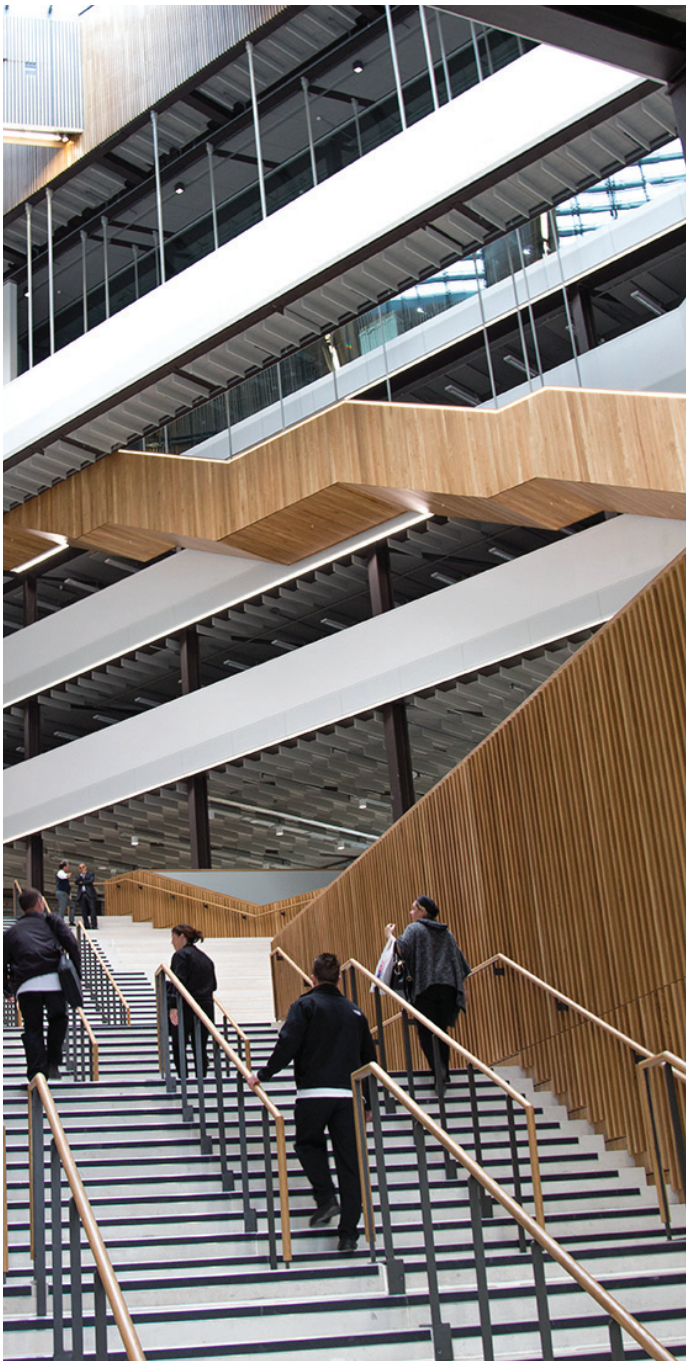
SCOTTISH FUTURES TRUST



# Environmental Sustainability Performance Criteria For Construction

A toolkit to establish and deliver
public sector construction requirements

# Table of Contents

March 2018

# INTRODUCTION

The Scottish Government is strongly committed to improved environmental outcomes, accelerating the circular economy and meeting its carbon emissions reduction targets. It has adopted a sector by sector approach to setting and delivering on these targets: public sector construction is one such sector. The Government's circular economy strategy Making Things Last recognises that construction and the built environment accounts for about 50% of all waste in Scotland and is a major influence on the efficient use of resources. In addition, more than 40% of Scotland's carbon dioxide emissions come from the energy used to heat, light and run Scotland's buildings.

The public sector in Scotland spends £4 billion on construction each year. This spend not only improves Scotland's infrastructure but, harnessed correctly, could also deliver significant environmental sustainability improvements for Scotland.

### Why has the toolkit been developed?

The 2013 review of Scottish public sector procurement in construction recommended that the Scottish Government should:

- align construction guidance to the wider sustainable procurement agenda in recognition of the potential for construction to demonstrate the benefits of good procurement
- better incentivise greener construction and promote modern methods of construction and provide better advice and guidance on renewables technologies.

The Environmental Sustainability Performance Criteria toolkit has been developed to help achieve these recommendations.

### What is its purpose?

The toolkit has been developed to help public sector organisations in Scotland deliver more environmentally sustainable buildings. It does this by:

- providing a clear overview of the policy and regulatory context for environmental standards for construction
- helping to clarify which environmental criteria are mandatory and which are voluntary
- giving guidance on the different elements to consider when developing an environmental project brief for construction
- providing a tool to track the project's environmental requirements
- setting out an overview of the additional tools and guidance which are available.

### Who is this for?

The toolkit is intended for use by staff from public sector organisations who are involved in the procurement of new buildings. It has been designed to support procurement teams from Local Authorities as well as government agencies, including the National Health Service. It has primarily been designed to support procurement of new buildings, however much of the guidance is also applicable to the refurbishment of existing buildings.

### What is in the toolkit?

The toolkit has two parts:

1. **Guidance Note** (this document)
2. **Environmental Performance Tracker** – an editable spreadsheet to establish and manage environmental construction requirements.

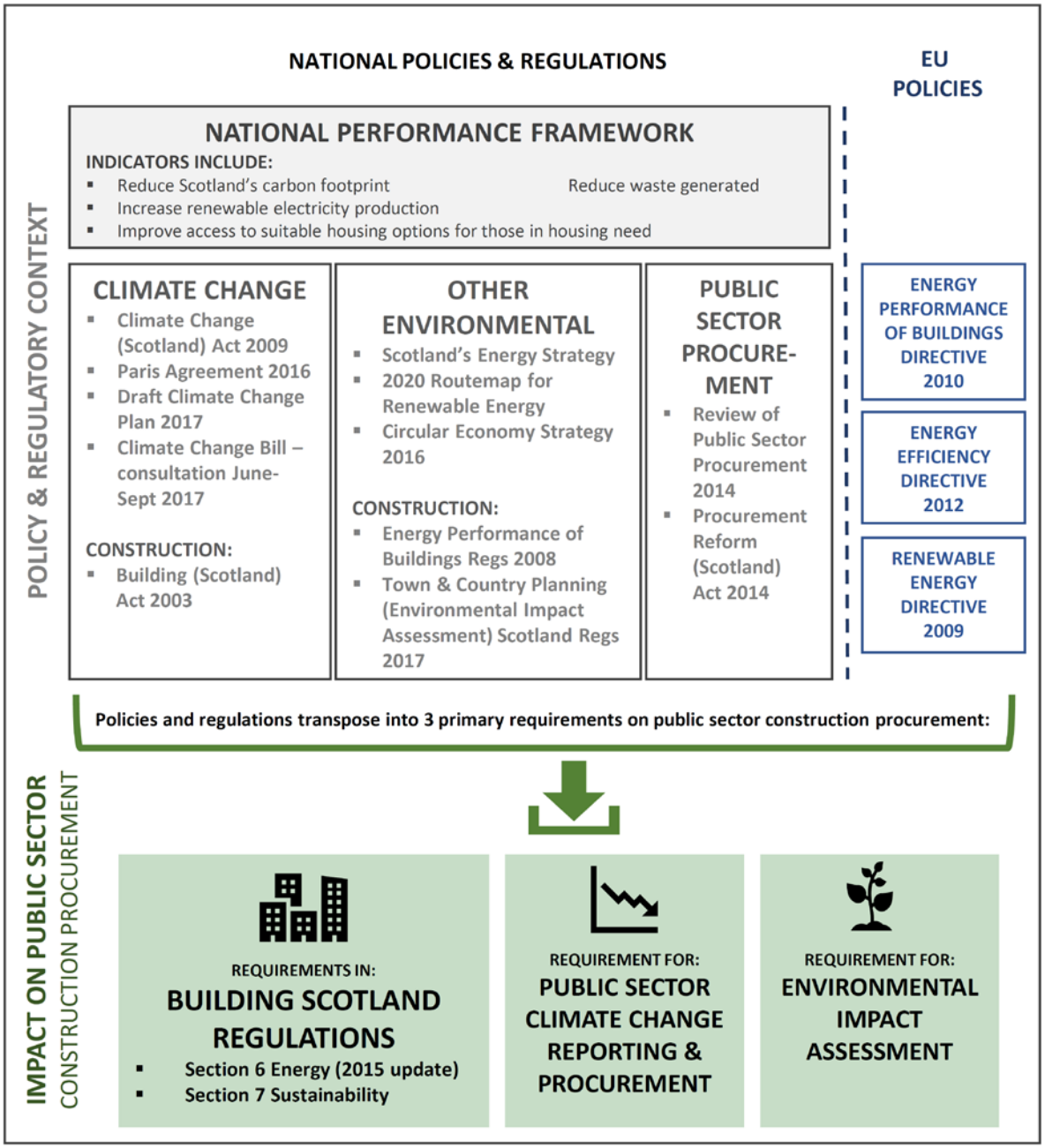
The guidance note has four sections:

1. **Environmental policy and regulations -** This section sets out the policy and regulatory context for environmental sustainability within public sector construction in Scotland. It provides an overview of the policy landscape and summarises key elements which impact on public sector construction procurement.
2. **Setting the brief-** This section provides advice on setting the environmental design and performance aspects of a project brief. It addresses the alignment between national and local strategies and individual project objectives and targets. It also sets out where to find evidence to support enhanced environmental targets, how to select a verification method and what incentives are available. The section concludes with an overview of what to include in the project brief and how to monitor and report outcomes.
3. **Using the Environmental Performance Tracker -** This section provides a step-by-step guide to using the Environmental Performance Tracker. The purpose of the tracker is to help procuring authorities achieve enhanced environmental sustainability outcomes by being able to more easily set and manage their project requirements.
4. **Additional guidance** - This section outlines the additional tools, methodologies and guidance which are avaliable to support environmental outcomes during the design, construction and operational stages of a project. Links and case studies have been provided to existing best practice and resources that can be utilised within projects.

