

ENVIRONMENT GUIDE 2017

Procurement criteria for low-carbon building

**Matti Kuittinen
Simon le Roux**

MINISTRY OF THE ENVIRONMENT

Environment Guide 2017



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Matti Kuittinen and Simon le Roux

Ministry of the Environment

ISBN PDF: 978-952-11-4788-3

Layout: Government Administration Unit, Publications, Marianne Laune

Helsinki 2018

Description sheet

Published by	Ministry of the Environment Department of the Built Environment	April 2018	
Authors	Kuittinen, Matti le Roux, Simon		
Title of publication	Procurement criteria for low-carbon building		
Series and publication number	Environment Guide 2017		
Register number	YM1/601/2017	Subject	Built environment
ISBN PDF	978-952-11-4788-3	ISSN (PDF)	1796-167X
Website address (URN)	http://urn.fi/URN:ISBN:978-952-11-4788-3		
Pages	50	Language	English
Keywords	public procurement, building, low carbon, carbon footprint, lifecycle assessment, energy efficiency, material efficiency, innovations, standards		
<p>Abstract</p> <p>This guide presents recommendations for Green Public Procurement (GPP) criteria to be applied on a voluntary basis in order to reduce the carbon footprint of building projects implemented by means of public funds under the Act on Public Procurement and Concession Contracts. Particular focus is placed on lifecycle thinking, which should be applied starting from the planning stage of buildings with calculations of the building lifecycle carbon footprint.</p> <p>Besides the suitability requirements for tenderers and cost estimates, the criteria include the assessment of energy, material and innovation aspects. Specific criteria relating to these categories have been drawn up for the procurement of design services, procurement of materials and equipment, procurement of building works, Design & Build projects and Design, Build & Operate contracts. The criteria are supplemented by detailed instructions based on standards which enable the environmental assessors involved in the projects to make comparable calculations.</p>			
Publisher	Ministry of the Environment		
Distributed by/ Publication sales	Distribution by: julkaisut.valtioneuvosto.fi Publication sales: julkaisutilaukset.valtioneuvosto.fi		

Kuvailulehti

Julkaisija	Ympäristöministeriö Rakennetun ympäristön osasto	Huhtikuu 2018	
Tekijät	Kuittinen, Matti le Roux, Simon		
Julkaisun nimi	Vähähiilisen rakentamisen hankintakriteerit		
Julkaisusarjan nimi ja numero	Ympäristöopas 2017		
Diaari/hankenumero	YM1/601/2017	Teema	Rakennettu ympäristö
ISBN PDF	978-952-11-4788-3	ISSN PDF	1796-167X
URN-osoite	http://urn.fi/URN:ISBN:978-952-11-4788-3		
Sivumäärä	50	Kieli	englanti
Asiasanat	Julkiset hankinnat, rakentaminen, vähähiilisyys, hiilijalanjälki, elinkaariarviointi, energiatehokkuus, materiaalitehokkuus, innovaatiot, standardit.		
Tiivistelmä	<p>Tässä oppaassa esitetään vapaaehtoiset kriteerisuositukset, joiden avulla julkisin varoin toteuttavien ja hankintalain alaisten rakennushankkeiden hiilijalanjälkeä voidaan pienentää. Erityinen painopiste on elinkaariajattelussa. Sitä suositellaan toteutettavaksi rakennusten suunnitteluvaiheesta alkaen elinkaaren hiilijalanjäljen laskennan kautta.</p> <p>Kriteerit sisältävät soveltuvuusvaatimusten ja kustannusten arvioinnin lisäksi energian, materiaalien ja innovaatioiden arvioinnin. Näihin teemoihin liittyvät kriteerit on laadittu erikseen suunnittelupalveluiden hankintaan, materiaalien ja laitteiden hankintaan, rakennusurakoiden hankintaan, kokonaisvastuurakentamiseen ja elinkaarimallille. Kriteereitä täydentävät standardeihin pohjautuvat yksityiskohtaiset ohjeet, joiden avulla hankkeissa mukana olevat ympäristöarvioinnin ammattilaiset voivat tehdä vertailukelpoisia laskelmia.</p>		
Kustantaja	Ympäristöministeriö		
Julkaisun jakaja/myynti	Sähköinen versio: julkaisut.valtioneuvosto.fi Julkaisumyynti: julkaisutilaukset.valtioneuvosto.fi		

Presentationsblad

Utgivare	Miljöministeriet Avdelningen för den byggda miljön	April 2018	
Författare	Kuittinen, Matti le Roux, Simon		
Publikationens titel	Upphandlingskriterier för koldioxidsnålt byggande		
Publikationsseriens namn och nummer	Miljöhandledning 2017		
Diarie-/ projektnummer	YM1/601/2017	Tema	Byggd miljö
ISBN PDF	978-952-11-4788-3	ISSN PDF	1796-167X
URN-adress	http://urn.fi/URN:ISBN:978-952-11-4788-3		
Sidantal	50	Språk	engelska
Nyckelord	Offentliga upphandlingar, byggande, koldioxidsnål, koldioxidavtryck, livscykelanalys, energieffektivitet, materialeffektivitet, innovationer, standarder.		
Referat	<p>I denna handledning presenteras frivilliga kriterierekommendationer med hjälp av vilka koldioxidavtrycket kan minskas för byggnadsprojekt som lyder under upphandlingslagen och som genomförs med offentliga medel. Tyngdpunkten ligger särskilt på livscykelräkning. Det rekommenderas att detta tillämpas redan när byggnaderna planeras genom en uträkning av koldioxidavtrycket för hela livscykeln.</p> <p>Kriterierna innehåller förutom lämplighetskrav och en kostnadsutvärdering även en utvärdering i fråga om energi, material och innovationer. I anslutning till dessa teman har det utarbetats separata kriterier för upphandlingen av planeringstjänster, upphandlingen av material och anordningar, upphandlingen av byggnadsentreprenader, byggprojekt där byggentreprenören ansvarar för alla byggskedet och livscykelmodellen. Kriterierna kompletteras med standarder som grundar sig på detaljerade anvisningar, med hjälp av vilka de yrkesutbildade personer som gör miljöbedömningar inom projektet kan utföra jämförbara uträkningar.</p>		
Förläggare	Miljöministeriet		
Distribution/ beställningar	Elektronisk version: julkaisut.valtioneuvosto.fi Beställningar: julkaisutilaukset.valtioneuvosto.fi		

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How to procure a low-carbon building

1

Identify the building project's

life cycle environmental impacts



In the preparation phase of the procurement, assess the building's environmental impacts over its life cycle.

Consider a preliminary assessment of life cycle costs with budgeting.

2

Set **targets for the carbon footprint**

Survey market solutions and their cost optimisation

Low-carbon targets

+

Functional and technical requirements

3

Select **subject of procurement** and allocate the targets to them



Design services



Material and equipment procurements



Building contracts

Specify

- Procurement procedure
- Description of procurement
- Suitability requirement
- Minimum requirements
- Selection criteria
- Method to compare tenders

4

Prepare calls for tender and compare tenders

Include the targets and assessment methods in the contract notice. A reference to a low carbon footprint may be included in the title of the contract, making the procuring entity's objective clear to tenderers. One can refer to criteria recommendations in this guide and attach them to the call for tender.

5

Include low-carbon targets in the contract

Consider using suitable incentives or penalties. Monitor target implementation during the contract period.

6

Make use of experiences

Document the results. Experiences of well-functioning or ineffective practices will be valuable for other contracting entities and tenderers. Share your observations with others!

PART I

BACKGROUND AND USE OF THE CRITERIA

1 Why is low-carbon building important?

Buildings and building construction have significant environmental impacts. They are responsible for about one third of Finland's greenhouse gas emissions and some 40% of energy consumption. Traditionally, efforts to reduce emissions from construction have been made by improving energy efficiency. A decrease in greenhouse gas emissions from energy production also helps to reduce the emissions related to buildings.

The operational emissions of a building decline as energy performances improve and emissions per unit of energy produced decrease. As operational emissions resulting from buildings are reduced, the impacts of the other life cycle phases on the carbon footprint of buildings are emphasised. Many different materials can be used to construct an energy efficient building, but there are differences between the life cycle emissions of different materials in relation to the technical and functional performance achieved with them.

International interventions for mitigating climate change generate more business for low-carbon products and services. It is vital for Finnish designers and builders to obtain experience and domestic market references to improve their competitiveness in international low-carbon building projects.

While construction is associated with many environmental impacts, the carbon footprint is an important factor in directing the built environment towards a path of sustainable development. Climate change mitigation is a key international goal. In the future, other environmental impact categories or social sustainability indicators may be included in our national procurement criteria, following the example of the European Commission's Green Public Building recommendations (1) and core indicators for resource efficiency in building (2).

Finland's national Energy and Climate Strategy 2016 set the objective of reducing the carbon footprint of construction and construction products (3). A government resolution from 2013 recommends taking the carbon footprint of building materials into

consideration in public building (4). The Ministry of the Environment has launched a drafting process aiming to incorporate the carbon footprint of construction in legislation in an effective manner at the latest by mid-2020s. The procurement criteria for low-carbon public building anticipate this development.

