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Plastics innovations for high performance and circularity in construction

@QuentindeHults @BASF

EP Intergroup Climate Change Biodiversity and Sustainable Development, March 2019

Plastic : a material of choice for sustainable construction

Performance

Durability

Weathering resistance

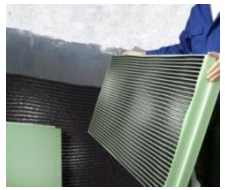
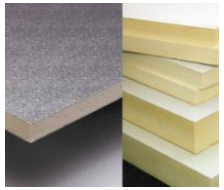
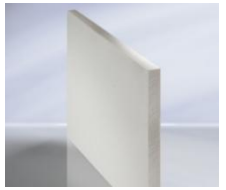
Low maintenance

Cost effectiveness

Light weight

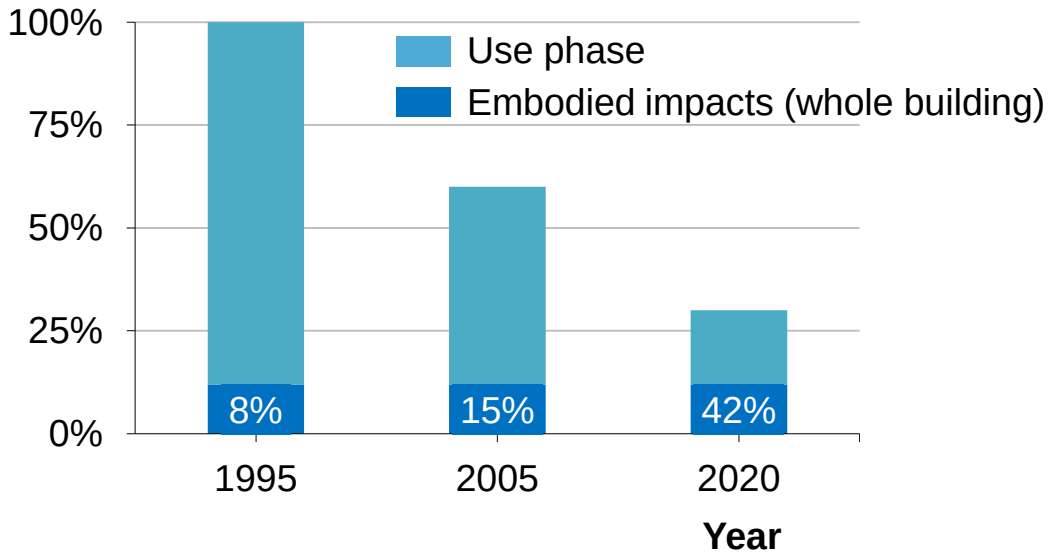
Design flexibility

Plastic foams : the highest insulation performance for buildings

1950	1960	1970	1980	1990	2000	2010	today
Styropor® EPS	**Styrodur®** XPS		**Elastopor®** PUR	**WALLTITE®** PU sprayfoam	**Neopor®** Grey EPS	**Elastopir®** PIR	**Slentite®** PU aerogel
							
Typical thermal conductivity (λ value)							
40 mW/mK	**34 mW/mK**		**23 mW/mK**	**25 mW/mK**	**32 mW/mK**	**21 mW/mK**	**17 mW/mK**
In practice to have the same insulation as 1m thickness of wood (oak or beech)							
20 cm	**17 cm**		**11.5 cm**	**12.5 cm**	**16 cm**	**10.5 cm**	**8.5 cm**

Thanks to the energy saved from higher insulation levels, the relevance of embodied impacts is gaining importance

- Primary energy over 50 years building life cycle



Source: Dr. Peter Mösle, Drees & Sommer Advanced Building Technologies GmbH

Relevance of embodied impacts on the entire life cycle is increasing considerably

... this makes the choice of materials and technics over the life time much more important

… this makes the use of building's Life Cycle Assessment more and more important to assess all impact

