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Green Public Procurement Criteria for Office Building Design, Construction and Management

Procurement practice guidance document

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Abstract

Procurement guidance document supporting the EU GPP criteria proposal for Office Building Design, Construction and Management

The development of GPP criteria for Office Building design, construction and management aims at helping public authorities to ensure that projects are procured and implemented with higher environmental standards. The aim of this document is to provide simplified guidance to procurers, estate managers and project teams on how to procure an environmentally improved office building. The guidance has been structured to reflect the distinct phases of activity that may be involved, as well as the most common forms of contracts that are used.

Table of contents

1 Introduction 1

1.1 Selecting and using the GPP criteria 1

1.2 Reflecting different procurement routes 2

1.3 The structure of this guidance 2

2 Guidance on procurement by the phase of activity 3

2.1 Preliminary scoping and feasibility 3
2.1.1 Creating the project definition 3
2.1.2 Choosing the site and location 3
2.1.3 Options appraisal and concept design 4
2.1.3.1 Establishing environmental performance objectives 4
2.1.3.2 Renovation or new-build? 4
2.1.3.3 Environmental planning considerations 5
2.1.3.4 Early assumptions about capital and life cycle costs 5
2.1.3.5 Design service life and future adaptability 6

2.2 Detailed design and applications for permits 7
2.2.1 The design brief and performance requirements 7
2.2.1.1 Under conventional contracting arrangements 7
2.2.1.2 Under integrated design and construction arrangements 7
2.2.2 Running a design contest for integrated design and build contracts 8
2.2.3 Commencing detailed design 8
2.2.4 Applying for planning permission and building permits 9
2.2.5 Preparation of the tender documentation in a conventional contract 9

2.3 Strip-out, demolition and site preparation works 10
2.3.1 Stripping out of buildings for renovation 10
2.3.2 Demolition and clearance of sites 10

2.4 Construction of the building or major renovation works 11
2.4.1 Selecting the main construction contractor 11
2.4.1.1 'Conventional' contracts 11
2.4.1.2 Integrated Design and Build (DB) contracts 11
2.4.1.3 Design, Building and Operate (DBO) contracts 12
2.4.1.4 Renovations carried out as 'energy services' 13
2.4.2 Monitoring and reporting of progress on site 13

2.5 Installation of energy services 14
2.5.1 Selecting energy service contractors 14
2.5.2 The installation and commissioning of energy services 14

2.6 Practical completion and handover 14
2.6.1 The building manual and handover training 14
2.6.2 Testing of the building fabric 14

2.7 Facilities management 15
2.7.1 The role of the facilities manager 15
2.7.2 Incentivising energy management 15

2.8 Post Occupancy Evaluation 15
2.8.1 Lessons that may be learnt from the project 15

1 Introduction

The aim of this document is to provide simplified guidance to procurers, estate managers and project teams on how to procure an environmentally improved office building. The guidance has been structured to reflect the distinct phases of activity that may be involved, as well as the most common forms of contracts that are used.

1.1 Selecting and using the GPP criteria

The criteria provide contracting authorities and their procurers with the opportunity to set requirements that address the most significant opportunities for environmental improvements along the life cycle of Office Buildings. They provide procurers with a basis for selecting tenderers according to their competencies, set technical specifications at different levels of ambition, as well as encouraging tenderers to bring forward innovative design solutions.

Guidance note 1. How the EU GPP criteria are structured and can be used

For each criteria area, there is a choice between two environmental levels of ambition :

- The Core criteria are those suitable for use by any contracting authority across the Member States and address the key environmental impacts. They are designed to be used with minimum additional verification effort or cost increases.
- The Comprehensive criteria are for those who wish to purchase the best products available on the market. These may require additional verification effort or a slight increase in cost compared to other products with the same functionality.

For both core and comprehensive criteria, it must be borne in mind that the procurement of office buildings is a particularly complex issue which necessarily results in the fact that, for both core and comprehensive levels of ambition, the inclusion of green criteria does require - when compared to standard solutions - increased expertise, verification effort and, at least for some of the criteria and depending on the procurement route and the experience of the design team and contractors, higher upfront costs.

The criteria reflect the types of GPP criteria described in the Buying Green handbook (EC, 2011):

- Selection criteria. When assessing ability to perform a contract, contracting authorities may take into account specific experience and competence related to environmental aspects which are relevant to the subject matter of the contract. They may also exclude operators who are in breach of environmental law and - for service and works contracts only – to ask specifically about their environmental management systems.
- Technical specifications: These criteria relate to characteristics of the work, supply or service being purchased itself – and not to the general capacities or qualities of the operator. These have two main functions:
    1. They describe the contract to the market so that companies can decide whether it is of interest to them. In this way they help determine the level of competition.
    2. They provide measurable requirements against which tenders can be evaluated. They constitute minimum compliance criteria. If they are not clear and correct, they will inevitably lead to unsuitable offers. Offers not complying with the technical specifications have to be rejected.
- Award criteria: These can be used to stimulate additional environmental performance without being mandatory and therefore without foreclosing the market for products not reaching the proposed level of performance.
- Contract performance clauses: These provide the opportunity to specify how the works will be carried out and to require monitoring of compliance with technical specifications as the works proceed.

1.2 Reflecting different procurement routes

Designing and procuring an office building with a reduced environmental impact, whether it be new-build or a major renovation, is a complex process. As was highlighted by the SCI (Sustainable Construction and Innovation through Procurement) Network in their guide for European Public Authorities, the form of procurement can have a significant influence on the outcome.

Each type of contract brings with it distinct interactions between the procurer, the contracting authority's internal team, the building design team, the construction contractor, service providers and the future occupants and facilities managers. Moreover, they each can have advantages and disadvantages in seeking to procure a building with an improved environmental performance. It is therefore important to identify the main points in the sequence of procurement activities where GPP criteria should be integrated.

This guidance is structured to reflect the key activities and decision points in the procurement process, as well as some of the common contract forms that are used in the European Union. Specific reference is made to the International Federation of Consulting Engineers' (FIDIC) contracts for construction works (Red Book), design and build (Yellow Book) and design, build and operate (Gold Book).

