

1a Conferenza Nazionale POLIURETANO ESPANSO RIGIDO

PU – sustainable solutions for nearly zero energy buildings

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Secretary General**



Who we are

- PU Europe is the European association representing the PU (PUR/PIR) insulation industry;
- Insulation boards, sandwich panels, spray foam, insulation cores for building blocks, technical insulation, SIPs, district heating pipes;
- PU is the high performance insulant particularly suited for nearly zero energy buildings.



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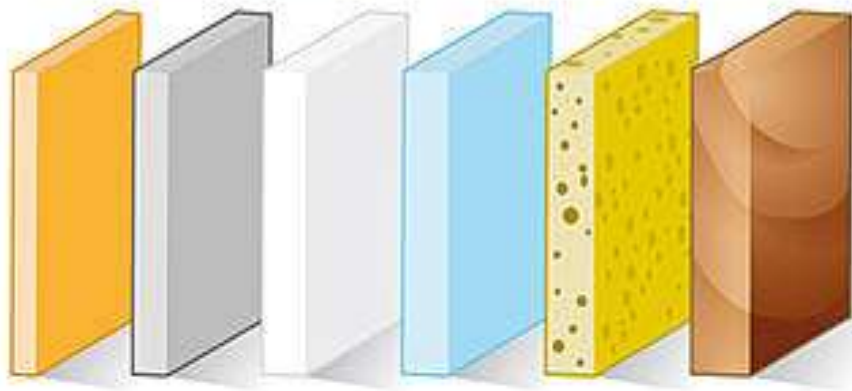
What is a sustainable building?

“**Sustainable buildings**” must strike the best balance between minimising environmental impacts and life cycle costs while stimulating social development.



PU is the most efficient, commonly available insulation product, ...

Thickness insulation:



PU 100 mm

EPS graphite 133 mm

EPS 146 mm

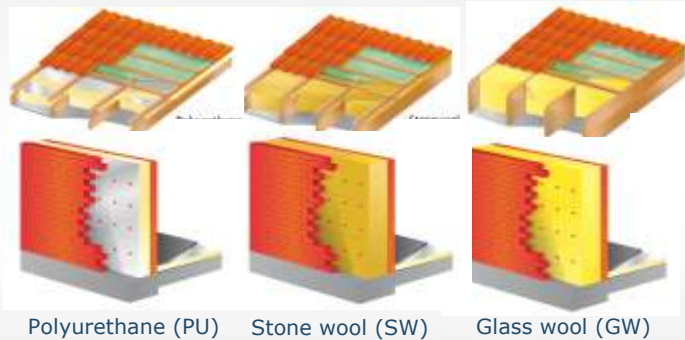
XPS 150 mm

MW 154 mm

Woodwool 167 mm

**... but what
about
environmental
performance?**

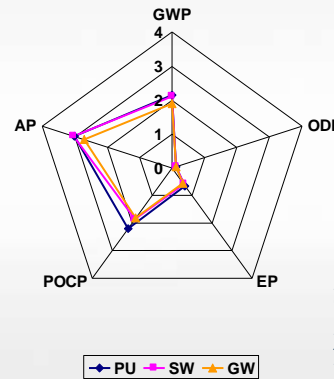
2010 – BRE LCA/LCC project Whole new residential building



Polyurethane (PU) Stone wool (SW) Glass wool (GW)

3-bedroom, 2-storey detached house
U-values: roof=0.13, wall=0.15, ground floor=0.18
Fixed internal floor area of 52 m² and fixed attic volume

LCA Results - Normalised data Construction materials and insulation

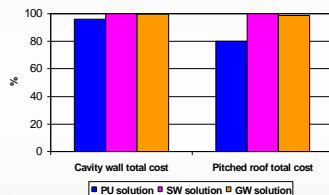


→ Similar environmental performance for all insulation solutions

Environmental Indicators
GWP global warming potential (kg CO₂ eq)
ODP ozone depletion potential (kg CFC11 eq)
EP eutrophication potential (kg PO₄)
AP acidification potential (kg SO₂ eq)
POCP photochemical ozone creation potential (kg ethene eq)

LCC Results

Cumulative costs @3.5% discount rate
Temperate oceanic climate



Cavity wall SW and GW solutions 4% more costly: more external brick wall, longer wall ties and larger foundation

Pitched roof SW and GW solutions 20% more costly: deeper rafters and larger roof covering surface area

