

KNT Symposium - Bischof



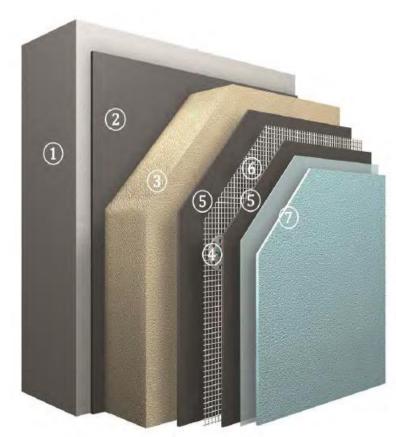
Techno-economic & environmental assessment of chemical recycling for technical plastics



- Focusing EPS-based ETICS

Motivation

- ETICS (External Thermal Insulation Composite Systems) are a popular solution for building insulation, benefits: increased energy efficiency and building longevity
- Expanded Polystyrene (EPS) is the predominant insulation material in ETICS (~80% market share), benefits: cost effectiveness, light weight, durability and excellent insulating properties



(1) Building envelope, (2) Adhesive mortar, (3) insulating material: EPS, (4) Dowels or rail systems, (5) Reinforcing mortar, (6) Reinforcing mesh, (7) Exterior coating

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Challenges

- With installation starting in the 1970s in Germany and lifetimes of 40-60 years [1], so far no need for extensive End-of-Life treatment options assessment
- Status Quo: Waste treatment via incineration in Municipal Solid Waste Incineration (MSWI) plants, however
 - Highly linear approach in terms of resource use
 - MSWIs running close to full capacities → inflated waste treatment costs for ETICS [2]
- Effective Recycling hindered by
 - Application as composite systems
 - Use of flame retardants



Sources:

[1] Albrecht, W., & Schwitalla, C. (2015). Rückbau, Recycling und Verwertung von WDVS.

[2] Heller, N., & Flamme, S. (2020). Waste management of deconstructed External Thermal Insulation Composite Systems with expanded polystyrene in the future.

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Approach

Dissertation Plan

- ETICS Quantification and waste projection for Germany
- Life Cycle Assessment of chemical recycling (via pyrolysis) and clinkering (cement production)
- Recycling center & network design and assessment

Helmholtz research project "FINEST"

 Use and management of finest particulate material flows in a sustainable circular economy



Project Partners













Thank you for your attention!

