

# Construction

## Green Public procurement (GPP) Product Sheet



This product sheet forms part of the EU Commission's GPP Training Toolkit, which can be downloaded from the GPP website

[http://ec.europa.eu/environment/gpp/toolkit\\_en.htm](http://ec.europa.eu/environment/gpp/toolkit_en.htm). Similar product sheets have been established for 10 other product and service groups. More information on the reasons for selecting these criteria can be found in the [detailed background report](#) on the website.

For each product/service group two sets of criteria are presented:

- **Core GPP criteria** address the most significant environmental impacts, and are designed to be used with minimum additional verification effort or cost increases.
- **Comprehensive GPP criteria** are intended for use by authorities who seek to purchase the best environmental products available on the market, and may require additional administrative effort or imply a certain cost increase as compared to other products fulfilling the same function.

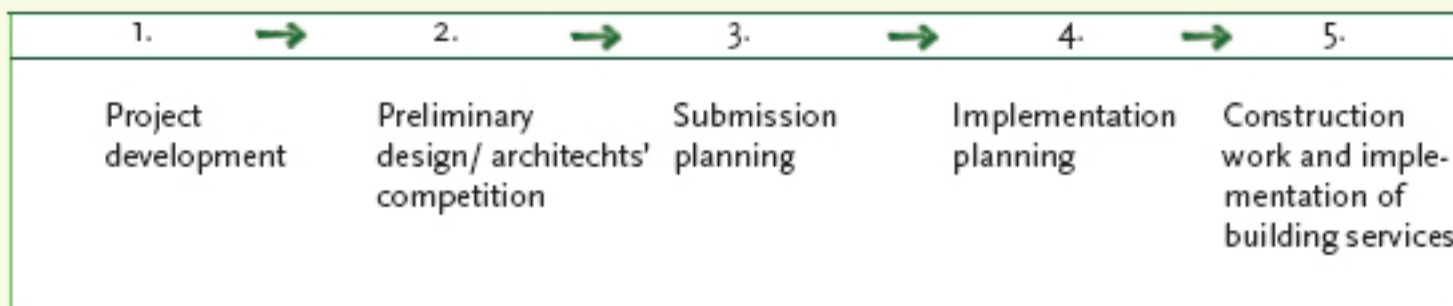
### 1 Scope

This Product Sheet includes recommendations for the procurement of construction works, including the supply of related services such as cooling, heating and ventilation services and the provision of electricity. It addresses the design, construction, use and disposal phase of buildings such as public services buildings and office buildings. For each of these phases environmental criteria are proposed. Criteria address energy consumption, the use of renewable energy sources (RES), construction materials and products, waste and water management as well as other aspects influencing the environmental impacts of construction: architects' experience, monitoring and user aspects.

The proposed approach focuses on buildings as a system instead of just an accumulation of components. Criteria can be used in tendering procedures for the construction of new buildings, as well as for renovation and maintenance contracts.

*Systemic components of construction works*

Energy performance	Building materials	Waste management	
<ul style="list-style-type: none"> <li>• Energy consumption (including heating, cooling, hot water, ventilation and electricity)</li> <li>• Passive House and Low-Energy House</li> <li>• Renewable Energy Sources (RES)</li> <li>• Monitoring the energy performance</li> </ul>	<ul style="list-style-type: none"> <li>• Exclusion of certain building materials and demanding sustainable building materials</li> <li>• Life Cycle Assessment (LCA): long life cycle and material efficiency</li> <li>• Insulation materials</li> <li>• Specific building materials made of wood, iron, concrete, masonry, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste reduction and recycling and/or re-use of materials</li> </ul>	
		Water management	<ul style="list-style-type: none"> <li>• Water saving installations and rainwater/greywater use</li> </ul>
		Other	<ul style="list-style-type: none"> <li>• Transport and noise control</li> </ul>

*The construction process*

## 2 Key environmental impacts

Impact	GPP Approach
The consumption of energy for heating, cooling, ventilation, hot water, and electricity, and resulting CO <sub>2</sub> emissions	<ul style="list-style-type: none"> <li>• Maximise the energy performance of buildings</li> <li>• Ensure high energy efficiency standards for heating, cooling, ventilation and hot water systems, and electronic devices</li> <li>• Use guaranteed performance contracts with Energy Service Companies</li> <li>• Encourage the use of localised renewable energy sources (I-RES)<sup>1</sup> and high efficiency cogeneration</li> <li>• Include a systematic Life Cycle Approach (LCA) for building materials</li> <li>• Encourage the use of sustainably harvested and produced resources and construction/insulation materials</li> <li>• Encourage the installation of high-end water saving technologies and reduce the use of freshwater during the construction process.</li> <li>• Encourage the use of non-toxic building materials by also building upon the availability of renewable raw materials based construction materials</li> </ul>
The consumption of natural resources	
The consumption of fresh water resources both during construction and during the use phase	
Emission of substances harmful to human health and the environment during the production or disposal of building materials leading to air and water pollution	
Negative health impacts on building users due to building materials containing dangerous substances <sup>2</sup>	
CO <sub>2</sub> emissions resulting from the transportation of construction materials and products	

<sup>1</sup> "Localised RES" means RES generating capacity within the building site itself (e.g. solar panels and cells, biomass boilers, wind turbines etc.).

<sup>2</sup> Defined and listed in Directive 76/796/EEC.

<sup>3</sup> Contracting authorities must ensure that the functionality of the buildings materials is not compromised (for example in terms of resistance to fungal growth) when using substitute substances/materials.

## Impact

CO<sub>2</sub> emissions resulting from the transportation of construction materials and products

Waste production

## GPP Approach

- Encourage the use of substitute substances/materials for dangerous building materials<sup>3</sup> by also building upon the availability of renewable raw materials based construction materials
- Use energy efficient vehicles for transportation and on the building site
- Apply effective supply chain management systems
- Minimise waste production and ensure proper waste management of demolition and construction waste

## 3 Construction - GPP criteria

### 3.1 Subject matter & selection criteria - Core and Comprehensive GPP criteria

#### 3.1.1 Subject matter & Selection criteria - Core GPP criteria

##### Subject matter

- Construction of new energy efficient [insert building type], using environmental friendly construction materials and products **or**
- Renovation of building stock of [insert building type] to high energy efficiency standards using environmental friendly construction materials and products.

##### Selection criteria

###### **Exclusion of certain contractors**

1. Construction companies, which have repeatedly acted against environmental legislation or regulations or have been found guilty of grave professional misconduct as outlined in Articles 53 and 54 of Directive 2004/17/EC and Article 45 of Directive 2004/18/EC, will be excluded from the tendering procedure.

