New study shows potential of concrete buildings to balance the energy grid and reduce CO_2 impact

Brussels, 26 October 2016: A new study by 3E has demonstrated the huge potential of buildings' thermal mass to maximise the use of renewable energy. This can result in up to a 25% CO_2 reduction per dwelling, up to 50% reduction in the need for peak electricity supply capacity and savings of up to €300 per household per year.

One of the challenges which we face today in terms of renewable energy is the mismatch between when this energy is generated and when it is needed. In order to make the most of the energy generated by renewables, such as wind and solar, flexibility is needed in the electricity grid.

Concrete is a heavyweight building material with a high thermal mass. This means that when it is warm, concrete absorbs unwanted heat, slowing the rise in temperature in indoor rooms. When temperatures fall in the evening, concrete releases the heat which it has absorbed during the day, keeping indoor rooms at a comfortable temperature. Thermal mass has traditionally been used to improve the energy efficiency of buildings and provide a stable indoor temperature.

A further - previously untapped – benefit is to use the thermal storage capacity offered by the structure to provide flexibility in energy grids and boost the uptake of renewable energy.

According to this study, commissioned by The Concrete Initiative, heavyweight buildings can provide this flexibility by allowing for consumer energy demand to be shifted in time ("active demand response") by using structural thermal energy storage. Therefore, in addition to concrete's well-known benefits in terms of the energy efficiency of individual buildings, its unique storage capacity can be harnessed by smart grids to increase the share of renewable energy in the grid. Thanks to concrete and smart controls, it is possible to use energy during off-peak times (e.g. early in the morning), which is then stored in the concrete and slowly released over the next few hours. This has benefits in terms of the electricity grid (reduced transmission and distribution infrastructure), lower investment costs, lower operational cost for consumers, higher renewable energy penetration, and reduced CO_2 emissions. Furthermore, this strategy does not require investment in extra storage devices.

The study contains recommendations for the current revision of the Energy Performance of Buildings Directive (EPBD) to fully exploit structural thermal energy storage. These include the need to recognise the available structural storage capacity in buildings, and to emphasise the relationship between buildings and the grid.

Click here to learn more about the benefits of activated thermal mass and to download the study.