1.3 The structure of this guidance

The process of constructing a new office building or carrying out a major office renovation tends to consist of a distinct sequence of procurement activities. Each contract relates indicatively to distinct phases of activity as a project proceeds. This guidance document has been structured in order to reflect these activities, focussing on some of the key issues and challenges in seeking to integrate EU GPP criteria into procurement. The activities covered are the following:

- Preliminary scoping and feasibility;
- Detailed design and applications for permits;
- Strip-out, demolition and site preparation works;
- Construction of the building or major renovation works;
- Installation of energy systems and the supply of energy services;
- Completion and handover;
- Facilities management,
- Post Occupancy evaluation.

Depending on the procurement route adopted, some of these contracts may be awarded to the same contractor, but in most cases they are let separately. Some contracts may be integrated in a design and build (DB) or a design, build and operate (DBO) arrangement, with the detailed design process, the main construction contract, the installation of energy services and even facilities management all potentially co-ordinated by one contractor.

2 Guidance on procurement by the phase of activity

The following sections describe the common procurement activities for an office building. For each activity, the key issues to consider when seeking to use the EU GPP criteria are briefly discussed and summarised.

The sequence of the activities is intended to reflect those of typical projects, starting from early decisions on the site and project definition, and extending all the way through to practical completion and occupation of the building.

2.1 Preliminary scoping and feasibility

Early decisions will be made about the siting of the building at this stage. It may entail a decision between renovating or demolishing an existing site (see Section 2.1.3.2), or it may be a choice between several locations within the public estate. This stage would generally involve the estates department and capital programmes. The expertise that may be needed at this stage is briefly discussed in *Briefing Note 1*.

Briefing note 1. Putting the team together: preliminary stages

At the preliminary stage the aim should be to draw upon internal expertise to support the procurer. Using internal expertise will ensure greater ownership of the project. The internal project team will in this way be better informed when managing external contractors and be able to maintain better control over the environmental specifications it requires.

Where possible, personnel with relevant expertise should be identified and assigned to the project. This might include, for example, representatives from estates, capital projects, finance, highways, energy and environmental management. Some authorities may also have in-house architects and designers.

Experience also suggests that the involvement of end-users of the building, for example management and/or workforce representatives from departments as well as future facilities managers, can help to ensure that the building is designed to meet their needs and, particularly if new and unfamiliar systems are incorporated, is practical to operate and maintain.

Preliminary appraisals and outline designs may be carried out in-house with support from external consultants to make up gaps in expertise. Support to be procured could include Environmental Impact Assessments, Transport Assessments, Life Cycle Costing and renovation options appraisals.

2.1.1 Creating the project definition

The project definition clearly sets out the strategic aims of the building project. Its objective is usually to create a clear brief for the internal project team, including the procurer. The project definition should include the environmental priorities of the contracting authority, as reflected in policies and plans, at a corporate level and in local planning policies. It can also be used to bring together initial information about the site and summarise the design requirements of the relevant departments that will occupy the building.

2.1.2 Choosing the site and location

One of the first considerations in relation to the siting of the project will be whether an existing building is to be selected for renovation or whether a new building will be constructed. An appraisal of the different options may be necessary to inform decision-making (see 2.1.3.2). This should include the potential to improve an existing building's environmental performance.

The location of an office building may also have a significant influence on the mode of travel for people working in the building and the consequential environmental impacts associated with car journeys. This may be the subject of an Environmental Impact Assessment (see Section 2.1.3.3).

In general, locations that are better served by public transport (measured in terms of the level of public transport connectivity or 'accessibility'), local strategic cycle networks, walking routes and car sharing services

for daytime travel needs [1] , as well as being near to local shops and services, have been shown to reduce a workforce's dependence on private car use. It is therefore recommended to carry out a scoping analysis of the locational options and projected travel patterns for an office site.

Additional supporting measures to mitigate the environmental impact of and need for car journeys can be brought together in a staff travel plan for an office site. These could include physical measures such as the installation of electric vehicle/bike charging points and bicycle parking spaces, as well informative measures such as public transport and car sharing information.

Another important consideration relates to whether the site is greenfield or brownfield. Choosing a greenfield site may result in soil sealing and the loss of productive agricultural land. On brownfield sites, the previous uses require consideration, especially if they were industrial, as they may incur additional resources to remediate and/or remove contaminated top soils as well as to make safe any below ground basements and workings.

2.1.3 Options appraisal and concept design

Before moving into the detailed design phase (see Section 2.2), an appraisal of different options is usually carried out in order to inform the business case for the project. This may include decision-making about whether to renovate an existing building or construct a new one.

An outline design concept for the building form, structure and services would usually be developed at this stage. This could include the identification of building(s) renovation options (see below). Design concepts and options would then be appraised for their costs based on industry standard yardsticks, schedules of rates and initial assumptions about how the building will be constructed or renovated.

2.1.3.1 Establishing environmental performance objectives

It is important that minimum technical requirements and possible areas of focus for award criteria are established during this preliminary phase. This will ensure that they are clearly communicated throughout the tendering process and will help building a common understanding. Initially the focus could be on strategic environmental requirements, for example, related to energy performance and the target lifespan of the building. These should then be detailed out in later steps to procure the design team and contractors.

2.1.3.2 Renovation or new-build?

The decision to retain and renovate an existing building or to demolish and/or construct a new building may need to take into account a number of factors which will need to be weighed up, including the costs and environmental benefits. The renovation of a building can have significant environmental benefits as a result of avoided impacts from the manufacturing of new construction materials. For example, the entire structural frame of a building could be re-used in situ. This may however be outweighed by the potential life cycle cost savings from the improvements in energy efficiency obtainable from a new building.

It is therefore important to first appraise whether, given the physical form and structure of the existing building, the building's environmental performance and, at the same time, the internal working environment can be improved sufficiently in order to meet the contracting authority's requirements. For instance, the following factors should be considered:

- Certain features of a building such as heat loss from structural elements (so-called 'thermal bridging') or heritage restrictions on making alterations to a building may preclude a cost effective level of improvement when compared to the minimum local legal requirements or the GPP criteria;
- Solutions may be available that allow elements of the existing building to be upgraded, e.g. the addition of low emissivity films to window units, thinner high performance insulation fitted either internally or externally;
- Potentially cheaper but less effective solutions such as internal insulation may reduce floor space and cause significant disruption, hence the overall costs of renovation options should be taken into account.

