

# The impact of fix insulation thickness on life time savings

In many new-build and renovation projects, the thickness of the insulation layer is restricted. This can be due to the pre-determined depth of wall cavities or rafters, minimum ceiling height, architectural details on outer facades, or the need to limit surface losses in the case of internal lining solutions. In such cases, the life time energy savings depend on the thermal conductivity of the insulation product used.

This particular case compared different solutions for the insulation of a wall (internal lining).

## Main results:

- PU insulation shows slightly higher environmental impacts at the product level when compared to some other insulation products. However, thanks to its high insulation capacity, PU saves more energy over the building life cycle and the life time environmental impact is therefore similar to that of other materials.

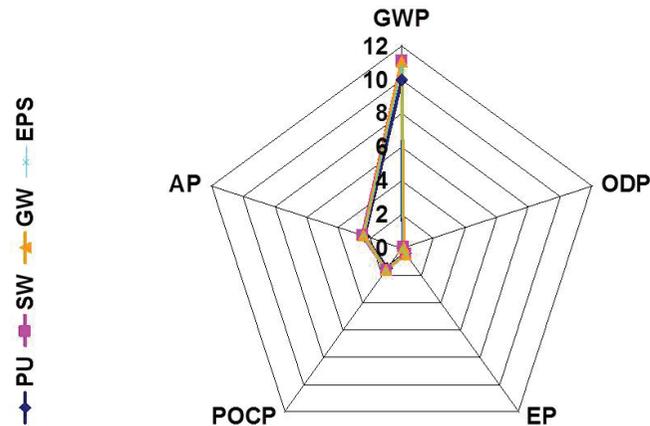
The thickness restriction resulted in different U-values for the different design solutions based on the thermal conductivity

of the insulation products covered. This in turn led to different energy consumption levels in the building use phase with the PU solution offering the highest energy savings.

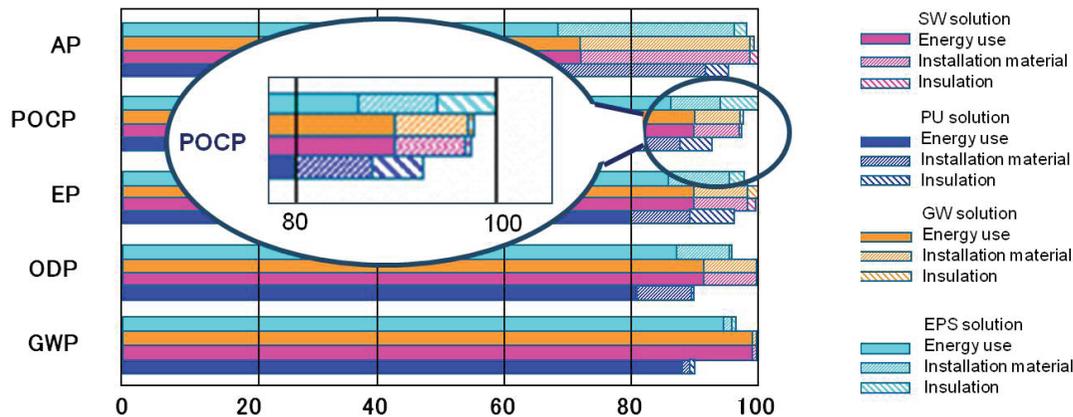
|                                   | PU solution | EPS Solution | SW Solution | GW Solution |
|-----------------------------------|-------------|--------------|-------------|-------------|
| Thickness <i>mm</i>               | 50          | 50           | 50          | 50          |
| Lambda <i>W/mK</i>                | 0.023       | 0.034        | 0.037       | 0.036       |
| U-value <i>W/m<sup>2</sup>K</i>   | 0.36        | 0.47         | 0.54        | 0.54        |
| Wall surface <i>m<sup>2</sup></i> | 134         | 134          | 134         | 134         |

## Life Cycle Analysis

The LCA looked at the environmental impacts of the construction/insulation materials and the impacts caused by the energy consumption during the building's use phase. The latter was necessary, as different insulation solutions resulted in different U-values and, hence, different energy use levels.



Normalised environmental impacts per impact category (temperate oceanic climate)



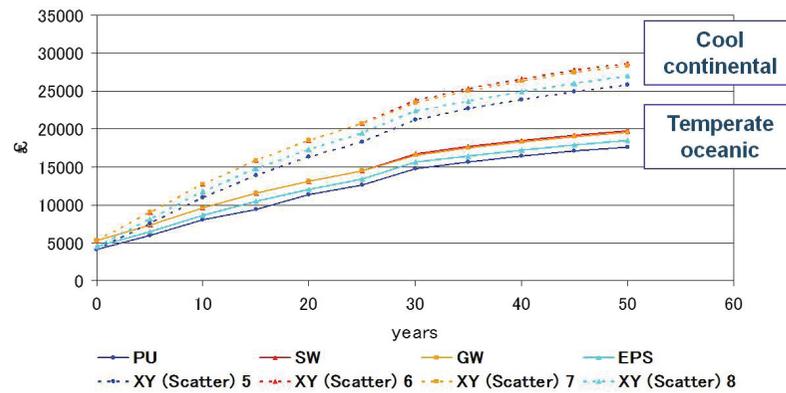
LCA Results expressed as characterised data (relative to maximum value in each impact category) - Analysis of energy and material contribution (temperate oceanic climate)

The study also looked into the contribution of the use phase energy, the internal lining materials and the insulation separately. The overall results show small differences between the insulation solutions. Generally, the internal lining installation materials have similar impacts which are negligible compared to the total impact of the building component.

The enlarged part of the following figure demonstrates that, while the PU solution has a high environmental impact for some indicators, the overall PU solution has a similar or slightly lower impact than the other solutions thanks to greater energy savings achieved by PU.

## Life Cycle Costs

The PU solution is very cost-competitive thanks to the higher energy savings achieved in the use phase.



LCC of the internal lining solutions for two climatic zones (50 years cumulated costs, 3.5% discount rate)

Source: [http://www.pu-europe.eu/fileadmin/documents/Reports\\_public/LCA\\_LCC\\_PU\\_Europe.pdf](http://www.pu-europe.eu/fileadmin/documents/Reports_public/LCA_LCC_PU_Europe.pdf)