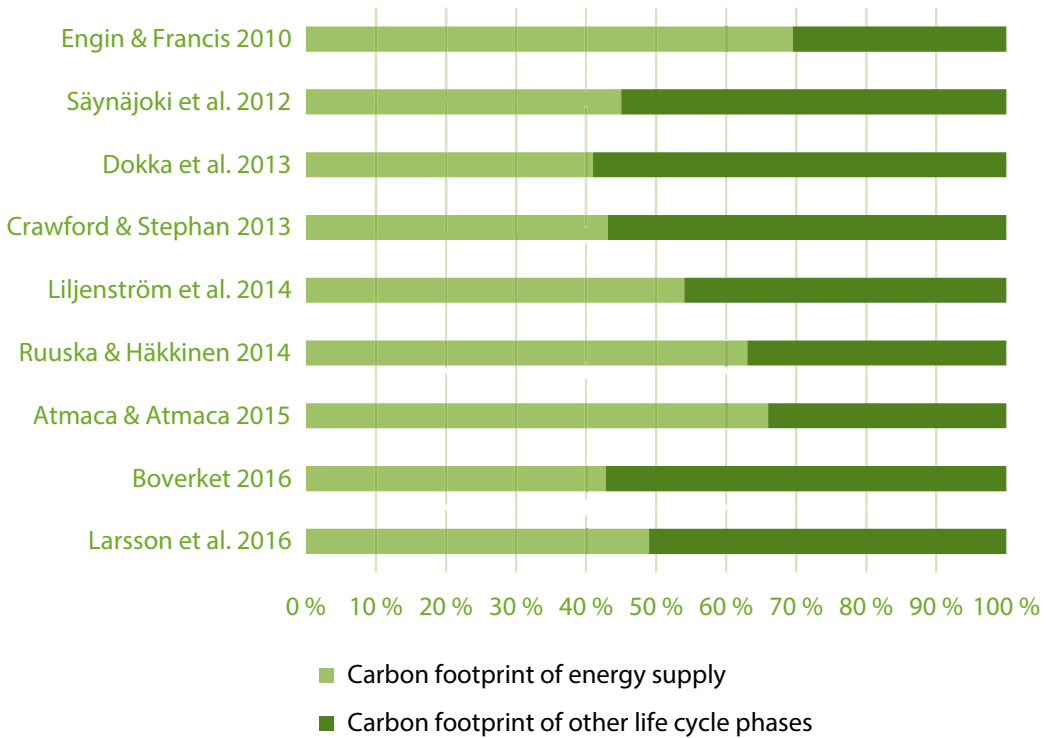


Figure 1. Distribution of a building's life cycle emissions according to international studies. In addition to emissions related to energy supply, a building's life cycle carbon footprint consists of the manufacturing and transport of construction products, construction, renovation and demolition. Studies show that in addition to emissions relating to energy supply, the emissions from other life cycle phases may be significant.

STUDIES ON LIFE CYCLE EMISSIONS FROM CONSTRUCTION:

Engin & Francis (2010). "Zero carbon isn't really zero: Why embodied carbon in materials can't be ignored?" Available at www.di.net/articles/archive/zero-carbon

Sturgis & Roberts (2010). *Redefining Zero*. RICS Research Report, May 2010.

Säynäjoki, Heinonen & Junnila (2012). "A scenario analysis of the life cycle greenhouse gas emissions of a new residential area". *Environmental Research Letters* 7 (3).

Crawford & Stephan (2013). "The Significance of Embodied Energy in Certified Passive Houses". *International Journal of Civil, Environmental, Structural, Construction and Architectural Engineering*. 7 (6): 427–433.

Dokka ym. (2013). *A zero emission concept analysis of a single family house*. Report No 5, SINTEF Academic Press.

Ibn-Mohammed et al. (2013). "Operational vs. embodied emissions in buildings – A review of current trends". *Energy and Buildings* 66: 232–245.

Ruuska & Häkkinen (2014). "The significance of various factors for GHG emissions of buildings". *International Journal of Sustainable Engineering*, 2014.

Liljenström et al. (2014). *Byggproduktionens miljöpåverkan i förhållande till driften. Livscykelberäkning av klimatpåverkan och energianvändning av ett nyproducerat flerbostadshus i betong med lågenergiprofil*. IVL Rapport C32.

Pöyry et al. (2015). "Embodied and construction phase greenhouse gas emissions of a low-energy residential building". *Procedia Economics and Finance* 21: 355–365.

Lützkendorf ym. (2015). "Net-zero buildings: incorporating embodied impacts." *Building Research & Information* 43 (1).

Atmaca & Atmaca (2015). "Life cycle energy and carbon dioxide emissions assessment of two residential buildings in Gaziantep, Turkey". *Energy and Buildings*, 102: 417–431.

Boverket (2016). *Miljö- och klimatanpassade byggregler. Förstudie*. Rapport 2016:14.

Larsson et al. (2016). *Byggandets klimatpåverkan. Livscykelberäkning av klimatpåverkan för ett nyproducerat energieffektivt flerbostadshus med massiv stomme av trä*. Sveriges Byggindustrier 2016.

2 Background

2.1 Objectives of the guide

This guide contains recommendations for procurement criteria that will help to reduce the carbon footprint of new building or renovation projects carried out with public funds. The criteria are largely based on European Commission's recommendations on green public building, and they thus help Finnish actors improve their competence relevant to public design and building procurements in European Union Member States. The updated Act on Public Procurement makes it possible to consider environmental impacts when assessing the economic advantageousness of a procurement. These criteria are recommendations that are not binding to contracting entities or designers. The contracting entity should evaluate on a case-by-case basis which criteria are to be applied to individual procurements.

A low carbon footprint means reducing the greenhouse gas emissions produced over the entire life cycle of a building. There are several greenhouse gases that contribute to global warming. As it would not be practical to refer to the specific volumes of different greenhouse gases produced over the building's life cycle separately, the global warming impacts of the different gases are converted into CO₂ equivalent amounts that correspond to the effects of carbon dioxide (CO₂e).

This guide places particular emphasis on the carbon footprint of construction, as reducing the risk of climate change has rapidly emerged as a central theme in international politics, research and product development.

Efforts to reduce the carbon footprint may be made by improving energy efficiency, selecting low-carbon forms of energy or choosing building materials with as low a carbon footprint as possible that meet their technical and functional requirements. In addition, land use, durability of construction, the building's service life and its need for maintenance and repairs affect its life cycle carbon footprint.

European and international standards are available for assessing the carbon footprint, including EN 15978 for calculating a building's environmental impacts and EN 15804 for preparing environmental declarations for construction products.

2.2 General objectives concerning construction

Construction is directed by many different requirements and objectives. In addition to statutory requirements, they include the contracting entity's functional and technical requirements. Sustainable development objectives may be set from ecological, social and economic viewpoints. While the criteria contained in this guide focus on one impact category of ecological sustainability (climate change), the contracting entity must always set quality requirements that are the most important for the project as a whole.

The importance of the criteria for low carbon footprint in relation to other building requirements and objectives should be assessed case-by-case. The emphasis on a low carbon footprint does not exclude the general or customer-specific requirements of construction. Contracting entities should strive for a low carbon footprint in addition to sustainable and healthy construction, not at their cost, and in compliance with building regulations.

2.3 Interfaces with other guides and recommendations

Both Finnish and European guides have been prepared on green public building procurement. The other key guides relevant to this theme are:

- Ministry of the Environment's guide *Green public building – Procurement guide* (2017)
- European Commission recommendations on procurement criteria of public office buildings (2016)
- European Commission's *Buying green! A handbook on green public procurement* (3rd. edition, 2016)
- European Commission Level(s) recommendations on core indicators of resource efficiency in building (2017)
- RT card 13-11268 Suunnittelu- ja konsultointipalveluiden julkinen hankinta (Public procurement of design and consultancy services. 2017)
- RT card 10-11291 Elinkaarisuunnittelun tehtäväluettelo ELINK18 (Task list for life cycle design. 2018)
- SCI-Network research group's report on innovative public building procurements 2012 (5)

2.4 Effectiveness, feedback and further development

The effectiveness of the criteria presented in this guide on the carbon footprint of construction will be monitored. The Ministry of the Environment will also collect feedback on the use of the criteria and any needs to improve them. Based on evaluations of effectiveness and feedback, the criteria will be developed in cooperation with the stakeholders.

Please send your feedback to: hankintaopas@ym.fi

NOTE:

The contracting entity always has the responsibility to exercise case-by-case discretion when it comes to the use of selected procurement criteria, also regarding the use of the voluntary criteria presented in this guide. These recommendations are intended to support the objective expressed in the updated Act on Public Procurement to enhance the efficient use of public funds while promoting high quality innovative and sustainable procurement.

When using these recommendations for low carbon footprint procurement criteria, it is up to the contracting entity to ensure that the principles to be complied with in public procurement under the relevant legislation are not compromised in individual cases.

3 Criteria for low-carbon building

This chapter provides a concise introduction to the recommendations for criteria and their backgrounds. See Part II for detailed procurement criteria.

3.1 Recommendations for criteria

The criteria for low-carbon building pertain to energy, materials and innovation. In addition, tenderer suitability and costs are assessed. The criteria are applied to different subjects of procurement, ensuring that the carbon footprint of the building produced as a result of the different procurements is cost-optimised as far as possible.