1 Car sharing is a service whereby the use of a car for business or personal use can be booked in advance, usually as a minimum on an hourly basis. *See* European Commission, *Best Environmental Management Practice for the Public Administration Sector*, Joint Research Centre IPTS, Final draft, June 2015http://susproc.jrc.ec.europa.eu/activities/emas/documents/PublicAdminBEMP.pdf

Given the emerging market for energy efficient building renovation, external expertise could be procured to identify state-of-the-art and cost effective solutions, as well as to carry out overall appraisal of their life cycle cost and benefit.

2.1.3.3 Environmental planning considerations

Where the decision is made to construct a new building (or buildings), environmental planning issues relating to the site would be subject to a screening decision. This would be used to determine whether the project is significant enough to be subject to an Environmental Impact Assessment under Article 4(2) Annex II of the EIA Directive 2011/92/EU. This could include, for example, the assessment of traffic impacts, air quality, noise, water and waste management.

Related planning considerations may influence the urban design and landscaping associated with a project. For example, the footprint and site coverage of a building (or buildings) and associated hard surfaces will influence the extent to which soil is sealed. Moreover, the permeability of the roofs, landscaping and hard surfacing, as well as how the drainage systems function, will influence how water runs off from the site. If the run-off of rain water from the site can be slowed, or even put to use, then the contribution to downstream flooding in areas of risk can be minimised. The wider potential value of such 'green infrastructure' is highlighted in *Briefing Note 2*.

Briefing note 2. The potential value of green infrastructure and ecosystem services

In the context of building design the European Commission describes green infrastructure as measures *'....designed to conserve, improve or restore nature, natural functions and processes to secure multiple ecosystem services for human society*' [2]. At a practical building and landscape design level, green infrastructure measures could include features such as green roofs and walls, habitats in courtyards and patios, Sustainable Urban Drainage Systems (SUDS) as part of landscaping, street trees and planted borders.

There is emerging evidence showing that biodiverse, green infrastructure can provide valuable 'ecosystem services'. For example, providing views and experiences of nature (so-called 'biophilia') can improve workforce productivity. Combinations of green roofs, walls, courtyards and street trees can moderate the microclimate around a building, thereby reducing the need for heating and cooling. This would have the benefit of reducing both energy-related greenhouse gas emissions and running costs.

The environmental impacts associated with the extraction and transportation of large volume, high weight materials such as aggregates may also be a consideration, and can be incorporated into the tenders documents. This should always be done based on an understanding of the market conditions and, when using award criteria by establishing and clearly specifying in the ITT weightings that will ensure effective competition and reward bids that offer the best overall environmental performance. This is particularly the case if it is chosen to link criteria on concrete and masonry recycled content with CO_2 emissions from aggregate transportation.

2.1.3.4 Early assumptions about capital and life cycle costs

At this stage, initial assumptions about the cost of environmental improvements can be integrated into the cost planning for the project. Life Cycle Costing (LCC) is a technique that can be used to inform decisions on the cost and benefit of requiring specific GPP criteria (see the description of LCC in Briefing Note 3 below).

Reference office building concepts used internally to appraise the possible costs may be included in the Invitation To Tender (ITT) for design teams and construction contracts. Provided that they include a bill of construction materials, they could be used as the basis for comparative assessments of environmental improvement options for the construction.

2 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Green Infrastructure (GI) — Enhancing Europe's Natural Capital*, COM(2013) 249 final, Brussels, 6.5.2013

Briefing note 3. Life Cycle Costing (LCC)

Life Cycle Costing is a technique that *'enables comparative cost assessments to be made over a specified period of time, taking into account all relevant economic factors both in terms of initial capital costs and future operational and asset replacement cost'* [3]. It is particularly relevant to achieving an improved environmental performance because higher initial capital costs may be required to achieve lower life cycle running costs. A simplified 'cost optimal' methodology was introduced by the recast Energy Performance of Buildings Directive (EPBD) and is referred to in the EU GPP energy criteria [4]. A full LCC exercise may be carried out with reference to ISO 15685-5 or equivalent.

The SCI Network has identified two common barriers to the implementation of LCC in the procurement of public buildings:

- Separation between capital and operating budgets: Because investments are ring-fenced this tends to reduce the incentive to make upfront investments that could lower operating costs.
- Expertise and capacity: Many public authorities may lack staff with the training and knowledge to carry out LCC evaluations. The availability of easy to use models and data can also be a barrier.

Organisational barriers can potentially be overcome by establishing joint departmental project teams that engage those who will be involved in operating the building asset.

Early consideration of whether to outsource LCC expertise if it does not exist in-house should be made. External cost consultants may typically offer this expertise.For contracting authorities considering carrying out LCC in-house a number of modelling tools are now available which can make LCC more accessible.

2.1.3.5 Design service life and future adaptability

The projected service life of a building is an important assumption in the modelling of the life cycle environmental impacts of buildings. This is highlighted by the EN 15978 standard for assessment of the environmental performance of buildings [5]. This aspect should therefore be considered from an early stage in the project.

The most significant environmental impacts of constructing a building relate to its structure. If the structure of the building can continue to be used at the end of the building's service life for the public authority, there can be significant environmental benefits. This can however be challenging to consider alongside the immediate functional requirements of the contracting authority.

Briefing note 4 summarises how the future potential for adaptability of an office building can be integrated into concept designs and briefs for the design team.

Briefing note 4. Design for durability and adaptability

Experience has shown that factors such as floor to ceiling heights and problems to adapt servicing such as electricity and air conditioning, which is generally located in the ceilings, can be major barriers to the conversion of offices. The ease of replacement of the façade and major Heating, Ventilation and Air Conditioning (HVAC) plant is also a major consideration, given the potential need to change the façade design, servicing strategy and to improve the buildings performance.