###### **Experience of the architect in environmental construction**

2. The architect must demonstrate sufficient experience with environmental building design. This may include reference to associated specialists e.g. engineering consultants for heating/cooling systems. Each applicant is required to submit a 2-page document outlining (past and on-going) experience in the following areas (indicative list):
  - Energy efficient and RES friendly construction design. Including, if available, specific energy demand per m<sup>2</sup> including heating, cooling, lighting and ventilation for a previous construction.
  - The use of high-efficiency cogeneration
  - The use of renewable energy sources
  - The use of guaranteed performance contracts with Energy Service Companies
  - Design of air-tight and air exchange systems with heat recovery.
  - Bioclimatic architecture, to achieve energy efficiency, thermal and optical comfort, and good indoor air quality standards, avoiding mechanical systems, e.g. light supply with daylight systems.
  - Use of construction materials and products. complying with environmental criteria
  - Water efficiency
  - Waste reduction

***Technical capacity to take the necessary environmental management measures in order to ensure that the construction works are executed in an environmental friendly way***

3. Bidders must demonstrate their technical capacity (either by having the expertise within the company or by co-operation with experts) to put in place certain environmental management measures that meet the following requirements:
- Ensuring effective protection of fauna and flora in the building area and its surroundings (where construction takes place in an environmentally sensitive area).
  - Measures to prevent any harmful waste and hazardous substance flows that may adversely impact the area.
  - Environmental management measures aimed at minimising waste production on the site, respecting noise regulations and avoiding traffic congestion.
  - Measures to ensure energy and water efficiency

**Verification:**

Possible means of proof include EMAS and ISO 14001 certificates or equivalent certificates issued by bodies conforming to Community law or the relevant European or international standards concerning certification based on environmental management standards. Other means of evidence provided by the company that can prove the required technical capacity will also be accepted.

### 3.1.2 Subject matter & Selection criteria - Comprehensive GPP criteria

#### Subject matter

Construction of new/renovation of [insert building type], achieving an energy performance similar to the low energy house or passive house standard, using sustainable construction materials, considering intelligent energy service solutions, sustainable water and waste water management aspects and healthy living conditions.

#### Selection criteria

##### **Exclusion of certain contractors**

1. Construction companies which have repeatedly acted against environmental legislation or regulations or have been found guilty of grave professional misconduct as outlined in Articles 53 and 54 of Directive 2004/17/EC and Article 45 of Directive 2004/18/EC, will be excluded from the tendering procedure.

##### **Experience of the architect in environmental construction**

2. The architect must have sufficient past and associated experience with environmental building design. This can include reference to associated specialists e.g. engineering consultants for heating/cooling systems. Each applicant is required to submit a 2-page document outlining (past and on-going) experience in the following areas (indicative list):
  - Energy efficient and RES friendly construction design. Including, if available, specific energy demand per m<sup>2</sup> including heating, cooling, ventilation and lighting for a previous construction.
  - Air-tightness and air exchange systems with heat recovery.
  - The use of high-efficiency cogeneration
  - The use of renewable energy sources
  - The use of guaranteed performance contracts with Energy Service Companies
  - Bio-climatic architecture, to achieve energy efficiency, thermal and optical comfort, avoiding mechanical systems, e.g. light supply with daylight systems.
  - Use of LCC and LCA tools in design.
  - Use of construction materials and products complying with environmental criteria
  - Achievement of good indoor air quality standards.
  - Water efficiency
  - Waste reduction

**Technical capacity to take the necessary environmental management measures in order to ensure that the construction works are executed in an environmental friendly way**

3. Bidders must demonstrate their technical capacity (either by having the expertise within the company or by co-operation with experts) to put in place certain environmental management measures that meet the following requirements:
- Ensuring effective protection of fauna and flora in the building area and its surroundings (where construction takes place in an environmentally sensitive area).
  - Measures to prevent any harmful waste and hazardous substance flows that may adversely impact the area.
  - Environmental management measures aimed at minimising waste production on the site, respecting noise regulations and avoiding traffic congestion.
  - Measures to ensure energy and water efficiency

**Verification:**

Possible means of proof include EMAS and ISO 14001 certificates or equivalent certificates issued by bodies conforming to Community law or the relevant European or international standards concerning certification based on environmental management standards. Other means of evidence provided by the company that can prove the required technical capacity will also be accepted.

### 3.1.3 Subject matter & Selection criteria - Explanatory notes

#### Explanatory notes

- **Experience of the architect in environmental construction:** Judging the experience of the architect requires experience from the contracting authority. It may be appropriate to bring in external expertise and set up a jury that combines common knowledge to judge the experience statements of competing architects. This list is indicative and can be expanded/reduced to fit the situation. It will be necessary for the authority to determine what appropriate past experience means<sup>14</sup>.
- **Exclusion for grave professional misconduct:** Contracting companies can only be excluded if the national laws of a Member State include provisions on environmental law, and where the violation of such laws (and a final decision in this sense by a court) would constitute grave professional misconduct; bidders who have been convicted in this sense could be excluded (Articles 53 and 54 of Directive 2004/17/EC and Article 45 of Directive 2004/18/EC).

## 3.2 Specifications and award criteria - Core and Comprehensive GPP criteria

### 3.2.1 Energy performance requirements - Core criteria and comprehensive GPP criteria

#### 3.2.1. a) Energy performance requirements - Core GPP criteria

#### Energy performance

#### Specifications

##### Energy consumption standards

1. The overall [net/final/primary]<sup>5</sup> energy demand of the building (including heating, cooling, hot water, ventilation and electricity) is [X]% lower than the maximum defined in [insert relevant national legislation].

##### Energy efficiency training

2. A training session must be given to the building manager on the energy efficient use of the building following the completion of construction/renovation works. The bidder must outline the content of the training.

#### Award criteria

Additional points will be awarded for:

1. **Lowest energy consumption** and use of localised RES sources and/or high efficiency cogeneration  
Lower energy consumption than that demanded in the specifications, based on the overall [net/final/primary] energy demand of the building (including heating, cooling, hot water, ventilation and electricity). Points will be awarded on the basis of a sliding scale between the best and worst bids.

<sup>4</sup> The evaluation should focus more on the quality of the work presented than on limiting the participation of architects by introducing a high number of years of required experience in sustainable construction. Nevertheless it is recommended to include a minimum past experience level of 2 years.

<sup>5</sup> There are three main ways to specify energy consumption, depending on the definition of the system boundaries:

- **Net energy:** Energy that is available to consumers for use in appliances and systems. Calculation considers only the building properties and not those of the heating/cooling system and results in the net energy use. To perform the calculation of net energy, data for indoor climate requirements, internal heat gains, building properties and outdoor climatic conditions are needed.
- **Final energy:** Energy consumption measured at the final use level. For a building, energy inflow measured at the gate of the building.
- **Primary energy:** Energy consumption measured at the natural resource level/primary energy content.