# 1.0 ENVIRONMENTAL POLICY & REGULATIONS

This section sets out the policy and regulatory context for environmental sustainability within public sector construction procurement in Scotland. It provides an overview of the policy landscape and summarises key elements which impact strongly on public sector construction procurement.

The section is made up of two parts: the first part sets out the policy and regulatory context; the second part outlines the resulting requirements on public sector construction procurement. The diagram below provides a summarised overview of the two sections and their relationship.



## 1.1 Policy & regulatory context

The policy and regulatory context includes national level policies as well as European Union policies. Policy has been grouped into three areas which sit underneath the overarching National Performance Framework of the Scottish Government. The three policy areas are: climate change; other relevant environmental policies; and public procurement policies.

Only the key policies, legislation and regulations which impact environmental standards within public sector construction have been included in this document. Broader environmental policies have not been included.

### 1.1.1 National Performance Framework

The Scottish Government's National Performance Framework establishes broad measures of national wellbeing covering a range of economic, health, social and environmental indicators and targets. The purpose of the framework is to focus government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth.

The framework includes an outcome to reduce the local and global environmental impact of consumption and production and a target to reduce greenhouse gas emissions. The framework also includes a range of indicators which are relevant to public sector construction, including:

- Reduce Scotland's carbon footprint
- Reduce waste generated
- Increase renewable electricity production.

### 1.1.2 Climate change policies

The Scottish Government is committed to reducing Scotand's carbon emissions. The Climate Change (Scotland) Act in 2009 created a statutory framework for Scotland's reduction in greenhouse gas emissions. The Act sets an interim target of a 42% reduction in emissions (compared to 1990) by 2020, with a final target of an 80% reduction by 2050.

In 2016, the UK signed the United Nations' Paris Agreement, the world's first comprehensive climate agreement, dealing with greenhouse gas emissions mitigation, adaptation and finance. In January 2017 the Scottish Government released a draft of the Climate Change Plan, the third report on proposals and policies for meeting Scotland's annual greenhouse gas emissions targets. The Plan sets out the Government's approach to meeting its emission reduction targets from 2017 to 2032. It summarises Scotland's approach sector by sector, including construction, and includes the draft new Climate Change Bill.

### 1.1.3 Climate change policies relating to new construction

Scottish building regulations, provided under the Building (Scotland) Act, aim to further the conservation of fuel, power and the achievement of sustainable development associated with new buildings and construction work.

Under the Scottish building regulations, new construction work has to meet the Scottish Building Standards. There are seven sections of building standards with section 6 (Energy) and section 7 (Sustainability) being of most relevance to this guidance note.

In 2007, Scottish Ministers convened an expert panel to advise on the development of a low carbon building standards strategy to increase energy efficiency and reduce carbon emissions. This resulted in The Sullivan Report – 'A Low Carbon Building Standards Strategy for Scotland' . A key recommendation of this Report was staged improvements in the section 6 energy standards in 2010 and 2013, with the aim of net zero carbon buildings (emissions for space heating, hot water, lighting and ventilation) in 2016/17, if practical.

In May 2013 Scottish Ministers reconvened the Sullivan panel with a view to revisiting some of their original recommendations, taking account of the impact of the economic downturn on the construction sector. Whilst maintaining the level of ambition, the 2013 Update report recommended a more moderate pace of change.

Reviews of the energy standards has resulted in a stepped reduction in emissions in 2002, 2007, 2010 and most recently in October 2015. The overall impact of staged improvements to energy standards for new buildings is benchmarked against standards applied in 1990 (the United Nation Framework Convention on Climate Change base year for assessing CO2 emissions abatement). The overall effect of the review is that new buildings are now, on aggregate, producing around 75% less emissions than those built to 1990 standards[i].

The forthcoming review of the energy standards will consider the next steps to further reducing carbon emissions from new buildings with changes anticipated to take effect from 2020.

### 1.1.4 Other environmental policies

There are a range of other policies and legislation which have a relationship to the environmental impact of new buildings and these are briefly summarised below.

- Scotland's Energy Strategy - The draft Energy Strategy for Scotland was published for consulation in early 2017 setting out the Scottish Government's vision for the future energy system in Scotland for the period to 2050. The draft strategy includes a renewed focus on energy efficiency – taking a targeted approach to reducing demand and improving the energy efficiency of Scotland's homes and buildings through Scotland's Energy Efficiency Programme.
- Routemap for Renewable Energy in Scotland 2011 - This updated and expanded Routemap reflects the challenge of the new target to meet an equivalent of 100% demand for electricity from renewable energy by 2020, as well as the target of 11% renewable heat.
- Making Things Last Circular Economy Strategy 2016 - This strategy sets out the priorities for moving towards a more circular economy - where products and materials are kept in high value use for as long as possible. The construction sector is Scotland's biggest user of materials and responsible for over half of the carbon emissions when the operation of buildings is included.
- Energy Performance of Buildings (Scotland) Regulations 2008 –These regulations state that where a building is to be sold or let the owner must make a copy of a valid energy performance certificate for the building available free of charge to a prospective buyer or prospective tenant. These Regulations partially transpose the EU Energy Performance of Buildings Directive outlined in section 1.1.6 below.
- Town & Country Planning (Environmental Impact Assessment) Scotland Regulations 2017 - These regulations implement the Environmental Impact Assessment (EIA) Directive 2011/92/EU, as amended by Directive 2014/52/EU in Scotland. They require an EIA with planning applications for larger developments. The EIA Report describes the likely significant effects of the development on the environment and proposed mitigation measures.
- Council environmental policies – Some local authorities in Scotland have elected to set sustainability requirements for new construction specific to their jurisdiction. For example Glasgow City Council's City Development Plan sets minimum levels of sustainability above mandatory requirements by referring to the enhanced levels within section 7 of the Building Standards.

### 1.1.5 Public sector procurement

The report of the Review of Scottish Public Sector Procurement in Construction was published in October 2013. The review looked at practices of public bodies involved in construction-related procurement and how to deliver value for taxpayers' money.

The report proposed "an approach to public sector construction procurement which achieves better collaboration in design-led procurement, which achieves value for money for the public sector but which

also recognises that the construction sector is a vitally important part of the Scottish economy". The Scottish Government welcomed the report and announced in May 2014 that it would implement 66 of the 67 recommendations made, including:

- **Recommendation 54:** The Scottish Government should….better incentivise greener construction and promote modern methods of construction and provide better advice and guidance on renewables technologies
- **Recommendation 55:** Construction guidance should be aligned to the wider sustainable procurement agenda in recognition of the potential for construction to demonstrate the benefits of good procurement and should take account of the Sullivan Panel report of November 2013.

This toolkit has been prepared to help meet recommendations 54 and 55. Further information on modern methods of construction is provided in section 4.6 of this guidance note.

More broadly, the Procurement Reform (Scotland) Act 2014 provides a national legislative framework for sustainable public procurement that supports Scotland's economic growth through improved procurement practice. The Act and related EU Directives provide the statutory foundations for the Scottish Model of Procurement. These aim to place sustainable and socially responsible purchasing at the heart of the process.

### 1.1.6 EU policies

The main EU Directives which relate to energy and the environmental sustainability of buildings are the Energy Performance of Buildings Directive (EPBD), the Energy Efficiency Directive (EED) and the Renewable Energy Directive.

- EPBD Directive 2010/31/EU – This requires all new buildings to be nearly zero-energy by the end of 2020. All new public buildings must be nearly zero-energy by 2018. On the 30 November 2016 the European Commission proposed an update to the Energy Performance of Buildings Directive to help promote the use of smart technology in buildings and to streamline the existing rules.
- Energy Efficiency Directive – This sets out energy savings requirements for EU countries' buildings. This includes making central government buildings more energy efficient and requiring national plans to be established for renovating overall building stock.
- Renewable Energy Directive 2009/28/EC - The Renewable Energy Directive establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil at least 20% of its total energy needs with renewables by 2020 – to be achieved through the attainment of individual national targets.