Note: the study excluded the cost of additional land unable to be utilised because of larger building footprints

→ PU solution more cost effective

Conclusions

•LCA

- All insulation solutions give similar environmental performance
- Insulation material has limited contribution to overall building environmental performance

•LCC

- PU solution lowest life cycle cost

2013 - New PwC study to compare the performance of different insulation products in end-use applications



- Use of European standards: EN 15643-2, EN 15978, EN 15643-4 and published product EPDs
- End-use applications
 - Residential pitched roof renovation
PU, glass fibre, stone fibre, wood fibre
 - Commercial building new flat roof
PU, stone fibre
 - Commercial building sandwich panel wall
PU, stone fibre
- Three climate zones

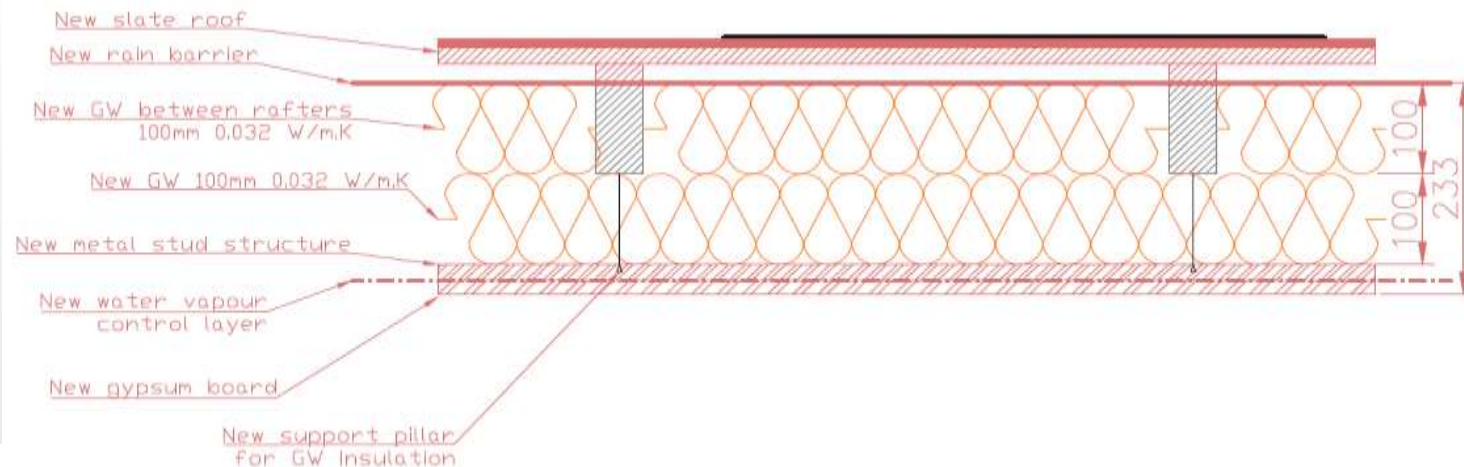
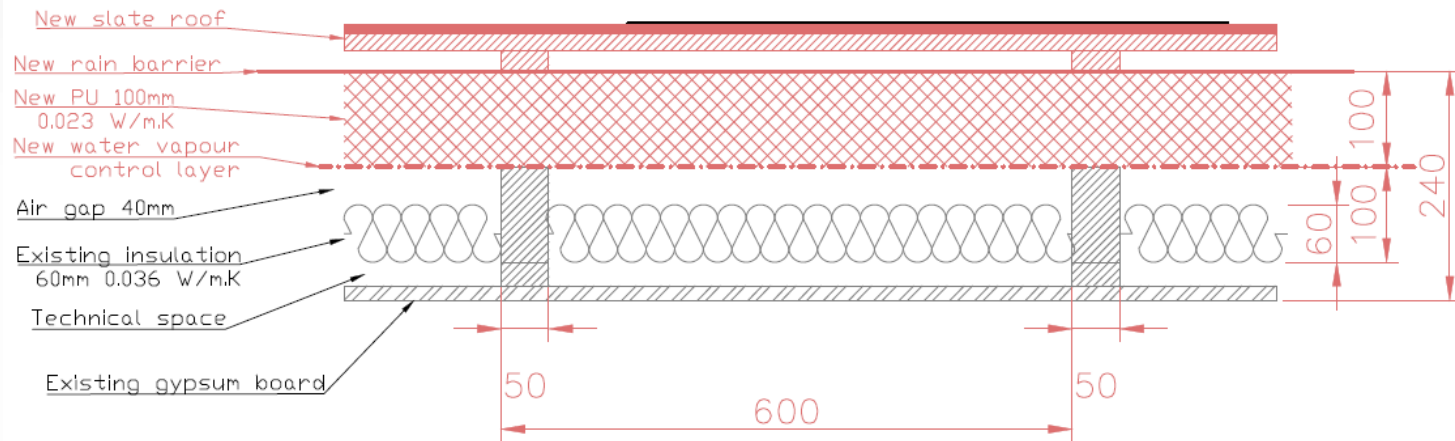


