

LIFE ECO TILES

LIFE14 ENV/IT/000801

ECO innovative methodologies for the valorisation of construction and urban waste into high grade TILES

Start date: 01/06/2017 Expected end date: 28/02/2018

DELIVERABLE E.3 AFTER-LIFE PLAN

Deliverable Name	E. Project management and monitoring of the project progress
Associated Action	E.3 After-life plan
Action Responsible	UNICAM
Contributor(s)	
Author	EP
Planned delivery date	31/08/2017
Actual delivery date	28/02/2018
Nature	Working Document - internal to the Consortium
Attachments	-

TABLE OF CONTENTS

1	Project.....	3
1.1	Strategy	3
2	The Methodologies	4
3	The Results	6
4	COMMUNICATION AND DISSEMINATION PLAN	9
4.1	Communication actions	9
4.2	Communication tools	12
5	THE AFTER LIFE PLAN	17



LIST OF FIGURES

Fig.1- Life Cycle approach.

Fig.2- Networking Waste form.

Fig.3- (a) Legambiente Onlus Treno Verde 2018 (Green Train 2018) at the Ancona (Italy) train station on the 13-14 of March 2018. (b) ECO TILES demo tile sample in exhibition at the event.

LIST OF TABLES

Tab.1- **Articles/interviews** media contacts featuring ECO TILES

Tab.2- Technical and scientific **papers**

Tab.3- **Poster and oral presentations** during national and international meetings

Tab.4- ECOTILES events

Tab.5- ECOTILES participation at different events

Tab.6- ECOTILES participation at future events.

LIST OF ABBREVIATIONS AND DEFINITIONS

Abbreviation	Definition
EU	European Union
GA	Grant Agreement



1 The project

The **ECO TILES LIFE14 ENV/IT/000801** project demonstrated the possibility to produce fully recycled (up to 77%) pre-casted cement-based products (Terrazzo tiles) using recycled glass from urban and industrial waste, ceramic and Construction & Demolition Waste (CDW). By using this approach, the tile production (ECO TILES) was demonstrated to have a substantial less (-20%) environmental impact respect to traditional tiles while achieving the manufacture of high-grade pre-casted products, with physical properties and technical performances comparable or superior to the traditional ones.

LIFE ECOTILES project has been carried out in the period September 2015 - February 2018 achieving the following objectives:

- Creation of protocols for characterization, testing and selecting the best and most suitable waste materials to realise recycled pre-casted products;
- Production of demo products maintaining or improving mechanical and structural characteristics compared to current products made with virgin materials.
- Technical evaluation of the demonstration and monitoring of performance, including a full LCA study.
- Reduction and optimization of production times and costs, thus demonstrating the applicability of recycled products in high-volume series in the Terrazzo tiles and pre-cast sector;
- Creation of a Network for Waste and signing of agreements with waste management companies and construction stakeholders for a recycling chain at local level in the Marche region.

1.1 Strategy

LIFE ECOTILES contributes to the achievement of the EU 2020 objective on Waste and Resource Efficiency. In fact, more than half of all materials extracted globally (over three billion tonnes/year in the EU only) are used for the building sector. The EU aims to reduce the environmental impact of the construction sector by recycling or re-using large amounts of the materials coming from the construction and demolition thus



reducing the consumption of raw materials. In fact, the Construction and Demolition waste (CDW) has been identified by the Commission as a priority waste stream due to the huge amounts generated (around 850 Mt/year), coupled with its high potential for re-use and recycling although still under-exploited.

To increase the awareness of eco-products among the general public, as well as the policy makers and industrial sector, the project created a structured network for the valorization of the industrial and urban waste streams with a focus to the Construction and Demolition Waste at Regional level in the Marche.

The LIFE ECOTILES adopted a life-cycle approach, recycling several types of waste from building and manufacturing industry and transforming the otherwise disposal materials into secondary raw materials. This allowed to identify all the possible improvements through the products life steps (Fig.1).