There are also other EU directives which may be relevant to some projects including the Waste Framework Directive, the Construction Products Regulation and the Energy Related Products Directive. In addition Closing the Loop is the EU's action plan for the circular economy.

## 1.2 Requirements on public sector construction procurement

This section sets out how the national and EU policies impact on public sector construction projects and the specific requirements which result from this. It covers:

- Public sector requirements on climate change reporting and procurement
- Environmental Impact Assessment
- Scottish Building Standards.

### 1.2.1 Public sector procurement and climate change reporting

There are two requirements relating to the procurement of environmentally sustainable buildings which apply to the public sector. These are:

- **The Procurement Reform (Scotland) Act 2014** places sustainable procurement duties on contracting authorities. Authorities are required to consider how in conducting the procurement process it can improve the economic, social, and environmental wellbeing of the authority's area.

- **The Climate Change (Scotland) Act 2009** places duties on public bodies relating to climate change:
    - Section 72 of the Act states that "a planning authority, in any local development plan prepared by them, must include policies requiring all developments in the local development plan area to be designed so as to ensure that all new buildings avoid a specified and rising proportion of the projected greenhouse gas emissions from their use, calculated on the basis of the approved design and plans for the specific development, through the installation and operation of low and zero-carbon generating technologies."
    - Further to the Act, in 2015 the Scottish Government introduced an Order requiring all 150 Public Bodies who appear on the Major Player list to report annually to Scottish Ministers on their compliance with the climate change duties.

The Scottish Government has stated that it will be outlining proposals for a new Climate Change Bill as part of delivering its commitment to the Paris Agreement. This may have further implications for the procurement of new buildings by public sector organisations.

### 1.2.2 Environmental Impact Assessment

The Town & Country Planning (Environmental Impact Assessment) Scotland Regulations 2017 require an Environmental Impact Assessment (EIA) with planning applications for larger developments. The EIA should include amongst other things:

- A description of the factors likely to be significantly affected by the development: population, human health, biodiversity, land, soil, water, air, climate (for example greenhouse gas emissions, impacts relevant to adaptation) and others.
- The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.

### 1.2.3 Scottish Building Standards

On 1st of May 2011, the sustainability section was introduced to the Scottish Building Standards through the Building (Scotland) Act. Applicable to all new buildings, the principles build upon the degree of sustainability already embedded within the building regulations. Introduction of a sustainbility standard aims to encourage greater awareness of the design and construction of all new buildings within a broader context of sustainable development.

The sustainability section of the Technical Handbooks rewards new buildings that meet the 2010 building standards with a Bronze level label. Further optional upper levels of sustainability are defined by Silver and Gold labels. These have been created through identifying cost-effective benchmarks verifiable by the building warrant system. The standard address eight different aspects of sustainability:

| **Domestic buildings** | **Non-domestic buildings** (all except aspect 1, are only available for school buildings with classrooms) |
|---|---|
| 1. Carbon dioxide emissions | 1. Carbon dioxide emissions |
| 2. Energy for space heating | 2. Energy for thermal comfort and artificial lighting |
| 3. Energy for water heating | 3. Water efficiency |
| 4. Water use efficiency | 4. Biodiversity |
| 5. Optimising performance | 5. Well-being |
| 6. Flexibility and adaptability | 6. Flexibility and adaptability |
| 7. Well-being and security | 7. Material use and waste |
| **8.** Material use and waste | 8. Optimising performance |

Key points to note are:

- **Bronze level is achieved automatically** - Recognising the degree of sustainable design that is inherent within the other six sections of the building standards, a bronze level of sustainability is achieved automatically for new buildings.
- **Silver level of carbon dioxide emissions aspect achieved automatically** - As a consequence of the 2015 carbon emissions standard of the energy section, the silver level is automatically assigned to the carbon dioxide emissions aspect for new buildings.
- **"Active" levels** – The presence of low or zero carbon generating technologies (LZCGT) are also recognised through additional levels called Bronze Active and Silver Active.
- **Non-domestic buildings still in development** - The sustainability labelling system has been fully developed for domestic buildings, however, due to the more varied and complex nature, labelling for non-domestic buildings has only been partially developed. At present, all eight aspects are defined only for new 'school buildings containing classrooms'.
- **Platinum level only carbon dioxide emissions** - A further upper level called 'platinum' has been reserved for further recognition within the building standards system. At present, only the aspect of carbon dioxide emissions has been defined for this level.

One of the requirements of the current standards is that upon completion of all new buildings a Sustainability Label is affixed within the building (see Appendix 1). This label will show the level of sustainability that has been achieved.

# 2.0 SETTING THE PROJECT BRIEF

This section provides advice on setting the environmental sustainability performance criteria for a project brief. It aligns national strategies, the procuring authority's organisational policies and individual project objectives and targets. It also sets out where to find evidence to support enhanced environmental targets, how to select a verification method and what incentives are available. The section concludes with an overview of what to include in the project brief and how to monitor and report outcomes.

## 2.1 Where to begin

The procurement of a new building by a public sector organisation provides an important opportunity to contribute towards established national and local policy objectives for environmental sustainability. The first step in setting a project brief for environmental sustainability is to consider the broader outcomes and objectives which the building can contribute towards.

Most public sector bodies in Scotland have their own sustainability or environmental strategies to guide the delivery of their services. In some cases the strategy will set specific objectives regarding the procurement and operation of buildings owned or managed by the organisation. These objectives are often framed in light of the organisation's wider policies and obligations such as the economic development strategy, local improvement plans or single outcome agreement.

| National objectives<br>**NATIONAL PERFORMANCE INDICATORS** | Local objectives<br>**EXAMPLE ORGANISATIONAL POLICIES & PLANS** |
|---|---|
| **Reduce Scotland's carbon footprint** | • Minimise carbon emissions<br>• Maximise fabric efficiency of new & existing buildings<br>• Ensure SMART Building Management systems are used |
| **Reduce waste generated** | • Maximise the re-use of existing built assets & materials<br>• Maximise recovery & recycling of existing assets<br>• Maximise the use of low wastage offsite manufacture |
| **Increase renewable electricity production** | • Maximise onsite renewables including power & heat |
| **Improve access to local greenspace**<br>**Improve people's perceptions of their neighbourhood**<br>**Increase natural capital** | • Enhance the existing biodiversity<br>• Maximise green space within all developments |
| **Improve self-assessed general health**<br>**Reduce premature mortality** | • Ensure indoor air quality as a key target in all assets<br>• Ensure zero toxin materials are specified and procured<br>• Maximise day lighting<br>• Minimise fuel poverty through energy efficiency |
| **Increase the proportion of journeys to work made by public or active transport** | • Provide secure and covered bicycle parking<br>• Provide shower and locker facilities |

Fig 2. Examples of National Indicators and Environmental Sustainability Policies

The table above gives examples of how a organisations' policies can be aligned to the Scottish Government's National Indicators (outlined in Section 1.1.1). There are 55 national performance indicators in total.

Ideally there should be a strong alignment between national objectives for environmental sustainability, organisational objectives and individual project objectives, as follows:


## 2.2 Getting the right skills

Delivering a new building which achieves enhanced sustainability standards requires a skilled team with experience and cross-disciplinary capability. The senior manager responsible for the overall procurement will need to ensure that team members can manage the technical as well as the project management aspects of brief. Ideally team members will have a sound understanding of the principles of circular economy, whole life costing and design optimisation.

## 2.3 Cost benefit of environmental performance

The next step is to consider the available evidence on the costs and benefits of environmentally sustainable construction. Procuring buildings with higher levels of environmental sustainability can deliver significant benefits to public sector organisations – but the specific costs and benefits will need to be assessed for individual projects. There is a strong evidence base available to support this assessment including:

- The Business Case for Green Building – This report, published by the World Green Building Council in 2013, found that the direct benefits from green buildings in use (such as reduced energy and water use and lower long-term operations and maintenance costs) typically exceed any costs premiums associated with their design and construction within a reasonable payback period.
- Delivering Sustainable Buildings - savings and payback – This report by Yetunde Abdul (BRE) and Richard Quartermaine (Sweett Group) applies cost data from real construction projects to three case study buildings – an office, a secondary school and a community healthcare centre – and provides detailed capital and operational cost information.
- The Value of BREEAM - This document brings together the findings from a range of publications to present the business case for maximising sustainability through BREEAM certification of non-domestic (commercial) buildings.
- BRE Case Studies – The Building Research Establishment has produced a large number of case studies on building sustainability. Some of these have targeted information on the outcomes achieved in different buildings – including a report on carbon reduction targets in schools.

Overall there is strong evidence that environmentally sustainable buildings can be delivered at a price comparable to conventional buildings and investments can be recouped through operational cost savings. Using a Whole Life Costing approach during the project scoping phase will ensure that the long-term costs and benefits are fully recognised and considered. There are tools available to help build the business case including the Design led Whole Life Costing Tool and the Whole Life Appraisal Tool (Refer to section 4.2).