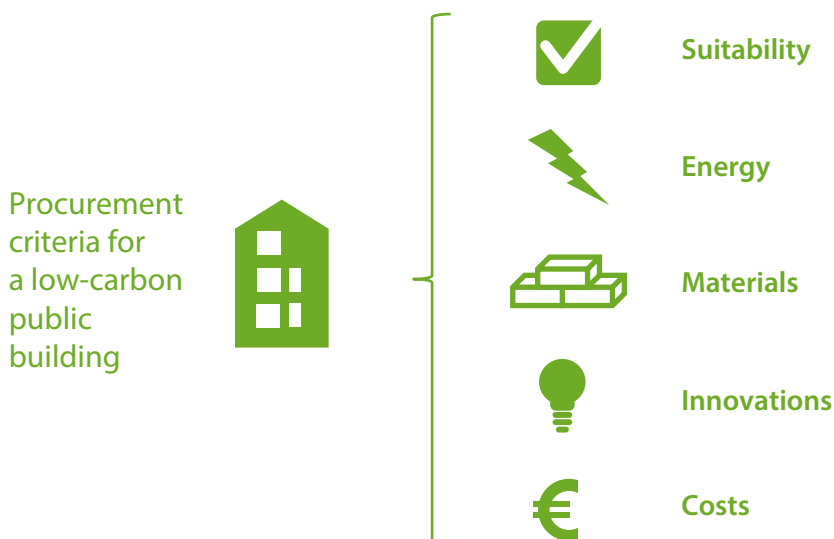


Figure 2. Recommended criteria for low-carbon building.

The criteria are mainly based on the criteria for green public building recommended by the European Commission (6). All Commission recommendations can also be applied to Finnish building procurements. However, the criteria selected for this guide form a simplified and easy-to-follow route to the incremental reduction of the negative environmental impacts of public construction.

The procurement criteria are listed separately for different subjects of procurement. These subjects are design services, building construction contracts, material and equipment procurements as well as integrated Design & Build projects (when design, building work and materials are purchased as a single procurement) and the Design, Build & Operate model (when procurement contains the building as well as its maintenance for a specified period) also known as a Life cycle contract.

Firstly, criteria related to energy or materials are set for the procurement of design services. Other criteria for a low carbon footprint are then applied to the procurement of the building works and materials when the construction contract goes to tender. The criteria for the various procurement phases add up to a low-carbon end result as shown in Figure 3. More resources are usually available for procurements that exceed the EU threshold value than for national procurements. This is why the use of criteria is highly recommended for these projects in particular.

This guide recommends the use of certain criteria as minimum requirements for a procurement, and others as comparison criteria. Depending on the procurement, the criteria may also be applied in other ways. The minimum requirements refer to the minimum requirements associated with the description of the procurement referred to in Chapter 9 of the Act on Public Procurement. Selection criteria refer to the grounds for comparing the economic advantageousness of the price-quality ratio described in section 93 of the Act on Public Procurement.

The criteria are always chosen to fit the subject of the procurement. Consequently, the contracting entity should engage in dialogue with the market in the planning phase of the procurement and identify the criteria that will achieve the highest impact on the building's carbon footprint in each situation.

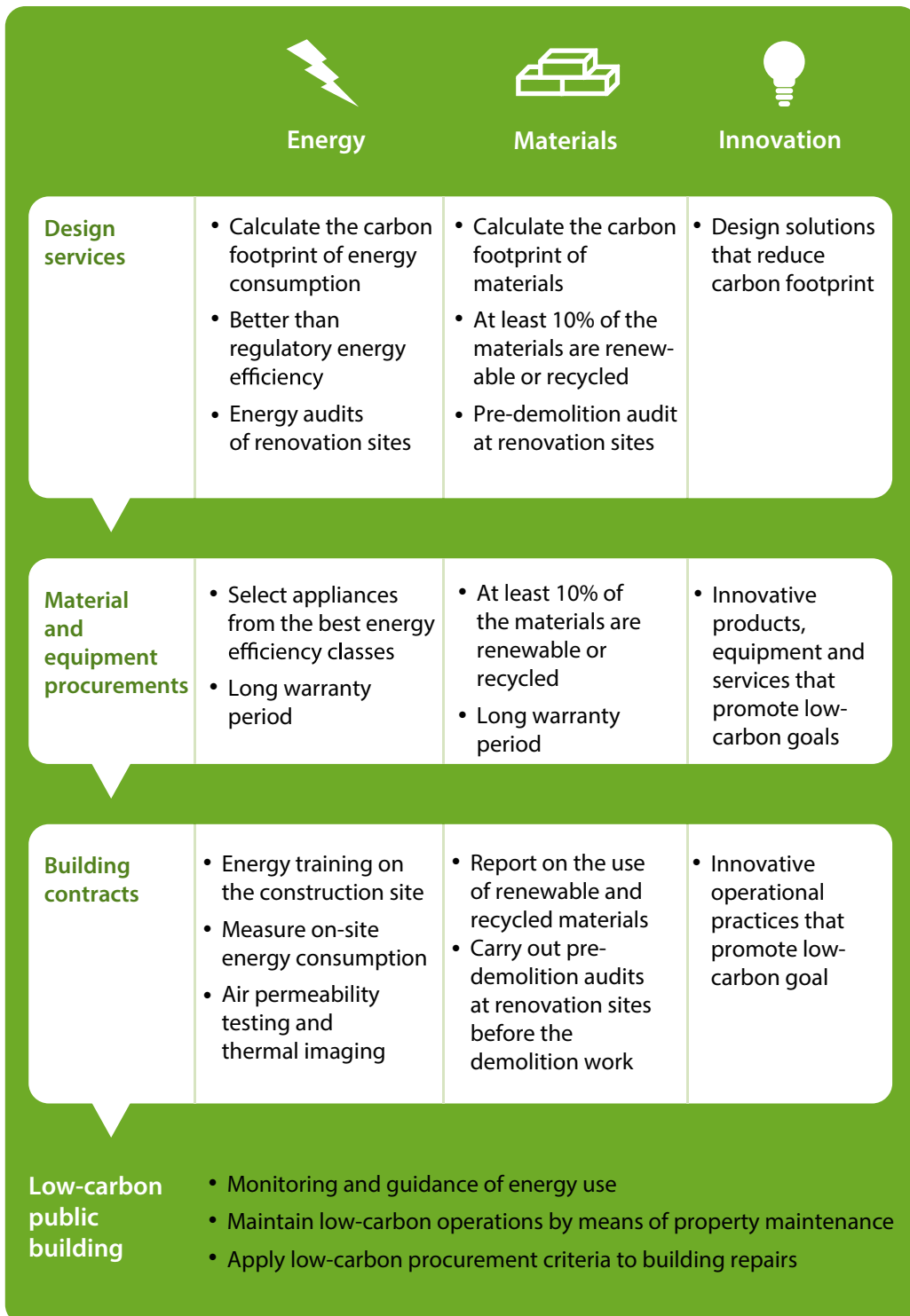


Figure 3. A low-carbon building is the sum of criteria applied in several different phases of the procurement

3.2 Suitability requirements for low-carbon building

3.2.1 Suitability requirements for procurement of design services

The suitability criteria ensure that actors who participate in the tendering process have good capabilities to produce high quality results. When using suitability criteria, the contracting entity should take into account the preconditions for assessing suitability relevant to different procurement forms referred to in Chapter 5 of the Act on Public Procurement.

In the design phase, it is recommended that the suitability requirements target the designers' references. As low-carbon construction is a relatively new standpoint on design, however, it is not sensible to require that the design team has extensive experience or multiple references, for example of calculating a building's carbon footprint. On the other hand, there should be sufficient competency in the design team related to energy efficiency and carbon footprint calculation and expertise in low-carbon building materials and construction methods. This ensures that the minimum requirements set for design are achievable.

3.2.2 Suitability requirements for procurement of building contracts

The recommended suitability requirements for companies offering building contracts are their references of acting as the main contractor and project leader in energy-efficient building projects. In addition, at least in procurements of building contracts that exceed the EU threshold value, it is recommended that the tenderer has a third-party certified environmental management system in use.¹

3.2.3 Suitability requirements for procurement of materials and equipment

The setting of suitability requirements for tenderers is not recommended in the procurement of materials and equipment. Instead, it is recommended to use minimum requirements set for the products and equipment to be procured. These requirements directly and effectively target the subject of the procurement, rather than targeting a wholesaler who does not have a direct impact on the environmental friendliness of the product they sell.

¹ See section 90 of the Act on Public Procurement, Management and quality assurance measures in environmental aspects.

3.3 Low-carbon criteria for energy

3.3.1 Energy efficiency in procurement of design services

The recommended criteria related to energy strive to reduce energy use over the building's life cycle to below the minimum statutory level.

Low-carbon new buildings should be designed to have 10% better energy performance than the regulatory level

When procuring design services, it is recommended that energy-related criteria are targeted at the minimum requirements contained in the description of the procurement which each tender must fulfil. Low-carbon new buildings should be designed to have at least 10% better energy performance than the regulatory level (Ministry of the Environment Decree on the Energy Performance of New Buildings)².