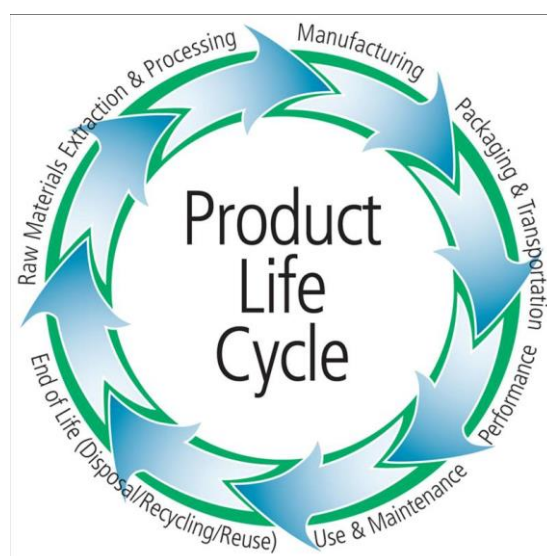


Fig.1- Materials and resources all have environmental, social and economic impacts; the so called Life Cycle Approach means analysing the environmental impacts and financial costs over the entire life of the product.

2 The Methodologies

The LIFE ECOTILES project has successfully demonstrated the possibility to obtain high-grade products using low-energy and low-emissions production processes, with a relevant positive impact on the environment.



The production chain showed evidence that while the realization steps of the ECOTILES are mostly similar to the typical production chain of a traditional Terrazzo tile, the main innovation consists in the experimentation and choice of new constituents composed of several streams of waste materials substituting up to 77% of the product mixture. In particular, CDW was inserted in the tiles, making an innovative contribution to the production of new eco-friendly materials for the construction sector.

The ECOTILES products have been engineered into three different typologies, Standard, Extraware and Design. The **standard** tile is similar to a traditional tile but containing up to 77% of waste material; the **extra ware** tile aims to valorize the technical performance of the product by using waste components with different hardnesses, therefore suitable for high traffic or industrial environments; the **design** tile combines the characteristics of the previous one but it is customizable in a wide range of colors and patterns. All three types have been realized in both the single layer and double layer versions and different sizes: normal size (20x20 x 1.2, 25 x 25 x 1.3, 40 x 40 x 1.7, 60 x 60 x 1.7 cm) and large size (100x100x3 and 120x120x3 cm) for single layer version, while sizes 20x20x2.2, 25x25x2.3, 40x40x3.3 and 60x60x3.7 cm have been chosen for the double layer version.

The project started from a first step devoted to retrieve and characterize the different constituents suitable for the tile production: aggregates, powder, Portland cement and pigments. For the use as aggregate, different materials were tested: types of ceramic waste with/without glazing; bricks and roof tiles; gres; industrial and municipal glass waste; CDW (Construction and Demolition Waste). Some types of waste materials have been excluded for a variety of reasons, which included: presence of splinters in the aggregate composed of glazed ceramics; unsuitable colors in the bricks/roof tiles or for the sanitaryware waste. Instead, although the presence of highly heterogeneous components in CDW (i.e. mixed construction wastes) makes this material difficult to be used in high-grade decorative tiles, a successful use of CDW was carried out by allocating it in the bottom part of the double layer tiles.

During the mixing step, several mixes have been tested in order to find the best combination between constituents. The mixes, mechanically well homogenized and poured in the molds, are then pressed for excess water removal and inserted in the “micro-chamber curing” where they remain for the curing time. By using the micro-chambers, patented by Grandinetti, the tile is left to cure for 15 instead of the usually



required 28 days, using its own humidity and heat. This method allows saving 100% of the energy traditionally required during the drying/curing steps using vapor fluxes to speed up the process, thus reducing the overall energy consumption however producing final product of high quality. The use of the micro-chambers also reduces the storage time in the factory, speeding and increasing the company productivity.

The polishing process is often a critical moment of the engineering of new products, since it allows to verify the final aspect of the tile, both in terms of technical performance and aesthetical appeal. A careful and selective choice of combination of aggregate and powder type and grainsize, color and color contrasts, designs and patterns, styles and tile versions, allowed to obtain tiles of quality and performances similar and/or superior to the traditional terrazzo tiles. The physical and mechanical tests carried out at the Centro Ceramico - University of Bologna, allowed to determine that the ECO TILES fully comply with the UNI EN 13748-1 “Terrazzo tiles - Part 1: Terrazzo tiles for internal use” required for the Terrazzo tiles, and therefore can be launched in full production and enter the market.

3 The Results

In this chapter the environmental and socio-economic results of the project are reported, which allow to demonstrate the sustainability and transferability of the project outcomes.