Residential Pitched roof renovation

Design options: $U = 0.16 \text{ W/m}^2\text{K}$

Different solutions for different insulants: PU, stone fiber, glass fiber and wood fiber

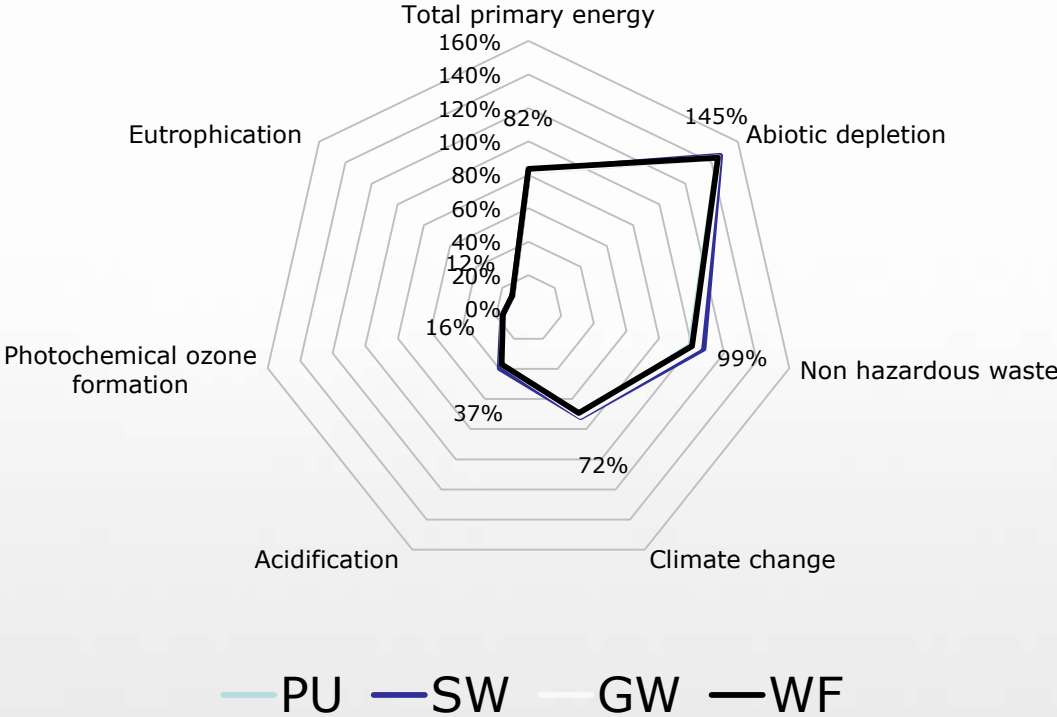
Example: PU (above rafter) and glass fibre (below rafter)



Residential Pitched roof renovation Preliminary Environmental Assessment

Environmental performances similar
for all insulation solutions

Normalised LCA results (level of European inhabitant)