## 2.4 Setting project targets

Once the evidence has been assessed, the next step is to set specific environmental sustainability targets for the project. As a minimum these will need to meet all the mandatory obligations set out in Section 1 and should be proportionate to the size of the project and appropriate to the building's use. Prior to setting targets, procurement managers should consider:

- What does good, sustainable design mean on this specific project? Which targets are relevant to the outcomes we're trying to achieve and which don't make sense for this building?
- Lessons learned from previous projects in regards to environmental sustainability – What worked well? Have post-occupancy evaluations been undertaken? Has there been any assessment of the outcomes achieved?
- Consulting with other Local Authority departments and public sector agencies – Have similar projects recently been procured by others? Would site visits to buildings incorporating similar targets be useful?
- Undertaking an early assessment of the constraints and opportunities of the site – What is unique about the site which might either provide an environmental opportunity or a challenge? Are there local factors which could be exploited for greater environmental benefit?

There are a number of different frameworks which can support procurement managers to set project targets and validate outcomes. These include:

- **BREEAM** – the sustainability assessment method managed by BRE Global.
- **Sustainability section of the Scottish Building Standards** - section 7 (for domestic and school buildings containing classrooms).

**BREEAM:**

- BREEAM is the UK's predominant sustainability assessment method for buildings. It addresses a number of lifecycle stages such as new construction, refurbishment and in-use. Globally there are more than 561,900 BREEAM certified developments, and almost 2,265,400 buildings registered for assessment since it was first launched in 1990. Further detail on BREAAM can be found at: http://www.breeam.com/

**Sustainability section of the Building Standards:**

- The aim of the sustainability section of the building standards is to encourage the design and construction of new buildings that address eight 'aspects' of sustainable construction beyond what is sought in demonstrating basic compliance with building regulations. This has created a mechanism for organisations targeting higher levels of environmental sustainability to receive independent recognition of their achievement. Further detail on Section 7 is set out in Appendix 2.
- The section 7 sustainability standards have only been fully defined for domestic buildings and school buildings containing classrooms. The principles may be relevant to other non-domestic building types however the detailed technical standards cannot be directly transposed. Therefore the BREEAM tool is likely to provide greater guidance when procuring these building types.

Both of these frameworks provide targets across a range of environmental categories and for a range of building types. The basic parameters of both frameworks are set out in the table below. Procurement managers will need to determine on a case by case basis which framework best fits their project. In some cases using both frameworks may add value. Some sectors will also have specific requirements in order in how they apply these frameworks.

| | BUILDING STANDARDS<br>**SECTION 7 SUSTAINABILITY:** | BRE GLOBAL<br>**BREEAM TOOL:** |
|---|---|---|
| **CATEGORIES** | - Carbon dioxide emissions<br>- Energy for space heating / thermal comfort / artificial lighitng<br>- Energy for water heating<br>- Water use efficiency<br>- Optimising performance<br>- Flexibility and adaptability<br>- Well-being / security<br>- Material use and waste<br>- Biodiversity (non-domestic) | - Energy<br>- Health & Well-being<br>- Innovation<br>- Land use<br>- Materials<br>- Management<br>- Pollution<br>- Transport<br>- Waste<br>- Water |
| **BUILDING TYPES** | - Domestic buildings<br>- School buildings containing classrooms (only carbon dioxide emissions apply to other non-domestic buildings) | - Offices<br>- Industrial<br>- Retail<br>- Public building including (Education, Healthcare, Prisons, Law courts,<br>- Multi-residential accommodation/Supported living facility<br>- Residential institutions(short term stay)<br>- Non residential institutions<br>- Assembly and leisure |
| **LEVELS** | - Bronze<br>- Bronze Active<br>- Silver<br>- Silver Active<br>- Gold<br>- Platinum (only defined for carbon dioxide emissions) | - Pass<br>- Good<br>- Very good<br>- Excellent<br>- Outstanding |

## 2.5 Choosing the right assurance

The next step is to consider the type and level of assurance and validation required in relation to the environmental sustainability of the project. The public sector organisation will need to ensure that it has validation procedures which will satisfy its own operational and governance arrangements. There needs to be a sufficient level of confidence in the accuracy of the environmental sustainability data that is being reported and included within its Annual Procurement Report to meet the Climate Change (Scotland) Act 2009 requirements.

Assurance can range from:

**SELF ASSURANCE**
Consultants & suppliers provide evidence of meeting project targets directly to client.

**MIXED APPROACH**
Audited approach to key targets such as carbon dioxide emission, plus self assurance of remainder.

**THIRD PARTY VERIFICATION**
The Sustainability Label and BREEAM certification offer full third party assessment and verification

The scale of validation is likely to vary across procuring authorities. Where there is a large pipeline of projects, reliance on independent self-certification by the supplier with ad-hoc audits of this information might offer a manageable approach. However, through effective contract management all targets should be fully validated to ensure compliance with the contract conditions. There are also defined methodologies in the validation of data including UK Government's Soft Landings (refer Section 4.5 of this Guidance Note).

The timing of when different project targets are validated will vary. Most environmental sustainability targets will be achieved during the construction phase of the project and be measurable upon completion. Some targets will have preliminary validation at design stage and full validation at project completion. Zero Waste Scotland have developed in depth procurement guidance for the construction sector which can be used to support validation.

Any statement of sustainability under Section 7 of building standards will be checked as part of the building warrant (design) to verify that the proposals, when constructed, will meet the building regulations. On completion of the work the 'relevant person' (usually the owner) has to submit a completion certificate that confirms the completed work meets the building regulations and is in accordance with the building warrant. The local authority building standards section (verifier) will carry out inspection of the work as part of their duty to carry out reasonable inquiry into the issued completion certificate.

## 2.6 Consider incentives

The next step is to find out whether there are incentives available to support the procuring authority achieve the project targets. The availability of incentives can change rapidly, however a summary of two key incentives available in mid-2017 are listed below:

- The Renewable Heat Incentive (RHI) – The Non-Domestic Renewable Heat Incentive (RHI) is a government environmental programme that provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations receive quarterly payments over 20 years based on the amount of heat generated. The scheme covers England, Scotland, and Wales.

- Feed-in Tariffs (FIT) - The Feed-in Tariffs (FIT) scheme is a UK government programme designed to promote the uptake of renewable and low-carbon electricity generation technologies. The FIT scheme is available for anyone who has installed, or is looking to install, one of the following technology types up to a capacity of 5MW, or 2kW for CHP: solar photovoltaic (solar PV), wind, micro combined heat and power (CHP), hydro and Anaerobic digestion (AD).

## 2.7 Preparing the brief

The next step is to prepare the brief for the environment performance criteria for the project. A thorough and articulate environmental brief will be a critical step in achieving the objectives of the project and contributing to the organisation's broader sustainability outcomes.

Some key elements to consider are set out below:

- Vision and objectives – Start with the bigger picture to give the project consulants and contractors a vision of the outcomes the building could achieve. Make the connection between national outcomes for Scotland, local objectives and building-level targets.
- Clarify roles – Ensure the responsibility for meeting project targets is clearly set out. In particular, clarify how you would like the architects and engineering consultants to work together to achieve energy, carbon dioxide, water and indoor environment targets. Also consider roles during the handover and operational phases of the building.
- Environmental advisor – For more complex projects, consideration should be made to the appointment of a specialist advisor to lead the environmental outcomes of the project.
- Balance detail and innovation – Try to be specific about the project objectives but challenge the design team to innovate. Encourage cross-disciplinary collaboration to solve project challenges.
- Validation and reporting – Specify in the design brief the level and frequency of validation and reporting that will be required for the environmental targets.

## 2.8 Monitoring and reporting

The key areas to consider when setting up a monitoring and reporting approach include:-

- Consistency of reporting across all projects – The consistency of reporting will support the ability of the public sector organisation to consolidate data across all their projects and demonstrate benchmark and stretch targets.
- Frequency of reporting – This should be set out from the outset as a key project objective. Identifying and notifying the project team early of reporting requirements will offer all parties the opportunity to work collaboratively to mitigate the risk of non-delivery of targets.
- Resourcing to manage monitoring and reporting - The public sector organisation should ensure the appropriate level of resource is available to meet its duties, and should collect environmental sustainability data during the pre-construction, construction and in-use phases. This could be led and managed by its environmental sustainability manager.
- Alignment with Annual Procurement Report – The approach to reporting should enable the public sector organisation to easily extract project data to include in its Annual Procurement Report. This will help to demonstrate that the procurement spend is being used to achieve better public services, social, economic and environmental outcomes, and climate change obligations. The diagram below illustrates the relationship between project targets and the National Performance Framework:

# 3.0 USING THE ENVIRONMENTAL PERFORMANCE TRACKER

## 3.1 Overview

Design and construction processes are typically delivered through phased procurement management approaches. These cover the early stages of identifying the project and framing the brief, to the completion and operation of the final building. Building projects commonly adopt the Royal Institute of British Architects Plan of Works which this guidance aligns with, as outlined in figure 3, below:

This toolkit is designed to integrate into standard building procurement processes and provide support in setting and monitoring environmental requirements throughout the process. The toolkit has two parts:

1. Guidance Note (this document)
2. Environmental Performance Tracker – an editable spreadsheet to establish and manage environmental construction requirements.