LIFE ECOTILES AS INNOVATIVE PRODUCTION

LIFE ECOTILES successfully showed the eco-friendly production innovation respect to the traditional terrazzo tiles process. The ECOTILES production strategy has been especially described during the actions B1 and A2, which demonstrated the possibility to realize high-grade products coupled with a significant green value. Thanks to the actions of dissemination of the results carried out during the project time, LIFE ECOTILES has also promoted effective communication activities to better explain the benefits of ECOTILES production with the aim of increasing the awareness in the EU countries regarding the acquisition of good practices and green solutions in the construction sector.



SUSTAINABILITY OF OUTCOMES

The ECOTILES team worked closely with stakeholders, policy makers and consumers to stress out the ecological relevance of eco-friendly products, like ECO TILES, to support and promote the acceptance and use of new green products containing different types of waste materials.

In particular, one important aspect of the ECOTILES production is represented by the reduction of emission of Kg CO₂ equivalents of 19% for the single layer tile type and 11% for the double layer, achieved by the ECOTILES compared to the traditional terrazzo tile. Moreover, an ECO TILES tile can contain up to 77% of recycled materials, meaning that for 1 m² of ECO TILES produced, 28.5 Kg of waste materials (glass, ceramic or CWD) are recycled. If we consider to convert the annual tile production of the Grandinetti company (20.000 m²) into ECO TILES, the quantity of recycled waste material could be calculated as 570 tons. Replicating this technology in other companies and countries, this could represent a good practice of producing tiles using waste material that can be adopted in order to reduce mining and saving georesources and mining waste, reduce energy for the tiles production, decrease the CO₂ production during the process, and thus, presenting a significative impact on human health and environment.

LIFE ECOTILES POTENTIAL AND RELEVANCE FOR EU COMPANIES

The projection of a possible 5-years market scenario has shown how a GRA-like EU-based company may gain profit from both a partial (30%) and a complete conversion (100%) of the annual tile production into ECO TILES. Additionally, the 100% ECO TILES scenario demonstrated an average increase of ROI (Return of Investments) of 6.06% compared to the 3.85% for the 30% scenario. This implies that it could be still advantageous for a company specialize the production in ECO TILES. Moreover, since the Terrazzo tile market is small and traditional, as well as still lacking of innovative eco-friendly solutions, there is a high potential of market penetration of a product like ECO TILES, even more since the production costs (and therefore selling price) of ECOTILES are comparable to those of the traditional terrazzo tiles. Moreover, the eco-friendly character of the ECOTILES is an appealing feature for customers and vendors, as evidenced during the project, therefore suitable to encounter the customers' interest and success in the market.



TRANSFERABLE AND REPLICABLE TILE PRODUCTION

LIFE ECOTILES has demonstrated the validity of a flexible strategy production, which allows to produce tiles with different features (the eco-friendly character) but using a process similar to that of the traditional tiles. The ECO TILES process presents, however, one technical improvement, i.e. the micro-chamber curing, which allows 100% energy saving during this process. The insertion of high quantities of waste materials (77%) improved the process performances as suggested by the results given by the Life Cycle Assessment. The study and selection of waste materials and demo tiles carried out during the project allowed to obtain a high-grade and well-characterized and tested new product.

For this reasons, ECOTILES production presents a high potential for interest in reproducibility and an easy approach that can be adopted in different companies and countries, both EU and extra-EU. For example, a case study has been carried out regarding the possible ECOTILES production in the Andhra Pradesh region (India). India is a fast growing economy in different sectors and the interest for new green materials with an aesthetic innovative design makes the ECOTILES products appealing. In the case study, it was used in India the ECO TILES production chain adopted in Italy by GRA. However, the production costs were recalculated based on the Indian market prizes and service costs, in particular regarding materials, water, energy and labour. The esteemed production cost obtained is 14.56 € per m². In India, the esteemed cost for ECOTILES produced is therefore lower than the average sale price of a traditional terrazzo tile, that is approximately 18 € per m². Thus proves that the production of ECOTILES process can be easily reproducible, being also profitable, even in extra-EU developing country. Especially where there is a lack of such eco-friendly products, ECOTILES can be the first example of a green and high-grade product.



4 COMMUNICATION AND DISSEMINATION PLAN

The communication and dissemination activities and products carried out during the project include actions which cover the scientific, technical, outreach and educational aspects of the project.

4.1 Communication actions

Table 1 reports some of the articles which appeared in the press, interviews in the local and regional TV channels or the articles appearing in the web magazines. It is of particular interest that the web magazines reach not only the region but also have a much wider diffusion than printed journal/magazine, allowing a better communication of the project. Worth noticing is the article about ECOTILES published by the magazine Architectural Digest Collector–France, after the presentation of the first demos made at Cersaie 2016. The importance of the magazine allowed to reach experts in the sector of architecture, designers and building companies world wide.