In renovation projects, the building should be designed to have 20% better energy performance than the regulatory level (Ministry of the Environment Decree on Improving the Energy Performance in Renovations and Alterations). In individual renovation cases, the contracting entity may choose to direct this energy performance target to bear on the parts of the building to be renovated, on the net energy use of the building, or on the overall energy use of the building weighted by energy carrier factors (E-value). In addition to these, the performance target applies to improving the energy efficiency of the technical systems of the renovated building.

In renovation projects, the building should be designed to have 20% better energy performance than the regulatory level

In the design phase, it should be noted that under the amended Energy Efficiency Act (1338/2016), central government authorities are only allowed to procure products in the best possible energy efficiency class (7). This should be taken into account for example in the design of building services.

An energy audit should be part of the design in renovation projects, unless such an audit has already been carried out when preparing the procurement. The energy audit provides necessary information for the design work, for example on the building's energy consumption and structural energy performance. The reporting instructions prepared by Motiva (8), for example, can be followed when conducting an energy audit.

3.3.2 Energy efficiency in procurement of building contracts

The designed energy performance is realized in the building contract phase. Therefore minimum requirements and selection criteria for contracts are recommended that provide

² Decrees on the energy performance of buildings entered into force at the beginning of 2018.

the means to achieve the designed energy performance as far as possible. An energy simulation model can be updated with the actual solutions and measured values to verify if the building reaches the designed energy performance. The contracting entity may include incentives or penalties that support the achievement of these objectives in the contract.

On-site energy consumption is measured, and emissions from energy consumption are calculated

The minimum requirement is that on-site energy consumption is measured, and that based on this measured consumption the CO₂e emissions from energy consumption are calculated and reported. No threshold values are proposed for site energy consumption. However, the aim is to improve energy efficient building practices by measuring and reporting.

In addition, the organisation of energy efficiency training for the staff on building sites is recommended. For example, this training may be carried out using the materials developed in the European BUILD UP Skills project (9). Training can help to improve the professional skills needed to implement nearly zero-energy buildings and thus promote good quality in the construction of the building.

The minimum requirements of a low-carbon public building project include air permeability measurement and thermal imaging. They help to verify that the targets for construction quality factors have been achieved. The incentives and penalties to be used and any corrective actions that may be indicated by the measurements must be defined in the contract negotiations.

3.3.3 Energy efficiency in procurement of materials and equipment

In purchases of equipment related to energy efficiency, it is recommended that equipment is selected from the two best energy rating classes. However, under the Energy Efficiency Act, any equipment procured by central government authorities must always be from the highest energy efficiency class.

Certain building service equipment have energy labels, including lamps and luminaires and some ventilation units or air conditioners. Many household appliances have energy labels, such as fridges, ovens and hobs, washing machines and cooker hoods. The choice of household appliances can be influenced in public housing construction projects.

If there is no energy label available for the appliances in question, the contracting entity should make use of the energy efficiency reference values set in the implementing regulation of the Ecodesign Directive, and select an energy efficient option as referred to in section 29 b of the amended Energy Efficiency Act.

3.4 Low-carbon criteria for materials

3.4.1 Assessment of materials in the design phase

The influence of material choices on a building's carbon footprint can be effectively steered in the design phase. For this reason, it is recommended to include the calculations of building materials' life cycle carbon footprints in the design services. Based on these calculations, the most cost-optimal way of reducing the carbon footprint of building materials can be identified in the design phase. For a more detailed description of the calculation methods, see Chapter 5.

Design services should include a calculation of building materials' life cycle carbon footprint

In addition to an energy audit, it is recommended that a pre-demolition audit is included in the design of renovation projects. A pre-demolition audit is a procedure taken before initiating demolition work, in order to identify possibilities to reuse building components or recycle their materials.

It is recommended that products containing renewable or recycled materials should be used in the design of a low-carbon building. The proportion of these materials out of the total weight of all building and site filling materials should be a minimum of 10%³. For more detailed instructions for assessing this amount, see Chapter 5.

By using renewable (e.g. wood) and recycled materials (e.g. recycled steel, concrete, glass, bitumen or recycled soil materials), the use of raw materials that cause a greater environmental impact can be avoided, and a transition towards circular economy in the construction sector can be supported. However, it must be ascertained in the design phase that the minimum volume of renewable and recycled materials can be realised cost-effectively and meet functional and technical requirements. Calculations should also be produced to ensure that the use of renewable and recycled materials supports the building's energy performance and reduces its life cycle carbon footprint.

3.4.2 Materials in the contract phase

In the contract phase, it is essential to construct the building with products that meet the objectives set for the materials and structures in the design phase as far as possible.

³ According to the European Commission's green public building recommendations (10, p. 81), 10% of recycled materials can be used in the majority of building projects with very little extra effort. The Commission thus recommends that the share of recycled materials in public building projects be increased to between 15 and 30%. The Ministry of the Environment's guide sets the moderate minimum target of 10%, with the possibility of awarding additional points to tenderers who are able to commit to a higher rate.

If the contract includes procuring building materials, it is recommended that minimum requirements applicable to material procurements are applied to the contract.

To achieve the minimum volumes of renewable and recycled materials shown in the building design, the total weight of renewable and recycled building materials in proportion to the total weight of other building materials must be reported in the contract phase.

Renovation contracts often include demolition work. It is recommended that a pre-demolition audit should be carried out. The materials to be demolished should be reported following the List of Waste (11) to facilitate their recycling and further processing.

3.4.3 Material procurements

The proportion of recycled and renewable raw materials should be at least 10% of the weight of all materials used in the building project.

When procuring materials and construction products, it should be ensured that the minimum quantities of renewable and recycled materials set in the design phase are realised. It is recommended that the proportion of recycled and renewable raw materials should be at least 10% of the weight of all materials used in the building project, calculated according to the instructions given in Chapter 5. When procuring products, their responsible sourcing, end of the life cycle disposal and recyclability should be taken into consideration. The materials should be easy to demount and reuse.

3.5 Low-carbon innovations as selection criteria

Criteria for innovation provide incentives to make completely new proposals to reduce the carbon footprint of the built environment. At the same time, product development in the design and construction sectors is encouraged. Innovations are possible in all phases of the procurement. Typical features of procurements aiming for innovation are performance-based criteria, proactive dialogue with the market, procurement procedures that recognize innovative solutions, and new contract model types.

The use of comparison criteria to promote low-carbon innovations in procurements will not directly guarantee that innovations will be available. However, the criteria are a good way of comparing the carbon footprint results produced by innovative solutions. Making comparisons between the tendered innovations has been facilitated by accurately defining the method used to prove an innovation's impacts on the carbon footprint (see Chapter 5).

Innovations may include multi-objective building optimisation in the design phase (12) carried out to assess low-carbon building solutions, the application of a weighted form factor in the architectural massing, or the use of renewable fuel in site machinery. For example, a low carbon footprint can be achieved by selecting low-carbon materials or energy, but just as well by designing a building where materials can be saved, or which has a good structural energy performance.

The impacts of innovations can be assessed following the instructions in Chapter 5. The call for tenders should specify how the selection criteria will be weighted in proportion to the tender price.

3.6 Costs

In addition to the procurement price, the building's life cycle costs or price-quality ratio can be taken into account in procurements.

When examining the costs, particular attention should be focused on the building's life cycle costs, which include repairs, adaptability and service needs while operational. These costs can be assessed over the building's full service life. In addition, the life cycle costs associated with equipment related to energy efficiency can be assessed, for example.

4 Use of criteria

For a more detailed description of how different criteria are applied in different phases of the procurement, see the Ministry of the Environment's guide 'Green Public Building –Procurement Guide' (2017). This Chapter sums up the recommendations relevant to reducing the carbon footprint of buildings.

4.1 Carbon footprint in the different phases of a procurement

Low-carbon building criteria can be used in different phases of a green public building project as shown in Figure 4: in the needs analysis carried out when preparing the procurement, as suitability requirements for the procurement, in descriptions of procurement, in the selection of the most economically advantageous tender, as contract terms, and during the commissioning phase.

The planning phase of the procurement is vital for the outcome. The environmental objectives of the project are crystallised in the description of the procurement, in comparison criteria for economic advantageousness and in tenderer suitability requirements. This is why sufficient time should be allowed for this procurement phase, and appropriate expertise should be called on.

The procurement procedure selected in the planning phase affects the use of criteria. Some of the potential procurement procedures are rarely used in construction, such as online auctions or dynamic purchasing systems. The typical choices are an open or a closed procedure, negotiated procedures or competitions. When aiming for new and innovative solutions, a design competition is often an effective method.

The criteria in this guide have been selected ensuring that they can mainly be verified on the basis of European standards. Additionally, many of them are relevant to the criteria for voluntary environmental certification systems commonly used in the construction sector. See section 5.7 of this guide for more information on the relationship between the criteria for low-carbon building and these typical environmental certificate criteria.

Sufficient dialogue with the market is important in low-carbon building. This makes it possible to survey a range of technical solutions suitable for the procurement and select an appropriate level of required performance before the call for tenders is published. It is vital that the criteria have an effective influence on environmental impacts. However, it is equally important that the criteria and the level of difficulty they involve are proportionate to the subject of the procurement.