Building assessment schemes such as BREEAM and DGNB include criteria and tools to assess the physical 'flexibility and adaptability' of buildings. These highlight other factors to consider, including:

- The placement of columns and bay widths;
- The ease by which interior walls can be moved;

3 Davis Langdon, *Life cycle costing (LCC) as a contribution to sustainable construction: a common methodology*, Literature review prepared for the European Commission, May 2007

4 Commission Delegated Regulation No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements (OJ L 81/18 21.3.2012)

5 EN 15978: 2011. *Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method*

- The extent to which the building is divided into one or more parts or wings;
- The load bearing capacity of the floors;
- Plan depth and daylight penetration.

Factors such as these, sometimes also referred to as 'functional adaptability' aspects, should be considered at both the concept and detailed design stage, with reference to design criteria and tools that provide specific recommendations.

An additional factor for consideration is the design of HVAC systems so that they can be adapted to future changes along the life cycle of the building. This could relate to changes in fuels or input energy sources, but also occupancy patterns, such as the use intensity and internal layout.

2.2 Detailed design and applications for permits

2.2.1 The design brief and performance requirements

2.2.1.1 Under conventional contracting arrangements

In a conventional contracting arrangement, a design is procured for the building project and a contractor is procured to construct this design (also referred to as an 'employer design' contract[6]). In the first step in this process, a brief is therefore required, setting out the contracting authorities design requirements. These would usually be expressed in terms of GPP performance in order to provide designers with flexibility (for instance, energy use in terms of kWh/m^2), but they may also refer to specific GPP requirements (for instance, the use of timber from sustainably forestry). This brief would form the basis for the ITT for a design team, which could optionally be run as a design competition in order to encourage innovation.

2.2.1.2 Under integrated design and construction arrangements

Where design and construction are to be procured together (in ''design and build''[7] or ''design, build and operate''[8] contracts), the contracting authority's performance requirements assume a greater importance. This is because they will form the basis for one ITT for the main construction contractor and their design team together. It is therefore important in these two types of contracts that GPP criteria are fully addressed within the performance requirements. It may be necessary to procure expertise at this stage in order to prepare the performance requirements.

Guidance note 5. Putting the team together – developing performance requirements and designs

As the project enters the detailed design stage, the contracting authority may wish to procure an external project manager with experience in innovative construction projects. The project manager's role could include supporting the development of the brief and/or the performance requirements which will form the basis for the ITT. They could also support the procurer by helping to troubleshoot issues or barriers to the implementation of GPP requirements.

Experience suggests that the core design team will require experience and expertise in a number of key areas, which are identified in more detail in the GPP Selection Criteria:

- Architect: Knowledge and experience of designing and specifying environmentally improved buildings, ideally supported by evidence from post-occupancy evaluations.
- Service engineers: Knowledge and experience of designing and specifying low energy heating, cooling, ventilation and lighting systems, ideally supported by evidence from post-occupancy evaluations, as well as carrying out specialist analysis such as energy modelling.

6 Under the International Federation of Consulting Engineers (FIDIC) this would be equivalent to a Red Book contract.

7 Under the International Federation of Consulting Engineers (FIDIC) this would be equivalent to a Yellow Book contract.

8 Under the International Federation of Consulting Engineers (FIDIC) this would be equivalent to a Design, Build and Operate contract.

- Structural engineers: Knowledge and experience of designing and specifying innovative structures and materials that can deliver improved resource efficiency and life cycle performance.
- Specialist environmental consultants: Knowledge and experience in providing advice on innovation in areas such as materials sourcing, waste management and certification schemes, as well as the capacity to carry out specialist analysis such as LCA.
- Cost consultant: Knowledge and experience of environmentally improved specifications and construction systems, as well the capacity to carry out specialist analysis such as LCC.

It is important that experience and expertise is verified by references from clients and/or recognised certifications and qualifications. The Selection criteria should be included in the ITT for all forms of contract.

2.2.2 Running a design contest for integrated design and build contracts

Where the design and build are to be integrated in one contract, there tends to be less direct control over the final design. The performance requirements to be communicated to potential contractors are therefore important in formally specifying GPP requirements. These will be used by the selected design and build contractor's design team to develop a detailed design as described in Section 2.2.3.

There is, however, still the potential to influence the design before the contract is signed. The main design and build construction contractor can be procured on the basis of a design contest. This can bring a number of benefits, particularly if the contracting authority is unsure about the cost and risk of meeting GPP criteria. This can be run in two stages, moving from concept designs to detailed designs. This option is discussed in Briefing note 6 below.

Briefing note 6. The value of design contests in stimulating innovative design solutions

Design contests are a valuable tool that can be used to bring forward innovative designs, design teams and cost effective solutions on a competitive basis in response to performance requirements.

Integrated design and build contracts can be procured in two stages, incorporating a design contest. At the first stage, a qualification and shortlisting can be made based on expertise and an outline design concept. At the second stage, the final selection can be based on detailed designs that have been fully costed by bidders.

The benefit in both cases is that the contracting authority has the opportunity to ensure that the selected design cost-effectively integrates GPP requirements.

2.2.3 Commencing detailed design

Detailed design is carried out by a design team, the members of which can either be individually selected, called down from a framework contract or selected on the basis of a design competition. The process varies according to the type of contract, which would usually take the following forms:

- In a *conventional construction contract*, where there is a separation between the designer and the construction contractor, the design team is instructed by the architect who is accountable to the contracting authority.
- In a *design and build or a design, build and operate contract*, the design team is usually controlled by the main construction contractor, although it may be possible to 'novate' (transfer) the design team employed by the contracting authority to their chosen contractor.

Other arrangements are used in the EU but are less common. For example, a project manager or 'management contractor' may be contracted to co-ordinate a design team appointed by the public authority and to prepare tenders for works contractors in accordance with the public authority's performance requirements. Although other such arrangements are not specifically covered by this guidance, the reference to the importance of setting performance requirements will still be relevant.

As described in Section 2.2.1.2, the core design team will generally include an architect, project manager, cost consultant, consulting engineers (civils, structures and services) and specialist environmental consultants.

Technical tools used by this team to meet GPP requirements should include dynamic energy modelling and Life Cycle Assessment (LCA) software (see the Briefing note 7 for LCA below).