Technical or scientific papers have been published (or submitted or still preparation) as indicated in Table 2. The papers follow the presentations carried out at regional national or international meetings and conferences, as indicated in Table 3.

- Tab.1-Articles/interviews media contacts featuring ECO TILES

Tg UNICAM	Interview	02/02/2018	Dal progetto ECOTILES un network sugli scarti
Il settempedano.it	Web-news	01/07/2017	A Ostuni l'azienda GRA protagonista di Materica
Il Resto del Carlino	Paper	20/05/2017	Organizzato da Unicam dibattito sull'ambiente
Agi.it	Web-news	19/05/2017	RIFIUTI: CONVEGNO UNICAM IL 23/5 SU PROGETTO UE "ECOTILES"
Cronache Maceratesi	Web-news	19/05/2017	Ambiente e rifiuti, convegno ad Unicam
Ilmascalzone.it	Web-news	19/05/2017	Ad Unicam convegno su ambiente e rifiuti
Vivere Camerino	Web-news	19/05/2017	Si parlerà di ambiente e rifiuti nel convegno Unicam in programma a Camerino
AD Collector France	Paper and digital	04/2017	Le Terrazzo (Fig. 6)
TV Centro Marche:	TV roll and interview	12/01/2017	ECOTILES: le nuove mattonelle, riciclate dalle macerie (Available on Youtube, Fig. 5a)



Appennino Camerte	Paper (Fig. 5b)	01/01/2017	Ricostruire nel segno dell'ecosostenibilità con i materiali da demolizione
Cronache Maceratesi	Web-news	29/12/2016	Ricostruire con i materiali da demolizione: il progetto innovativo di Unicam
Picchio News	Web-news	29/12/2016	Ricostruire nel segno dell'ecosostenibilità sfruttando i materiali da demolizione
Ansa	Web-news	29/12/2016	Terremoto, ricostruzione ecosostenibile

- Tab.2-Technical and scientific **papers**

Journal	Format	Publishing date	Title
Renewable Matter	Technical Paper	26/08/2017	"The case of Eco-tiles"
ISDRS Conference	Conference Paper	In press	Ecological tiles from Urban Waste Glass and Construction & Demolition waste"
TILES Italia	Technical Paper	Submitted	"Circular economy: the case of the ecological production of "terrazzo" tiles "
In Preparation	Scientific Paper	In preparation	Recycled waste glass as replacement in cementitious materials
In Preparation	Scientific Paper	In preparation	Glass aggregates and cement interaction on waste material made Terrazzo tiles: the effect of curing and environment

- Tab.3- **Poster and oral presentations** during national and international meetings

Event	Format	Place/Date	Title
5th Scientific day of School of Science and Technology	Abstract Poster	Camerino, 08/05/2016	ECO Innovative methodologies for the valorization of construction and urban waste into high grade TILES (ECOTILES, EU-LIFE project)
2nd European Mineralogical Conference EMC 2016	Presentation	Rimini, 11-15/09/2016	Characterization of urban and industrial glasses in the sustainable production of raw materials
Rifiuti come risorsa: opportunità per le aziende del territorio	Presentation	Civitanova, 27/01/2017	Il progetto EU-Life Ecotiles: aspetti tecnici ed economici
LIFE Platform Meeting	Presentation	Sassuolo, 11/04/2017	Metodologie innovative per il riciclaggio degli scarti urbani ed edili nella produzione di piastrelle



Ambiente e Rifiuti: Innovazione, Esperienze ed Opportunità dalla Progettazione Europea	Presentation	Camerino, 23/05/2017	Il progetto EU-Life Ecotiles: costruire eco-sostenibile
MACERIE NEL CRATERE	Invited talk	Macerata, 27/05/2017	Il progetto Ecotiles: nuovi materiali per l'edilizia ecosostenibile da scarti vetrosi, ceramici e da costruzione/demolizione
Geosciences: a tool in a changing world	Abstract Poster	Pisa, 03-06/09/2017	Construction and Demolition Waste (CDW) for eco-innovative building product
MACERIE NEL CRATERE: la gestione sostenibile	Invited talk	Ascoli Piceno, 29/09/2017	Nuovi materiali per l'edilizia ecosostenibile: la soluzione ECOTILES
Sardinia Symposium 2017	Abstract Poster	Santa Maria di Pula, 2-6/10/2017	ECO Innovative methodologies for the valorization of construction and urban waste into high grade TILES
Geological Society of America 2017 fall meeting	Abstract Poster	Seattle, 22-25/10/2017	Substituting raw materials with waste for new eco-sustainable building products (ecotiles).
American Geophysical Union 2017 fall meeting	Abstract Poster	New Orleans, 11-15/12/2017	Waste material based "Terrazzo" tiles: the effect of curing time and extreme environmental conditions over glass aggregate/cement matrix boundary