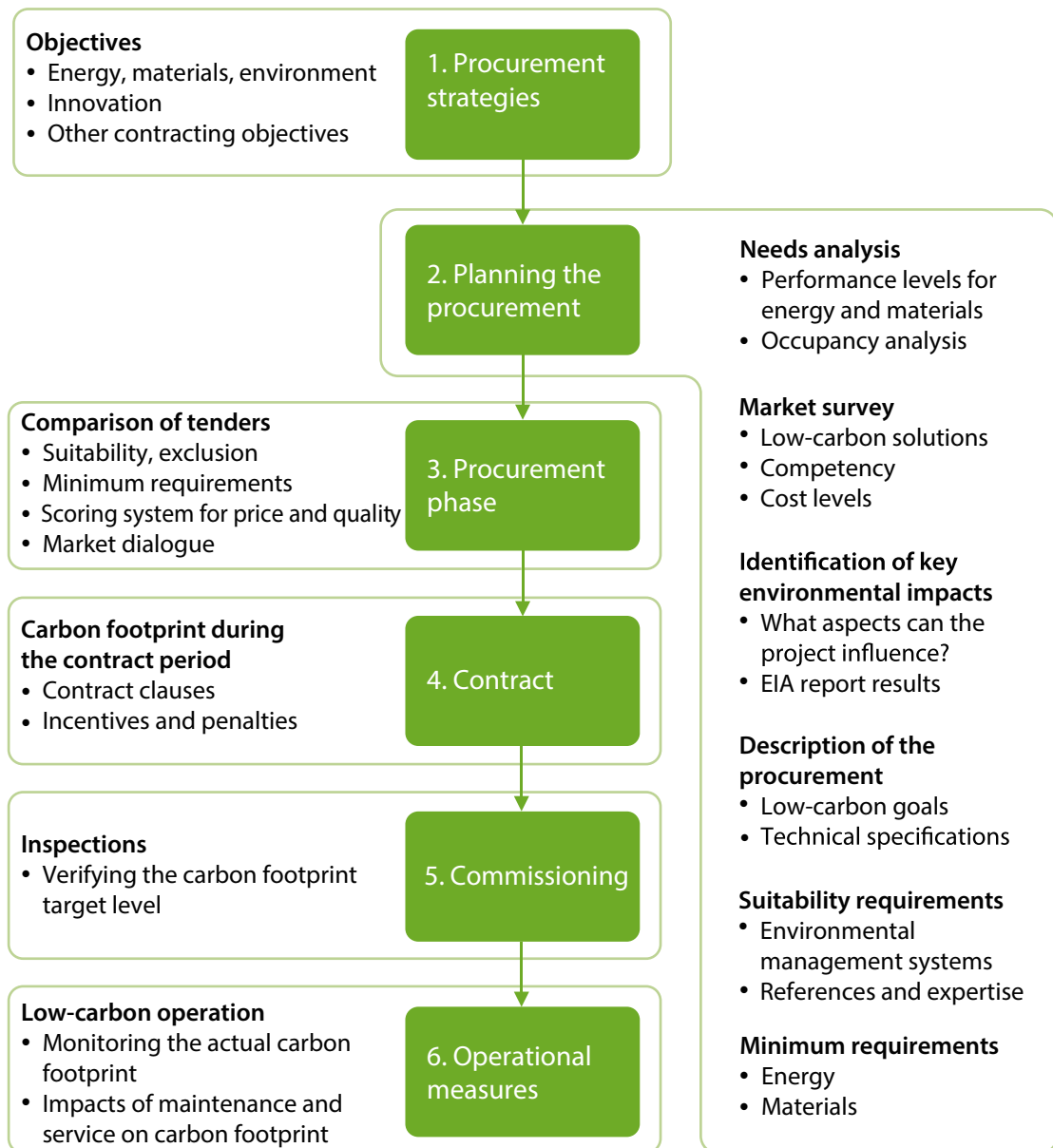


Figure 4. Use of criteria for low-carbon building in different phases of the procurement process.

4.2 Selecting the most economically advantageous tender from the perspective of low-carbon building

The contracting entity should select the most economically advantageous tender. Under the Act on Public Procurement, this may be the tender at the lowest price, at the most affordable cost, or with the best price-quality ratio for the contracting entity. The decision on the method of establishing economic advantageousness is made by the contracting entity.

If the lowest price or most affordable cost is selected as the criterion for economic advantageousness, the use of procurement criteria for low-carbon building will be restricted to the suitability requirements and the description of the procurement. In these cases, however, environmental targets can efficiently be included in the description of the procurement and minimum requirements.

If the tender with the best price-quality ratio is selected, the tenders can be compared in a versatile manner, applying selection criteria for low-carbon building. In this case, the contracting entity should specify the weightings of the selection criteria and the method used for comparing tenders. See Figure 5 for alternative ways of assessing economic advantageousness and applying the criteria for low-carbon construction in the assessment.

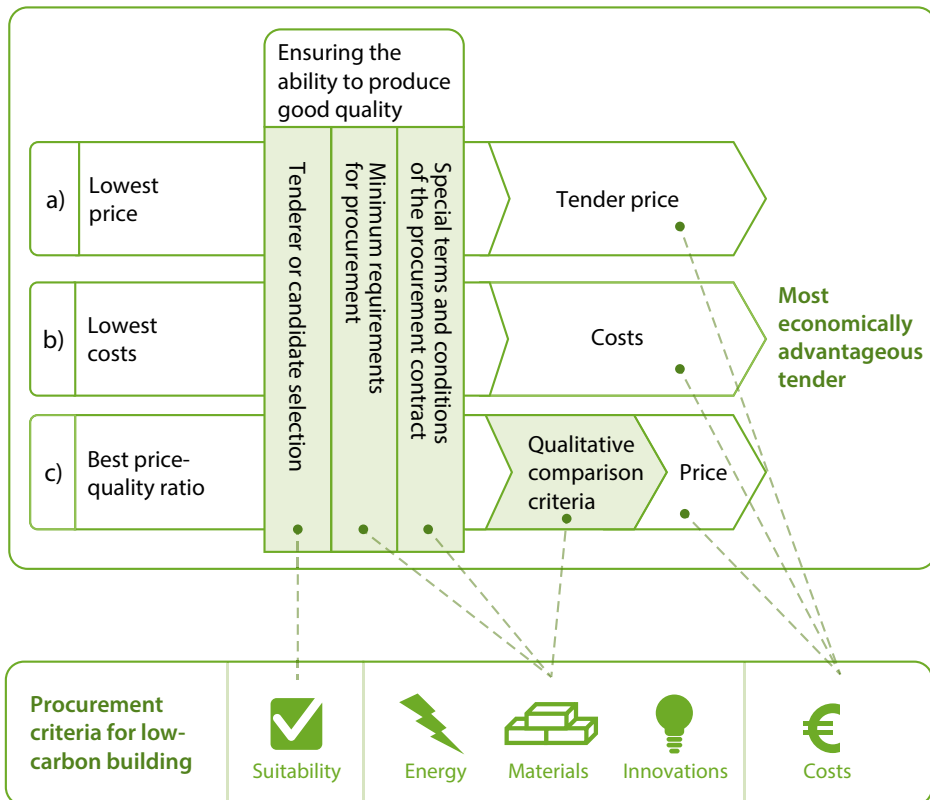


Figure 5. Using the criteria for low-carbon building when selecting the most economically advantageous tender.

PART II

RECOMMENDED CRITERIA

PROCUREMENT CRITERIA FOR DESIGN SERVICES

- 1a. Designing a low-carbon new building
- 1b. Designing low-carbon renovations

PROCUREMENT CRITERIA FOR BUILDING CONTRACTS

- 2a. Low-carbon new building contract
- 2b. Low-carbon renovation contracts

PROCUREMENT CRITERIA FOR MATERIALS AND EQUIPMENT

- 3. Material and equipment procurements for low-carbon new buildings and renovations

PROCUREMENT CRITERIA FOR OTHER CONTRACT AND IMPLEMENTATION FORMS

- 4a. Design & Build contracts in low-carbon new building and renovation projects
- 4b. Design, Build & Operate model in low-carbon building

Criteria 1a. Designing a low-carbon new building

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> The tenderer should have the number of references required by the contracting entity relating to designing energy efficient and low-carbon buildings. The design team should have expertise in energy efficient design and carbon footprint calculation. Verification: The tenderer's list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy	<ul style="list-style-type: none"> The building is designed to have an energy performance at minimum 10% better than the regulatory level (Ministry of the Environment Decree on the Energy Performance of a New Building). The equipment for the building is selected in the two highest energy efficiency classes or, in procurements by central government authorities, the best energy efficiency class. The design work includes a calculation of emissions from energy consumption while operational as part of the building's life cycle carbon footprint.
Materials	<ul style="list-style-type: none"> The structures and site fillings are designed ensuring that at minimum 10% of their weight is made up from low-carbon recycled or renewable materials, assessed following the instructions given in Chapter 5. The design work includes carbon footprint calculations for massing alternatives and main structure types as well as combining this data with the carbon footprint from energy consumption. The factors of the carbon footprint are reported to the contracting entity to facilitate the selection of a cost-optimised alternative. The calculations are produced in compliance with standard EN 15978 over the entire life cycle following the instructions in Chapter 5.
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Innovations and additional points	<ul style="list-style-type: none"> The tenderer may propose innovative design methods that can minimise and cost-optimize the building's carbon footprint. The lower carbon footprint achieved through innovation is assessed following the calculation instructions given in Chapter 5. Additional points are awarded if the designer updates the life cycle carbon footprint calculation to correspond with the actual figures realized at handover.
Other quality factors required by the contracting entity	
Tender price	