This section provides a step-by-step guide to using the Environmental Performance Tracker. The Tracker can be accessed here :
(https://www.scottishfuturestrust.org.uk/storage/uploads/environmentalperformancetrackermar18.xlsx)

## 3.2 The Environmental Performance Tracker

The purpose of the Environmental Performance Tracker is to help public sector organisations achieve enhanced environmental sustainability outcomes by being able to easily set and manage their project requirements. The Environmental Performance Tracker can be used on both domestic and non-domestic buildings. The key benefits of using the Tracker are:

- clear oversight of the different environmental requirements set for a project
- a simple connection between project targets and organisational objectives
- the ability to monitor progress against different requirements throughout project delivery
- better communication with consultants and contractors on environmental requirements
- greater support to set and achieve higher environmental targets.

The Environmental Performance Tracker has been designed to incorporate a wide range of potential environmental requirements. This includes all Aspects within Section 7 of the Building Standards, as well as BREEAM and EPC requirements.

The targets may include include a combination of upper level Section 7 Aspects, benchmarks which are verified by third parties as well as individual targets:

| TYPE OF TARGET | Section 7 Levels: | Other third party verifications: | Individual targets: |
|---|---|---|---|
| EXAMPLES INCLUDE: | ▪ Bronze Active<br>▪ Silver<br>▪ Silver Active<br>▪ Gold | ▪ Energy Performance Certificate level<br>▪ BREEAM Certification | ▪ Level of embodied carbon<br>▪ Waste reduction targets<br>▪ Material reuse targets |

The Environmental Performance Tracker is designed to be used throughout the project lifecycle. The diagram below sets out the key points in the procurement process when the Environmental Performance Tracker should be used.

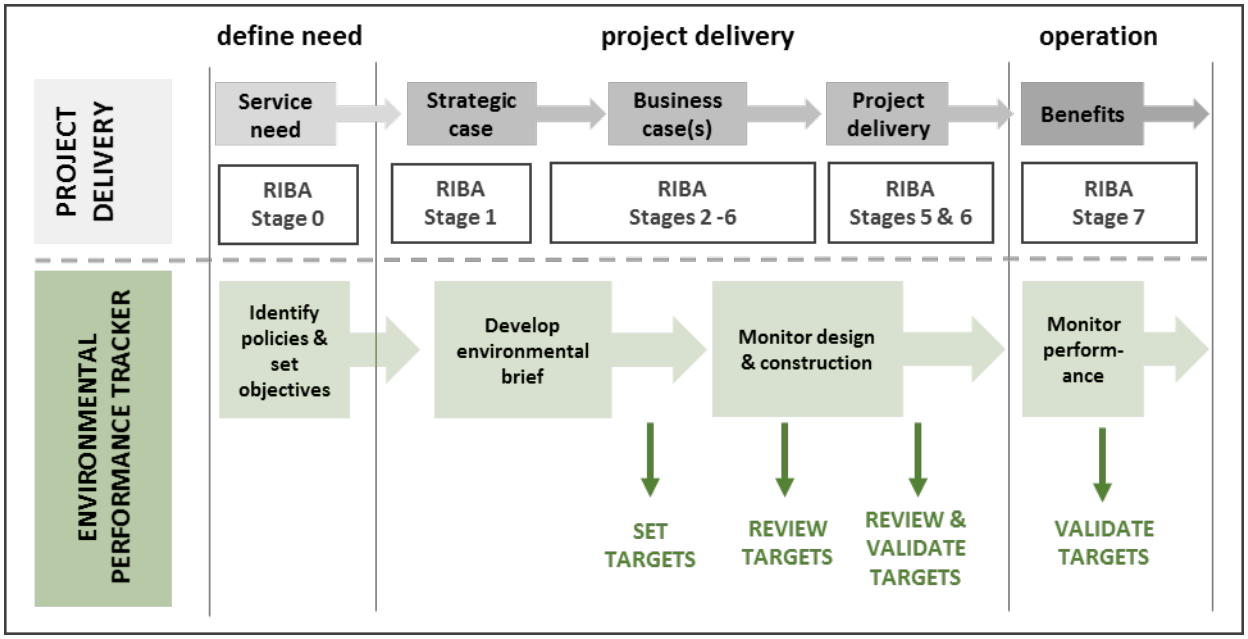



Figure 3. Adoption of tracker through the development process

It is critical to embed 'outcomes-based' environmental sustainability from the beginning, and then to report it at the end. Waiting until the end of the design of a building is likely to lead to 'bolt on' measures to improve environmental performance. Adopting the principle of whole life performance can support the achievement of greater outcomes. Committing at the start of the project to the future monitoring of the performance of the building is also essential.

## 3.3 How to use the Environmental Performance Tracker

The sections below set out a step-by-step guide to using the Environmental Performance Tracker on a project:

- **Step 1:** Identify and insert your organisation's environmental policies
- **Step 2:** Set project objectives
- **Step 3:** Set project targets
- **Step 4:** Set validation methods
- **Step 5:** Use Environmental Performance Tracker to monitor and report

The tracker has been set up with three worksheets as set out below.

- Domestic buildings
- Non-domestic buildings (excluding school buildings)
- School buildings (containing classrooms)

To begin using the Tracker follow the 5 steps set out below:

## Step 1: Identify and insert your organisation's environmental policies

The first step is to identify the environmental policies your organisation has set which will influence the benchmarks targeted in your project. These might be general policies, for example: reduce energy use in new buildings. Or they might be specific, for example: include onsite renewables on all new building projects.

The tracker groups environmental targets around five key areas:

1. Low Carbon & Energy
2. Health & Well-being
3. Circular Economy
4. Greener Environment
5. Whole Life Performance

There is also space to add environmental issues which fall outside these five areas, and for BREEAM and Energy Performance Certificate targets.

The relevant National Performance Indicators are already built into the Environmental Performance Tracker. The organisation's policies should be input into the spreadsheet alongside the most relevant issue.

**EXAMPLE:** In this example the public sector organisation has three environmental policies which relate to Low Carbon & Energy. They are: minimise carbon emissions; maximise fabric efficiency of new and existing buildings; and maximise onsite renewables where cost-effective.

| | A | B | C | |
|---|---|---|---|---|
| 1 | **ISSUE** | **NATIONAL PERFORMANCE INDICATOR** | **ORGANISATIONAL POLICIES** | **PR** |
| 2 | | | | |
| 3 | **LOW CARBON & ENERGY** | Reduce Scotland's carbon footprint<br>Increase renewable energy production | Minimise carbon emissions from council buildings<br><br>Maximise fabric efficiency of new and existing buildings<br><br>Maximise onsite renewables where cost-effective | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |

## Step 2: Set project objectives

The next step is to set the specific environmental sustainability objectives for your project. These should align to the broader organisational priorities. The project objectives will define the approach to achieving the enhanced environmental sustainability targets for that project.

**EXAMPLE:** In the example below, the procuring authority has agreed to aim for a 10% reduction in the predicted energy use of the new housing compared to the previous project they delivered. They have also decided to investigate the potential for a high percentage of onsite renewables.

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **ISSUE** | **NATIONAL PERFORMANCE INDICATOR** | **ORGANISATIONAL POLICIES** | **PROJECT OBJECTIVES** |
| 2 | | | | |
| 3 | **LOW CARBON & ENERGY** | Reduce Scotland's carbon footprint<br>Increase renewable energy production | Minimise carbon emissions from council buildings<br><br>Maximise fabric efficiency of new and existing buildings<br><br>Maximise onsite renewables where cost-effective | Achieve a 10% project carbon reduction compared to previous housing project<br><br>Investigate providing 30% of energy from onsite renewables |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |

## Step 3: Set project requirements

Project requirements are clearly defined environmental sustainability performance criteria with an associated verification and measurable methodology. When setting targets, procuring authorities and their design teams must ensure the targets chosen are relevant and proportionate to the project.

Targets can be added in two ways:

- For Section 7 targets – use the drop downs built into the spreadsheet
- Add your own targets

**EXAMPLE:** In the example below, the council has decided to target Gold level for Aspects 1-3, Silver for Aspect 4 and has also set a renewables target.

| D | E | F | G |
|---|---|---|---|
| **PROJECT OBJECTIVES** | **POTENTIAL TARGETS** | **ADOPT?** | **TARGET LEVEL ADOPTED** |
| | | Use drop-down list | Use drop-down list or provide detail of other target |
| Achieve a 10% project carbon reduction compared to previous housing project<br><br>Investigate providing 30% of energy from onsite renewables | Carbon dioxide emissions (Aspect 1) | YES | Gold |
| | Energy for space heating (Aspect 2) | YES | Gold |
| | Energy for water heating (Aspect 3) | YES | Gold |
| | Water use efficiency (Aspect 4) | YES | Silver |
| | *Provide 30% of energy from onsite renewables* | YES | |
| | *Other target* | | |

## Step 4: Set validation methods

The next step is to decide the appropriate method to validate the achievement of each project target.