• LIFE ECO TILES ROLL UP

ECO TILES Project
ECO innovative methodologies for the valorization of construction and urban waste into high grade TILES

project
ECOTILES is a research project financed by the LIFE program of the European Union, under the topic ENVIRONMENT. The project sees the collaboration between the scientific expertise of the Geochemistry-Mineralogy-Petrology group at University of Camerino for the study of geomaterials, and the Grandnelli company, leader in Italy specialized in the production of traditional and artistic terrazzo tiles.

aims
The LIFE ECOTILES project will demonstrate the possibility to produce fully recycled (up to nearly 70%) pre-cast cement-based products (terrazzo tiles) using recycled glass from urban and industrial waste, ceramic and Construction & Demolition Waste (CDW). The production will have a substantial less (>20%) environmental impact than for traditional tiles and achieve the manufacture of high-grade pre-cast products.

waste and environment
ECOTILES products will contribute to the achievement of EU 2020 goals on Waste and Resource Efficiency, by reducing emissions, resource waste, impacts on human health and the environment.

partners
The Geochemistry-Mineralogy-Petrology group is actively involved in research projects for the study of geomaterials both in basic research and in applicative problems. The Grandnelli company was established at the beginning of 1960 in San Severino Marche and is leader in the production of the traditional marble chip and cement tiles.

contact information:
www.ecotiles-lifeproject.eu
facebook, twitter, linkedin

• LIFE ECO TILES BUSINESS CARD

ECOTILES
EU-Life project

ECO innovative methodologies for the valorization of construction and urban waste into high grade TILES

Prof. Eleonora Paris (PI)
School of Science and Technology
University of Camerino
Camerino (62013) Italy

www.ecotiles-lifeproject.eu
eleonora.paris@unicam.it
phone: +39-0737-40280
mobile: +39-320-7985880



To ensure an effective dissemination of the advancements in the ECO TILES project a series of events were hosted by the ECO TILES partners (UNICAM), as reported in table 4. The list includes also the first intervention organized in a school, as part of an educational and outreach program carried out as an extra activity, requested by the school, and the course of Waste Management organized for the first time for the University of Camerino students at the master level.

Type of activities	Main leader	Date	Place	Type/size of audience	TITLES and NOTES
<i>Networking event (B3)</i>	UNICAM	23 may 2017	Camerino (Macerata)	End-users local companies, student and curious. Stakeholders involved in the network for waste collection and valorisation at Regional level. 50 attendees	<i>“Ambiente e Rifiuti: innovazione, esperienze ed opportunità della progettazione europea”</i> Presentation of results of technical activities, LCA, other life projects, Circular economy.
<i>Local event (D3)</i>	UNICAM	February 2017	Passo di Treia (Macerata)	Middle school 45 students (12 years old) and teachers	Educational activity on waste and circular economy carried out with the school Seminar about the Ecotiles project Outreach activity
<i>Interim Workshop (D3)</i>	UNICAM	27 January 2017	Civitanova Marche (Macerata)	End-users in the precasted/ceramic/cement industry. Stakeholders involved in the network for waste collection and valorisation at Regional level. 60 attendees	<i>“Rifiuti come risorsa: opportunità per le aziende del territorio”</i> Presentation of results of technical activities, preliminary LCA. The event has been shifted from M13 to M15, first, and then moved to January 2017 because of the seismic crisis in the area
<i>University course</i>	UNICAM	November 2018	University of Camerino	Master degree students 30 attendees	<i>University course of “Waste Management”</i>



<i>Final Conference (D3)</i>	UNICAM	11 may 2018	Camerino (Macerata)	Other life and/or european projects. Stakeholders involved in the network for waste collection and valorisation at Regional level. 105 attendees	<i>"Nuovi materiali ecosostenibili dai rifiuti: sinergie di successo tra industria e università"</i>
------------------------------	--------	-------------	---------------------	---	--

Tab.4- ECOTILES events

ECOTILES was also present at national and international events, fairs, conferences, meetings, expositions, where the team participated in different ways (table 5).

