Mineral wool waste back to loop with advanced sorting, pre-treatment, and alkali activation

**Call/Topic:** Raw materials innovation for the circular economy: sustainable processing, reuse, recycling and recovery schemes

**Type of action:** Innovation action

**Duration:** 36 months

**Project start:** 1st of June, 2019

**Project budget:** 6,7 MEUR

**Total EU funding:** 5,3 MEUR

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Mineral wool = glasswool and stonewool building insulation material

Picture: Tero Luukkonen, University of Oulu
Background

Mineralwool in construction and demolition waste (CDW) of buildings totals up to 2.5 Mt annually in EU*. Majority of it is landfilled with different environmental, economic and societal impacts.

The project aims to divert mineral wool from landfilling and introducing novel technology and value chain to CDW sorting, analysis, pre-treatment, processing, novel product development market introduction and commercialization.

New products and applications for construction are prepared with sustainable, alternative, non-conventional raw material with geopolymer technology.
What are geopolymers i.e. alkali-activated materials?

- Based on the chemistry of the most abundant elements in the crust
- Oxides of silicon and aluminum (\(\text{SiO}_2, \text{Al}_2\text{O}_3\))
- Also MgO, CaO, Fe$_2$O$_3$
- Available in ashes, clays, slags, etc.
- And in mineral wools!

- In addition, alkali activator needed
- Results in ceramic or concrete like material, with tunable properties
- Room temperature process
In nutshell

Milling

MINERAL WOOL WASTE

MINERAL WOOL POWDER

Alkali-activation

addition of e.g. NaOH, Na$_2$SiO$_3$, NaAlO$_2$

MINERAL WOOL GEOPOLYMER
WOOL2LOOP Consortium

Saint-Gobain Finland Oy (SG), Finland – Coordinator
University of Oulu (OUULU), Finland – Scientific coordinator
Saint-Gobain Ecophon AB (SGE), Sweden
Timegate Instruments Oy (TG), Finland
Slovenian National Building and Civil Engineering Institute (ZAG), Slovenia
Termit (TER), Slovenia
Clover Strategy Ltd (CLO), Portugal
Institute of Applied Economics and Health Research (APEHR), Denmark
Recycling Assistance BVBA (REAS), Belgium
Technical University of Delft (TUDelft), Netherlands
XTREEE, France
Zavod 404 (ZAV), Slovenia
CRH, Netherlands
Tree Capital (TREE), Poland
Delete Finland Oy (DEL), Finland
Partner roles

North Europe
Finland, Sweden
- Mineral wool Sourcing from CDW
  - Innovative technology (DEL, TG)

East Europe
Slovenia, Poland
- Smart demolition (TREE)

West Europe
France, Belgium
- Pre-demolition audit (REAS, TG)

Products
- Acoustic panels (SGE)
- Dry mix concrete (SG)
- Floor screed (SG)
- Pavement slabs (TREE)
- Façade elements (TER)
- 3D printing (ZAV)
- Hollow core slabs (CRH)
- Fiber-reinforced panels (CRH)
- 3D printing (XTREEE)

Research
- UOulu
- ZAG
- TU Delft
- Benchmarking (ZAG, REAS, SG)
- Environmental, health, and safety (CLO)
- Economics (APEHR)
By careful mix design of mineral wool geopolymers, it is possible to product a wide range of value-add products with different properties e.g. durability, density, compressive and flexural strength.

Mineral wool geopolymer can enhance the sustainability profile of traditional concrete products. Up to 80% CO₂ footprint reduction compared to OPC can be expected.

Mineral wool geopolymers can provide performance improvement compared to traditional concrete.

- Contributing to standardization of geopolymers / AAMs.
- Creating new markets for “waste” materials, necessary step for the transition to circular economy.
WOOL2LOOP Workpackages & Leaders

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<tr>
<th>WP</th>
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<td>Birgitte Holt-Andersen (APEHR)</td>
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