### 3.2.1. b) Energy performance requirements - Comprehensive GPP criteria

**Note:** Two different options are proposed here for energy performance. In addition to selecting one of these the contracting authority should also include the general criteria on energy performance included in the third box.

#### Energy performance - Option 1

##### Specifications

###### **Energy performance standard**

1. The energy performance must meet the criteria underlying a low-energy or Passive House standard [include name and internet address of a relevant Passive House specification].  
Energy efficiency training
2. A training session must be given to the building manager on the energy efficient use of the building following the completion of construction/renovation works. The bidders must outline the content of the training

#### Energy performance - Option 2

##### Specifications

###### **Localised RES (I-RES)**

1. A minimum of [X]% of [net, final or primary] energy demand must be provided by localised renewable energy sources (I-RES). I-RES means renewable energy source generating capacity within the building site itself (e.g. solar panels, biomass boilers, wind turbines etc.).

###### **Energy consumption standards**

2. The overall [net/final/primary] energy demand of the building (including heating, cooling, hot water, ventilation and electricity) is [X]% lower than the maximum defined in [insert relevant national legislation].

Energy efficiency training

3. A training session must be given to the building manager on the energy efficient use of the building following the completion of construction/renovation works. Bidders must outline the content of the training

##### Award criteria

Additional points will be awarded for:

###### **1. Innovative energy efficient building services**

Bidders must submit specific proposals for achieving energy efficient lighting, heating, cooling, high-efficiency cogeneration and ventilation in the building. Additional points will be awarded for the proposed approach, by evaluating the estimated energy savings (in comparison to standard systems) and the use of passive components (e.g. insulation, daylight use).

###### **2. Lower energy consumption**

Lower energy consumption than that demanded in the specifications, based on the overall [net/final/primary] energy demand of the building (including heating, cooling, hot water, ventilation and electricity). Points will be awarded on the basis of a sliding scale between the best and worst bids.

### 3.2.1. b) Energy performance requirements - Explanatory notes

**Passive House requirements:** Passive houses aim to achieve a very high energy performance in buildings by using as much passively generated heating, cooling and ventilation as possible and thereby reducing energy consumption significantly compared to average buildings. (Please also see further information in the [Background Report](#).)

The contracting authority will need to define the most appropriate criteria to apply. The following Passive House specifications can be used as a baseline:

- Passiv Haus Institute Standard (Germany): [www.passiv.de](http://www.passiv.de).
- MINERGIE-P (Switzerland): [www.minergie.ch/index.php?standards-6](http://www.minergie.ch/index.php?standards-6).
- PassivHausUK (UK): [www.passivhaus.org.uk](http://www.passivhaus.org.uk).
- CEPHEUS Project (EU): [www.cephesus.de/eng](http://www.cephesus.de/eng).
- European Passive Houses (EU): [www.europeanpassivehouses.org](http://www.europeanpassivehouses.org).

**General note:** It is recommended to evaluate which would be the best phase for including each of the proposed environmental criteria (architect's design competition, tendering procedure for construction works).

- **Localised RES (I-RES) percentage:** The contracting authority will need to determine the appropriate minimum % of I-RES. This will largely depend on the climatic conditions and the experience with I-RES installation. Typically this should be between 5-20%.
- **Energy consumption standards:** The choice of net, final or primary energy demand will depend on the indicators used for defining energy performance provided in national legislation. The contracting authority should clearly state the applicable legislation (see Annex 1, Table 13 in the [Construction Background Report](#)).  
When evaluating the incoming bids contracting authorities must verify the correct use of the applicable calculation method. This might need external/internal expert input.
- **Energy consumption standards – defining percentage levels:** The percentage level (ambition level) to insert highly depends on the ambition level of the maximum energy performance defined in national legislation. It is recommended to aim for at least 20% lower than the existing national standard demands.
- **Low energy and Passive House Standards:** In general use, the meaning of the term 'low-energy house' has changed over time, and will certainly change in the future. Right now, it is generally considered to be in the range from 30 kWh/m<sup>2</sup>a to 20 kWh/m<sup>2</sup>a (9,500 Btu/ft<sup>2</sup>/yr to 6,300 Btu/ft<sup>2</sup>/yr). In comparison, the German Passivhaus ultra-low energy standard, currently undergoing adoption in some other European countries, has a maximum space heating requirement of 15 kWh/m<sup>2</sup>a or 4,755 Btu/ft<sup>2</sup>/yr ([http://en.wikipedia.org/wiki/Low-energy\\_building](http://en.wikipedia.org/wiki/Low-energy_building))
- **Building services:** Construction works also includes the installation of heating, ventilation, air conditioning and refrigeration (HVACR) as well as energy supply, lighting and water systems. A specialist company may be contracted to design and install (and sometimes maintain) these services for the building – often called "building services". (such company is often designated as an "Energy Service Company")
- **Award criteria:** Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria should, altogether, account for at least 10 to 15 % of the total points available. Where the award criterion is formulated in terms of "better performance as compared to the minimum requirements included in the technical specifications", points will be awarded in proportion to the improved performance.
- **Energy consumption standards – recommended stage of the construction process:** Energy demand thresholds should be included in all stages of the procurement process.

## 3.2.2 Building materials - Core criteria and comprehensive GPP criteria

### 3.2.2. a) Building materials - Core GPP criteria

#### Building materials/construction products

##### Specifications

###### Exclusion of certain materials

1. Bidders must declare that the following materials/substances will not be used in the building:
  - Products which contain sulphurhexafluoride (SF<sub>6</sub>).
  - Indoor paints and varnishes<sup>6</sup> with a content of solvents (volatile organic compounds (VOCs) with a boiling point of 250°C maximum) higher than:
    - for wall paints (according to EN 13300): 30 g/l (minus water).
    - for other paints with a spreading rate of at least 15 m<sup>2</sup>/l at a hiding power of 98% opacity: 250 g/l (minus water).
    - for all other products (including paints that are not wall paints and that have a spreading rate of less than 15m<sup>2</sup>/l, varnishes, wood stains, floor coatings and floor paints, and related products): 180g/l (minus water).

###### Verification:

Bidders must declare that these products/substances will not be used in the building.

###### Timber

2. Timber used in the building shall come from legal sources.

###### Verification:

Certificates of chain of custody for the wood fibres certified as FSC, PEFC or any other equivalent means of proof, will be accepted as proof of compliance. The legal origin of the wood can also be demonstrated with a tracing system being in place. These voluntary systems may be 3rd party certified, often as part of ISO 9000 and/or ISO 14000 or EMAS management systems.

