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WHITE PAPER
Forum for Circular Infrastructure
Specifying for circularity
Start

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Contents

Glossary

Term	Definition
Circularity/ circular economy	There are numerous definitions of circularity. BS ISO 59904 defines the circular economy as "An economic system that uses a systemic approach to maintain a circular flow of resources by recovering, retaining or adding to their value, while contributing to sustainable development. The inflow of virgin resources is kept as low as possible, and the circular flow of resources is kept as closed as possible to minimise waste, losses and releases from the economic system".[1] However, this does not include aspects connected with regenerating nature, which is an important component of other definitions of circularity — e.g. the Ellen MacArthur Foundation (a leading non-governmental organisation in this field) defines the circular economy as "a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources".[2]
Infrastructure	The basic physical and organisational structures and facilities (for example, buildings, roads, power supplies) needed for the operation of a society or enterprise; and generally falling into the categories of transport, energy, water, communication, waste and flood risk management.[3]
Contract	A legal agreement between parties for the supply of goods, services or works.
Client	The party which appoints another party under the contract to supply goods, services or works. May also be referred to as the "employer" or the "contracting authority".
Designer	In the context of this report, the party which is appointed to provide design services to the client.[4]
Contractor	Broadly speaking, the party, which is appointed to supply goods, services or works to the client. In the engineering context, it may also be used to refer to the party which physically constructs the work.[3]
Specification	Specifications set out the technical requirements for the goods, works, or services that a contracting authority is purchasing.[5]

1 BS ISO 59004: Circular Economy — Vocabulary, Principles and Guidance for Implementation
2 https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview
3 Office of National Statistics Developing new measures of infrastructure investment - Office for National Statistics
4 In many contracts, design and construction services are provided by the same party.
5 UK Government Commercial Function Guidance – Technical Specifications Guidance_-_Technical_Specifications.pdf

Introduction

The Forum for Circular Infrastructure (FCI) brings together infrastructure owners and operators from across the UK and Ireland to share best practice, facilitate opportunities for collaboration and drive innovation to encourage innovative thinking on a fully circular infrastructure delivery.

FCI provides a space for members to discuss current and emerging challenges and opportunities, and a collective voice to inform and shape future policy through responding to consultations.

Delivering fully circular infrastructure will require inputs from many stakeholders at different stages, ranging from academic research through to contractors on site, and all stages in between.

Many different parties are involved in infrastructure delivery, including clients, designers, and construction, maintenance, and decommissioning contractors.

Their respective roles and requirements — whether for individual projects, broader programmes, or frameworks — are typically defined through contracts, which can take various forms depending on the nature of the services being procured.

The specifications included within the contract are the means by which a client (in this case an infrastructure owner/operator) sets out what they want to achieve. These specifications can range from flexible, results-orientated requirements, to detailed, prescriptive instructions in terms of how the project is designed, constructed and operated.

It follows from this that if a client wants to embed circularity into their project, they need to include relevant specifications into contracts.

This white paper is not intended to provide guidance on what constitutes circularity or technical information on particular aspects of circularity: instead, it aims to provide principles on how to include circularity in specifications for infrastructure projects.

The guidance in this white paper is applicable to both project-level and framework contracts and is intended to assist and inform infrastructure operators when considering how best to incorporate circularity in their contract specifications.

Context

This section briefly summarises the current context affecting specifying for circular infrastructure.

Drivers for circularity in the infrastructure sector

Specifying for circularity should form part of a wider systemic change in how infrastructure is delivered and managed to support wider decarbonisation and sustainability goals. This should extend throughout the project lifespan and encompass fundamental decisions on how assets are managed throughout their life, from design to end-of-first-life and beyond.

There is little evidence at present on the circularity of UK infrastructure projects — a function of the facts that there is no universal definition of circularity, nor is there a system for collecting and analysing UK-wide data on material use in infrastructure. This does not mean that there is no action on circularity — there are many practical examples of circularity being embedded in infrastructure projects; but the lack of an agreed baseline of how circular infrastructure projects are at the moment makes it difficult to track progress. This is not unique to infrastructure; the UK Circularity Gap Report[6] highlights that only **7.5 per cent** of materials are cycled back into the UK economy, indicating a national circularity gap. This suggests that circular infrastructure delivery may reflect broader systemic challenges in the national economy.

