereas capital carbon will have greater relevance at a project level.

3. Green Book Carbon Requirements

Funding for City Region and Regional Growth Deal projects is determined through the development of business cases that must follow HM Treasury Green Book guidance. A review of the Green Book was published by HM Treasury in November 2020 [3] that included updated guidance on the appraisal of projects, programmes and polices to meet net zero carbon emissions by 2045 in Scotland and 2050 in rUK. Sections 3.5 to 3.8 include the requirement to include the carbon emissions impact from projects in the Economic case. The following important points can be drawn from this guidance:

1. The whole life carbon emissions from all proposed programmes, policies and projects should be assessed and quantified, e.g. in tonnes of carbon dioxide equivalent. This value is referred to as "*Carbon Emissions Impact*";
2. The carbon emissions impact should be converted to a financial cost using the approach set out in the Department for Business, Energy and Industrial Strategy (BEIS) Carbon Values [4]. This calculated value, herein referred to as the "*Carbon Emissions Impact Cost*", represents the cost of removing the carbon emissions predicted to result from the project from the atmosphere, also known as the 'abatement' cost;
3. The carbon emissions impact cost for all options appraised within the business case should be included in the Economic Case; and,
4. Where a project, or an option within a project, can be qualitatively demonstrated to have a negligible carbon emissions impact, no quantification will be necessary and there will be no requirement to include an associated carbon emissions impact cost. This is only likely to apply to revenue projects that will demonstrably have no measurable influence on carbon emissions.

The above requirements should be followed for all new project or programme business cases within the Deals.

3.1 BEIS Carbon Values

The values used to assign a financial cost to carbon emissions impacts are currently under review by BEIS, reflecting the emerging understanding of carbon abatement costs. It is likely that these values are set to increase, which could result in options within business cases with higher carbon emissions impacts becoming less economically viable.

When available, new carbon values will be announced through the Deals Programme Management Office (PMO) network.

4. Carbon Management Procedure

An appropriate methodology for managing and minimising whole life carbon emissions resulting from projects should be applied from the earliest possible stage, i.e. the Royal Institute of British Architects (RIBA) Stage 1 (Preparation and Briefing) [5]. The intended carbon management methodology should be stated within the Management Case section of the business case.

The following two methodologies are internationally acknowledged as best practice approaches for managing whole life carbon for buildings and infrastructure projects. They are

[3] https://tinyurl.com/b7n8dzes
[4] https://tinyurl.com/a3t7jxhj
[5] https://tinyurl.com/xmwph3jn

mutually compatible and provide a 'level playing field' for the assessment and management of projects across the Deals programme. Both approaches stem from the need to minimise whole life carbon in the built environment to meet national climate change targets.

4.1 Infrastructure: PAS 2080

For infrastructure projects, *PAS 2080: Carbon Management in Infrastructure* should be applied. This document stems from HM Treasury's Infrastructure Carbon review in 2013, which identified that most carbon emissions in the UK (53% in 2013) are associated with the construction, operation, maintenance and use of infrastructure.

PAS 2080 emphasises the importance of all parties involved across the value chain working collaboratively towards a common carbon reduction goal and the achievement of the following outcomes:

- reduced carbon, reduced cost infrastructure;
- more collaborative ways of working that promote innovation, delivering benefit to society and communities served by economic infrastructure;
- effective carbon management in infrastructure that makes an important contribution to tackling climate change and leaves a positive legacy for future generations; and,
- the delivery of more sustainable solutions, at lower cost, that will enhance the reputation of the infrastructure industry, generating pride for those who work in it and attracting new people and skills.

4.2 Buildings: RICS Professional Statement

For building projects, The Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Professional Statement [6] should be applied. This document addresses the emerging understanding of the importance of embodied carbon in building projects and is compatible with other approaches to building sustainability, e.g. BREEAM [7] and the forthcoming Net Zero Public Buildings Standard [8].

