

## **Towards a simpler durability prediction**

To accommodate a documented durability demand in the 2<sup>nd</sup> sustainability wave

The energy consumption for the production of building materials is huge. Very huge. 11 % of the CO<sub>2</sub> emission is caused by the world's energy production originating from the production of building materials. Today, society has a major focus on reuse, to minimize the use of limited resources such as raw materials and energy. However, for new constructions use of reused materials is a niche.

The fourth largest building material waste fraction was in 2020 fired clay bricks, with 225.000 tons, corresponding to almost 50 % of the yearly used fired clay bricks for new constructions, though the reused fired clay bricks correspond only to around 1-2 %. A major challenge to overcome when upscaling the reuse of construction materials from a niche to a common product is a needed change from an experience to a knowledge-based approach.

Reuse is related to a whole group of challenges. One of them is sorting out pieces with too little remaining durability, meaning when the expected lifetime of the reused material does not match the expected lifetime of the construction being built into.

Today, salt weathering tests are the most frequent durability (aging) tests performed in the laboratory, reflecting their worldwide importance for new constructions and conservation. Such tests have a duration of 3-4 months. This project aims to examine and optimize a new and simpler measuring method at DTU Sustain, and its reliability compared to traditional salt weathering tests. More specifically, the measuring method consists of an electrochemical determination of the effective diffusion being related to the Biot number (a transport number through the porous material).

Durability measurement and assessment experience will be shared with the stakeholders "Genbrugsmursten" and "Technological Institute, Masonry".

The aim is to enable simpler durability prediction, which will make it possible to test a larger number of materials, and thereby offer more well-described re-used materials.

The project period is May 2024-October 2026. Towards the end of the project, the results of the project will be shared in a workshop targeted to practitioners (consultancy industry, contractors, and authorities).