



Exercise 4c.2: Environmental checklist

Estimated time requirement: 30 minutes

Introduction

When writing a product standard, it is important to evaluate how products can affect the environment. Ideally, such evaluation is conducted as early as possible in the process of standard development. In order to facilitate this evaluation, the European Union’s CEN Environmental Helpdesk (CEN/EHD) has developed various support tools. One key tool an environmental checklist, which can guide working groups in identifying aspects during the standards development process.

Task

Please form groups of 2-3 people and analyze the background text carefully with regard to the impacts along the lifecycle stages of clay bricks. Based on the background text above, go through the checklist in table 1 below and identify the environmental aspects relevant to the product (reference flow: 1 kg of clay brick). Fill in each box if there are significant product environmental inputs and outputs by using the information presented in the text above. In addition, please fill in other relevant aspects and provide at least three recommendations on how to include environmental considerations in the comments section.

Background

You have recently joined Technical Working Group (TWG) RECE-2025 for revising the European standard “CEN - EN 771-1: Specification for masonry units - Part 1: Clay bricks” with special regard to environmental considerations. During the inception meeting of the TWG, it was agreed to identify potentials for including environmental specifications by analysing the lifecycle of a standardised clay brick based on publicly available LCA data from the University of Pretoria, South Africa. Following this LCA, the environmental impacts are illustrated by using impact category indicators (e.g. emissions as kg of CO₂ equivalent, water, land use and energy) in order to compare results and understand critical processes and resources.

Note: The information presented in the text below has been modified and simplified for the purpose of this exercise. Details about the original LCA can be found on the following webpage: <http://claybrick.org/> An illustration of the lifecycle stages of a clay brick is presented in the figure below. All environmental impacts are normalized to a reference flow of 1 kg of clay brick.