Closing the loop

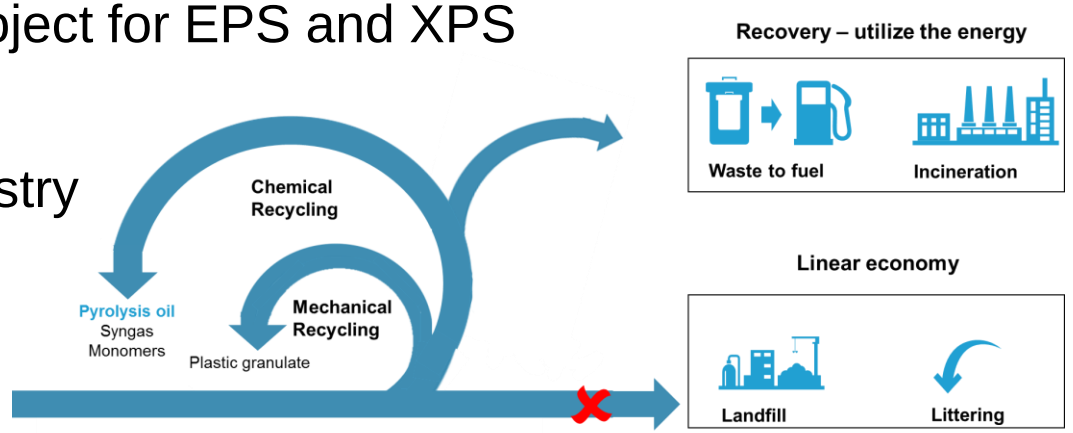
- Building applications have long life time, waste stream still limited but will increase

  Building & Construction : Around 20% of plastic usage, around 5% of plastic waste

- Energy recovery is a very valid option from a LCA point of view and to avoid landfilling.
  Current end of life for post consumer building & construction plastic waste :

  24% recycling - 43% energy recovery - 33% disposal

- Plastics can be recycled, despite challenges (mixed streams, legacy substances…)
  - Mechanical recycling, eg. PolyStyreneLoop demo project for EPS and XPS
  - Chemical recycling
    - turning waste into feedstock for the chemical industry
    - complementing other options
    - BASF pilot : ChemCycling



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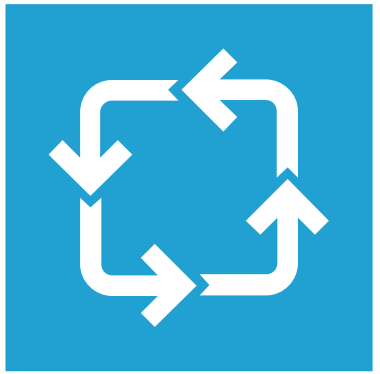
Policy recommendations for sustainable buildings

- Aim for nearly zero energy building stock : more and better renovation
  - EPBD implementation
  - Aligning renovation strategies with climate goals
  - Energy efficiency first

- Use Life Cycle Assessment (LCA) at building level to consider all impacts
  - Level(s) as basis for future initiatives
  - LCA to be used to assess all options, including recycling



- Supportive and technology open framework for recycling
  - Including chemical recycling
  - Encouraging value chain developments

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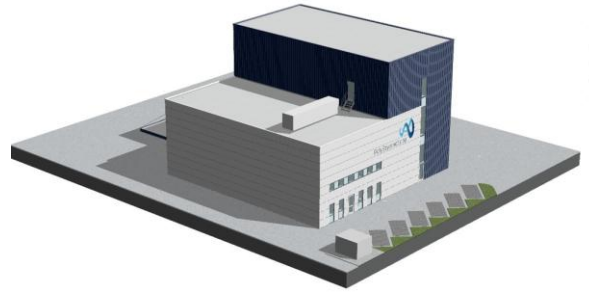
Example : PolyStyreneLoop
Recycling of old EPS and XPS insulation boards

PolyStyreneLoop

- Dealing with legacy substance HBCD
- Creating new products: polystyrene and bromine
- Joint Commitment to Circular Economy by European Styrenic industry
- Demo plant and pilot value chain (collection of waste stream) aiming to treat 3000 t/year



https://polystyreneloop.org/

Project financed with help of the European Commission, on the Environmental and Governance Program LIFE 16 ENV/NL/000271

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Principle of ChemCycling

Partnership and collaboration are key for success

BASF:
Oil as feed
for Verbund

Partners & BASF:
Pyrolysis with
plastic waste

BASF:
Recycled chemicals
via mass allocation

Waste management:
Waste collection
and sorting

Customers and consumer brands:
Products with allocated
recycling content

Consumers:
Consumption &
end of product life