Designing-out waste and circularity

Principles for designing-out waste in construction projects are well-established, and sources include:

- Routemap for Zero Avoidable Waste in Construction (Green Construction Board).[7]
- Designing Out Construction Waste - A guide for project design teams (Zero Waste Scotland).[8]

These principles form an important part of circularity but the focus on 'waste minimisation' can often be a reactive rather than proactive strategy. Like recycling, it tends to address the symptoms of a linear system — waste and inefficiency, rather than tackling the root causes. Truly circular approaches aim to redesign waste from the outset, reduce unsustainable levels of consumption, and adopt a more holistic approach to resource use across the entire project lifecycle. As such, standard approaches to designing-out waste are necessary, but not sufficient, for delivering genuinely circular infrastructure.

Standards, targets and regulations

There are a number of current and emerging standards and regulations relating to circularity in the built environment, and it is not the purpose of this report to give a comprehensive overview of these.

However, it is important that clients specifying for circularity are aware of these and incorporate them into specifications where relevant.

The ISO 59000 suite of standards for the circular economy set out definitions and approaches to measuring circularity that can be used to ensure consistency across the field.

The European Committee for Standardisation is (at the time of writing in 2025) in the process of developing standards for circular economy in the construction sector (under CEN/TC 350/SC 1); and in the UK the government is in the process of developing a circular economy strategy for England, with the support of the Circular Economy Taskforce.

Measures are being introduced in the European Union under the Circular Economy Action Plan that, despite the UK no longer being in the EU, may have an impact on construction products, including the Ecodesign for Sustainable Products Regulations, the Construction Products Regulations and the Critical Raw Materials Act.

The UK Government and the devolved national governments have various targets relating to circularity, although these are largely qualitative and do not set binding targets for specific projects or programmes.

The national target of **70 per cent** recovery rate for construction and demolition waste has been in place for a considerable period and is comfortably exceeded, and as such is not a driver for circularity.

6 https://www.circularity-gap.world/united-kingdom
7 https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2021/07/ZAW-Interactive-Routemap-FINAL.pdf
8 https://www.zerowastescotland.org.uk/resources/design-out-waste-construction

Key considerations

The type specifications you will need will vary greatly depending on the type of contract and type of work you are procuring. For the infrastructure sector, the types of work will mainly comprise:

- Appraisal of options.
- Design (for new assets or refurbishments and upgrades).
- Construction and refurbishment.
- Maintenance of existing assets.

Some contracts may include just one of these elements, but some contracts can include all of them (e.g. in the case of Design-Build-Operate contracts).

Be clear on what you want

Define circularity objectives and requirements

- Decide how you want to define circularity at an organisational or project level.
  - Your organisation may already have an agreed definition of circularity which you can use otherwise, you can develop one for the project, drawing on a wide range of sources. This definition will set out the overarching principle/ way of working and will help guide your project.
- Be as clear as possible in your definition of circularity requirements — vague or unfocused definitions will elicit similarly vague outcomes.
  - A clear definition of requirements will consider the whole lifespan of the project from design to the end of the initial design life and beyond, not just the use of materials during the construction stage.
  - Requirements should be more focused on the specifics of the project context, defining specific deliverables, activities, and outcomes.
  - Requirements should be consistent with the organisational/project-level definition of circularity but should be more detailed and actionable.

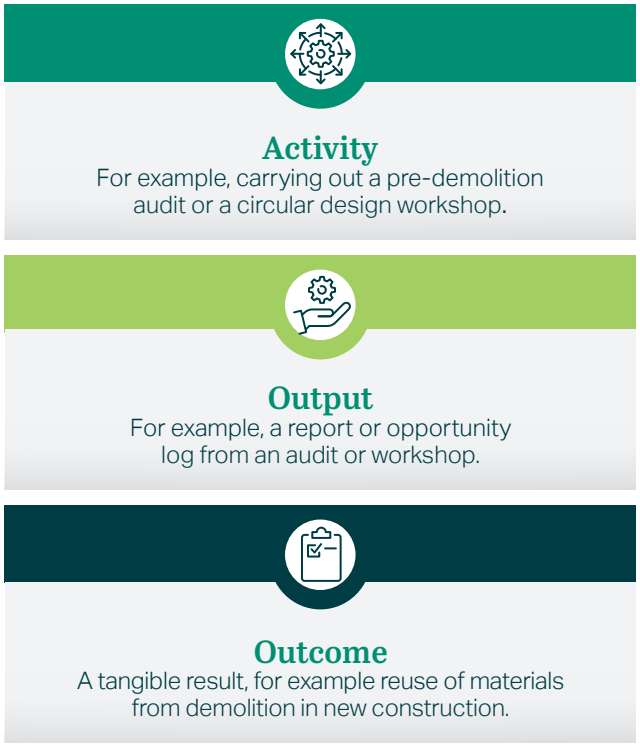
It is beyond the scope of this report to provide guidance on definitions of circularity and how these relate to your project. There are many publications that explore this in considerable detail.