If wood stems from a country that has signed a Voluntary Partnership Agreement (VPA) with the EU, the FLEGT license will serve as proof of legality<sup>7</sup>.

For the non-certified wood bidders shall indicate the types (species), quantities and origins, together with a declaration of legality. As such the wood shall be able to be traced throughout the whole production chain from the forest to the product. In specific cases, where the evidence provided is not considered sufficient to prove compliance with the requested technical specifications, contracting authorities may ask suppliers for further clarifications of proof.

<sup>6</sup> Limit values extracted from the European Ecolabel and relevant standards such as EN 13300.

<sup>7</sup> The FLEGT (Forest Law Enforcement Governance and Trade) action plan was adopted by the EU in 2003. The Action Plan outlines a series of measures to address illegal logging in developing countries. The Plan defines a timber licensing system to guarantee the legality of imported wood products. In order to obtain the license, Voluntary Partnership Agreements (VPAs) have to be signed between timber-producing countries and the EU. Timber products, which have been legally produced in VPA partner countries, will be licensed for the legality of production; more information at: <http://ec.europa.eu/environment/forests/flegt.htm>.

<sup>8</sup> Identified using reports of reliable sources such as [www.globalwitness.org/media\\_library\\_get.php/150/0203\\_The%20Logs%20of%20War\\_by%20GW\\_Fafo.pdf](http://www.globalwitness.org/media_library_get.php/150/0203_The%20Logs%20of%20War_by%20GW_Fafo.pdf).

<sup>9</sup> Identified on the basis of the Corruption Perception Index, based on reliable sources such as [http://www.transparency.org/content/download/10825/92857/version/1/file/CPI\\_2006\\_presskit\\_eng.pdf](http://www.transparency.org/content/download/10825/92857/version/1/file/CPI_2006_presskit_eng.pdf)

<sup>10</sup> Identified through reliable sources, such as [http://assets.panda.org/downloads/keep\\_it\\_legal\\_final\\_no\\_fsc.pdf](http://assets.panda.org/downloads/keep_it_legal_final_no_fsc.pdf).

## Specifications

### **Volatile Organic Compounds (VOC)**

3. The VOC emissions from the building products used must not exceed the respective values outlined in the European standard for the determination of emissions from building products EN ISO 16000-9 to -11 (see: [www.iso.org](http://www.iso.org)), or equivalent. (for instance the building products must adhere to the test values set in the German AgBB scheme in order to meet the minimum requirements of the building codes for health protection with regard to VOC emissions).

#### **Verification:**

Test report based on the outlined method in EN ISO 16000-9 to -11 or equivalent (see for instance for the German AgBB scheme [.http://www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2008.pdf](http://www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2008.pdf)).

## Award criteria

Additional points will be awarded for:

### **1. Use of construction materials and products complying with certain environmental criteria**

Bidders must indicate the percentage of [insert relevant product types, e.g. windows, paints, insulation materials] to be used in construction (by value) that are produced in compliance with the standards underlying a Type I ecolabel according to ISO standard 14024 or provide clear and transparent information on the product performance based on type III product declarations. Additional points will be awarded in proportion to the percentages proposed.

#### **Verification:**

Products carrying a type I ecolabel will be deemed in compliance with these criteria. Alternatively credible documentation that the standards of a given type I ecolabel are met will also be accepted.

### **2. Use of construction materials based on renewable raw materials**

Bidders must indicate the percentage of [insert relevant product types, e.g. windows, paints, insulation materials] to be used in construction (by value) that are based on renewable raw materials

### **3. Sustainable forestry sources**

Wood products coming from forests that are verified as being managed so as to implement the principles and measures aimed at ensuring sustainable forest management, on condition that these criteria characterize and are relevant for the product.

In Europe, these principles and measures shall at least correspond to those of the Pan-European Operational Level Guidelines for Sustainable Forest Management, as endorsed by the Lisbon Ministerial Conference on the Protection of Forests in Europe (2 to 4 June 1998). Outside Europe they shall at least correspond to the UNCED Forest Principles (Rio de Janeiro, June 1992) and, where applicable, to the criteria or guidelines for sustainable forest management as adopted under the respective international and regional initiatives (ITTO, Montreal Process, Tarapoto Process, UNEP/FAO Dry-Zone Africa Initiative).

#### **Verification:**

Certificates of chain of custody for the wood fibres certified as FSC<sup>11</sup>, PEFC<sup>12</sup> or any other equivalent means of proof, will be accepted as proof of compliance. Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.

<sup>11</sup> FSC (Forest Stewardship Council): <http://www.fsc.org/en/>.

<sup>12</sup> PEFC (Programme for the Endorsement of Forest Certification): <http://www.pefc.org/internet/html>.

### 3.2.2. b) Building materials - Comprehensive GPP criteria

## Building materials/construction products

### Specifications

#### Exclusion of certain materials

- Bidders must declare that the following materials/substances will not be used in the building:
  - Products which contain sulphurhexafluoride (SF<sub>6</sub>).
  - Indoor paints and varnishes<sup>15</sup> with a content of solvents (volatile organic compounds (VOCs) with a boiling point of 250°C maximum) higher than:
    - for wall paints (according to EN 13300): 30 g/l (minus water).
    - for other paints with a spreading rate of at least 15 m<sup>2</sup>/l at a hiding power of 98% opacity: 250 g/l (minus water).
    - for all other products (including paints that are not wall paints and that have a spreading rate of less than 15m<sup>2</sup>/l, varnishes, wood stains, floor coatings and floor paints, and related products): 180g/l (minus water).

#### Verification:

Bidders must declare that these products/substances will not be used in the building.

#### Timber

- Timber used in the building shall come from legal sources. **Verification:**  
 Certificates of chain of custody for the wood fibres certified as FSC, PEFC or any other equivalent means of proof, will be accepted as proof of compliance.  
 The legal origin of the wood can also be demonstrated with a tracing system being in place. These voluntary systems may be 3rd party certified, often as part of ISO 9000 and/or ISO 14000 or EMAS management systems.  
 If wood stems from a country that has signed a Voluntary Partnership Agreement (VPA) with the EU, the FLEGT license may serve as proof of legality<sup>16</sup>.  
 For the non-certified wood bidders shall indicate the types (species), quantities and origins, together with a declaration of legality. As such the wood shall be able to be traced throughout the whole production chain from the forest to the product.  
 In specific cases, where the evidence provided is not considered sufficient to prove compliance with the requested technical specifications, contracting authorities may ask suppliers for further clarifications or proof.

<sup>15</sup> Limit values extracted from the European Ecolabel and relevant standards such as EN 13300.