Type of activities	Main organizers	Title and website	Date	Place	Type of participation
International Exhibition	Società EDI-CER	Cersaie- Salone internazionale della ceramica per l'architettura http://www.cersaie.it	28 sept- 2 October 2015	Bologna Italy	Presenting ECOTILES
International Workshop	DCCI UNIGE-FIBERS LIFE project	IWIW 2016-International Workshop on Industrial Waste http://www.fibers-life.eu	17 February 2016	Genova Italy	Brochure distribution and make contacts
Exhibition	Confcommercio Perugia-Umbriafiere	EXPOCASA http://www.expo-casa.com	5-13 March 2016	Perugia Italy	Visitor
Exhibition Event	Comune di Milano	Fuorisalone Brera Milano Design week http://www.fuorisalone.it	12-17 April 2016	Milano Italy	ECOTILES exhibition and brochure distribution
International sustainable stone conference	Carrara centro Fiere	Carrara Marmotec 2016- First international Sustainable Stone Conference http://www.carraramarmotec.com	20 May 2016	Carrara Italy	Visitor and making contacts
Regional	Confindustria Marche	Marketplace Day	27 May 2016	Ancona Italy	Presenting ECOTILES and making contacts
Regional	UNICAM	5 th scientific day of school of science and technology	8 June 2016	Camerino (Italy)	Poster contribution
International Conference	LIFEWEST project	Cyprus2106- 4 th Int. Conf on Sustainable Solid Waste Management http://www.cyprus2016.uest.gr	23-25 June 2016	Cyprus	Visitor and making contacts



International Conference	Unit B3-LIFE and CIP. Eco-Innovation	LIFE platform meeting on Circular Economy	27-28 June 2016	Milan	Making contacts
European Conference	Italian Society of Mineralogy and Petrology (SIMP)	Emc ² European Mineralogical Conference http://www.emc2016.socminpet.it	11-15 September 2016	Rimini	Oral contribution, making contacts
International Exhibition	REMTECH EXPO	Inertia http://www.remtechexpo.com	21-23 September 2016	Ferrara	Visitor
International Exhibition	Società EDI-CER	Cersaie 2016- Salone internazionale della ceramica per l'architettura http://www.cersaie.it	26-30 September 2016	Bologna	ECOTILES exhibition and brochure distribution
Regional	UNICAM	Comitato Sostenitori UNICAM meeting	23 October 2016	S. Severino (MC)	Presenting ECOTILES and making contacts
International Workshop	LIFE SANITSER	Life Sanitser Final Conference	10 March 2017	Viterbo (Italy)	Making contacts and brochure distribution
International Exhibition	Palaexpo SA	Geneva Inventions 2017	11-15 April 2017	Geneva (Swiss)	Making contacts
National meeting	Italian NCP for LIFE program	LIFE platform meeting on ceramic and brick manufacturing	11 April 2017	Sassuolo (Italy)	Presenting ECOTILES and making contacts
Regional Workshop	COSMARI	Macerie nel cratere	27 May 2017	Macerata	Making contacts and brochure distribution
International Workshop	LIFE	Information & Networking Event LIFE 2017 call for project proposals.	30-31 May 2017	Bruxelles (B)	Making contacts
National Workshop	Gruppo Nazionale di Mineralogia (GNM)	Minerali e ceramiche, ieri, oggi e domani	13-14 June 2017	Parma (Italy)	Making contacts
National Workshop	Brindisi PPC Architects Association	"Materica" Materials as expressive medium of architectural language"	30 June 2017	Ostuni (Italy)	Presenting ECOTILES and brochure distribution
Regional Workshop	LIFE REFIBRE	Buone pratiche per impiego di materiale da riciclo, Implicazioni e policy, esempio di applicazione sul settore strade e civile	6 July 2017	Ancona (Italy)	Presenting ECOTILES and brochure distribution
National Conference	SIMP-SGI-AIV-SoGel	SIMP-SGI-AIV-SoGel 2017 "Geosciences: a tool in a changing world"	4-6 September 2017	Pisa (Italy)	Presenting ECOTILES



