Karlsruhe Institute of Technology

Institute for Industrial Production (IIP)
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Techno-economic & environmental assessment of chemical recycling for technical plastics

Focusing EPS-based ETICS

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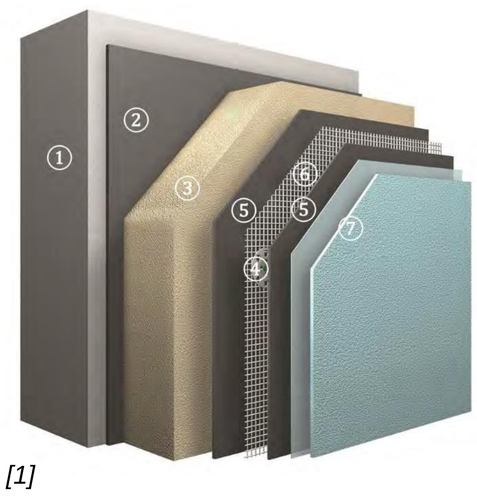
Motivation

- External Thermal Insulation Composite Systems (**ETICS**) 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]

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** and contamination with toxic flame retardants (HBCD)

[3]

Approach

Dissertation Plan

- ETICS Quantification for Germany
- Life Cycle Assessment of pyrolysis and inertisation via clinkering
- Recycling center & network design and evaluation

FINEST Project:

- Use and management of finest particulate anthropogenic material flows in a sustainable circular economy
- Goal regarding ETICS: Assessment of chemical recycling of ETICS waste via pyrolysis, and utilization of mineral waste in cement production

FINEST

project website: https://finest-project.de/

Project Partners

HZDR · HZB Helmholtz Zentrum Berlin · KIT · UFZ · TU Bergakademie Freiberg

Sources:
[1] Albrecht, W., & Schwitalla, C. (2015). Rückbau, Recycling und Verwertung von WDVS. https://publica.fraunhofer.de/handle/publica/297612
[2] Heller, N., & Flamme, S. (2020). Waste management of deconstructed External Thermal Insulation Composite Systems with expanded polystyrene in the future. Waste Management & Research: The Journal for a Sustainable Circular Economy, 38(4), 400–407. https://doi.org/10.1177/0734242X20904413
[3] https://www.lr-online.de/imgs/29/8/6/6/2/3/8/0/1/tok_aae62ba9d044e271d24823b79a57ef57/w1200_h675_x750_y467_211856461.jpg-18aa7b2b00572b0f.jpeg