**EXAMPLE:** In the example below the Building Warrant process is being used to validate the first four targets. The renewables target will be validated through the energy model undertaken by consultants to the project.

| E | F | G | H |
|---|---|---|---|
| **POTENTIAL TARGETS** | **ADOPT?** | **TARGET LEVEL ADOPTED** | **VALIDATION METHOD** |
| | Use drop-down list | Use drop-down list or provide detail of other target | |
| Carbon dioxide emissions (Aspect 1) | YES | Gold | Through Building Warrant (design) |
| Energy for space heating (Aspect 2) | YES | Gold | Through Building Warrant (design) |
| Energy for water heating (Aspect 3) | YES | Gold | Through Building Warrant (design) |
| Water use efficiency (Aspect 4) | YES | Silver | Through Building Warrant (design) |
| *Provide 30% of energy from onsite renewables* | YES | | Energy model from consultant |
| *Other target* | | | |

mestic | School buildings

## Step 5: Use the Environmental Performance Tracker to monitor and report

The Environmental Performance Tracker should be used as a live monitoring and decision-making document through all stages of project delivery from inception to completion. The procuring authority should put in place a monitoring process for the collation and management of project data.

Requirements may change as engagement with the design team and supply chain inform cost, practicality and options for further enhancements. The Environmental Performance Tracker has been designed to help manage this change process.

The tracker has 3 columns to manage and record progress towards targets:

- Status- this has drop downs which show On track, Adjusted or Achieved.
- New target – if a target has been adjusted there is space to include the new target.
- Notes – there is space to record decisions, issues, etc.

**EXAMPLE:** In the example below, the first 3 targets are on track to be achieved. The target for water use efficiency has been upgraded from Silver to Gold and the notes record the details of this change. The final target has been achieved.

| G | H | I | J | K | L |
|---|---|---|---|---|---|
| **TARGET LEVEL ADOPTED**<br>Use drop-down list or provide detail of other target | **VALIDATION METHOD** | **STATUS**<br>Use drop-down list | **NEW TARGET (IF APPLICABLE)** | **NOTES** | **Refer to Guidance Section** |
| Gold | Through Building Warrant (design) | On track | | | |
| Gold | Through Building Warrant (design) | On track | | | |
| Gold | Through Building Warrant (design) | On track | | | Refer to section 4.5 Low Carbon Technologies |
| Silver | Through Building Warrant (design) | Adjusted | Gold | 25/3/17 - Modelling indicates Gold is achievable. New target adopted at project meeting 20/3/17. | |
| | Energy model from consultant | Achieved | | | |
| | | | | | |
| | | | | | |

ɔn-Domestic | School buildings

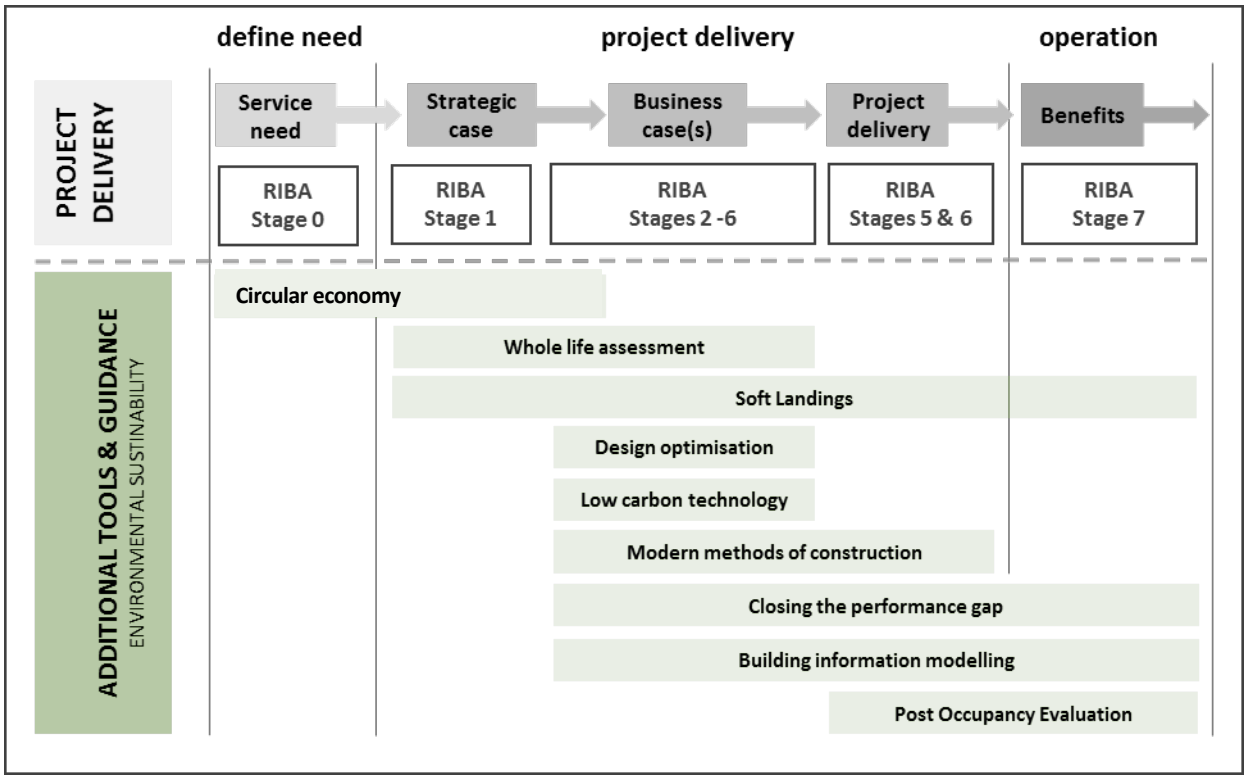
The Tracker also provides a link to further information in the Guidance Note.

At each monitoring or reporting milestone an updated version of the Environmental Performance Tracker should be saved into the project records to enable comparison over time. Users may prefer to either save the file or to copy and update new worksheets.

# 4.0 ADDITIONAL TOOLS & GUIDANCE

This section outlines the additional tools, methodologies and guidance to support environmental outcomes during the design, construction and operational stages of a project. Links and case studies have been provided to existing best practice and to resources that can be utilised within projects.

The topics have been set out based on the stage of the project they applied to, as follows:




## 4.1 Circular economy

Opportunities for the reuse, refurbishment or recycling of existing built assets are critical to environmental sustainability. The Scottish Government wants Scotland to be at the forefront of design for a more circular economy, combining ambitious research and thinking with practical application. Alignment with the Scottish Government's 'Making Things Last, A Circular Economy Strategy for Scotland' should entail a fundamental review of how built assets will deliver key outcomes over their lifetime.

Circular construction principles should sit at the heart of all public sector construction projects in Scotland. This entails the design of built assets while thinking about their full life-cycle: from being built and used to becoming ready to be disassembled and repaired and eventually recycled. Increasingly, the approach to delivering environmental sustainability will also involve new business approaches, reviewing revenue through leasing, servicing, repair and re-sale.

Zero Waste Scotland have a comprehensive range of guidance to support those procuring new buildings to adopt a circular economy approach:

- Procuring Resource Efficient Construction Projects
- Best Practice Guide to improving waste management on construction sites
- Whole life costing guidance and training

Zero Waste Scotland can also provide advice and support through the

- Resource Efficient Scotland Advice and Support Service and the
- Circular Economy Business Support Service.

The Scottish Government is committed to making better use of its existing assets. This commitment means that when public sector organisations are considering future accommodation requirements there should be a presumption in favour of suitable solutions from within the Government estate. With its strategic overview of public sector accommodation holdings, the Facilities & Estates Services Directorate (FES) or Scottish Futures Trust are well-placed to assist public sector organisations throughout this process.

This may be applied in the procurement of construction projects through a focus on design for durability, deconstruction, disassembly and flexibility together with refurbishment, repair, re-using, recovering or re-manufacturing materials or equipment, where relevant.

Joint working may extend to some procuring authorities reviewing adjacent / overlapping authorities' procurement pipelines to clearly identify potential framework opportunities including smart infrastructure, shared built assets or developing saleable heat networks.

## 4.2 Whole Life Assessment

In the last decade, there has been an increased focus on the whole life cost of new buildings. This has been driven by increased running costs of buildings associated with growth in labour costs and energy prices. In addition, mounting concerns over the long term environmental impact of buildings have forced designers to adopt a more holistic attitude, and to look more closely at the costs incurred over the whole life cycle, from conception to demolition.

With occupancy costs representing up to 70% of the total cost of a building over its life cycle, the pre-occupation with capital expenditure has led to designs which do not offer the client best value for money in the long term. With the introduction of framework procurement strategies, it is important to understand the benefits of whole life costing (WLC).

The WLC of the project in terms of operating expenditure (OPEX) and capital expenditure (CAPEX) must be considered carefully to fully benefit from environmental sustainability enhancements. Whole life costing should be seen as an investment appraisal and management tool, which assesses the total cost of an asset over its whole life. It takes account of the initial capital cost, as well as operational, maintenance, repair, upgrade and eventual recycling costs.