The use of Building Information Models (BIM) by the design team and construction contractors can facilitate LCA and other forms of analysis required to support compliance with environmental performance criteria. The effectiveness of BIM as a tool to support environmental analysis will depend on the data collated within the BIM. Data requirements therefore need to be defined to facilitate the analysis.

Briefing note 7. Life Cycle Assessment (LCA) and choice of functional unit

LCA is a tool that can be used to analyse the environmental impacts of different building designs and specifications. It is specified in the GPP criteria as a means of quantifying improvements in the environmental impacts of buildings. LCA analyses for office buildings should be carried out in accordance with ISO 14040 and ISO 14044.

In an LCA, the unit of 'product' that is to be analysed must be defined. This is termed the 'functional unit'. It is important that the functional unit used relates to the usage of the building. This is to ensure that the resource efficiency of the building is optimised. For example, energy use per desk space or occupant may be preferable to m^2, which is more commonly used.

Using LCA requires specialist technical skills that should be procured, if not available in-house, as part of the design team. This technical capability should go hand in hand with practical knowledge and experience of the available improvement options, their material composition, their availability in the supply chain and their cost and design implications.

If a GPP requirement to carry out an LCA of a building design is included, the technical expertise within the internal team and the procurement panel also becomes important. This is because bidders will need to follow pre-defined rules and guidance in order to ensure that they are comparable. Moreover, LCA reports submitted as part of bids will need to be subject to a critical review by an expert evaluator.

2.2.4 Applying for planning permission and building permits

The outcomes of the detailed design process (as described in Section 2.2.3) are important in seeking to meet GPP requirements. This is because they are generally used to demonstrate conformity with urban planning policies and to obtain building control permits, which usually require the submission of energy modelling showing that the building meets national minimum requirements for energy performance and, where relevant, incorporates low or zero carbon energy generation technologies. Local urban planning policies may also contain their own environmental requirements. In each case there is likely to be an overlap with GPP criteria.

2.2.5 Preparation of the tender documentation in a conventional contract

The detailed design forms the basis for the tender specification which will be used to procure the main construction contractor. It is therefore important that it incorporates GPP requirements. This could include requirements relating to:

- Target service life, upgradeability, adaptability and recyclability;
- Design performance, such as energy and water consumption,
- Material specifications, such as specific combinations of building elements identified by LCA analysis and timber from sustainably managed forestry,
- Execution of the contract, including site waste management, handover of Building Energy Management Systems and testing of the building fabric.

There is evidence that reference is increasingly being made by procurers to performance benchmarks associated with multi-criteria building certification schemes and assessment tools. Contracting authorities and their procurers may therefore have questions as to how these may relate to the EU GPP criteria.

The potential relationship between the EU GPP criteria and existing schemes and tools is discussed further in the Briefing note 8.

Briefing note 8. Working with existing building certification schemes and assessment tools

A number of existing building assessment and certification schemes are in operation across the EU. These include schemes that are being used across Member States together with a range of assessment tools that have been developed at a national or regional level. The more mature schemes and tools can provide a familiar reference point for private sector partners and contractors, and are generally third party verified.

The EU GPP criteria address the key environmental impact of office building along their life cycle, as well as addressing issues relating to health and comfort in the working environment. Existing schemes and tools tend to have areas of overlap with the EU GPP criteria, however their equivalence and weighting of the most environmentally significant criteria can vary.

The contracting authority may also require the bidder to carry out a Life Cycle Cost assessment. Bids may then be compared on the basis of the 'Most Economically Advantageous Tender' (MEAT) considering life cycle costs. This should include the long-term cost of maintenance, utilities and waste management. It is recommended that the LCC is assessed as a global figure (i.e. all lifetime costs added together) and not as a separately weighted award criterion.

2.3 Strip-out, demolition and site preparation works

A range of works contracts may be required to prepare a building for renovation or a site for new construction. In both cases the GPP criteria require that contractors carry out a pre-demolition/strip-out audit in order to determine what can be re-used, recycled or recovered.

This audit should take place as early as possible in order to maximise opportunities for the potential re-use of major structural elements of the building and to inform the decision to renovate or demolish (see Section 2.1.3.2). The materials, products and elements identified shall then be itemised in a Strip-out *or* Demolition Bill of Quantities[9]. A waste management plan shall identify how recovery for re-use or recycling will be maximised.

2.3.1 Stripping out of buildings for renovation

The strip-out and selective demolition of existing structures on the site, including buildings intended for major renovation, may be let as a separate contract prior to the main construction contract. At this stage it should be specified that, based on the findings of a strip-out audit, materials shall be recovered for re-use and recycling according to a plan, with monitoring systems implemented to verify performance. The works should be carried out in accordance with the detailed design for the major renovation.

2.3.2 Demolition and clearance of sites

The demolition of existing structures on the site, as well as excavations and backfilling, may be let as a separate contract prior to the main construction contract. The specialist treatment of hazardous waste and contaminated land may also be contracted separately. At this stage it should be specified that, based on the findings of a demolition audit, materials shall be recovered for re-use and recycling according to a plan and in a closed loop if possible. Monitoring systems shall be implemented to verify compliance and, in the case of award criteria being set, the level of performance.

9 European Commission, *Reference document on best environmental management practices in the building and construction sector*, JRC-IPTS, September 2012 see Chapter 7, Building end of life

2.4 Construction of the building or major renovation works

2.4.1 Selecting the main construction contractor

There are a number of types of contractual arrangements that are in common use. In this section, four arrangements are covered - conventional, integrated design and build, Design Build & Operate (DBO) and energy services. For each, their distinct advantages and disadvantages, as well as some of the key issues to consider for GPP, are briefly highlighted.

2.4.1.1 'Conventional' contracts

In a conventional contract (also referred to as employer design), a 'lump sum' is usually agreed with the selected main construction contractor (see Figure 1.1). This price is usually based on the contractor's competitive response to the detailed tender specification but, allowing for some uncertainty during the build programme, it is usually not a fixed price.