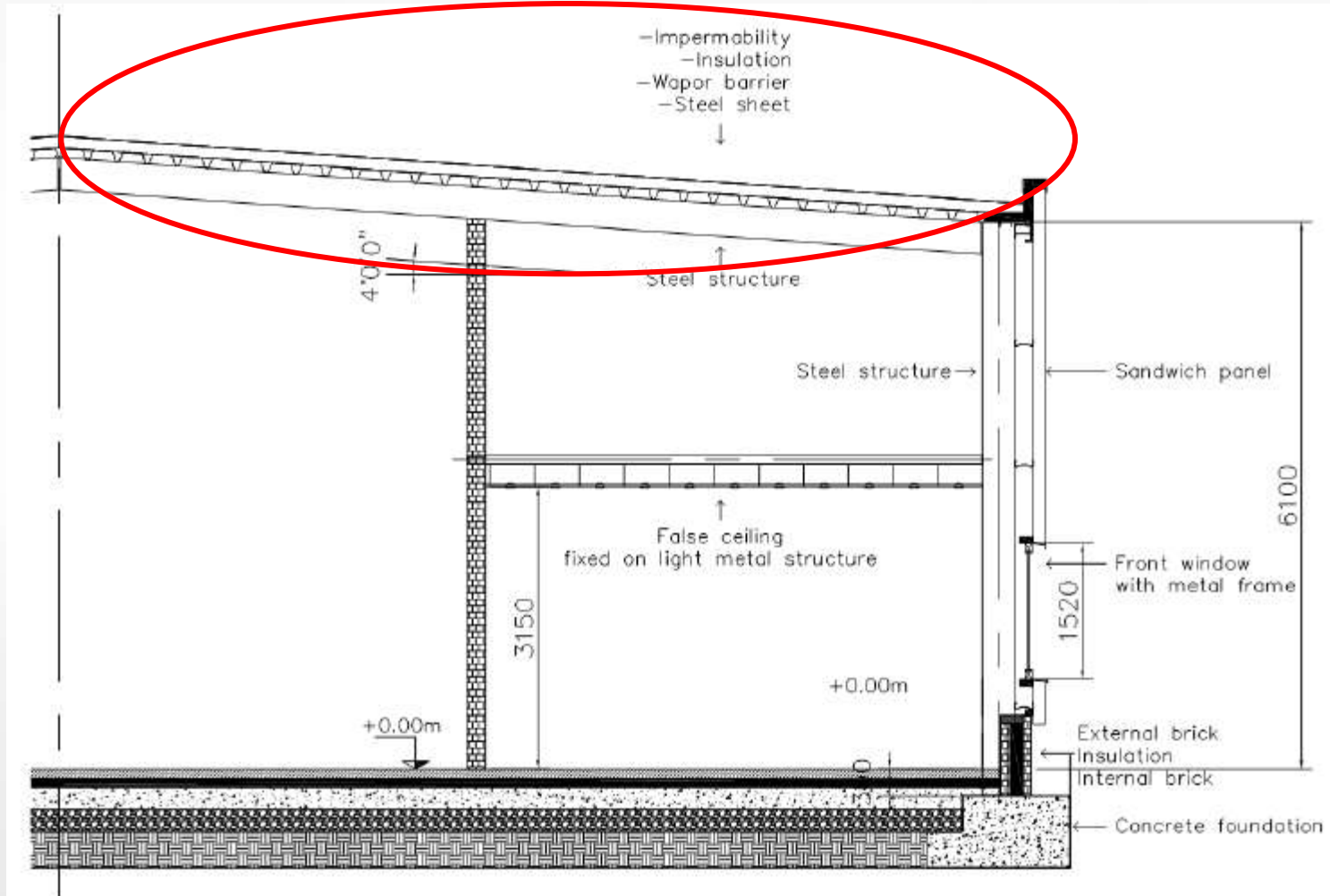


Commercial new flat roof

Design options: $U = 0.18 \text{ W/m}^2\text{K}$

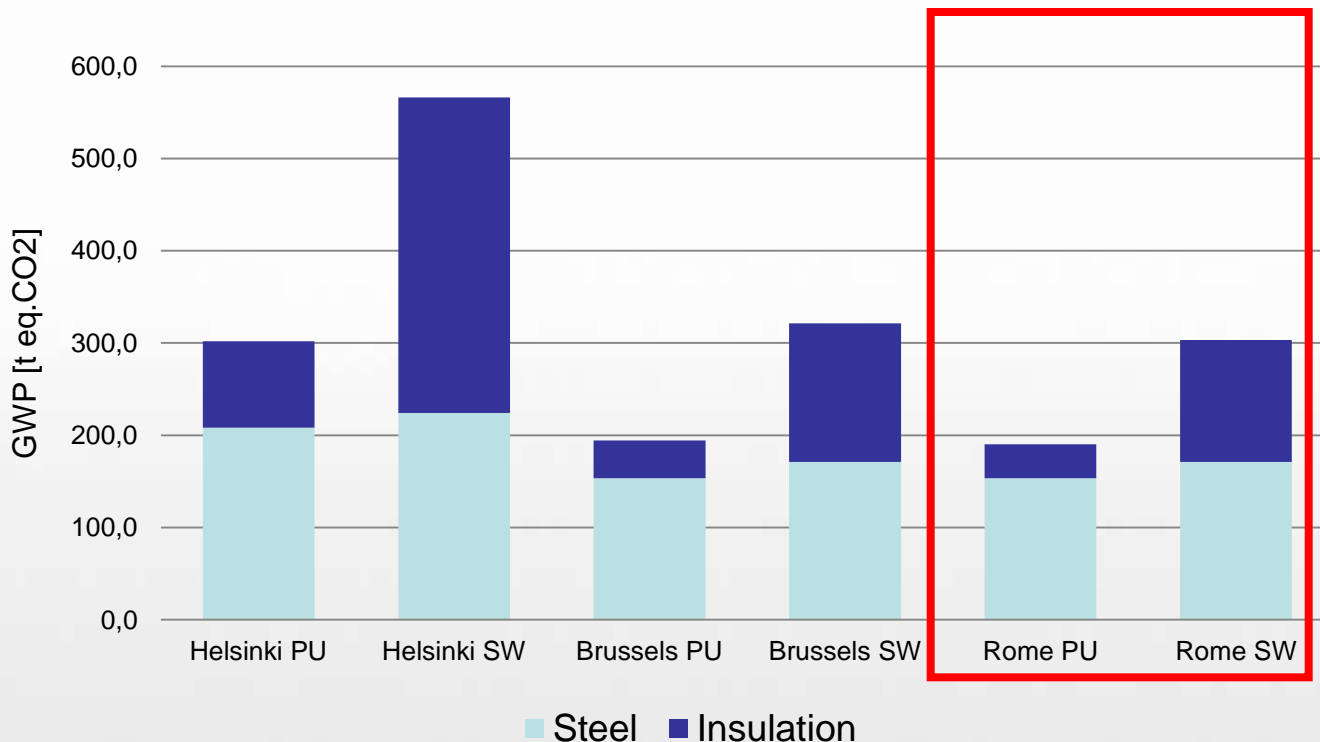
Surface:
ca. 2800m²

Similar
build-up
for each
insulation
type: PU
and stone
fiber



Commercial new flat roof Preliminary Environmental Assessment

PU has significantly lower global warming potential* than stone fibre solution thanks to lighter and more efficient insulation layer and 10% lighter steel structure