<sup>16</sup> The FLEGT (Forest Law Enforcement Governance and Trade) action plan was adopted by the EU in 2003. The Action Plan outlines a series of measures to address illegal logging in developing countries. The Plan defines a timber licensing system to guarantee the legality of imported wood products. In order to obtain the license, Voluntary Partnership Agreements (VPAs) have to be signed between timber-producing countries and the EU. Timber products, which have been legally produced in VPA partner countries, will be licensed for the legality of production; more information at: <http://ec.europa.eu/environment/forests/flegt.htm>.

<sup>17</sup> Identified using reports of reliable sources such as [www.globalwitness.org/media\\_library\\_get.php/150/0203\\_The%20Logs%20of%20War\\_by%20GW\\_Fafo.pdf](http://www.globalwitness.org/media_library_get.php/150/0203_The%20Logs%20of%20War_by%20GW_Fafo.pdf).

<sup>18</sup> Identified on the basis of the Corruption Perception Index, based on reliable sources such as [http://www.transparency.org/content/download/10825/92857/version/1/file/CPI\\_2006\\_presskit\\_eng.pdf](http://www.transparency.org/content/download/10825/92857/version/1/file/CPI_2006_presskit_eng.pdf).

<sup>19</sup> Identified through reliable sources, such as [http://assets.panda.org/downloads/keep\\_it\\_legal\\_final\\_no\\_fsc.pdf](http://assets.panda.org/downloads/keep_it_legal_final_no_fsc.pdf).

## Specifications

### **Volatile Organic Compounds (VOC)**

3. The VOC emissions from the building products used must not exceed the respective values outlined in the European standard for the determination of emissions from building products EN ISO 16000-9 to -11 (see: [www.iso.org](http://www.iso.org)), or equivalent. (for instance the building products must adhere to the test values set in the German AgBB scheme in order to meet the minimum requirements of the building codes for health protection with regard to VOC emissions)

#### **Verification:**

Test report based on the outlined method in EN ISO 16000-9 to -11 or equivalent (see for instance for the German AgBB scheme [.http://www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2008.pdf](http://www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2008.pdf)).

### **Steel**

4. [Applicable for renovation work] For the purpose of cleaning, derusting and removing paint from steel products, silicon-blasting agents must not be used. Residual materials must be disposed of according to relevant national legislation.

#### **Verification:**

Bidders must declare that this criterion will be met.

## Award criteria

Additional points will be awarded for:

### **1. Use of construction materials and products complying with certain environmental criteria**

Bidders must indicate the percentage of [insert relevant product types, e.g. windows, paints, insulation materials] to be used in construction (by value) that are produced in compliance with the standards underlying a Type I ecolabel according to ISO standard 14024 or provide clear and transparent information on the product performance based on type III product declarations. Additional points will be awarded in proportion to the percentages proposed.

#### **Verification:**

Products carrying a type I ecolabel will be deemed in compliance with these criteria. Alternatively credible documentation that the standards of a given type 1 ecolabel are met will also be accepted.

[For countries where sufficient LCA data for building materials exists] bidders can be asked to present LCA data [insert name of LCA tool] to allow for an LCA comparison of construction materials.

### **2. Use of construction materials made from renewable raw materials**

Bidders must indicate the percentage of [insert relevant product types, e.g. windows, paints, insulation materials] to be used in construction (by value) that are based on renewable raw materials

### **3. Competition around R-values<sup>20</sup> (combination of lambda<sup>21</sup> and the thickness of insulation products) of the proposed insulation**

Bidders must provide the R-values of the proposed insulation materials. Points will be awarded on a sliding scale between the best and worst bids.

#### **Verification:**

Test documentation of the proposed insulation material/solution using an accredited R-value calculation standard for insulation must be provided.

<sup>20</sup> The R-value describes the insulation properties of certain building insulation materials.

<sup>21</sup> Lambda is a value for measuring the thermal conductivity of a material.

## Award criteria

### 4. *Sustainable forestry sources*

Wood Products coming from forests that are verified as being managed so as to implement the principles and measures aimed at ensuring sustainable forest management, on condition that these criteria characterize and are relevant for the product.

In Europe, these principles and measures shall at least correspond to those of the Pan-European Operational Level Guidelines for Sustainable Forest Management, as endorsed by the Lisbon Ministerial Conference on the Protection of Forests in Europe (2 to 4 June 1998). Outside Europe they shall at least correspond to the UNCED Forest Principles (Rio de Janeiro, June 1992) and, where applicable, to the criteria or guidelines for sustainable forest management as adopted under the respective international and regional initiatives (ITTO, Montreal Process, Tarapoto Process, UNEP/FAO Dry-Zone Africa Initiative).

#### **Verification:**

Certificates of chain of custody for the wood fibres certified as FSC<sup>22</sup>, PEFC<sup>23</sup> or any other equivalent means of proof, will be accepted as proof of compliance. Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.

<sup>22</sup> FSC (Forest Stewardship Council): <http://www.fsc.org/en>

<sup>23</sup> PEFC (Programme for the Endorsement of Forest Certification): <http://www.pefc.org/internet/html>

### 3.2.2. c) Building materials - Explanatory notes

#### Explanatory notes

- **General note:** It is recommended to evaluate which would be the best phase for including each of the proposed environmental criteria (architect's design competition, tendering procedure for construction works).
- **Recycled/re-used content:** A minimum requirement should be 5%. If award criterion 1 (LCA comparison of building materials) is used, a relatively low percentage should be set.
- **Recycled/re-used content – specification or award criteria:** Where the contracting authority is unable to define the availability of recycled/re-used content, this criterion could instead be used in the award phase.
- **Use of environmental construction materials and products – specifications or award:** It is proposed to use this criterion in the award phase as the contracting authority will likely not have sufficient knowledge of the market availability and price of such products. If the contracting authority has good market knowledge, minimum percentages for certain product types could be included in the specifications. Different information hubs exist in Europe, giving detailed information on sustainable building materials such as established information websites of respective ecolabels. Please see the ecolabel section in the [Construction Background Report](#).
- **Award criteria:** Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria should, altogether, account for at least 10 to 15 % of the total points available. Where the award criterion is formulated in terms of "better performance as compared to the minimum requirements included in the technical specifications"; points will be awarded in proportion to the improved performance. It is essential that the feasibility of the proposed solutions is evaluated at the tendering phase and monitored in the execution phase.
- **LCA comparison of construction materials:** The availability of LCA data on building materials varies considerably from country to country. The contracting authority will need to consider whether sufficient data exists to apply this award criterion. The contracting authority will also need to determine which LCA tools are most appropriate for the region/type of construction work. A list of suitable LCA tools is available in section 6 in the [Construction Background Report](#). Where LCA tools are available, it may replace the most specific requirements on building materials (as they are covered by the LCA tool).  
Note: A contract clause on the compulsory use of an LCA tool during the design phase is also recommended – see below.