International Exhibition	Società EDI-CER	Cersaie 2017- Salone internazionale della ceramica per l'architettura http://www.cersaie.it	25-29 September 2017	Bologna	ECOTILES exhibition and brochure distribution
Regional Workshop	COSMARI	Macerie nel cratere: la gestione sostenibile	29 Sept 2017	Ascoli	Making contacts and presenting ECOTILES, brochure distribution
International Conference	ERSCP	The 18th European Roundtable on Sustainable Consumption and Production	1-5 October 2016	Skyathos island, Greece	Making contacts
International Conference	Eurowaste srl	Sardinia Symposium 2017, 16 th international waste management and landfill symposium www.sardiniasymposium.it	2-6 October 2016	Santa Maria di Pula	Presenting ECOTILES with a poster Making contacts
Extra EU Conference	GSA Geological society of america	GSA fall meeting 2017 http://community.geosociety.org/gsa2017/home	22-25 October 2017	Sattle (US)	Presenting ECOTILES with a poster
National Exhibition	KeyEnergy	Ecomondo 2017	7-10 November 2017	Rimini (Italy)	ECOTILES exhibition
Regional award	Legambiente Marche	"Ridurre si può nelle Marche" Award	12 December 2017	Ancona (Italy)	Presenting ECOTILES and brochure distribution, making contacts
Extra EU Conference	American Geophysical Union	AGU fall meeting 2017 http://fallmeeting.agu.org/2016/2017-fall-meeting-new-orleans/	12-16 December 2017	New Orleans (US)	Presenting ECOTILES with a poster

Tab.5- ECOTILES participation at different events.

5 THE AFTER LIFE PLAN

The After_LIFE Plan focus to the main actions: 1) extention of the project actions, 2) dissemination of results and use of communication materials, 3) maintenance and update of the website, 4) continuing the collaboration between partners/stakeholders/LIFE projects, 5) promotion of ECO TILES results in future events/conferences, 6) educational/outreach activities.

It is worth to note that all the costs related to the after-life activities of the project will be covered by



UNICAM funds, made available for the continuation of the visibility of the project results but for the importance to maintain and increase the Network “Waste” diffusion. Special funds have also been devoted to support post-docs and PhDs, research and outreach activities.

ACTION 1- Extension of the project

The GEOCDW project (submitted in the 2017 LIFE waste call) represents a extension of the ECO TILES results, with the aim to enlarge the objectives and the market reach with new eco-sustainable products. The project will be re-submitted in the next call. The GEOCDW focus was to complement the results achieved with ECO TILES aiming at demonstrating a production process where cement can be totally replaced by a CDW-based secondary raw material binder. Products resulting from ECO TILES are made up to 77% of recycled materials, consisting of powders and aggregates obtained from waste glass/ceramics/CDW to be mixed with variable cement amounts, whereas the purpose of GEOCDW is to start producing new building materials where the percentage of recycled materials will raise up to 95%, thanks to the use of CDW and substitution of the traditional cement with other binders and chemical additives.

ACTION 2- Dissemination of results and use of communication materials

The action consists in re-printing brochure and posters of the project to ensure that the dissemination materials will target a larger audience both at the UNICAM and GRA sites and during the events they participate. PDF versions will be always available at the ECO TILES website and will be used to reach a wider public, both national and international, also using the mailing lists used for the ECO TILES project. A video describing the project is in preparation and will be used in events and activities in schools and made available in the website to ensure visibility.

ACTION 3- Maintenance and update of the website



The ECO TILES website (<http://www.ecotiles-lifeproject.eu>) is a communication tool of main importance which disseminates information in both English and Italian languages. The content of the website will be constantly updated and the website will be maintained online during the next five years. Papers (scientific and technical) will be uploaded when published.

ACTION 4- Continuing the collaboration between partners/stakeholders/LIFE projects

The collaboration between the partners of the ECO TILES project and the stakeholders of the sector will continue even after the end of the project. Furthermore, ECO TILES project launched the creation of the “Network Waste” to spread the concept of circular economy and stimulate synergies between industry and research on the use of waste for new products. The collaboration with other LIFE projects will be continued to explore other possibilities in the production of new green materials. The first of these collaborations has been described in the action 1, consisting in the submission of a new LIFE project. Another is the collaboration with a CDW company for a PhD project carried out in collaboration with the University of Chieti.








with the contribution of the
LIFE Programme of the European Union

NETWORK  **WASTE**

Un'iniziativa proposta dal Progetto LIFE ECO TILES (UNICAM) per diffondere la cultura dell'economia circolare e stimolare la creazione di sinergie tra aziende e università sulla riutilizzazione degli scarti