In single stage tenders, it is important that the contractor has a clear understanding of the GPP performance requirements and has the capability to respond to them. The potential to include award criteria should already have been explored earlier in the process by the design team, but the nature of the contract will still allow for contractors to identify cost effective and innovative responses.

A main contractor may also be procured through a two stage tender process. In this process, a main contractor is selected with whom a pre-construction agreement is signed. In the second stage, the contracting authority and the main contractor tender most of the main sub-contracts in order to firm up the pricing of the project. This can in-turn allow for greater involvement by the contracting authority in selection of sub-contractors.

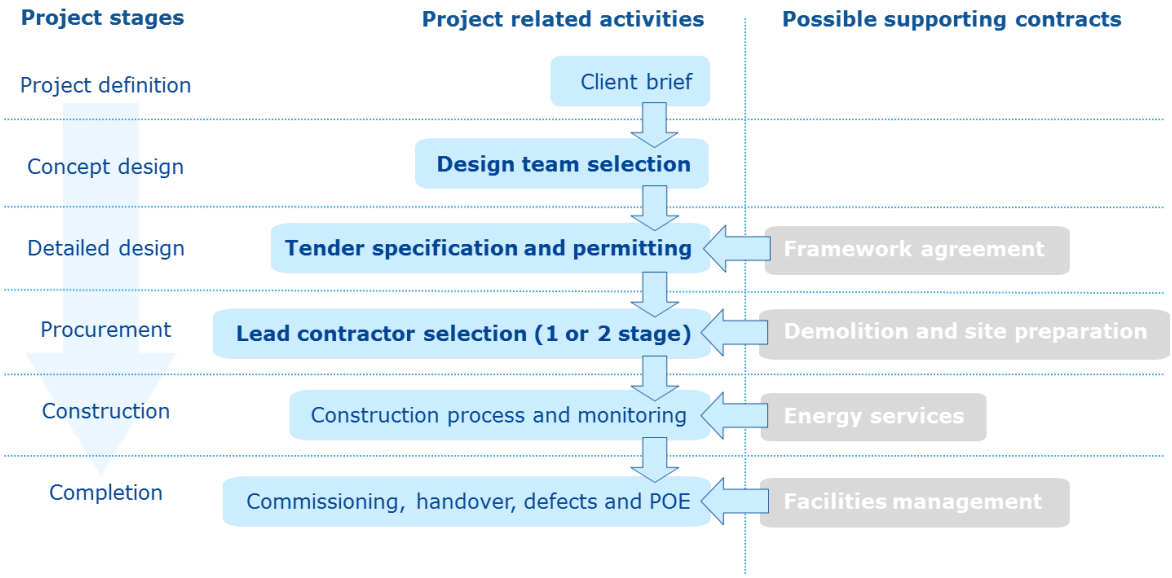

Figure 1.1 Indicative stages of project and procurement activity in a 'conventional' contract

2.4.1.2 Integrated Design and Build (DB) contracts

In a contract with integrated design and build, the contractor will have been selected at an earlier stage on the basis of its capabilities and its design team's response to the contracting authority's performance requirements (see Figure 1.2). The main advantage of this contract form is that it integrates the design team and the construction contractor, which can help to minimise risk and uncertainty in delivering innovative specifications. It also affords the contractor greater flexibility in meeting the performance requirements, but this places a strong emphasis on ensuring that performance requirements are carefully defined.

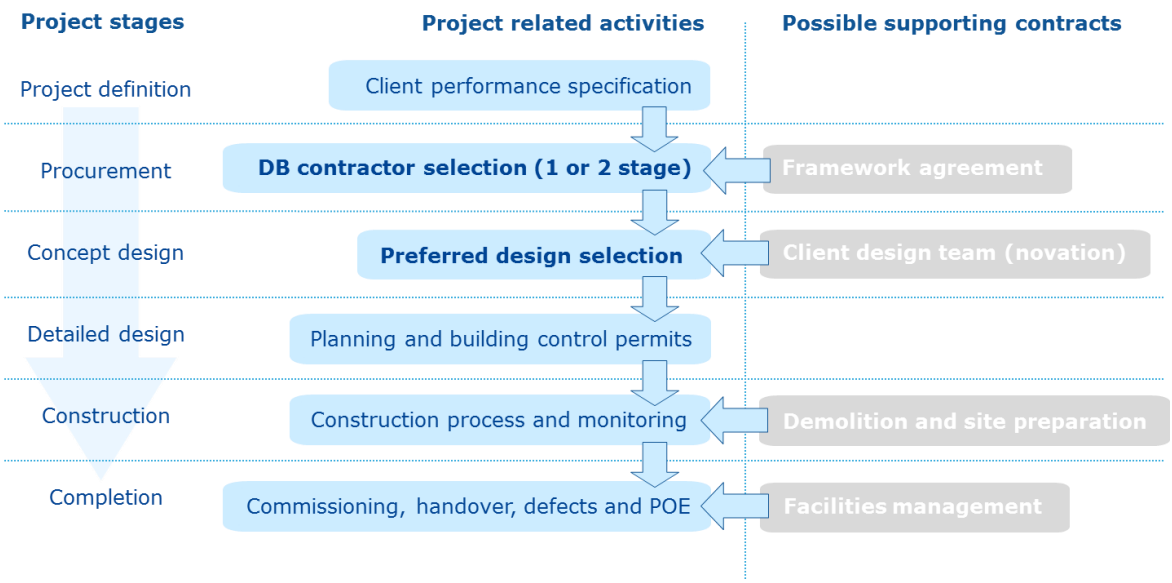

Figure 1.2 Indicative stages of project and procurement activity in a DB contract

2.4.1.3 Design, Building and Operate (DBO) contracts

In a Design, Build and Operate contract that include project financing many of the risks associated with the project are transferred to the operator (the contractor), who is usually responsible for the building over a 20-30 year timeframe or 'concession' period (see Figure 1.3). The contracting authority sets out its functional requirements for the building in a specification. Bidders are invited from potential operators with the appropriate financial strength and technical capabilities. Operators are usually a consortia or Special Purpose Vehicle (SPV) bringing together construction contractors, investors, specialist sub-contractors and services providers. Once a bidder is selected, a contract is agreed which includes the financial arrangement for use of the building by the contracting authority.