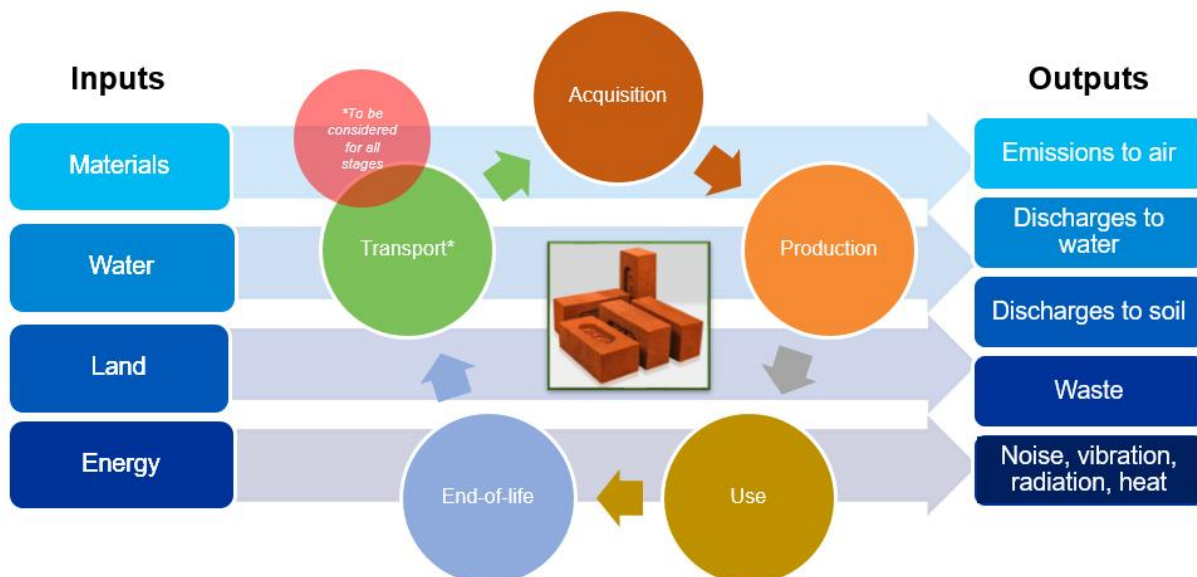


Figure 1: Simplified lifecycle of a clay brick



Lifecycle of a clay brick

The main component of the bricks is clay, which is mined from open cast mines usually during periods of little rainfall. 1 kg of clay bricks results in 0.15 m³ of tailings during raw material extraction at the mining site, 0.38 l of water consumption and 0.018 kWh of energy (resulting in 0.06 kg of CO_{2-eq} emissions). The mined clay is stockpiled for a number of weeks to allow it to weather. This weathering eases the subsequent milling process and helps to save energy. The clay particles are reduced in size by milling and mixed with additives to lower salinity and increase plasticity, requiring 0.01 kWh of energy and emitting 0.02 kg CO_{2-eq} in the process.

The dry mix is then transported (requiring 0.002 kWh of energy and emitting 0,004 kg CO_{2-eq}) to the manufacturing facility. Subsequently, 0.08 l of water is required for dust settling and irrigation within the factory. After forming of the bricks, drying is required (using 0.015 kWh of energy and emitting 0.03 kg CO_{2-eq}). To make bricks more durable they are burnt in a tunnel kiln. Tunnel kilns are continuously fired and brick packs move in the course of 48 to 72 hours through various temperature zones. Maximum firing temperature can vary from 1,050 °C to 1,180 °C whereby 0.026 l fresh water per brick is used. Further, 0.012 kWh of energy are needed and the production processes emits 0.16 kg of CO_{2-eq}.

The finished clay bricks are transported from the production facility to the construction site together with other building materials. Besides gasoline for the vehicle during transport (4.03 kWh, 0.84 kg CO_{2-eq}), the construction of a brick wall requires 0.05 m² per 1 kg of brick. For the purpose of this LCA, it is assumed that the brick wall will require no maintenance over its lifespan and no resources are required in the use phase of the product. At the end of life, the brick wall is demolished. From 1 kg of clay brick, an average of 63.3 % is landfilled and 36.7% is recycled. During demolition and landfilling, emissions of 2.34 kg CO_{2-eq} are released and 14.88 kWh of energy are consumed. The land use requirements of landfilling translate into 0.0717 m². For demolition and recycling only 0.0007 m² of land are needed. In addition, total of 0.34 kg CO_{2-eq} are emitted and 1.45 kWh of energy are used during recycling.



Table 1: EU Environmental Checklist

Technical working group: RECE-2025			Title of standard: CEN - EN 771-1: Specification for masonry units - Part 1: Clay bricks					Date of last modification of the environmental checklist: Date of training			
Environmental Issue	Stages of the lifecycle										All stages
	Acquisition		Production		Use			End-of-Life			
	Raw materials and energy	Pre-manufactured materials & components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ Material and Energy Recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials	0.15 m ³										
Water	0.38 l		0.08 l + 0.026 l								
Energy	0.01 kWh	0.01 kWh	0.015 kWh + 0.012 kWh				1.45 kWh			14.88 kWh	0.002 kWh + 4.03 kWh
Land					0.05 m ²			0.0007 m ²		0.0717 m ²	
Outputs											
Emissions to air	0.06 kg CO _{2-eq}	0.02 kg CO _{2-eq}	0.03 kg CO _{2-eq} + 0.16 kg CO _{2-eq}				0.34 kg CO _{2-eq}			2.34 kg CO _{2-eq}	0.004 kg CO _{2-eq} + 0.84 kg CO _{2-eq}
Discharges to water											
Discharges to soil											
Waste											
Noise, vibration, radiation, heat											
Other relevant aspects											
Risk to the environment from accidents or unintended use	Health and safety during mining operations		Health and safety during milling and drying operations		Structural stability			Health and safety during demolition			
Customer information			Recycled content		Insulation factor						
<p>Comments: Based on LCA results of clay bricks, the following clauses could be included in standard CEN - EN 771-1: 1) use of secondary raw materials during production; 2) lightweight construction to reduce required amount of material during production; 3) consumer information on thermal insulation value for reference during use phase.</p> <p>NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the lifecycle, is included in the stage of transportation.</p> <p>NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.</p>											