Criteria 1b. Designing low-carbon renovations

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> The tenderer should have the number of references required by the contracting entity relating to improving the building's energy performance or reducing its carbon footprint through renovation projects. The design team should have expertise in energy efficient design and carbon footprint calculation. Verification: The tenderer's list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy	<ul style="list-style-type: none"> In a renovation project, the building is designed to have an energy performance at minimum 20% better than the regulatory level (Ministry of the Environment Decree on Improving a Building's Energy Performance in Renovations and Alterations). The equipment for the building is selected in the two highest energy efficiency classes or, in procurements by central government authorities, the best energy efficiency class. The design work includes a calculation of emissions from operational energy consumption after renovations as part of the building's life cycle carbon footprint. The design work includes an energy audit carried out before the renovations, if this audit has not been conducted when preparing the procurement. The audit includes an air permeability measurement of the building to be renovated in compliance with standard EN ISO 9972 and thermal imaging in compliance with standard EN 13187
Materials	<ul style="list-style-type: none"> The design work includes a pre-demolition audit of parts to be demolished, in which components that can be reused and recycled are reported, and the volume of wastes to be generated is assessed based on the List of Waste categories (Government Decree on Wastes 179/2012, Annex 4). New structures and site fillings are designed ensuring that at minimum 10% of their weight is made up from low-carbon recycled or renewable materials, assessed following the instructions given in Chapter 5. The design work includes carbon footprint calculations for massing alternatives and the main structure types of new components as well as combining this data with the carbon footprint from energy consumption. The components of the carbon footprint are reported to the contracting entity to facilitate the selection of a cost-optimised alternative. The calculations are produced in compliance with standard EN 15978 over the entire life cycle following the instructions in Chapter 5.
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Innovations and additional points	<ul style="list-style-type: none"> The tenderer may propose innovative design methods that can minimise and cost-optimize the building's carbon footprint. The lower carbon footprint achieved through innovation is assessed following the calculation instructions given in Chapter 5. Additional points are awarded if the designer updates the life cycle carbon footprint calculation to correspond with the actual figures realized at handover.
Other quality factors required by the contracting entity	
Tender price	

Criteria 2a. Low-carbon new building contracts

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> • In a procurement exceeding the EU threshold value, a company submitting a tender should have a certified environmental management system. • The tenderer should have the number of references required by the contracting entity relating to the building of energy efficient and low-carbon buildings. • Verification: The tenderer's list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy	<ul style="list-style-type: none"> • Electricity and district heat consumption on site and, in procurements exceeding the EU threshold value, fuel consumption of machinery and equipment on site are measured and their carbon footprint is reported following the instructions given in Chapter 5. • Training related to energy efficiency is organised on site, for example using the BUILD UP Skills material or similar. • Before handover, the building's air permeability is measured in compliance with standard EN ISO 9972, and thermal imaging is carried out in compliance with standard EN 13187. Incentives, penalties and any corrective measures needed are specified by the contracting entity. • In procurements of energy-consuming equipment, the procurement criteria for low-carbon construction products and equipment are complied with (criteria 3).
Materials	<ul style="list-style-type: none"> • In procurements of building materials and products, the procurement criteria for low-carbon construction products and equipment are complied with (criteria 3). • The total quantities of renewable or recycled materials indicated in the designs are included in the material procurements. Once the building has been completed, the actual volumes of recycled or renewable materials are reported.
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Innovations and additional points	<ul style="list-style-type: none"> • The tenderer may propose innovative implementation methods that reduce the life cycle carbon footprint of the site or the building. Additional points are awarded for reducing the carbon footprint in proportion to the reference level following the instructions in Chapter 5. • Additional points may be awarded for a higher percentage of recycled or renewable materials than the rate indicated in the plans, if this helps to reduce the building's carbon footprint.
Other quality factors required by the contracting entity	
Tender price	

Criteria 2b. Low-carbon renovation contracts

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> • In a procurement exceeding the EU threshold value, a company submitting a tender should have a certified environmental management system. • The tenderer should have the number of references required by the contracting entity relating to improving the building's energy performance in renovation projects. • Verification: The tenderer's list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy	<ul style="list-style-type: none"> • The electricity and district heat consumption on site and, in procurements exceeding the EU threshold value, fuel consumption of machinery and equipment on site are measured and their carbon footprint is reported following the instructions given in Chapter 5. • Training related to energy efficiency is organised on site, for example using the BUILD UP Skills material or similar. • Before handover, air permeability of parts of the building affected by the renovation are measured in compliance with standard EN ISO 9972, and a thermal imaging is carried out in compliance with standard EN 13187. Incentives, penalties and any corrective measures needed are specified by the contracting entity. • In procurements of energy-consuming equipment, the procurement criteria for low-carbon construction products and equipment are complied with (criteria 3).
Materials	<ul style="list-style-type: none"> • In procurements of building materials and products, the procurement criteria for low-carbon construction products and equipment are complied with (criteria 3). • The total quantities of recycled or renewable materials indicated in the designs are included in the material procurements. Once the renovations have been completed, the actual quantities of recycled and renewable materials are reported. • Before demolition, a pre-demolition audit is conducted, in which the possibilities of recycling or reusing the materials to be demolished are identified. A report on the pre-demolition is produced. • The weight of the parts of the building to be demolished will be estimated and reported in a waste movement document following the classification in the waste list (Government decree on wastes 179/2012, Annex 4).
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Innovations and additional points	<ul style="list-style-type: none"> • The tenderer may propose innovative implementation methods that reduce the life cycle carbon footprint of the site or the building. Additional points are awarded for reducing the carbon footprint in proportion to the reference level following the instructions in Chapter 5. • Additional points may be awarded for a higher percentage of recycled or renewable materials than the rate indicated in the designs, if this helps to reduce the building's carbon footprint.
Other quality factors required by the contracting entity	
Tender price	

Criteria 3. Material and equipment procurements for low-carbon new buildings and renovations

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> The application of suitability requirements to procurements of materials and equipment is not recommended.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy	<ul style="list-style-type: none"> The appliances to be procured are to be selected in the two highest energy label classes. In all procurements by the central government authorities, equipment related to energy efficiency must be selected from the highest energy efficiency class. If a product does not have an energy efficiency class, the reference values of its energy efficiency must comply with the European Commission's product-specific regulation applicable to ecodesign (see the Act amending the Energy Efficiency Act 1338/2016, section 29b).
Materials	<ul style="list-style-type: none"> The total quantities of renewable or recycled materials indicated in the designs are included in the material procurements. Once the building has been completed, the actual quantities of recycled or renewable materials are reported. At minimum 10% of the total weight of all building and filling materials of the procurement is made up of recycled or renewable materials, assessed following the instructions given in Chapter 5. Verification is based on the contract-phase bill of quantities.
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Energy and materials	<ul style="list-style-type: none"> Warranty period: Additional points are awarded in proportion to the length of the warranty period. Additional points may be awarded for a larger percentage of renewable or recycled materials than the rate shown in the designs.
Innovations	<ul style="list-style-type: none"> The tenderer may propose innovative solutions that reduce the life cycle carbon footprint of the building, equipment or materials. Additional points are awarded for reducing the carbon footprint relative to the reference level following the instructions in Chapter 5.
Other quality factors required by the contracting entity	
Tender price	

Criteria 4a. Design & Build contracts in low-carbon new building and renovation projects

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> • In a procurement exceeding the EU threshold value, a company submitting a tender should have a certified environmental management system. • The tenderer should have the number of references required by the contracting entity relating to the building of energy efficient and low-carbon buildings. • The suitability requirements for design services are applied to these services (criteria 1a or 1b). • Verification: The tenderer’s list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy Materials	<ul style="list-style-type: none"> • Minimum requirements for design services (criteria 1a or 1b). • Minimum requirements for building contracts (criteria 2a or 2b). • Minimum requirements for building materials and products (criteria 3).
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Energy Materials Innovations	<ul style="list-style-type: none"> • Selection criteria for design services (criteria 1a or 1b). • Selection criteria for building contracts (criteria 2a or 2b). • Selection criteria for building materials and products (criteria 3).
Other quality factors required by the contracting entity	
Tender price	

Criteria 4b. Design, Build & Operate model in low-carbon building

SUITABILITY REQUIREMENTS APPLICABLE TO ALL TENDERERS	
Suitability	<ul style="list-style-type: none"> • In procurements exceeding the EU threshold value, the company supplying the life cycle service should have a certified environmental management system. • In procurements exceeding the EU threshold value, the company tendering for the building contract should have a certified environmental management system. • In procurements exceeding the EU threshold value, companies offering building maintenance should have a certified quality management system for building maintenance. • The companies submitting tenders should have the number of references required by the contracting entity relating to the building of energy efficient and low-carbon buildings. • The suitability requirements for design services are applied to these services (1a or 1b). • Verification: The tenderer's list of references over the period specified by the contracting entity, taking into account the principles of proportionality and non-discrimination.
MINIMUM REQUIREMENTS FOR THE SUBJECT OF THE PROCUREMENT THAT ALL TENDERS MUST FULFIL	
Energy Materials	<ul style="list-style-type: none"> • Minimum requirements for design services (criteria 1a or 1b), if design is included in the procurement. • Minimum requirements for building contracts (criteria 2a or 2b). • Minimum requirements for building materials and products (criteria 3).
SELECTION CRITERIA FOR WHICH ADDITIONAL POINTS WILL BE AWARDED AS SPECIFIED BY THE CONTRACTING ENTITY	
Energy Materials Innovations	<ul style="list-style-type: none"> • Selection criteria for design services (criteria 1a or 1b). • Selection criteria for building contracts (criteria 2a or 2b). • Selection criteria for building materials and products (criteria 3).
Other quality factors required by the contracting entity	
Tender price	