The RICS whole life carbon approach identifies the best overall combined opportunities for reducing carbon and helps to avoid any unintended consequences of focusing on operational emissions alone. The specific objectives of the RICS Professional Statement are to:

- provide a consistent and transparent whole life carbon assessment implementation plan and reporting structure for built projects in line with EN 15978 (Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.) [9];
- enable coherence in the outputs of whole life carbon assessments to improve the comparability and usability of results;
- make whole life carbon assessments more 'mainstream' by enhancing their accessibility and therefore encourage greater engagement and uptake by the built environment sector;
- increase the reliability of whole life carbon assessment by providing a solid source of reference for the industry;
- promote long-term thinking past project practical completion, concerning the maintenance, durability and adaptability of building components and the project as a whole; and

[6] https://tinyurl.com/tfb44ydc
[7] https://www.breeam.com/
[8] https://www.scottishfuturestrust.org.uk/page/net-zero-public-sector-buildings-standard
[9] https://shop.bsigroup.com/ProductDetail?pid=000000000030256638

- promote circular economic principles by encouraging future repurposing of building components, as well as of the project as a whole, through quantifying their recovery, reuse and/or recycling potential.

4.3 Revenue Projects

The approach to managing carbon on projects where no new construction is planned will depend on the objectives of the project and its purpose in relation to addressing the climate emergency.

The carbon emissions impact of some revenue projects will not be possible to meaningfully quantify according to Green Book requirements. However, such projects may still support the achievement of the transition to net zero emissions, e.g. through raising awareness or carbon literacy training. If this is possible and intended, it should be described in the Management Case.

Where any quantifiable carbon emissions impact from a revenue project is expected, this should be estimated in accordance with Green Book requirements and included in the Economic Case. In all such quantifiable cases, the same general best practice carbon management approach described in PAS 2080 (and RICS) should be applied, i.e. quantification, baselining, reduction targeting, and proactive management.

5. Project Carbon Categorisation

The Deals programme includes a range of project types of differing scales and in a variety of delivery stages, with many early stage projects having not yet quantified their likely whole life carbon emissions impact.

In this context, to enable a consistent and transparent national approach to managing the potential carbon emissions impact of the Deals and their projects, a simple categorisation system has been developed using existing carbon terminology, benchmarked by the likelihood of a project to accord with Scotland's Climate Change Plan [10].

This categorisation system is based on the concepts of *control* and *influence*, i.e. the likely controllable carbon emissions impact of a project and the influence a project will have on carbon emissions beyond its control boundary. The system is suitable for a non-specialist Project Owner, based on project information expected to be available at RIBA Stage 1.

5.1 Carbon Control

Five project carbon emission impact control categories have been developed to enable the initial qualitative assessment of Deal projects. These categories are based on the potential of a project to either increase or decrease carbon emissions, as follows:

- Category 1 – Results in less atmospheric carbon;
- Category 2 – Whole life carbon net zero;
- Category 3 – Capital carbon increase then operationally net zero;
- Category 4 – Capital and operational carbon increase; or,
- Category 5 – Operational carbon increase.

Figure 1 below illustrates the project carbon emissions impact control categorisation process.