**Guidance Note:**
The Scottish Futures Trust have developed a Whole Life Appraisal Tool for the built environment to assist the public sector procurer make informed decisions to optimise a built asset's whole life performance.

Zero Waste Scotland has developed a whole life costing tool focus on the resources used in a building. It employs alternate scenarios in order to evaluate different designs. It considers the impact of using different materials, the effectiveness of renewable energy solutinos and operating costs over the lifecycle of a building.

The Zero Waste Scotland guidae focusses mainly on in-use carbon emissions, however as zero energy / carbon buildings start to become a reality; embodied carbon will represent the majority of a project's whole-life carbon emissions. The Royal Institute of Chartered Surveyors has developed an RICS Embodied Carbon Assessment Methodology to calculate cradle-to-gate embodied carbon emissions.

## 4.3 Soft Landings

Soft landings is the process of aligning the interests of those who design and construct an asset with the interests of those who use and manage it. It aims to improve client and user experiences, with reduced re-visits, and to give a product that meets and performs to client expectations.

In September 2012 the UK Cabinet Office announced that by 2016 all publicly funded projects should be delivered in accordance with Government Soft Landings (GSL) as part of the public sector adoption of Building Information Modelling (BIM). However it is not mandatory for Local Authorities, schools or the NHS.

The key benefits of adopting a Soft Landings approach are to:

- reduce cost and improve performance of asset delivery and operation
- manage aftercare during early operations, supported by the design and construction team
- encourage collaborative Post Operational Evaluation to measure and optimise asset performance and embed lessons learnt
- use BIM Level 2 as an asset / data management tool to assist the briefing process.

Usable Buildings is a free resource for practitioners, managers, building owners, developers, students and anyone else who wants to make buildings more suitable for the people who use them, less damaging to the natural environment and a better long-term investment. The resource includes a range of case studies, guidance and research. An overview of the Soft Landing process can be found at the following link.

## 4.4 Design optimisation and adaptability

Design plays a significant role in the environmental performance of any built asset through reducing energy demands and waste. Designing a building with adaptability and deconstruction in mind is critical and will result in minimum lost of materials during maintenance, refurbishment and end of life.

The size of a building will drive the energy demands of a new facility. To this end, reducing area will play a significant part in improving environmental performance. A variety of intiatives have been developed to assess the efficiency of a building area and should be considered through the design process. These include area metrics for schools, primary healthcare and workplace that have been developed by Scottish Futures Trust. These metrics can be used as a design tool to define briefs or compare the area efficiency of a new project.

Zero Waste Scotland's Designing Out Waste provides excellent advice and dhelps prioritise the design opportunities, as well as a suggested format for a design review workshop, which can be particularly useful for larger projects. Zero Waste Scotland also offers a range of model procurement clauses aligned with the Scottish Government's targets and objectives. This is aimed at enhancing high quality re-use, recycling and avoidance of waste to landfill including through designing out waste and implementing Site Waste Management Plans (SWMP). Zero Waste Scotland also provide guidance on resource efficient construction products which make best use of materials, water and energy in manufacture and use.

**Case Study | New South Glasgow Hospital**
New South Glasgow Hospital (NSGH) is a £575 million building project, and naturally required and displaced a huge amount of materials. NSGH's principal contractor used waste forecasting tools developed by Zero Waste Scotland to set a target of diverting **90%** of project waste from landfill.

## 4.5 Low Carbon Technologies

Renewables incentives fall into either local power or heat production incentives. The Feed-in Tariffs (FITs) scheme is a UK Government scheme designed to encourage uptake of a range of small-scale renewable and low-carbon electricity generation technologies like Photovaltaics, wind or hydro turbine or micro CHP. The Renewable Heat Incentive (RHI) is a UK Government scheme set up to encourage uptake of renewable heat technologies amongst householders, communities and businesses through financial incentives.

The Heat Policy Statement (HGPS) published in June 2015, sets out the Scottish Government's approach to decarbonising Scotland's heat system, diversifying our sources of heat, reducing pressure on household energy bills and maximising the economic opportunities of the transition to a low carbon heat sector.

- The heat map allows users to identify opportunities for decentralised energy projects across Scotland.
- The Heat Network Partnership is a collaboration of agencies focused on the promotion and support of district heating schemes in Scotland. The website offers experience, information and key contacts that will help boost the growth of district heating.

Public sector organisations should consider carefully the various risks and opportunities of the wide range of renewable, low carbon heat and power technologies available. This can be done through industry engagement and working with design teams to determine feasibility.

**Case Study | Commonwealth Games Athletes' Village**
A district heating system, which supplies instantaneous heat and constant hot water, powers the Commonwealth Games Athletes Village legacy homes, as well as the adjacent Emirates Sports Arena. The system is approximately 30% – 40% more efficient than conventional heating schemes, providing residents with substantial cost benefits and delivering nearly zero carbon development.

## 4.6 Modern methods of construction

The term modern methods of construction (MMC) embraces a number of approaches involving off-site manufacture or assembly. The definitions of MMC have varied over the years but include the following types:

- volumetric construction
- pods
- panelised systems
- sub-assemblies and components
- site-based MMC.

These are set out in the NHBC Foundation report: A guide to modern methods of construction.
This classification also includes innovative on-site methods designed to improve efficiency and/or reduce waste, such as thin joint blockwork.

The use of MMC is growing internationally due to improved customer perceptions, the introduction of government support initiatives and the success of various high-profle case studies (Goulding and Arif, 2013). The current value of offsite construction in the UK is £1.5bn and it is projected to grow to £6bn (UKCES, 2013), this equates to a 7% share of constructions' £90bn annual contribution to the UK economy (HM Government, 2013).

In the UK MMC has been identified as a method of delivery for the Government 2025 Vision for Construction particularly given the housing shortage. In regional Scotland there have been several Scottish Government led initiatives to actively promote offsite construction particularly in housing through demonstration projects (Scottish Government, 2012 & 2013).

**Guidance Note:**
The document Building Offsite: An Introduction is an excellent resource, including case studies, to support those procuring new buildings in Scotland.

## 4.7 Closing the performance gap

In recent years, the construction industry and government have grown increasingly concerned over the potential gap between design and as-built energy performance. Recent studies have suggested that in-use energy consumption can be between 5 to 10 times higher than compliance calculations carried out during the design stage- noting that compliance calculations are not based on expected energy consumption.

Factors contributing to the performance gap include:

- A lack of monitoring and feedback following occupancy, meaning that problems are rarely identified, user behaviour is not corrected, and lessons are not learned for future projects.
- Design assumptions do not properly reflect the in-use performance of buildings. Designers are rarely required to predict actual in-use energy consumption.
- Unregulated sources of energy consumption such as small power loads, server rooms and so on are not included in a compliance calculation. Yet these typically account for more than 30% of the energy consumption in office buildings.
- There are discrepancies between design specifications and the specification and quality of works as built. There are incorrect assumptions about the performance of some building components (such as party walls).
- Project participants struggle to communicate the intended energy performance for the design from the earliest stages, and have on-going problems with communicating the design intent throughout detailed design.

## 4.8 Building Information Modelling

Building Information Modelling (BIM) can deliver more innovative, cost-efficient buildings through integrated information and collaboration. The inherent power of BIM is its potential contribution to the design, construction and commissioning of buildings with lower environmental impacts.

BIM information can include daylighting and solar studies, material and product libraries containing embodied energy and Life Cycle Assessment (LCA) information, as well as de-construction, maintenance and building management information for the entire lifecycle of a building. BIM is important in creating a library of the materials in a building. In time these 'material passports' will become an important development in the long term sustainability of a building.

Scottish Government reconfirmed their commitment to BIM with the pubclication in March 17, of the BIM policy note for procurement. This policy note was supported by the new BIM Guidance Portal for Scotland's Public Sector. This provides guidance and tools for the public sector in the adoption of BIM.

The BIM Compass is a simple, unambiguous and confidential way to assess your current BIM capability and compare against industry benchmarks. This is to support both suppliers and procurers to inform their current capability and identify areas for future training and up-skilling. The assessment tool is free and is set against UK Level 1 and Level 2 BIM Maturity and the associated standards.

Procuring authorities should consider the use of BIM Level 2 during the design and construction phase to simulate in-use energy usage and energy saving measures, which the facilities manager can adopt during in-use phase. A well-managed BIM model can provide a cost-effective way of managing the building and enhancing environmental sustainability in the long term.

**Case Study | Dumfries and Galloway Royal Infirmary**
The use of BIM on the project enabled close co-ordination of Design for Manufacture & Assembly (DfMA ) components, tracking these through design, manufacture, delivery and installation ensuring maximum resource efficiency alongside the ability to plan and deliver optimum energy efficiency in the assets operation, maximising the value of the asset over its entire life.

## 4.9 Post occupancy evaluations

Many buildings do not perform as planned - in some cases this can impact on running costs, staff and client satisfaction and performance, health, safety and comfort. For repeat construction clients, learning from and correcting past mistakes in design and commissioning of buildings can be extremely cost-effective and greatly improve workplace productivity.