PART III

INSTRUCTIONS FOR APPLYING THE CRITERIA

5 Instructions

These instructions present in more detail the comparison and calculation methods required in the recommended criteria for low-carbon public building procurements. They include:

- Carbon footprint calculation
- Life cycle cost calculation
- Measuring the electricity, fuel and district heat consumption of the construction site and calculation of emissions
- Determining the proportion of renewable and recycled materials
- Verifying innovativeness
- Correspondence of the criteria to the European Commission's Green Public Building criteria
- Correspondence of the criteria to the most common environmental certification systems for buildings

The instructions were prepared for experts who assess the environmental impacts of public building projects. For this reason, the instructions refer to standards and widely used assessment and calculation methods without providing detailed descriptions of them.

5.1 Carbon footprint calculation

In this context, carbon footprint refers to the emissions caused over the building's life cycle measured as carbon dioxide equivalent (CO₂e). European standards EN 15804 (construction products) and EN 15978 (buildings) as well as the more specific rules applicable to product categories (PCR) must be complied with in the calculations. These standards also explain the division of a building's and a construction product's life cycle into modules A to D, to which reference is made below.

It is recommended to use the Green Building Council Finland's Calculation Guide: Life-cycle Carbon Footprint (13) with the following additions:

- Unless otherwise agreed in an individual project, it is recommended that 50 years should be used as the calculated building life cycle, which is generally used in life cycle assessments.

- Input data of the calculation
 - The carbon footprint from energy consumption should be calculated following GBC Finland's guidelines.
 - For the calculation of the life cycle carbon footprint for materials, it is recommended to primarily use data from environmental product declarations prepared and verified in compliance with the EN 15804 standard, and only use generic databases as a secondary source.
 - If environmental product declarations are used as input data in the calculations, they must cover the life cycle phases that the calculation concerns.
 - The database should be selected individually for each project. If the calculation is to be used for comparing different options, the same database and definition of scope should be used in all calculations.

- Calculation delimitations, scenarios and allocations
 - In national procurement projects, the calculation can be simplified following section 4.1 of GBC Finland's Life-cycle Carbon Footprint Calculation Guide. When a building contract exceeds the EU threshold value, the calculation should be based on accurate estimation, at least regarding transport distances (life cycle module A4).
 - All scenarios to be used will be defined with the contracting entity, so that they correspond to the intended use of the building as realistically as possible.
 - Physical allocation (based on the dry weights of products) will be used to evaluate manufacturing phase emissions. Economic allocations should be avoided, due to the fluctuation of price levels.

- Impacts external to the life cycle system boundary
 - Any benefits obtained in module D of a building's life cycle can be presented as part of "low-carbon innovations".
 - The benefits may include energy recovery, substitution of fossil energy forms, substitution of virgin raw materials enabled by recycled raw materials, substitution of non-renewable raw materials etc. The impacts of the shown benefits on the building's life cycle carbon footprint must be demonstrated by calculations.
 - The scenario used as the reference level for module D calculations should be described transparently, and it should represent a typical reference level.

- Consideration of materials' special features
 - Concrete carbonation (if included in the calculations)
 - Calculation method: Standard EN 16757.
 - The carbon footprint of materials and works for planned repairs of carbonation should also be accounted for in the calculation of the carbonation of concrete structures in the building use phase (module B1).
 - Carbon stock in timber (if included in the calculations)
 - Calculation method: standard EN 16485.
 - The organic carbon stock can be included in the calculation as a negative figure only if the timber originated from a sustainably managed forest (see section 6.3.4.2 of standard EN 16485, example 1).
 - The carbon stock in a timber product will be released at the latest in life cycle module C.
 - According to the standard, the organic carbon stock should be reported separately as additional information, allowing it to be deducted from the life cycle carbon footprint at the latest when the building is demolished.

5.2 Life cycle costs

In this context, life cycle costs refer to the costs incurred for the building over its life cycle. The calculation of these costs is based on European standard EN 16627.

It is recommended that the calculation is carried out applying GBC Finland's Calculation Guide for Life-Cycle Cost (14) with the following additions:

- Unless otherwise agreed in an individual project, it is recommended that 50 years should be used as the calculated building life cycle, which is generally used in life cycle assessments.
- It is recommended that the costs related to purchasing or renting the site are excluded from the life cycle costing, unless the nature of the life cycle assessment so requires. For example, the costs related to the site may be relevant to the building procurement when the building could be located on alternative sites, or when a site owned by the contracting entity has an alternative possible use that would generate revenue.
- Unless otherwise agreed in an individual project, the 3% interest rate referred to in the calculation instructions of cost-optimised levels of energy efficiency in Directive 2010/31/EU (15) may be used.
- The life cycle costs of external negative impacts can only be included in the calculations if their monetary value can be determined as described in section 95 of the Act on Public Procurement.

- Electricity and energy prices should be based on current regional or national levels obtained from statistics.

5.3 Measuring a site's electricity, fuel and district heat consumption and emission calculations

The consumption of electricity and any district heat used is measured and emission are calculated for all building contracts. In addition, in building procurements exceeding the EU threshold value, emissions from fuels used on site should be included.

5.3.1 Electricity

- It is recommended that the on-site electricity consumption is calculated based on electricity bills as a total for the period during which the site has been operational until the building is handed over, unless the contracting entity requires reporting for any other intervals.
- The emissions related to the electricity consumed on the site should be calculated using emission coefficients obtained from the electricity supplier. If these are not in use, the emissions for the years in question should be calculated based on the average emission coefficient for Finnish electricity production. If the calculation is made before the site phase commences and the construction year is not yet known, then the most recently available statistical data should be used for the emissions calculation.
- If the site produces renewable electricity, its measured amount should be deducted from the electricity used for the site.
- The electricity consumed by machines, equipment and plant on the site as well as by temporary site facilities should be included in the site's electricity consumption. Off-site electricity consumption, including recharging batteries, is not included.

5.3.2 District heating and cooling

- The consumption of any district heating and cooling on the site will be reported based on measurements as a total amount for the period during which the site has been operational until the building is handed over, unless the contracting entity requires reporting for any other intervals.
- The emissions related to district heating and cooling will be calculated and reported using an emission coefficient obtained from the regional district heating company.

5.3.3 Fuels

- Fuel consumption on site is reported by fuel types as a total volume for the period during which the site has been operational until the building is handed over, unless the contracting entity requires reporting for any other intervals.
- The fuel consumption may be estimated, for example based on the operating hours of machinery and equipment. The consumption should be reported both in litres and as CO₂e emissions. The emissions are calculated based on the coefficients given by the manufacturers of the fuels in use. If this data is not available, information in Finnish databases can be used for calculating the emissions.
- All machinery and equipment that consume fuel on the site will be included in the fuel consumption. It is recommended that the site personnel transportation or the fuel consumption of vehicles delivering goods to the site during the inbound journey, unloading, loading or return journey will not be included

5.4 Assessing the proportion of recycled or renewable materials

When designing the structural types and fill materials, a preliminary plan is to be produced regarding the quantities of renewable and recycled materials. Procurements are made on the basis of this plan. When procuring materials, however, there may be differences between the availability or cost-optimisation of certain products or materials. This is why discretion should be allowed regarding the procurement of materials in the contract and procurement phase, provided that the minimum amount of recycled or renewable materials required for the project as a whole is not reduced.

- Materials that fulfil the criteria are renewable and recycled materials, materials from industrial residue streams as well as re-used products or building components.
- The material weights should be calculated as dry weights (moisture content 0%).
- The required proportion is calculated as the total of all the material flows of the building project. If the materials are procured in several batches, the contracting entity should ensure that the overall target is reached. If the material is both recycled and renewable (for instance, thermal insulation made from recycled newspaper, or recycled wood chippings used as covering for planting), it is only included in one of these categories, not both.
- In addition to the weight of construction products, filling materials as well as organic growth mediums and covering materials used in landscaping will also be included in the amount. Vegetation to be planted is not included in renewable materials, even if it were used as a green surface on building roofs or walls.
- Renewable materials should originate from sustainable and responsible sources. This is verified as specified by the contracting entity.

- The health aspects, safety and suitability of recycled materials should be verified individually in each case.
- The reuse of construction products or components will not include materials, products or components found in a building to be repaired, or in the design area that will stay in place during the building works, or which are not affected by the building measures.
 - Example: The structures that remain in place in a building to be renovated are not included.
 - Example: If the internal doors of a building to be renovated are detached, repaired and reused in the same building, they may be included.
 - Example: If the windows, bricks or plumbing fixtures of a building to be renovated are reused on a different site, their share will not be included in the building project under scrutiny.