[10] https://www.gov.scot/policies/climate-change/

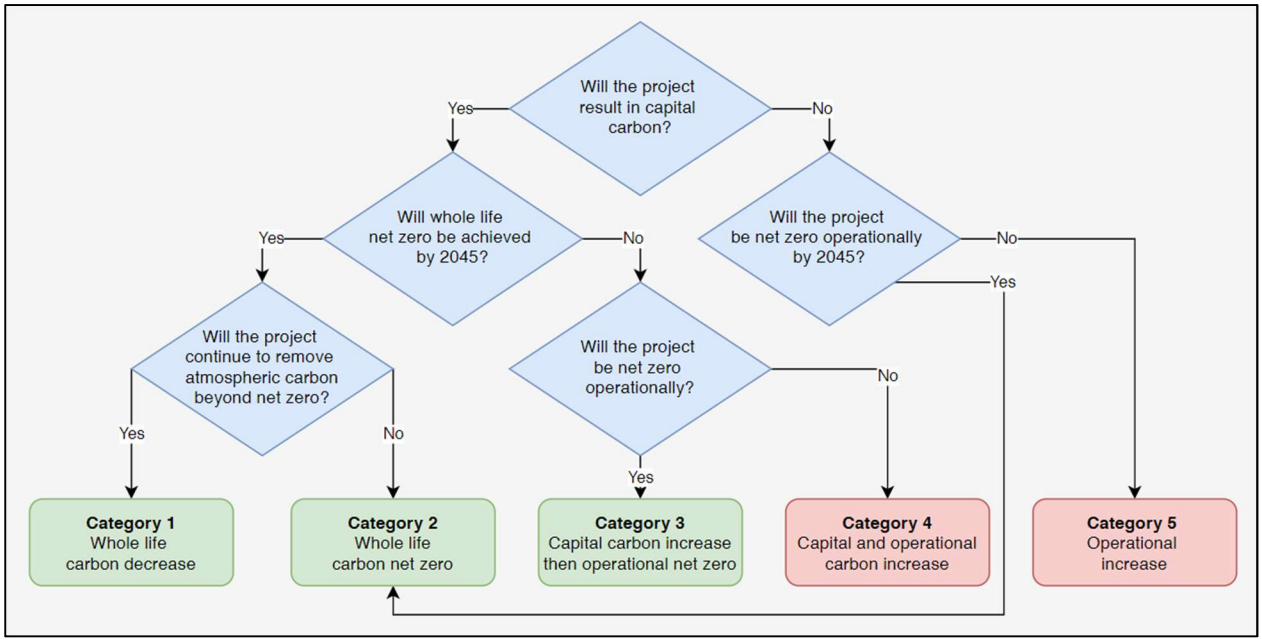

Figure 1: Carbon Emissions Impact Control Categorisation

5.2 *Carbon Influence*

Three project carbon emission impact influence categories have been developed, based on the potential of a project to influence carbon emissions beyond its control boundary, as follows:

- Category A - Leads to wider carbon emissions reductions;
- Category B - Will have a negligible effect on wider carbon emissions; or,
- Category C - Leads to an increase in wider carbon emissions.

Figure 2 below illustrates the project carbon emissions impact influence categorisation process.

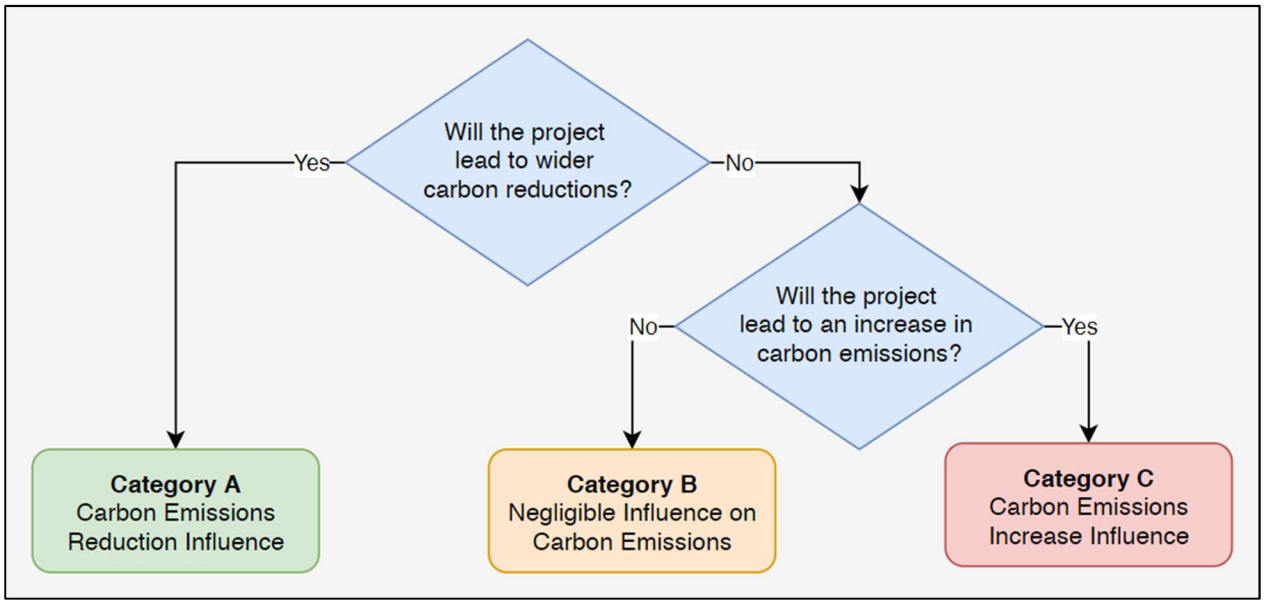

Figure 2: Carbon Emissions Impact Influence Categorisation

Project Owners should record the categorisation of their projects using the form contained in ***Appendix A***, to be submitted to the Scottish Government's City Region and Regional Growth Deals Sustainable Development Manager (SDM) for approval.

