

LEAD PARTNER



Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

PARTNERS



OUTLINE

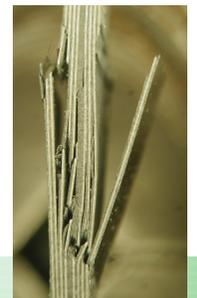
The present CO2 emissions regulations force car manufacturers to aim at significant weight reduction, which seems possible only through the substitution of metals with polymer composite materials (PMC). These PMC however should also be recyclable, in order to be compliant with End-of-Life Vehicles (ELV) regulations and low cost, in order to be mass produced. Currently PMC are used only for luxury cars, and are not environmentally friendly, due to the significant productions of wastes during production (up to 30% by weight) and non-recyclability. On the contrary project C2CC will employ enriched basalt, derived from EU raw materials (Isomatex, Filava), which is C2C recyclable. These mineral fibres will be associated with innovative bio-mass derived thermo-set resins to produce Basalt-PMC that can be chemically "cleaved" to recovery both a polymer (which will be used for producing automotive internal parts) and the fibers (which will be re-melted to fibre and re-employed for the original components). Project C2CC is funded with 1'137'000 C by KIC Raw Materials, with activities aiming at TRL 7.

The project will bring this solution on the verge of being mass produced and will assess all environmental benefits of the new solution, particularly lower embodied energy and lower C-emissions. C2CC project will demonstrate the technical feasibility of this concept on real automotive components and compliance with automotive industry expectations.



CONTACT

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This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation



**Research project within EIT Raw Materials KAVA 5 Upscaling (18052, C2CC, Cradle-To-Cradle Composites)**

## THE PROJECT

C2CC aims at demonstrating that two products could be combined making possible a disruptive evolution in the automotive sector:

- “Filava”, aeronautical-grade enriched basalt fiber, distributed in Italy by GS4C
- a biomass-derived cleavable epoxy thermoset resins based on Connora cleavable hardener distributed in Europe by R\*Concept/Ferrer Dalmau (30 % w/w of biomass).

Project demonstrator is producing a full recyclable composite car hood, for the model 500 Abarth and the estimated potential production is of 100'000/year according to a cradle-to-cradle recycle approach.

During the 39 months project activities (2019-2022), IP is expected to be created about:

- the cleavable polymers and prepreg development;
- the sizing on enriched basalt mineral fibers, suitable to be dissolved together with the polymer matrix;
- the production of a C2C recyclable car bonnet;
- the engineering of the recycling pilot lines;
- the recovered thermoplastic use for the production of automotive internal components.

To quantify the environmental and socioeconomic impacts, in addition to a conventional environmental Life Cycle Assessment study (LCA), also Material Flow Analysis (MFA) and embodied energy evaluations (EEE) of pristine and recovered materials will be carried out by UBX.



## ACTIVITIES

C2CC will focus on prepreg lamination and autoclave thermocuring (current reference technique for the production of PMC for structural applications). Compression molding is also interesting (faster technique) and will also be considered.

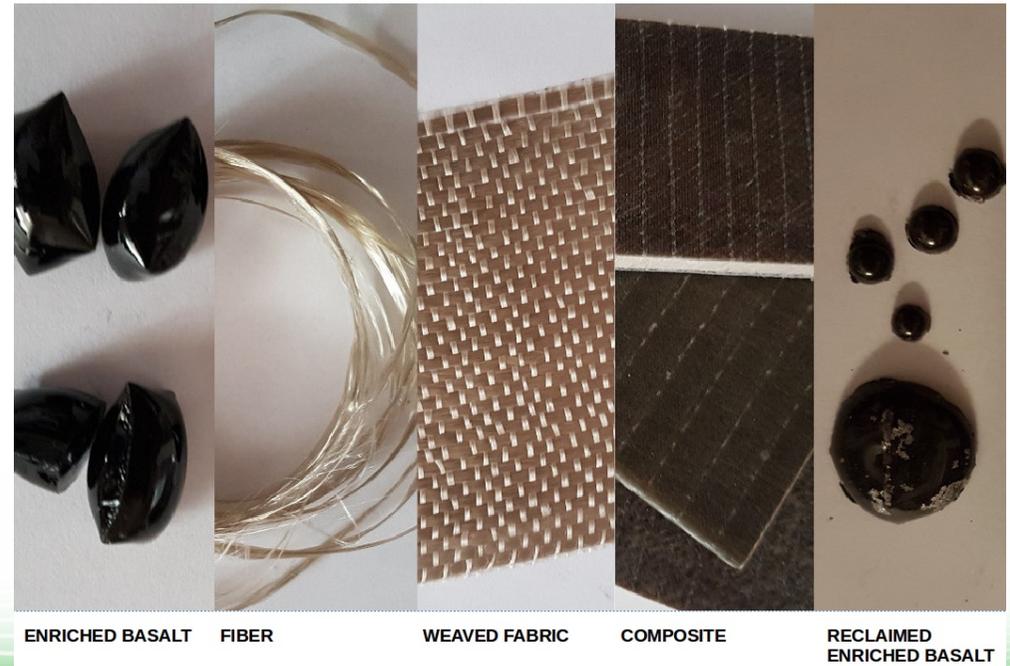
Prepreg will be mainly developed in Gaiker, using the Filava enriched basalt fiber and the biobased cleavable epoxies. The final objective is to obtain the suitable balance of stability and reactivity which is determinant to manufacture, transport and moulding the prepreg.

Activities: adjustment of fiber percentage, evaluation of chemical polymerization, use of additives to improve the fiber impregnation, optimization of the prepreg processability using warm pressing and production of the front bonnet demonstrator in AM Composites facilities.

Role of CRF:

- Evaluation of the performances of the 500 Abarth bonnet demonstrator according to the FCA standards.
- Building an interior vehicle component with an injection molding process, using the thermoplastic to be recycled.

### CRADLE TO CRADLE LIFE CYCLE



ENRICHED BASALT

FIBER

WEAVED FABRIC

COMPOSITE

RECLAIMED  
ENRICHED BASALT