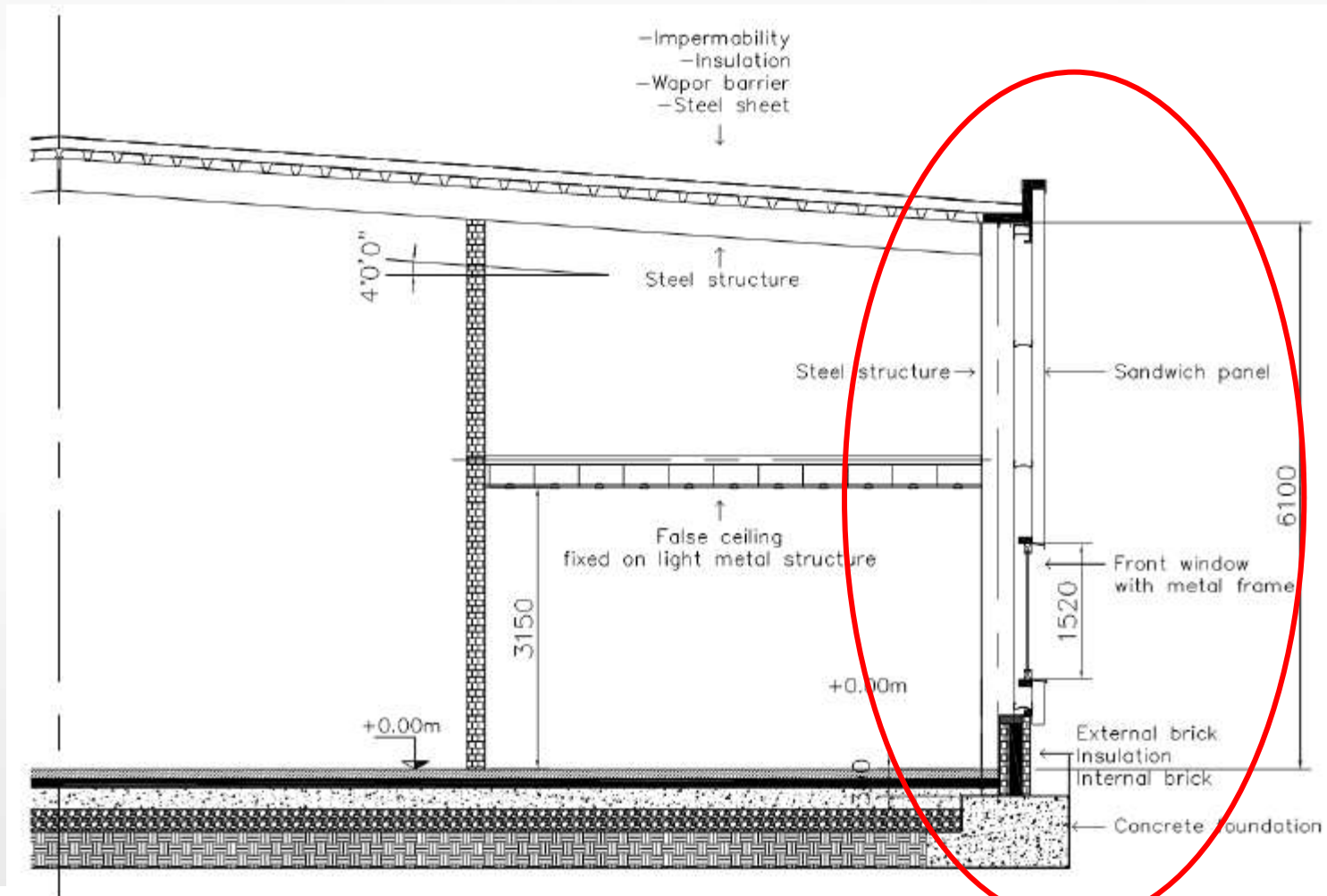


* Other environmental indicators not yet available

Commercial sandwich panel walls

Preliminary Environmental Assessment

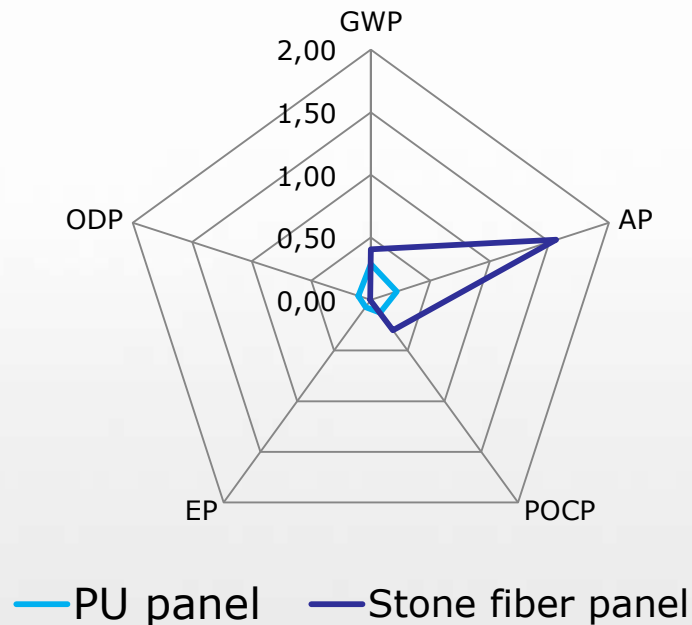
Similar build-up for each insulation type: PU and stone fibre



Commercial sandwich panel walls Preliminary Environmental Assessment

Very good performance of PU solution in most impact categories thanks to lower density and thickness

Normalised LCA results (level of European inhabitant)



Conclusions

- Sustainability performance of insulation solutions depends on end-use application;
- Environmental performance of insulation solutions are fairly similar in applications like pitched roof;
- PU shows better performance, when specific mechanical properties are required (flat roof, sandwich panels);
- These results cannot be extrapolated to all applications and all impact categories, but general trend is already confirmed

Watch life the construction of a passive house in Brussels



Polyurethane passive house in Brussels



- Offer policy makers the possibility to visit house during construction and use;
- Verify satisfaction levels

www.polyurethanes.org/passivehouse



Thank you for your attention

www.pu-europe.eu

www.excellence-in-insulation.eu

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