Project Owners with projects in any of the following categories should investigate the feasibility of improving their carbon categorisation and ensuring alignment with Scotland's Climate Change Plan. This will involve liaison and engagement with the Deals SDM.

- Control Category 4 (Capital & Operational Carbon Increase);
- Control Category 5 (Operational Carbon Increase); or,
- Influence Category C (Indirectly leads to a Carbon Increase).

5.3 Example Project Categories

The table below includes hypothetical examples of projects and their associated carbon emissions impact categories.

Example Project Description	Impact Category
Deployment of a new technology for extracting carbon from the atmosphere that extracts more carbon than was emitted to create it. Its success leads to the accelerated uptake of this technology across the country.	1A
A skills programme with no specific carbon objectives that involves no construction and is intended to enhance the employability of individuals within a region.	2B
A new research centre building that is designed to be operationally net zero (i.e. no fossil fuels will be required to operate it) but will have no measurable bearing on wider carbon emissions.	3B
A road that will be operationally net zero, e.g. by using renewable electricity for lighting, but will lead to an increase in vehicle km and associated 'tailpipe emissions' across the region.	3C
A building that will have no measurable bearing on wider carbon emissions that is designed to be heated by a gas fired system (*noting that the Scottish Government is currently developing regulations which will require new buildings consented from 2024 to use zero emissions heating (and cooling)*)[11]	4B
An investment programme that results in the growth of a business that is already releasing carbon emissions with no carbon mitigating measures. The success of that business leads to other similar business success.	5C

6. Monitoring and Evaluation

Central to the Deals funding process is the requirement for evidence to support the achievement of objectives set out within business cases. As part of this benefits realisation process, monitoring and evaluation of project performance is required to ensure successful outcomes. Information from this process is collated by the Programme Management Office at a Deal level and reported to government Deal Leads.

The carbon performance of projects will be based upon the achievement of carbon commitments set out in the Full Business Case (FBC). For any project, even projects in the delivery phase with no carbon commitments in their FBC, Scotland's net zero whole life carbon emissions trajectory towards 2045 will be the carbon performance benchmark, with examples of better performance being the achievement of net zero more quickly or the demonstration of wider carbon benefits of the project.

[11] https://tinyurl.com/25xenxvn

Example carbon benefits realisation outputs are included as ***Appendix B***.

Appendix A

Project Carbon Categorisation Form

Item	Project Owner Response
1. **Project Name**	
2. **Deal Region**	
3. **Brief Description of Project**	
4. **Expected Carbon Emissions Impact CONTROL Category** (1-5)	
5. **Expected Carbon Emissions Impact INFLUENCE Category** (A-C)	
6. **Justification of Expected Carbon Emissions Impact Category** e.g. a short narrative outlining the key carbon emission sources and their relationship to capital and operational net zero following the Deals Carbon Emissions Impact Categorisation Process.	
7. **Could the Carbon Emissions Impact Category be improved?** e.g. from Category 4B to Category 3A	
8. **Could the carbon performance of the project be improved?** e.g. reducing emissions further, achieving net zero faster.	
9. **How will carbon be managed?** e.g. through PAS 2080: Carbon Management in Infrastructure for infrastructure projects or the RICS Whole Life-Cycle Carbon Professional Statement for buildings projects	
10. **What other carbon savings are expected to result from the project?** e.g. wider carbon savings across the economy resulting from project output	

