

The environmental benefits of relocating buildings

As the climate on earth deteriorates, actions are carried out within Europe to limit the number of dangerous emissions to reduce the environmental consequences related to greenhouse gases. One industry that accounts for a large part of these emissions is the construction sector and this can further be related to the use of raw materials sourced from nature. A strategy to lower the use of raw materials needed to produce new products is to reuse already existing products. Reusing materials and products are already being implemented in the construction sector, and for development to continue, several ways of reusing materials must be explored. A possible solution to implement reuse in the construction sector is to relocate buildings instead of demolishing them, which could reduce the need for new materials.

This study investigated the process of relocating a building from its original site to a new location and calculate the climate impact that is generated throughout the process (Case A). To compare the emissions generated when a building is relocated, another case was designed to calculate the climate impacts of demolishing the same building and constructing a new building (Case B). The climate impact was measured in Global Warming Potential (GWP) in kg CO₂e and divided by the gross floor area of the building (BTA).

To calculate the climate impact of a relocation of a building, two things were required; A building that the calculations would be based on as well as an understanding of how a relocation of a building is performed today. The building that was studied was a detached house with a souterrain design constructed in the 1950s. An interview was conducted with a company that specializes in moving buildings and during the interview it was discussed how a move would be carried out for the building on which the study would be based. From the interview, it was considered that the entire building could not be transported, which meant a part of the building had to be demolished.

The results showed that when relocating a building from its original site to a new location, the biggest impacts were related to the construction work needed to enable transportation. It consisted of preparatory work with construction machines that were used to enable a lift of the house, as well as to then install the building on the new site. For the building to be placed in a new location, a new foundation was required to be constructed. This process was the second largest contributor to the climate impact. The results are presented in Figure 1.

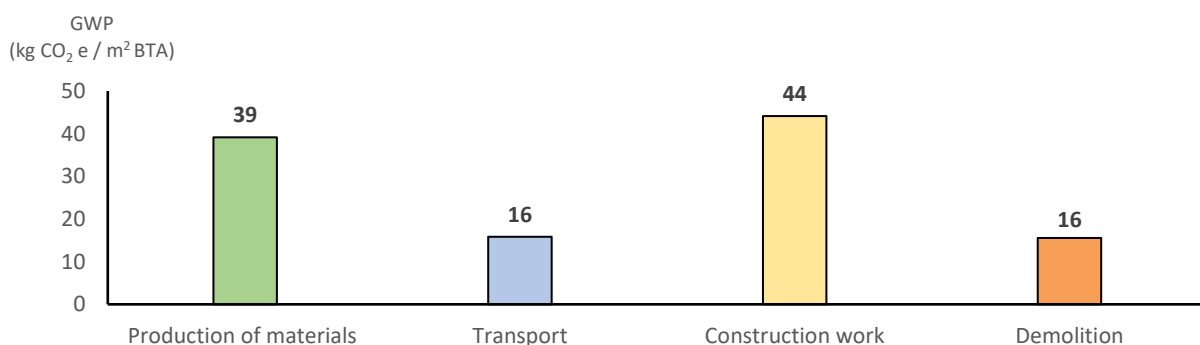


Figure 1 Climate impact of different processes in the relocation of the building

Once the climate impact of relocating a building had been calculated, a comparison could be made with the case where a new house was to be built. The results showed that relocating a building would generate a lower climate impact than constructing a new one, as shown in Figure 2. This comparison also showed that the biggest difference in climate impacts between relocating a building and constructing a new one was related to the new materials that needed to be produced for the new building.

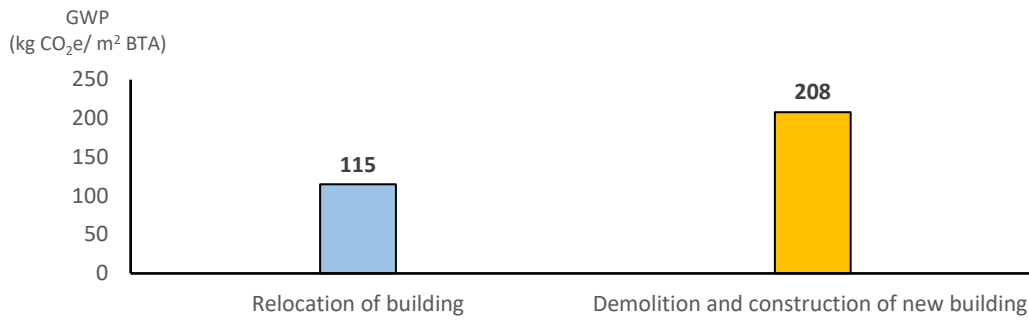


Figure 2 Comparison of climate impact between Case A and Case B

An environmental payback time was calculated considering the energy use for space heating and domestic hot water use, where the relocated building had a higher energy use compared to the newly constructed building. This resulted in an environmental payback time of 141 years, implying that after this time, the relocated building would have generated the same climate impact as the newly constructed building. The outcomes of this study showed that it could be a potential environmental benefit to relocate a building rather than demolish it and construct a new one.