Post-Occupancy Evaluation (POE) is the process of obtaining feedback on a building's performance in use. The value of POE is being increasingly recognised, and it is becoming mandatory on many public projects. POE is valuable in all construction sectors, especially healthcare, education, offices, commercial and housing, where poor building performance will impact on running costs, occupant well-being and business efficiency.

The 2008 Audit Scotland report Improving the school estate recommended that "Councils should complete post-occupancy evaluations as a matter of priority." Post occupancy evaluations can help fine tune new buildings, improve designs for future schools, explore how users are interacting with their new environments, thereby strengthening stakeholder engagement, and demonstrate best value.

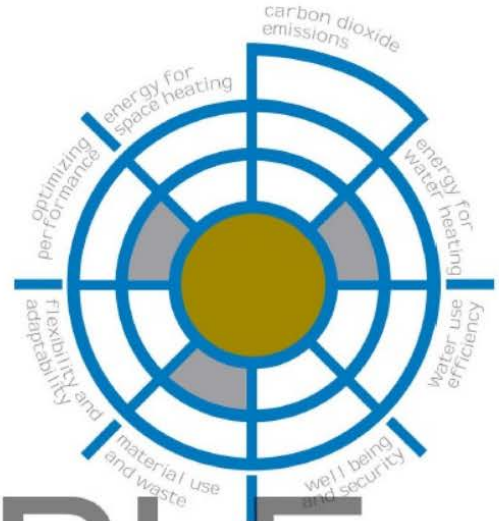
**Guidance Note:** There are a number of different post occupancy evaluation methodologies. In 2005 the then Scottish Executive commissioned work to demonstrate a post occupancy evaluation of Braes High School in Falkirk.

# APPENDICES

## APPENDIX 1 – Sustainability Label

# Building Standards Sustainability

At completion, the building achieved the specified level of sustainability in the aspects below:







**Platinum**
**Gold:** Not Achieved
**Silver:** Partly Achieved
**Bronze Active:** Achieved by use of the following technology: Heat Pump
**Bronze:** Sections 1-6, 2010 Standards

## Building / Development:
64 Greenstreet,
Bigtown
XX9 9XX

## Building Warrant Reference:
621621844KKY

## Date:
10.10.2011

## Building Standards Division's Technical Handbooks
Contain detailed guidance on the measures to achieve the levels within each aspect of sustainability. See Building Standards pages on www.scotland.gov.uk

This statement of sustainability for a new building must be fixed within the building in accordance with standard 7.1.

The Scottish Government

## APPENDIX 2 – Summary of section 7 of the Building Standards

| | DOMESTIC BUILDINGS | NON-DOMESTIC BUILDINGS |
|---|---|---|
| BASELINE LEVEL | **Bronze**<br>The dwelling meets the functional standards set out in Sections 1 – 6 of the Building Standards.<br>**Bronze Active:**<br>The dwelling meets the functional standards set out in Sections 1 – 6 AND includes the use of low and zero carbon generating technology. | **Bronze**<br>The building meets the functional standards set out in Sections 1 – 6 of the Building Standards.<br>**Bronze Active:**<br>The building meets the functional standards set out in Sections 1 – 6 AND includes the use of low and zero carbon generating technology. |
| OPTIONAL UPPER LEVELS | **Silver**<br>The dwelling meets the Bronze level AND complies with additional requirements in all eight aspects:<br>9. Carbon dioxide emissions<br>10. Energy for space heating<br>11. Energy for water heating<br>12. Water use efficiency<br>13. Optimising performance<br>14. Flexibility and adaptability<br>15. Well-being and security<br>16. Material use and waste<br>**Silver Active:**<br>The dwelling meets the Silver level AND includes the use of low and zero carbon generating technology in respect of meeting at least one of the aspects: Silver 1, Silver 2 or Silver 3.<br>**Gold**<br>The dwelling meets the Bronze level AND complies with higher additional requirements in all eight aspects.<br>Note that Aspect 1: Carbon dioxide emissions can also be recorded at platinum level (net zero carbon equivalent). This does not affect the level awarded (bronze, silver or gold). | **Silver**<br>*(Only available for school buildings containing classrooms)*<br>The building meets the Bronze level AND complies with additional requirements in all eight aspects:<br>9. Carbon dioxide emissions<br>10. Energy for thermal comfort and artificial lighting<br>11. Water efficiency<br>12. Biodiversity<br>13. Well-being<br>14. Flexibility and adaptability<br>15. Material use and waste<br>16. Optimising performance<br>**Silver Active:**<br>The building meets the Silver level AND includes the use of low and zero carbon generating technology in respect of meeting at least one of the aspects: Silver 1, Silver 2 or Silver 3.<br>**Gold**<br>*(Only available for school buildings containing classrooms)*<br>The building meets the Bronze level AND complies with higher additional requirements in all eight aspects.<br>Note that Aspect 1: Carbon dioxide emissions can also be recorded at platinum level (net zero carbon equivalent). This does not affect the level awarded (bronze, silver or gold). |

## APPENDIX 3 – Further links

### Environmental Sustainability Procurement Guidance:

| SOURCE | DESCRIPTION | LINK |
|---|---|---|
| **Scottish Government Procurement Directorate** | Scottish Government's Procurement Policy Handbook, Procurement Policy Manual, Procurement Policy Notes (SPPNs) and Scottish Procurement Action Notes. | www.gov.scot/Topics/Government/Procurement |
| **Procurement Reform (Scotland) Act 2014** | The Procurement Reform (Scotland) Act 2014 establishes the laws regarding sustainable public procurement based on the Scottish Model of Procurement being business friendly and socially responsible. Should also include Public Contracts (Scotland) Regulations 2015, Procurement (Scotland) Regulations 2016. | www.legislation.gov.uk/asp/2014/12/contents |
| **Procurement Journey** | The Procurement Journey supports all levels of procurement activities. It facilitates best practice and consistency across the Scottish public sector. | www.procurementjourney.scot |
| **Scottish Government Training Framework.** | Marrakech training is available through Scottish Government Training Framework. | http://www.gov.scot/Topics/Government/Procurement/policy/corporate-responsibility/CSR/Marrakech/Mod |
| **Energy Savings Trust Procurement Guide** | A practical guide to help installers, assessors and consultants bid for public sector contracts in the energy efficiency and renewables marketplace. | www.energysavingtrust.org.uk/procurement-guide |

### Capacity Building Guidance:

| SOURCE | DESCRIPTION | LINK |
|---|---|---|
| **Zero Waste Scotland** | Impartial publications for advice on reducing your organisation's carbon footprint & improving resource efficiency. Support for Circular Economy projects available. | www.zerowastescotland.org.uk<br>www.resourceefficientscotland.com |
| **Energy Savings Trust** | Make your organisation more energy efficient, improve business transport, access financial support or participate in the sustainable supply chain, there is help available. | www.energysavingtrust.org.uk/scotland |
| **Low Carbon Skills Fund** | The Low Carbon Skills Fund gives Scottish businesses with under 100 employees the opportunity to apply for up to £5000 towards employee training costs in areas such as renewable energy and low-carbon technologies, energy efficiency, waste management and reuse, and reducing carbon in supply and energy management. | www.ourskillsforce.co.uk/develop/low-carbon-skills-fund/ |

## Technical Guidance:

| SOURCE | DESCRIPTION | LINK |
|---|---|---|
| **Carbon Trust** | Independent team includes qualified engineers and finance professionals and a meteorologist all focussed on our mission to accelerate the move to a sustainable, low carbon economy. As we are independent, we are technology agnostic and are not tied to the promotion of specific products or suppliers: | www.carbontrust.com/client-services/advice/public-sector-advice/technical-advice-carbon-footprinting-project-feasibility/ |
| **Carbon Trust** | Low Carbon Cities Programme supports cities and regions in developing area-wide carbon reduction strategies. | www.carbontrust.com/client-services/advice/public-sector-advice/low-carbon-cities/ |
| **Decentralised energy support** | The Carbon Trust can provide independent, technology-agnostic help and advice to public bodies that want to investigate and progress decentralised energy projects, such as district heating, local energy generation and heat networks. | https://www.carbontrust.com/client-services/advice/public-sector-advice/decentralised-energy-support/ |
| **Heat Energy Partnership** | This Guidance provides key information on the most common delivery structures / business models that have been adopted in the UK for heat networks. | www.districtheatingscotland.com |
| **Home Energy Efficiency Database (HEED)** | Energy efficiency installations that have been implemented in the domestic building stock made available in order to help RSL's plan, deliver and monitor progress on improving energy efficiency. | www.energysavingtrust.org.uk/domestic/heed |
| **The Green Network for Social Housing** | Connecting RSL's with an interest in installing renewables or improving the energy efficiency of their buildings. | http://greennetworkforsocialhousing.energysavingtrust.org.uk |
| **Transport Scotland / Energy Savings Trust Sustainable Business Transport Review** | A free sustainable transport review service helps organisations in Scotland become more efficient with their transport and travel arrangements. | www.energysavingtrust.org.uk/sustainable-business-transport-review |

[i] Based on information sourced from the Business and Regulatory Impact Assessments undertaken for each review of the Technical Standards.