### 3.2.3. Water saving installations - Core criteria and comprehensive criteria

#### 3.2.3. a) Water saving installations - Core GPP criteria

#### Water saving installations

##### Specifications

##### **Water saving installations**

1. All sanitary and kitchen water facilities must be equipped with the latest water-saving technologies available on the market.
  - Dual flush WCs should use a maximum of 6 litres for full flush and 3 litres for urine flush.
  - Waterless urinals have to either use a biodegradable fluid or operate completely without fluid.
  - Water saving devices fitted into cisterns must demonstrate a water saving of at least 30% for toilet flushing.
  - Tap inserts should save at least 50% of water compared to normal tap use.

##### **Verification:**

Bidders must provide technical data-sheets for the products to be installed that verify compliance with the specifications.

#### 3.2.3. a) Water saving installations - Comprehensive GPP criteria

#### Water saving installations

##### Specifications

##### **Water-saving installations**

1. All sanitary and kitchen water facilities must be equipped with the latest water-saving technologies available on the market.
  - Dual flush WCs should use a maximum of 6 litres for full flush and 3 litres for urine flush.
  - Waterless urinals have to either use a biodegradable fluid or operate completely without fluid.
  - Water saving devices fitted into cisterns must demonstrate a water saving of at least 30% for toilet flushing.
  - Tap inserts should save at least 50% of water compared to normal tap use.

##### **Verification:**

Bidders must provide technical data-sheets for the products to be installed that verify compliance with the specifications.

2. At least [X]% of the number of urinals and toilets must use waterless technologies.

##### **Verification:**

Bidders must indicate the number and percentage of waterless installations foreseen.

## Award criteria

Additional points will be awarded for:

### 1. **Rainwater and grey-water use**

Bidders must provide a proposal on how to maximise the use of rainwater and grey-water in the water supply and return system of the building. Additional points will be awarded based on the proposals submitted.

The proposals will be rated according to the following criteria:

- Design and quality of the technology including adaptability to the building design.
- Estimated percentage of overall water supply from rainwater and grey-water sources.
- Maintenance costs and durability of the product (installation and maintenance costs).

### 3.2.3. c) **Water saving installations - Explanatory notes**

#### Explanatory notes

- **General note:** It is recommended to evaluate which would be the best phase for including each of the proposed environmental criteria (architect's design competition, tendering procedure for construction works).
- **Water saving installations – verification:** In order to set the specifications and verify compliance, the contracting authority should have an overview of available technologies such as tap attachments and water flow restrictors on the market. The criteria can be adapted as necessary to fit market availability. Those presented in the criteria above are adapted from the UK National Water Supply Regulations based on the implementation of European Directive 2000/60/EC establishing a framework for Community action in the field of water policy. See also the Sustainable Products Catalogue at [http://www.globaltolocal.com/G2L\\_ESPO%20Catalogue.php](http://www.globaltolocal.com/G2L_ESPO%20Catalogue.php).
- **Water saving installations – defining percentages:** The level of ambition (X%) strongly depends on the market availability of the demanded technologies (e.g. NoMix-toilet systems) in the specific European region. Where the contracting authority is unfamiliar with the market situation, it is recommended to use this criterion in the award phase in order to set a realistic demand.
- **Rainwater and grey-water use – specifications or award phase:** It is also possible to set minimum percentages of overall water supply from rainwater and grey-water sources, however the potential will vary considerably according to climatic conditions. Therefore local expertise would be needed to set appropriate levels.
- **Award criteria:** Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria should, altogether, account for at least 10 to 15 % of the total points available.

### 3.3. Contract performance clauses - Core and Comprehensive GPP criteria

#### 3.3.1 Contract performance clauses - Core GPP criteria

##### Contract performance clauses

###### **Compulsory blower door test**

Where mechanical ventilation is included in the building, the contractor must ensure that a 'Blower Door Test' is carried out at [insert appropriate building stage]. This must be repeated until the appropriate standard is achieved.

###### **Book-keeping**

The contractor must provide a regular book-keeping service for the first three years that will provide the building manager with monthly figures on energy consumption for heating, cooling, ventilation, hot water, and electricity.

###### **Transport and recycling of building materials**

- The contractor should set a minimum and a target level for the use of reusable containers to transport the necessary building materials to, on and from the construction site.
- Suppliers of building materials must set a minimum and a target level for packaging waste (to be achieved for instance through a system of take back, recycle and reuse of packaging that comes with the building materials).

###### **Waste management**

The contractor must put appropriate measures in place to reduce and recover (reuse or recycle) waste that is produced during the demolition and construction process. It is required to have a recovery rate of at least 60% related to weight percentage segregation<sup>13</sup>.

###### **Verification:**

Proof of compliance can be provided by an Environmental Management System (EMS) such as EMAS or other evidence of equivalent environmental management measures.

<sup>13</sup> <http://ec.europa.eu/environment/integration/research/newsalert/pdf/68na3.pdf>.

### 3.3.2 Contract performance clauses - Comprehensive GPP criteria

#### Contract performance clauses

##### **Use of LCA tool in design**

In carrying out the design work [insert name of LCA tool(s)] must be used.

##### **Compulsory blower door test**

Where mechanical ventilation is included in the building, the contractor must ensure that a 'Blower Door Test' is carried out at [insert appropriate building stage]. This must be repeated until the appropriate standard is achieved.

##### **Book-keeping**

The contractor must provide a regular book-keeping service for the first three years that will provide the building manager with monthly figures on energy consumption for heating, cooling, ventilation, hot water, and electricity.

##### **Transport and recycling of building materials**

- The contractor should set a minimum and a target level for the use of reusable containers to transport the necessary building materials to, on and from the construction site.
- Suppliers of building materials must set a minimum and a target level for packaging waste (to be achieved for instance through a system of take back, recycle and reuse of packaging that comes with the building materials).

##### **Waste reduction and management**

The contractor must put appropriate measures in place to reduce and recover (reuse or recycle) waste that is produced during the construction process. It is required to have a recovery rate of at least 60% related to weight percentage segregation<sup>25</sup>.

**Verification:** Proof of compliance can be provided by an Environmental Management System (EMS) such as EMAS or other evidence of equivalent environmental management measures.

<sup>25</sup> See: <http://ec.europa.eu/environment/integration/research/newsalert/pdf/68na3.pdf>.