A potential advantage of a DBO arrangement is that facilities management and the ongoing performance monitoring of the building are integrated within the contract. Life Cycle Costing therefore become an important consideration because the contractor will seek to minimise running costs. This can be further incentivised in how the operating fee is structured. For example, a formula can be agreed for energy use in which savings are shared and increases are penalised.

The disadvantage is that the contractor will seek to minimise upfront investment costs. GPP requirements such as those relating to construction materials should therefore be prioritised during contractor selection. The knowledge and experience of the DBO consortium regarding how to appraise and manage the supply chain to meet GPP requirements are important. DBO contractors that are experienced in meeting environmental specifications may, for instance, have developed cost effective construction systems and energy services.

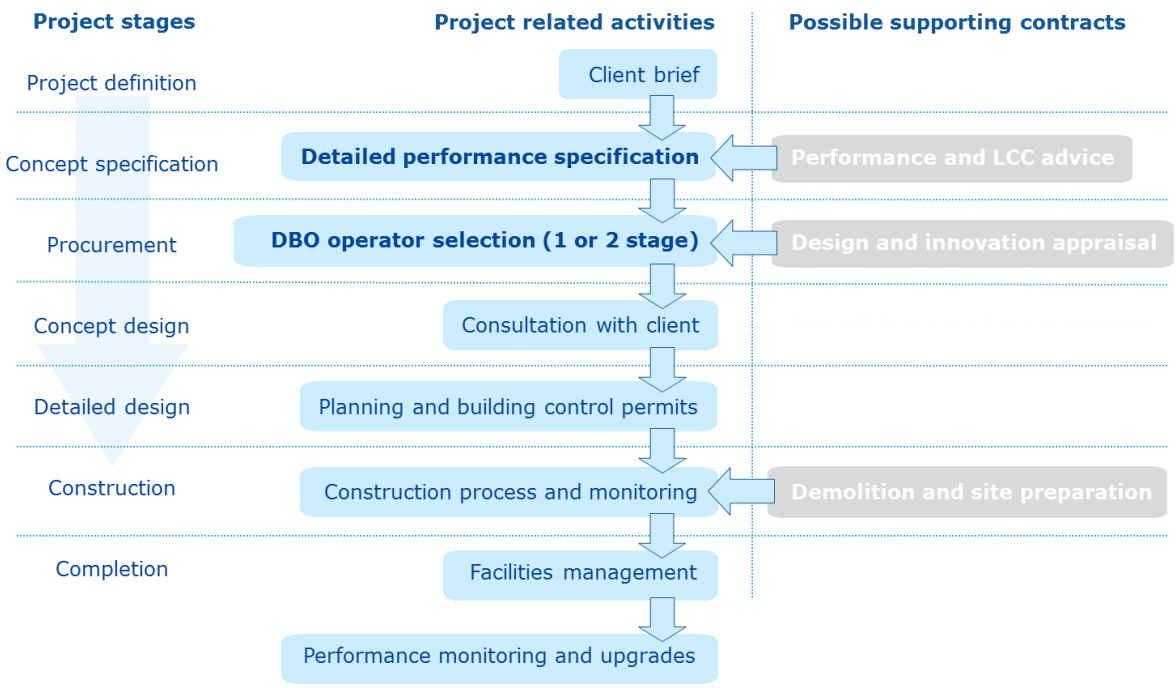

Figure 1.3 Indicative stages of project and procurement activity in a DBO contract

2.4.1.4 Renovations carried out as 'energy services'

A relatively new form of design, build and operate contract that is attracting increasing interest is where renovations are carried out under a so-called Energy Performance Contract (EPC) arrangement. These third party ESCos are invited to bid to provide a package of renovation works to reduce the energy consumption and/or CO_2 emissions of a building[10]. These works would tend to include building fabric improvements (typically focussing on windows, insulation and air tightness), but could also include energy generation technologies such as solar photovoltaics or biomass heating.

The works would be designed, installed and financed by the successful bidder on the basis of the estimated energy savings that will be made by the building occupier over a medium to long-term time frame. The contracting authority would then pay service charges to the contractor which would generally be calculated based on the value of the energy savings and the associated savings within departmental budgets.

Model EPC and ESCo contracts have been developed as part of EU funded projects such as Eurocontract[11]. Examples from Germany and Austria can be downloaded from the Eurocontract project website. These examples include references to factors and adjustments that should be taken into account when establishing contracts, such as,, for example, energy price fluctuations, weather conditions and building occupancy.

2.4.2 Monitoring and reporting of progress on site

A number of GPP criteria require the contractor to monitor performance as the build progresses. Site waste management, for example, requires ongoing data collection to determine how much waste has been re-used and/or recycled, which is then collated to produce a final report upon completion of the building. The sourcing of timber shall be supported by evidence to demonstrate compliance with the EU Timber Regulation and the contracting authority may choose to carry out spot checks. It is therefore important that requirements relating to compliance with GPP criteria as work progresses on site are clearly communicated in the ITT and that agreement is reached on monitoring processes.

10 *See for example* Berlin Energy Agency, Germany, http://www.berliner-e-agentur.de/en/consulting-information/energy-saving-partnerships-berlin *and* RE:FIT, London, http://www.refit.org.uk/what-refit/

11 European Energy Service Initiative, *Eurocontract EPC toolbox*, http://www.european-energy-service-initiative.net/eu/toolbox/eurocontract-toolbox.html

2.5 Installation of energy services

The installation of mechanical and electrical services to supply power, heat and cooling to an office building can be procured in a number of different ways. These options are briefly discussed in this section.

2.5.1 Selecting energy service contractors

In many cases the design and installation of energy services to supply heating and cooling to the building will be integrated within the responsibilities of the design team and the construction contractor respectively. A separate procurement exercise is therefore not required.

There is, however, increasing public sector interest in the procurement of third party providers such as Energy Services Company (ESCo) under Energy Performance Contracting (EPC) arrangements[12]. In this type of contractual arrangement, the design, installation and operation of renewable and/or high energy efficiency generating equipment to supply a building would become the responsibility of a specialist contractor.