Sources of useful information include:

- ISO 59004:2024 Circular economy — Vocabulary, principles and guidance for implementation (ISO).[9]
- How circular economy principles can impact carbon and value (UK Green Building Council).[10]
- Circular Economy Statement Guidance (Greater London Authority).[11]
- Our Shared Understanding: a circular economy in the built environment (Circular Built Environment).[12]

Be clear on how you expect circularity to be measured and reported

It is important at this stage to distinguish between activities, outputs and outcomes when defining how circularity is measured and reporting.



9 https://www.iso.org/standard/80648.html
10 https://ukgbc.org/wp-content/uploads/2022/08/Whole-Life-Carbon-Circular-Economy-Report.pdf
11 https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance/circular-economy-statement-guidance
12 https://www.circularbuiltenvironment.com/wp-content/uploads/2023/05/Our-Shared-Understanding-a-circular-economy-in-the-built-environment-v19-01.06.23.pdf

Develop performance outcomes

- Once you've decided how you're defining circularity for your project, then translate this into specific and measurable performance outcomes.
  - These can vary in complexity and ambition.
  - You can refer to third-party circularity standards; but it is essential to fully understand what they involve- whether they are suitable for application at the project level, and how compliance will be monitored. Without this, they may just become a tick-box exercise rather than a meaningful driver of circular outcomes.
- The most effective performance requirements will have tangible quantitative outcomes that you can measure and track.
  - At the most simple, this could be targets for waste recovery and non-virgin material content, although this represents a low level of ambition and projects aiming for circularity should seek to go beyond these.
  - More sophisticated targets would include, for example, material intensity metrics, as well as more stretching targets for recovery and non-virgin content.
  - A comprehensive suite of circularity performance metrics will include all of these and take a whole-life perspective of the asset, incorporating end-of-life as well as in-use requirements.
  - Metrics for circularity is a complex and evolving field — examples of specific metrics include:
    - Circular Economy Metrics for Buildings (Green Building Council).[13]
  - Having defined metrics, you need to describe what the contractor will need to submit and when — and also describe the type and quality of evidence that you expect to see to demonstrate that your requirements have been met. These can include quantitative evidence (e.g. material use, carbon footprints) and also qualitative evidence (e.g. circular economy workshop reports).
- Although such outcome-based performance requirements offer the highest degree of control, it's important to recognise that at present both clients and contractors may lack the information and understanding to properly define and measure them. If this is the case, you should consider instead specifying activities and outputs instead of outcomes.

Activities and materials

- You can consider specifying activities or outputs instead of outcomes — for example:
  - Requiring circular economy workshops to be held and their outcomes documented.
- You can also:
  - Specify particular requirements for end-of-life management of the asset or its constituent elements; or
  - Specify that certain types of hard-to-recycle materials are avoided, or
  - Specify certain types of construction (e.g. modularity or off-site construction) that may be more resource-efficient for your project.
- Designing for longevity and adaptability is a key principle of circularity: the longer an asset lasts for, then the more resource-efficient it is likely to be over its entire lifespan. While it's difficult to be prescriptive given the diversity of infrastructure asset types, you should consider what these concepts mean for your specific asset. This includes recognising the limitations of materials and components, identifying how they can be kept in use at their highest value when first use is no longer viable, and incorporating these considerations into specifications — particularly during the design phase, where they are most impactful.