### 3.3.3 Contract performance clauses - Explanatory notes

#### Explanatory notes

- **Use of LCA tool in design:** The contracting authority will need to determine which LCA tool(s) is most appropriate for the region/type of construction work, and determine which aspects of design and material selection this can cover. Otherwise this can be determined at the contract negotiation stage together with the winning architect. A list of LCA tools that could be used is available in the [Background Report](#). This contract condition must be clearly advertised in the tendering documents, so that the bidders are aware of what the contract will entail.
- **Blower door test – appropriate building stage:** The appropriate time for a blower door test to be carried out will depend on the type of building (e.g. for a wooden construction after the assembly of windows, doors and steam brakes).
- **Transport and recycling of building materials:** It may also be a good option to require that goods be shipped to a dedicated rail or inland waterway facility. This is only applicable if more than one potential contractor is actually able to use rail or inland waterway networks.
- **Waste reduction and management:** The contracting authority must set up a proper monitoring and evaluation system during the construction process that, besides general quality control issues, also focuses on the monitoring of the waste management system.

## 4 Cost considerations

According to the UK Office of Government Commerce<sup>26</sup> “The project procurement lifecycle considers the whole life of a project from inception through to design and construction, operation and finally re-use or disposal. It is a process which identifies where and when key decisions are to be made and determines the critical outputs that should be delivered at each stage of the project.” It encompasses all phases such as project development, the preliminary design/architects’ competition, submission planning, implementation planning, and the construction work and implementation of building services.

Life cycle costing (LCC) is central to the current international drive to achieve better value for money from the buildings and constructed assets procured and used. Governments are increasingly focusing on achieving better value from constructed assets and with this has come a recognition that better value does not mean lowest capital cost alone. Instead, the focus has shifted to the evaluation of all the costs and impacts of operating constructed assets over their life cycle, and to minimising both the life cycle costs and the environmental impact.

Life cycle costing calculations in the construction sector have been employed for many years<sup>27</sup>. A recently published study on the development of a common methodology of LCC in construction<sup>28</sup> looked at how to stimulate the use of LCC in the public procurement of construction works and products, for instance in the MEAT (Most Economically Advantageous Tender) selection. The report proposes the use of life cycle costs in the award process of the tender by expanding the quality criteria.

In general, over the life span of a building, running and maintenance costs will exceed the initial costs of construction by far. Running costs may constitute up to 85% of the total costs. On the same scale, the design costs are likely to be 0.3–0.5% of the lifetime costs, and yet it is through the design process that the largest impact can be made on the 85% figure. Thus, more action should be undertaken to make life cycle costing a standard procedure on which decisions relating to construction work are based. This should allow an assessment expressed in monetary value taking into account all significant and relevant costs from inception to disposal, including, for example, operation, energy, maintenance, cleaning, but also in-house resources, the economical life-span of each part of the facility and consultancy fees.

<sup>26</sup> See: [www.ogc.gov.uk/documents/CP0016AEGuide11.pdf](http://www.ogc.gov.uk/documents/CP0016AEGuide11.pdf).

<sup>27</sup> See: [http://ec.europa.eu/enterprise/construction/suscon/tgs/tg4/lcalccintro\\_en.htm](http://ec.europa.eu/enterprise/construction/suscon/tgs/tg4/lcalccintro_en.htm).

<sup>28</sup> Davis Langdon Management Consulting 2007: *Towards a common European methodology for Life Cycle Costing (LCC) – Guidance Document*. See: [http://ec.europa.eu/enterprise/construction/compet/life\\_cycle\\_costing/index\\_life\\_cycle\\_en.htm](http://ec.europa.eu/enterprise/construction/compet/life_cycle_costing/index_life_cycle_en.htm).

## 5 Relevant European legislation and Information sources

As the construction sector is highly complex this section refers to the most relevant and common EU regulations when addressing GPP practises in the area of construction. This European legislative framework relates to the above mentioned environmental impact categories (see Information sources).

### Energy

- European Directive on the Energy Performance of Buildings (2002/91/EC)
- European Directive on the promotion of cogeneration(2004/8/EC)
- Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC)
- Mandate 343 to CEN - Comité Européen de Normalisation

### Construction materials and products

- Thematic Strategy on the Urban Environment
- Construction Products Directive 89/106/EEC and its amendments (revision)
- REACH regulation 1907/2006

### Waste and water

- Waste Framework Directive 75/442 (under revision)
- Water Framework Directive 2000/60/EC (WFD)

## 5.1 European legislation

- European Directive 2002/91/EC on the Energy Performance of Buildings (EPBD):  
[http://eur-lex.europa.eu/LexUriServ/site/en/oj/2003/l\\_001/l\\_00120030104en00650071.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2003/l_001/l_00120030104en00650071.pdf)
- European Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:052:0050:0060:EN:PDF>
- European Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC):  
[http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l\\_114/l\\_11420060427en00640085.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_114/l_11420060427en00640085.pdf)
- European Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products: <http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1989/L/01989L0106-19930802-en.pdf>
- European Directive 2000/60/EC establishing a framework for Community action in the field of water policy:  
<http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2000/L/02000L0060-20011216-en.pdf>
- Mandate (343) to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and estimating the environmental impact, in accordance with the terms set forth in Directive 2002/91/EC. The mandate is accessible in the following database: [http://ec.europa.eu/enterprise/standards\\_policy/mandates/database/index.cfm?fuseaction=search.detail&id=221](http://ec.europa.eu/enterprise/standards_policy/mandates/database/index.cfm?fuseaction=search.detail&id=221)
- Standardisation mandate to CEN for the development of horizontal standardised methods for the assessment of the integrated environmental performance of buildings (Mandate 350):  
[http://ec.europa.eu/enterprise/standards\\_policy/mandates/database/index.cfm?fuseaction=search.detail&id=228#](http://ec.europa.eu/enterprise/standards_policy/mandates/database/index.cfm?fuseaction=search.detail&id=228#)
- Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste:  
[http://eur-lex.europa.eu/smartapi/cgi/sga\\_doc?smartapi!celexplus!prod!DocNumber&lg=en&type\\_doc=Directive&an\\_doc=2006&nu\\_doc=12](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=2006&nu_doc=12)
- Directive 2004/42/EC of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in decorative paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC:  
[http://eur-lex.europa.eu/smartapi/cgi/sga\\_doc?smartapi!celexplus!prod!DocNumber&lg=en&type\\_doc=Directive&an\\_doc=2004&nu\\_doc=42](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=2004&nu_doc=42)