Dichiarazione di interesse

Al coordinatore del progetto ECO TILES
Il/L'azienda/ente/associazione/professionista/singolo cittadino

e' interessata/o alle iniziative del NETWORK WASTE organizzate dal progetto LIFE ECO TILES, riguardanti eventi, seminari, corsi, progetti, possibilità di accesso a finanziamenti, collaborazioni tra aziende, collaborazioni con Università e centri di ricerca, dottorati industriali, diffusione di informazioni e sono finalizzate a creare nuove sinergie industria – università sul tema dei rifiuti, con particolare riguardo all'edilizia.

Fig.2 –Networking waste form.

ACTION 5- Promotion of ECO TILES results in future events/conferences

In the next few months the ECOTILES team will participate to several events: conferences, exhibitions, fairs, seminars (Table 6), making oral or poster presentation, distributing brochures and making contacts. Some of these events took already place at this time.

Type of activities	Main organizers	Title and website	Date	Place	Type of participation
Regional Exhibition	Legambiente onlus	Treno Verde 2018 (figure3)	12-13 March 2018	Ancona Italy	Brochure distribution and presenting ECOTILES
Seminar/ workshop	University of Genova	ISUGE Master class-UNIGE Promoted by LIFE FIBERS	17 March 2018	Genova Italy	Oral presentation of ECOTILES
International conference	UNICAM	La Green Economy nella regione Appenninica	22-23 MAY 2018	Camerino ITALY	Making contacts and brochure distribution



International conference	ISDR SOCIETY- UNIVERSITY OF MESSINA	24th International Sustainable Development Research Society Conference ; Action for a sustainable world: from theory to practice http://www.isdrsconference.org	13-15 JUNE 2018	Messina Italy	Oral presentation of ECOTILES
International conference	POLYTECHNIC UNIVERISTY OF BARI	3rd International Conference on Applied Mineralogy & Advanced Materials https://www.mms.events	24-26 July 2018	Bari Italy	Poster presentation
International conference	University of Catania	Geosciences for the environment, natural hazards and cultural heritage http://www.sgicatania2018.it	12-14 SEP 2018	Catania ITALY	Presenting ECOTILES and making contacts
International Exhibition	Società EDI-CER	Cersaie- Salone internazionale della ceramica per l'architettura https://www.cersaie.it/it/index.php	24-28 Sept 2018	Bologna Italy	ECOTILES exhibition and brochure distribution

Tab.6- ECOTILES participation at future events.



Figura 3- (a) Legambiente Onlus Treno Verde 2018 (Green Train 2018) at the Ancona (Italy) train station on the 13-14 of March 2018. (b) ECO TILES demo tile sample in exhibition onboard of the train that will travel in all Italy.



ACTION 6- Educational /formative activities

Following the interest arisen among the teachers of the area during the ECOTILES projects regarding themes related to the Environmental Education, outreach activities will be continued collaborating with middle and high schools by organizing different activities on waste and circular economy. This topic will be also the theme of the Summer School for teachers that will take place in July 2018 under the title “Georesources and Environmental Education” (50 attendees from all over Italy).

The course of Waste Management for the master students will be organized again at the University of Camerino for the academic year 2018-19, with also a visit to a landfill, the waste collection/separation center of Cosmari and a CDW treatment plant.

Finally, a post-doc has been hired by UNICAM to continue working on the results and extensions of the ECOTILES project. A PhD student has been enrolled to carry out his research project during the next 3 years on recycling and valorization of construction and demolition waste (CDW). Two master thesis on similar topics have been assigned to students. A PhD student will start work as a collaboration with University of Chieti and Portugal.

Due to the new environmental EU target aiming at recycling up to 70% of the amount of CDW and reduce the use of landfills, the development of recycling techniques and new approaches able to convert this type of waste into marketable products has an important relevance. This is even more important especially in Central Italy after the seismic events of October 2016, since it has been recently approved at the regional level (December 2017) the new CAM (Criteri Ambientali Minimi) requiring the introduction of not less than 15% waste in the both public/private and new/restored buildings, increasing therefore the need of new eco-friendly building products, like the ECO TILES. In this framework, the results obtained by the ECO TILES project are in agreement with the new rules and trends at the regional/national/international level and the extension and follow-up of the project will certainly contribute to create new materials to help reach the new requirements.