13 | https://ukgbc.org/wp-content/uploads/2023/03/Circular-Economy-Metrics-Paper.pdf

Resource efficiency benchmarks

- Consider setting (or requiring the contractor or designer to develop) a benchmark for resource efficiency — i.e. a quantitative measure of how much material is required to deliver the required performance of the asset.
- Benchmarking can be difficult for more complex or "one-off" infrastructure projects where there may not be similar projects to compare with; but can be done at least for some elements of projects. One approach is to use the initial design as the benchmark and then require the contractor or designer to demonstrate how they have improved on this benchmark as the project progresses. This is similar to the approach often taken for carbon benchmarking but can have weaknesses — e.g. it can incentivise the contractor to set an inflated initial benchmark so they can more easily demonstrate "improvements". If data is available, this can be avoided by using the most comparable "best practice" data from other similar projects or carrying out an independent benchmarking exercise.
- You can specify that the contractor or designer reports planned and actual performance and compare this to the benchmark.

Performance reporting

- Be clear on the approaches, methods and tools to be used for reporting (and evidencing) performance — for example the following can form part of the performance reporting and be mandated in the specification:
  - Life cycle assessments (provided these include end-of-life considerations).
  - Environmental product declarations (which can be used to inform life cycle assessments — on their own, a EPD may not include sufficient consideration of in-use and end-of-life issues).
  - Digital product passports (these are an emerging way of managing environmental data for a product throughout its lifespan and can support circularity by allowing informed decisions to be made about how to manage construction materials).

Allow for flexibility and innovation

- Improving circularity in construction requires innovation. Specifying exactly how things need to be done limits the scope for innovation.
- Where possible, focus on outcomes (what needs to be achieved) rather than inputs (how it needs to be done) to give room for innovation and flexibility.
- Clearly specify procedures for contractors to propose innovative solutions and how risks and gains can be shared (e.g. shared cost savings; collaborative approach to performance risk).
- Innovation might require departures or derogations from existing standards — make sure there is a process to allow this, provided that the contractor can demonstrate that the necessary performance and safety requirements can be maintained.

Use appropriate technical specifications and standards

Avoid over-specifying

- Consider whether any of your specifications are too rigid and hence drive excessive material use or require virgin rather than secondary/recycled resources which might be technically suitable.

Use published standards and guidelines

There are many published standards and guidelines for particular materials or systems which have been developed to support circularity. A non-exhaustive selection of examples includes:

Steel

- Circular Economy and Re-use Guide (Institute of Structural Engineering).
- Model specification for the purchase of reclaimed steel sections (British Construction Steel Association).
- Publication P427 Structural Steel Reuse (Steel Construction Institute).

Concrete

- Specifying Sustainable Concrete (Minerals Product Associate Concrete Centre).

Circularity in design

- EI/CIRIA/IPEICA Guidance.
- Circular Economy Guidance for Construction Clients: How to Practically Apply Circular Economy Principles at the Project Brief Stage (UK Green Building Council).
- Circular Economy How-to Guide: Reusing Products and Materials in Built Assets (UK Green Building Council).

Understand interfaces

- Circularity can be a powerful tool to address other sustainability aspects such as whole-life carbon; but there is also scope for negative unintended consequences — for example, blanket requirements for recycled content in localities remote from such sources could lead to excessive transport-related impacts if local virgin materials are replaced by recycled materials from far away.
- Specifiers should be aware of these interface issues and can, if necessary, set conditions on circularity requirements with reference to other sustainability and environmental performance requirements (e.g. a requirement to meet a recycled content requirement provided that such requirement does not lead to an overall increase in lifecycle carbon emissions).

Conclusions

If you are looking to embed circularity into a project, then including relevant specifications into contracts is critical.

When developing these specifications, you should consider the following questions:

- Have you clearly defined what you are seeking to achieve, in term of circularity objectives and requirements?
- Have you set out how you expect circularity to measured and reported — for instance, defining activities, outputs and outcomes?
- Do the specifications encourage or allow for flexibility and innovation to meet your circularity objectives?
- Have you used appropriate technical standards and specifications which facilitate circularity?
- Have you considered how circularity interfaces with other sustainability objectives?

Circularity is a rapidly evolving field, with new guidance, standards, policies and regulations appearing regularly.

By doing so we can ensure that technical advances and regulatory requirements are incorporated into our projects, contributing to the shift from a linear to a circular construction sector.

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