## 5.2 Studies, other information

- AgBB (Committee for Health-related Evaluation of Building Products) 2005: A contribution to the Construction Products Directive: Health-related Evaluation Procedure for Volatile Organic Compounds Emissions (VOC and SVOC) from Building Products. See: [www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2005.pdf](http://www.umweltbundesamt.de/building-products/archive/AgBB-Evaluation-Scheme2005.pdf), 6 December 2007
- CEN Technical Committee (TC) 350, on the Sustainability of Construction Works: <http://www.cen.eu/CENORM/BusinessDomains/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.asp?param=481830&title=CEN/TC%20350>
- CEN Technical Committee (TC) 351, on Construction products: <http://www.cen.eu/CENORM/BusinessDomains/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.asp?param=481830&title=CEN/TC%20351>
- CEN/TC350 Secretariat 2006: CEN/TC 350 – WI 00350001. Sustainability of construction works Framework for assessment of integrated buildings performance. Part 1: Environment, Health and Comfort and Life Cycle Cost Performances. European Standard working document as of November 2006.
- Davis Langdon Management Consulting 2007: Towards a common European methodology for Life Cycle Costing (LCC) – Guidance Document. Bruxelles: [http://ec.europa.eu/enterprise/construction/compet/life\\_cycle\\_costing/index\\_life\\_cycle\\_en.htm](http://ec.europa.eu/enterprise/construction/compet/life_cycle_costing/index_life_cycle_en.htm)
- European Commission 2004: Buying green! A handbook on environmental public procurement. Brussels: [http://ec.europa.eu/environment/gpp/guideline\\_en.htm](http://ec.europa.eu/environment/gpp/guideline_en.htm)
- European Commission 2007: Direction General Environment. 'Green' versus 'Sustainable' public procurement. See: [http://ec.europa.eu/environment/gpp/green\\_vs\\_sustainable.htm](http://ec.europa.eu/environment/gpp/green_vs_sustainable.htm), 22 October 2007.
- EIPRO 2005: Environmental Impacts of Products (EIPRO). EU DG JRC-IPTS. Bruxelles: <http://ec.europa.eu/environment/ipp/identifying.htm>
- ENPER-EXIST 2007: Applying the EPBD to improve the Energy Performance Requirements to Existing Buildings – ENPER-EXIST.WP 1 Final Report. April 2007. See: [www.enper-exist.com/pdf/reports/WP1\\_final\\_report\\_MS\\_04\\_07\\_07.pdf](http://www.enper-exist.com/pdf/reports/WP1_final_report_MS_04_07_07.pdf), 1 October 2007.
- Environmental Association Vorarlberg [Umweltverband Vorarlberg] 2007: Green Procurement in Construction. See: [www.umweltverband.at/index.php?id=beschaffung#322](http://www.umweltverband.at/index.php?id=beschaffung#322).
- EPD 2007: Using EPDs. See: [www.environdec.com/page.asp?id=300&menu=3,0,0](http://www.environdec.com/page.asp?id=300&menu=3,0,0), 4 July 2007.

- Federal Office for Building and Regional Planning 2001: Guideline for Sustainable Building. Berlin: [http://www.bbr.bund.de/cIn\\_005/nn\\_25610/EN/Publications/SpecialPublication/2006\\_\\_2001/DL\\_\\_GuidelineSustainable,templateId=raw,property=publicationFile.pdf/DL\\_GuidelineSustainable.pdf](http://www.bbr.bund.de/cIn_005/nn_25610/EN/Publications/SpecialPublication/2006__2001/DL__GuidelineSustainable,templateId=raw,property=publicationFile.pdf/DL_GuidelineSustainable.pdf)
- Gesellschaft für ökologische Bautechnik Berlin mbh 1999: Machbarkeitsstudie mit Empfehlungen zur Umsetzung der ökologisch - bautechnischen Ziele. Berlin: [http://www.procuraplus.org/fileadmin/template/projects/procuraplus/files/tenders/UBA\\_Neubau\\_BMU\\_Krit\\_2.2.pdf](http://www.procuraplus.org/fileadmin/template/projects/procuraplus/files/tenders/UBA_Neubau_BMU_Krit_2.2.pdf)
- Gesellschaft für ökologische Bautechnik Berlin mbh 2000: Leitlinien für die Baustoffauswahl. Berlin
- ICLEI 2007: The Procura+ Manual. A Guide to Cost-effective Sustainable Public Procurement. ICLEI – Local Governments for Sustainability. See: [www.procuraplus.org](http://www.procuraplus.org), 24 August 2007.
- ifz 2001: Austrian Criteria Catalogue "Check it!" Module 6 structural engineering. See: [www.ifz.tugraz.at/oekoinkauf/index\\_en.php/filemanager/download/141/modul6\\_eng%5B1%5D.pdf](http://www.ifz.tugraz.at/oekoinkauf/index_en.php/filemanager/download/141/modul6_eng%5B1%5D.pdf), 4. July 2007.
- OGC 2007: Sustainability. Achieving Excellence in Construction Procurement Guide. Office of Government Commerce (OGC). See: [www.ogc.gov.uk/documents/CP0016AEGuide11.pdf](http://www.ogc.gov.uk/documents/CP0016AEGuide11.pdf), 19 October 2007.
- ÖIBB - Austrian Institute for Construction Biology and Construction Ecology [Österreichisches Institut für Baubiologie und Bauökologie] 2007: Scientific research on building materials. See: [www.ibo.at/forschung.htm#projekte](http://www.ibo.at/forschung.htm#projekte), 1 October 2007.
- Trecodome, Chiel Boonstra 2007: Passive Housing in Europe – innovation in construction. Presentation at the Local Renewables Conference Freiburg: See: [www.iclei-europe.org/fileadmin/template/events/lr\\_freiburg\\_2007/files/Presentations/A2\\_Boonstra.pdf](http://www.iclei-europe.org/fileadmin/template/events/lr_freiburg_2007/files/Presentations/A2_Boonstra.pdf)
- UBA 2000: Grundlegende zusätzliche technische Vertragsbedingungen in den Leistungsverzeichnissen beim Bau des Dienstgebäudes des Umweltbundesamtes in Dessau. Dessau.

### 5.3 Internet sources

- [www.eebd.org](http://www.eebd.org)
- [www.lensebuildings.com](http://www.lensebuildings.com)
- [www.greenspec.co.uk](http://www.greenspec.co.uk)
- [www.uba.de](http://www.uba.de)
- [www.procuraplus.org](http://www.procuraplus.org)
- [www.iclei-europe.org/deep](http://www.iclei-europe.org/deep)
- [www.natureplus.org](http://www.natureplus.org)
- [www.blauer-engel.de](http://www.blauer-engel.de)
- [http://ec.europa.eu/environment/ecolabel/index\\_en.htm](http://ec.europa.eu/environment/ecolabel/index_en.htm)
- [www.eco-bau.ch](http://www.eco-bau.ch)

#### **Best practice examples obtainable online at:**

- [www.eu-greenbuilding.org](http://www.eu-greenbuilding.org)
- [www.greenbuildings.org](http://www.greenbuildings.org)

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