5.5 Assessing innovativeness

The procurement criteria allow for 'innovative' methods to reduce the building's life cycle carbon footprint. The definition of innovativeness is not specified, and so companies are free to propose their own solutions. If the tenderer proposes the use of an innovative method, a calculation should be attached to the tender to show how much CO₂e emissions are reduced by these innovative methods when compared to a conventional solution.

Verification should be carried out as follows:

- The calculation method is based on standard EN 15978 at the building's life cycle level, and on standard EN 15804 or the product category rule complementing the standard at the construction product level.
- The calculation should show the reduction in the building's life cycle carbon footprint achieved by using the innovation. The calculation should also include the potential impacts of the innovation that increase the carbon footprint, including the product's shorter technical service life or greater emissions from waste management.
- At the minimum, the comparison report should show:
 - The scope, scenarios and information sources of the calculation
 - A description and the emissions of the conventional solution
 - A description and the emissions of the innovative solution
 - The difference between the innovative and conventional solutions in CO₂ equivalent
- A conventional solution refers to a service or a product in general use in the Finnish market. The same variables should be used in the comparison. If scenarios are used in the comparison, they should be transparently described.

5.6 Correspondence of the criteria to the European Commission's Green Public Procurement criteria for buildings

The criteria in this guide have been selected ensuring that they can be used with reference to European standards. Table 1 describes the correspondence between the criteria for low-carbon building and the Commission's Green Public Procurement criteria for buildings, as well as key standards relevant to the criteria. Table 2 shows the relevance of the procurement criteria to the most common environmental labels for buildings used in Finland. If voluntary environmental labels for buildings are used for projects, the application of procurement criteria for low-carbon buildings may not necessarily require any more documentation than that required for voluntary labels.

Table 1. Correspondence of the criteria to the Commission's recommendations and European standards.

	EU GPP Criteria for Office Building Design, Construction and Management	EN standards associated with the criterion
1. Suitability		
Suitability requirements	A1, A2, A3	-
2. Energy		
Energy class better than the regulatory class	B1	EN 15603
Site energy efficiency	A3, D2	-
Building air permeability	F1, F3	EN ISO 9972, EN 13187
3. Materials		
Carbon footprint of materials	B8.2, B10.1, B10.3	EN 15804, EN 15978
Renewable and recycled materials	B10.2, D6	-
4. Innovations		
Low-carbon innovations	-	EN 15804, EN 15978
5. Cost		
Life cycle costs	A1, A2, A3	EN 15643-4, EN 16627

5.7 Most common environmental management certification systems relevant to the criteria

Table 2a. Correspondence of the criteria to the most common environmental management certification systems for buildings.

	BREEAM <i>BREEAM International New Construction 2016</i> <i>BREEAM International Refurbishment and Fit-Out 2015</i>	LEED <i>LEED v4 for Building Design and Construction</i>
Suitability	Man 01 Project brief and design Man 03 Responsible construction practices	IN Credit: LEED Accredited Professional
Energy	Man 04 Commissioning and handover Ene 01 Reduction of energy use and carbon emissions Ene 04 Low carbon design Ene 08 Energy efficient equipment	EA Prerequisite: Minimum Energy Performance EA Credit: Optimize Energy Performance
Materials	Mat 01 Life cycle impacts Mat 03 Responsible sourcing of construction products Mat 06 Material efficiency Wst 01 Construction waste management Wst 02 Recycled aggregates	MR Credit: Building Life-Cycle Impact Reduction MR Credits: Building Product Disclosure and Optimization: Environmental Product Declarations, Sourcing of Raw Materials, Material Ingredients
Innovations	Inn 01 Innovation	IN Credit: Innovation
Costs	Man 02 Life cycle cost and service life planning	-

Table 2b. Correspondence of the criteria to the most common environmental management certification systems for buildings.

	RTS <i>Environmental classification of a building project. Criteria for offices and business premises</i>	GBC Finland <i>Building life cycle indicators</i>	Nordic Ecolabel <i>Criteria for the Swan label: one-family houses, high-rise buildings, schools and day-care centres. Version 3.2.</i>
Suitability	P1.1 Steering and administration of the classification target	-	032 Information to those involved in the construction process
Energy	Y2.1 Energy efficiency Y2.4 System efficiency Y1.1 Life cycle carbon footprint	Total energy consumption Life cycle carbon footprint	04 Energy consumption of the building 030 Air permeability
Materials	P3.1 Environmental impacts of a site Y1.1 Life cycle carbon footprint	Life cycle carbon footprint	06 Energy efficient household appliances P4 White goods of best energy class P9 Ecolabelled construction products P12 Recycled or reused materials in construction products
Innovations	I1.1 Innovations	-	
Costs	T1.1 Life cycle costs	Calculation of life cycle costs	-

CONCEPTS AND ABBREVIATIONS

BREEAM	<i>Building Research Establishment Environmental Assessment Method.</i> A commercial environmental certification system for buildings, developed in the UK.
CE marking	Abbreviation of the French term <i>Conformité Européenne</i> . By using the CE marking, the manufacturer declares that the product meets the applicable European Union requirements. The obligation to use CE markings applies to construction products that are within the scope of harmonised European standards (hEN).
CO ₂ e	Carbon dioxide equivalent or the global warming impact of different greenhouse gases converted to a level that corresponds to the impacts of carbon dioxide.
Carbon footprint	Total volume of greenhouse gases emitted in the atmosphere as a result of human activity. The unit used to measure the carbon footprint is carbon dioxide equivalent (CO ₂ e). Carbon footprint calculations are based on technical specification ISO/TS 14067.
Central government authority	All administrative units that have national jurisdiction.
Design & Build contract	A contract where the contractor assumes full responsibility for all aspects of the project. A model where the design and implementation of a building is procured from a single supplier.
Design, Build & Operate	A procurement that covers the implementation and maintenance of a building for a set period.
EMAS	A European environmental quality management system (<i>Eco-Management and Audit Scheme</i>). Based on EU Regulation 1221/2009 and built on the ISO 14001 system.
EN	Abbreviation of the term <i>Europäische Norm</i> . An identifier used for the standards created by the European Committee for Standardization CEN.
Environmental label	An environmental label specified in standard EN ISO 14024, including EU Ecolabel or the Nordic Ecolabel.
Exclusion condition	Conditions on which certain tenderers shall be excluded from competitive tendering listed in section 80 and 81 of the Act on Public Procurement. The exclusion conditions may be mandatory or discretionary.
GBC Finland	<i>Green Building Council Finland.</i> A Finnish non-profit association that promotes sustainable development in the construction sector. Part of the worldwide Green Building Council network.

ISO 14001	An international environmental management system model that helps organisations improve the environmental responsibility of their operations.
LEED	<i>Leadership in Energy and Environmental Design</i> . A commercial environmental certification system for buildings, developed in the USA.
Life cycle assessment	A method for assessing the life cycle environmental impacts of a building or a product based on standard ISO 14044.
Life cycle cost	Costs created by a building or a product over its entire life cycle.
Life cycle	<p>(i) In a life cycle assessment: A series of consecutive phases that comprise the entire life cycle of a product or similar. The life cycle begins when the product is manufactured and ends when it is no longer used. The life cycle phases of construction products are specified in standard EN 15643-1: manufacturing, building, use and demolition.</p> <p>(ii) The entire service life of a product or a service.</p>
Low-carbon	In this publication: a solution or measure that reduces CO ₂ e emissions.
Minimum requirement	A requirement that concerns the subject of a procurement. All tenderers must meet the minimum requirements. The minimum requirements are specified by the contracting entity in the description of the procurement.
Nordic Ecolabel	A commercial environmental label developed in the Nordic countries showing that a product or a service meets certain environmental criteria. Established on the initiative of the Nordic Council of Ministers in 1989.
PCR	<i>Product Category Rules</i> . Product category rules for assessing the environmental impacts of construction products that add detail to the application of standard EN 15804, accounting for the special features of different construction products.
Selection criteria	Quality criteria used to assess the economic advantageousness of tenders.
Suitability requirement	A requirement applicable to tenderers. All tenderers must meet the suitability requirements. The suitability requirements are set by the contracting entity.

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Reducing the risk of climate change has rapidly emerged as a central theme in international politics, research and product development. The built environment is responsible for approximately one third of greenhouse gas emissions. This guide contains criteria recommendations to be applied on a voluntary basis in order to reduce the carbon footprint of building projects implemented with public funds under the Act on Public Procurement and Concession Contracts in Finland.

In addition to suitability requirements and cost assessment, the criteria cover the assessment of energy, materials and innovation related aspects. Specific criteria relating to these categories have been drawn up for the procurement of design services, procurement of materials and equipment, procurement of building contracts, Design & Build projects, and Design, Build & Operate contracts. The criteria are supplemented by detailed instructions based on standards which enable environmental assessors involved in the projects to make comparable calculations.

For a more detailed description of how different criteria are applied in different phases of the procurement, see the Ministry of the Environment's guide 'Green public building – A procurement guide' (2017).



Ympäristöministeriö
Miljöministeriet
Ministry of the Environment

ISBN 978-952-11-4788-3 (PDF)
ISSN 1796-167X (PDF)