

FACTSHEET BIO-BASED SHUTTERING

Procurement of Innovative Products: Bio-Based Products in Procurement

Why bio-based shuttering?

What is (bio-based) shuttering?

Shuttering is either a temporary or permanent type of formwork or mold into which concrete or similar materials are poured. Once the concrete or similar product has hardened and settled, the shuttering can be removed. In some cases removal is complex or costly and the shuttering remains in place. The material, of which the shuttering is made, is dependent on the application. Conventionally, materials such as wood, plastic and steel are used. Bio-based shuttering can be made of various bio-based raw materials derived from various agricultural products and waste streams. Examples of such bio-based shuttering are forest waste which is pressed into panels and bio-plastics made from potato peel waste. This factsheet provides information on bio-based shuttering and how to take these into account in procurement.

Why should organisations consider bio-based shuttering in procurement?

Organisations could consider bio-based shuttering in procurement if they would benefit from one or more of the capabilities attributed to the bio-based shuttering. Bio-based shuttering potentially has different capabilities as presented below. Aspects to keep in mind are environmental impact over the life cycle of the product (this could be determined through Life Cycle Assessment in accordance with ISO 14040) and the sustainable sourcing of the input material (this could be assessed in accordance with the sustainability criteria for biobased products from EN 16751 in combination with CEN/TR 16957 - Bio-based products - Guidelines for Life Cycle Inventory (LCI) for the End-of-life phase). With this kept in mind, several potential benefits can be attributed to bio-based shuttering¹.

- *Resource efficiency*: For the production of bio-based shuttering, use can be made of agricultural by-products and waste streams. Conventionally, use is made of plastics, steel or wood. In the case of wood use, this is usually wood from forests dedicated for production purposes. This switch in

material use could improve resource efficiency and in addition stimulate the market for secondary raw materials and the circular economy in general.

- *Reduced Greenhouse Gas (GHG) Emissions*: The greenhouse gasses emitted during the production of bio-based plastics have the potential to be lower than their petrochemical equivalent². Reduced greenhouse gas emissions will in turn contribute to combating climate change.

- *Avoidance of GHG Emissions*: By using bio-based products which replace petrochemical products, GHG emissions can also be avoided. Fossil feedstock need to remain in the ground to achieve the limit of a temperature increase less than 2°C³ as is included in the COP 21 agreement and ratified by UN-countries including the EU.

Reduced GHG Emissions

PVC, a hard plastic, is one of the materials which can be used as a shuttering. Bio-based PVC is made from ethylene. Bio-based ethylene production could reduce GHG emissions compared to its petrochemical alternative with approximately 40%. This comparison takes into account CO₂ uptake from the atmosphere, polymer production and incineration but excludes GHG avoidance. Future PVC production could amount to 95% savings. Source: 'Bio-based economy and climate change', Nova Institute, 2017-01.

- *Biodegradability*: Some bio-based products have the capability of being biodegradable in the soil⁴. Assuming a baseline in which a non-biodegradable plastic shuttering is left in place in the soil, switching to a biodegradable shuttering could result in reduced presence of non-biodegradable plastics in the soil.

¹ These benefits can differ between products and should always be confirmed by the supplier.

² Bio-based economy and climate change', Nova Institute, 2017-01

³ McGlade C. and Ekins, P. (2015) 'The geographical distribution of fossil fuels unused when limiting global warming to 2 °C', Nature 157.

⁴ Biodegradation is a natural chemical process in which materials are being transformed into natural substances such as water, carbon and biomass with the help of microorganisms. Compostability is a characteristic of a product that enables biodegradation under specific conditions (i.e. a certain temperature, timeframe, etc.). (Source: ISO 472:2013 Plastics - Vocabulary)

How to take into account specific capabilities of shuttering in procurement?

Procedures and purchasing strategies

Procurement within the infrastructure construction materials sector often implies procurement of services or works. Shuttering is likely to be procured as part of a service or works contract such as a bridge or road construction contract. The capabilities of bio-based shuttering in procurement could be described in terms of GHG emissions and biodegradability.

Example 1. GHG Emissions

The potential capability of reducing GHG emissions would be an important benefit and could therefore be confirmed as part of the procurement criteria.

Minimum Requirement: The carbon footprint of the raw material used for fabrication of the shuttering should be less than the carbon footprint of an appropriate reference raw material.

Additional information: The carbon footprint of the raw material

should be conducted in accordance with ISO 14067 or equivalent. The procurer shall specify the reference raw material. An example of an appropriate reference material could be PVC.

Verification: The tenderer shall provide information on the raw materials used and the carbon footprint results, which shall be reported according to ISO 14067 or equivalent. The comparison with the reference raw material shall be included in the report.

Example 2. Biodegradability in soil

If the procurer wishes to purchase a shuttering which should biodegrade in the soil, this criterion can be used to confirm biodegradability in the soil.

Minimum Requirement: The shuttering should biodegrade in the soil.

Additional information: All materials used in the shuttering must be biodegradable in the soil. To prove this, in practice often use is made of standard EN 13432:2000. When using this standard, the medium in which the biodegradation should take place changes, as well as the timing of biodegradation. Following this information, biodegradability could be proven in accordance with EN 13432:2000 or an equivalent standard such as the French Standard 'NF T51-800:2015-11: Plastics – Specifications for plastics suitable for home composting'. Other standards that can be used are 'ISO 17556:2012 Plastic – Determination of the ultimate aerobic biodegradability of plastic materials in soil', or 'ASTM D5988-12 Standard test method for determining

aerobic biodegradation of Plastic Materials in Soil'. Moreover, French standard 'NF U52-001 Biodegradable materials for use in agriculture and horticulture- Mulching products' and the Italian standard 'UNI 11462 Plastic materials biodegradable in Soil', include specifications defining the test methods and criteria (minimum pass levels) to designate a material as biodegradable in soil

An explanation of the testing procedure used to determine biodegradability under soil conditions should be included by the manufacturer.

Verification: Products holding a relevant label fulfilling the listed requirements will be deemed to comply. A technical dossier of the manufacturer or a test report demonstrating that these requirements have been met is accepted. The following labels comply with the EN 13432 (or equivalent) and can be used for verification:

- Vincotte: OK biodegradable soil,
- Din certo : DIN-Gepuft biodegradable soil

What bio-based shuttering are available?

The following databases contain information on the availability of bio-based shuttering:

- The Biobased Bouwen' database (the Netherlands) provides two different types of bio-based (compressed wood waste) shuttering products and their producer. Detailed information about the product, supplier and whether the product is certified is available within the database.
- The 'Materia' database (the Netherlands) provides information on one bio-based plastic which is also used to make a shuttering product. Information about the producer and product characteristics are made available.

Points of attention

The following potential barriers and bottle necks have been identified by procurers, policy makers and professionals that work with bio-based products in procurement. The relevance of each of these potential barriers is discussed for the product group 'shuttering':

- **Costs:** In one procurement example, the bio-based shuttering was found to be approximately 5% more expensive than a conventional shuttering. The Total Cost of Ownership was reduced and comparative to a conventional shuttering as the bio-based shuttering didn't have to be removed after casting of the concrete.
- **Level of development:** Products from three producers are found to be commercially available. The level of development is therefore considered new.
- **Availability:** The bio-based shuttering producers identified through the databases are based in the Netherlands.
- **Quality of the products:** The quality of bio-based shuttering products can differ. The time for biodegradation to take place, the type of raw materials used and the design all influence the quality.