Appendix B

Example Project Carbon Benefits Realisation Outputs

Outputs	Definition	Evidence
1. What are the embodied carbon emissions resulting from the project? (tonnes CO2e)	Embodied carbon is the total greenhouse gas emissions (often simplified to "carbon") generated to produce a built asset, excluding operational emissions. CO2e is shorthand for carbon dioxide equivalents, the standard unit in carbon accounting to quantify greenhouse gas emissions. Embodied carbon includes emissions caused by extraction, manufacture/processing, transportation and assembly of every product and element in an asset. In some cases, depending on the boundary of an assessment, it may also include the maintenance, replacement, deconstruction, disposal and end-of-life aspects of the materials and systems that make up the asset. Suitably authoritative carbon factor sources should be used in embodied carbon calculations, e.g. ICE Carbon Inventory, Environmental Product Declarations (EPDs), CESSM4, etc.	The level of evidence detail will depend on the phase of the project. At concept stage an estimate based on major project elements (e.g. steel, concrete, floor area, etc) will suffice. As a bill of quantities develops, so will the embodied carbon estimate. Evidence will be in the form of a simple calculation with clear workings and assumptions that should be broadly as accurate as the associated cost estimate.
2. How have embodied carbon emissions been minimised?	A description of the techniques used to arrive at the embodied carbon figure.	Evidence could include referring to the carbon management process used (e.g. PAS 2080, RICS Whole Life Carbon Assessment for the Built Environment, BREEAM, etc) and associated procurement mechanisms to minimise carbon. Evidence could also include the use of low carbon materials or construction techniques with associated estimated carbon savings. Circular economy contributions, including waste minimisation and materials re-use, should be included here.
3. What are the annual operational carbon emissions resulting from the project? (tonnes CO2e/year)	Operational carbon emissions result from the operation of a built asset. This includes carbon emissions associated with heating, hot water, cooling, ventilation, and lighting systems, as well as those associated with cooking, equipment, and lifts (i.e. both regulated and unregulated energy uses).	Predicted or actual data should be provided in relation to energy use, using best practice carbon conversion factors, e.g. the BEIS Greenhouse Gas Reporting factors or local equivalents where relevant.
4. How have operational carbon emissions been minimised?	A description of the techniques used to arrive at the operational carbon figure.	Evidence could include referring to the carbon management process used (e.g. PAS 2080, RICS Whole Life Carbon Assessment for the Built Environment, BREEAM, etc). Evidence could also include the use of renewable energy technologies or low carbon heating systems.

Outputs	Definition	Evidence
5. What are the estimated whole life carbon emissions resulting from the project over its design life? (tonnes CO2e)	Whole life carbon is the sum of a project's embodied carbon and operational carbon over a specified period, e.g. its design life or 60 years	Evidence would be a calculation showing the sum of the embodied and operational carbon values.
6. What whole life carbon savings are estimated compared to a 'business as usual' approach to project design and construction? (tonnes CO2e)	Savings can only be demonstrated against a legitimate carbon baseline, i.e. what carbon emissions would have resulted from the project had active carbon reduction measures not been in place.	Justification of the carbon resulting from the business as usual scenario, then a calculation showing the difference between this value and the project's whole life carbon emissions.
7. How will the project become operationally net zero carbon by 2045?	A net zero asset may be defined as one that achieves a level of energy performance in line with national climate change targets that does not burn fossil fuels and that is 100% powered by renewable energy. Net zero is essentially the achievement of a balance of zero greenhouse gas emissions by taking actions to remove the same quantity of greenhouse gases from the atmosphere as all of the activities under consideration generate.	Evidence could include an outline description of how the project will feasibly decarbonise over time, e.g. by introducing new renewable technologies or following electricity grid decarbonisation (if the asset is powered only by electricity). Potential barriers to achieving net zero (e.g. financial, technological, skills, etc) should be highlighted here.
8. How has the project contributed to a more environmentally sustainable transport network?	An important gauge in the environmental sustainability of a transport network is the carbon emissions it generates. Carbon emissions quantification usually requires traffic modelling, although this may not always be necessary, depending on the project.	Evidence will be project-dependent, from a qualitative description for negligible carbon impact projects, to quantification based on traffic modelling for potentially significant carbon impact projects (e.g. sizable roads projects).
9. Detail how the project has contributed to any other areas of environmental sustainability, e.g. mitigating pollution, dealing with contamination, enhancing biodiversity, etc	Environmental sustainability here is distinct from social or economic sustainability, which are covered by separate outputs.	Summary bullet points will suffice here. Evidence could include reference to an Environmental Impact Assessment (EIA) report or BREEAM certification if available. Other contributions towards environmental sustainability should also be highlighted here.