ESCo arrangements may be extended to include the financing of the energy supply equipment or even a complete package of renovation works to a building, financed by energy savings made by the building owner. The procurement of an ESCo to carry out renovation packages was briefly discussed in Section 2.4.1.4, including reference to example 'model' contracts.

Whilst this requires an additional procurement exercise, it creates an opportunity to invite the market to bring forward low or zero carbon emission solutions. The main potential advantages are lower upfront capital costs and the transfer of risk to the contractor. Examples of technologies that could be provided under this arrangement include cogeneration, district heating and cooling, biomass heating and solar photovoltaics.

2.5.2 The installation and commissioning of energy services

Experience internationally with the operation of low energy office buildings shows that innovative new forms of heating, cooling and ventilation systems can, if not designed, installed, commissioned and operated correctly, lead to higher than predicted energy use[13]. A GPP criterion has therefore been included that specifically addresses this issue. This criterion can be incorporated into the ITT for either the construction contractor or an energy services provider.

2.6 Practical completion and handover

2.6.1 The building manual and handover training

The building manual should be completed as part of the handover process. If a Building Energy Management System and/or other forms of intelligent control systems such as for lighting are specified, training on how they work, supplemented by information in the building manual, should be provided by the contractor and/or their design team. A maintenance and upgrading plan that aims to, for example, ensure high levels of energy efficiency during the service life of the building, may also form part of a DBO contract.

2.6.2 Testing of the building fabric

Achieving an air tight and contiguous building fabric is a critical step in seeking to reduce heating and cooling demands. Experience in Europe with low energy office buildings suggests that this requires careful detailing by the architect and quality control on the construction site[14]. Designers and contractors can potentially be selected based on their track record as evidenced by performance data and surveys of completed buildings.

Prefabricated building systems are also a demonstrated means of ensuring quality and precision[15]. They can also bring additional environmental benefits such as reductions in factory and site waste.

12 Under the International Federation of Consulting Engineers (FIDIC) this would be equivalent to a Silver Book contract.

13 IEA (2004) *Commissioning tools for improved energy performance*, ECBCS Annex 40 project, http://www.iea-ebc.org/projects/completed-projects/ebc-annex-40/

14 See for example Hannover *quality control scheme*, EU Concerto project, http://www.concerto-act2.eu/fichier/t_download/51/download_fichier_en_quality.assurance_en_130322.ds_act2.pdf

15 WRAP, *Current practices and future potential in modern methods of construction*, Final report, UK, January 2007

The GPP criteria may therefore include technical specifications for testing the integrity of the building fabric using thermal imaging and air pressure tests. These requirements can be incorporated into the ITT for the construction contractor.

2.7 Facilities management

2.7.1 The role of the facilities manager

The ongoing management and maintenance of the office building may be carried out by the public authority or may be let as a separate contract to a specialist company. This would tend to include the operation of energy, water and waste management systems. The relevant GPP requirements should therefore be incorporated into the ITT.

2.7.2 Incentivising energy management

In Design, Build and Operate arrangements, the role of facilities manager is assumed by the contractor over typically a 20-30 year time frame. GPP contract performance criteria relating to the management of energy, water and waste should therefore be incorporated into the main contract with the DBO operator. These criteria also propose incentives and penalty clauses.

2.8 Post Occupancy Evaluation

2.8.1 Lessons that may be learnt from the project

The implementation of new specifications to improve the environmental performance of a building is often a learning process for design teams. Studies in a number of countries have shown that there can be significant value in diagnosing and sharing the lessons from what worked and what did not on building projects[16]. This is often termed a Post Occupancy Evaluation (POE).

A POE is generally carried out a minimum of one year after the building has been fully occupied. It tends to focus on the functional and technical performance of the building, as well as the management process. A POE generally consists of:

- Data collection to compare design and actual performance;
- Interviews with occupiers to evaluate their experience of using the building and aspects of the design and specification;
- Interviews with the design team to evaluate project performance as a whole, with a focus on the integration of environmental performance specifications.

Best practice would be for a POE to be carried out by a third party, which could be a University or specialist consultancy, using a standardised methodology such as BUS (Building User Survey)[17].

The value of carrying out a POE can be significant. In the short-term, it can help in optimising the performance of a building and in identifying any remedial measures. In the medium-term, the learning can be used to improve the design, specification, management and procurement processes on future projects. This is particularly important for the public sector where this learning can be carried forward to subsequent capital projects in order to obtain better value and performance – for example, where a series of similar building projects are being procured under a framework.

With an increasing focus clients and the building sector on the links between environmentally improvements and health and comfort benefits, a POE can also support data collection and monitoring in order to quantify the benefits to occupier comfort and productivity (see Briefing note 9). The GPP criteria set includes

16 See for example EnOB, Research for energy optimised building, Germany http://www.enob.info/en/analysis/analysis/details/workplace-satisfaction-and-comfort/

17 Arup, BUS methodology, http://www.busmethodology.org.uk/

requirements relating to daylighting, thermal comfort and indoor air quality, which are important health and comfort factors for office buildings.

Briefing note 9. Achieving healthy buildings

Increasing attention is being given to the importance of creating comfortable and healthy office buildings. This is supported by growing scientific and market evidence of the linkages between healthy buildings and workforce productivity and satisfaction. Post Occupancy Assessments have shown that a healthy and attractive working environment with good daylighting, ventilation, stable seasonal temperatures, user control and views of green/blue spaces can contribute to greater workforce satisfaction, less illness-related absences and greater productivity[18].

The market significance of healthy buildings is highlighted by the launch in the US of the Well Building Standard[19], which is the result of extensive research and consultation with medical professionals, and by the findings of a major review of evidence carried out by the World Green Building Council for office buildings [20]. The latter highlights the financial importance of healthy buildings, considering that staff costs can account for up to 90% of departmental budgets.

18 Useable Buildings Trust, *PROBE post occupancy study series*, Building Services Journal 1995-2002, http://www.usablebuildings.co.uk/

19 International Wellbeing Institute, *The Well Building standard*, http://www.wellcertified.com/

20 World Green Building Council (2014) *Health, wellbeing & productivity in office – the next chapter for green buildings.*

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