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RE^4 Project

REuse and REcycling of CDW materials and structures in energy efficient pREfabricated elements for building REfurbishment and construction

D8.7 Initial Exploitation Plan Public summary of deliverable	
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[1] *Just mention the partner(s) responsible for the Deliverable*
[2] *PU: Public, RE: restricted to a group specified by the consortium, CO: Confidential, only for members of the consortium; Commission services always included.*
[3] *Draft, Revised, Final*

***Exploitation**, in this context, refers to the action of making use of and benefiting from project results.*

Exploitation Plan identifies results of the project and suggests a strategy of how to make use them in the most appropriate manner. This Exploitation Plan provides: Identification of exploitable results (ERs); Characterization of said results; Determination of exploitation routes; Analysis of individual partners' exploitation claims; Assessment of technology readiness level; IPR management; Assessment of possible risks; Summary of market analysis. Please note that the vast majority of Exploitation Plan is confidential, and thus, this summary is somewhat limited.

Exploitation workshop

During the project meeting in Berlin, the first exploitation workshop took place. FENIX as an exploitation leader organized and managed the workshop, involving all consortium partners. The aim of the workshop was to discuss the progress in the ERs development, introduce IPR issues related to exploitation, present risks management approach and to summarise preliminary market assessment. The outcomes of the workshop served as a basis for this Exploitation Plan.

Obligation to exploit

There are several commitments a partner that is responsible for exploitable result is obliged to follow. The key obligation is to take measures aiming to ensure exploitation of results in a period up to four years after the project ends. Each beneficiary must either directly or indirectly exploit its results by:

- Using them in further research activities (outside the RE⁴ project);
- Developing, creating or marketing a product or process;
- Creating and providing a service, or
- Using them in standardization activities

Exploitable results

The first step for developing comprehensive Exploitable Plan is to identify the list of Exploitable Results (ERs) developed under the RE4 project. The following table summarizes project's ERs.

No.	Exploitable Result	Lead partner
1	Fully prefabricated energy-efficient building made from CDW-derived materials and structures	CREAGH/ ACC
2	Sorting system for high quality CDW-derived materials	CDE
3	Machinery for extruded concrete product with CDW-derived materials	VORTEX
4	Concrete and timber façade panels	CREAGH/ ROS
5	Industrial precast RE⁴ load bearing façade elements	CREAGH
6	BIM-compatible tool and platform for CDW estimation and management	STRESS

7	Design of innovative prefab components with high ratios of CDW-derived materials	ROS/CREAGH
8	Innovative concrete made of Portland cement or alkali activated binder and recycled aggregate from CDW-derived materials	QUB
9	Machine learning, robot-based CDW sorting system for high-quality CDW-derived materials (Method+Equipment)	STAM
10	Innovative earth plaster made from recycled fine fraction (clay and silt) from CDW	ROS
11	Mix design system for self-compacting concrete containing large quantities of recycled materials	RISE
12	Ultra-high performance/high performance concrete with CDW as aggregate and filler	RISE
13	Innovative concrete made of brick and tiles from CDW-derived materials	QUB

Partners also provided detailed characterization of each of the results in terms of its description, innovation, benefits for customers, as well as, market and financial characterizations. This part of the report is, however, confidential.

Exploitable routes

Although each exploitable result requires different type of exploitation, the exploitation routes can be generally summarized as:

- Use for further research
- Developing and selling own products/services
- Spin-Off activities
- Cooperation agreement/Joint Ventures
- Selling IP right/Selling the (IP based) business
- Licensing IP rights (out-licensing)
- Standardisation activities (new standards/ongoing procedures)

Partners exploitation intentions and claims

In order to investigate the involvement of consortium partners in each of the exploitable results, a BFMULO analysis was selected as a best method. Partners assigned specific letters to each of the results according to their type of involvement. Letter **B** stands for background knowledge brought to the project; letter **F** represents foreground, i.e. new knowledge generated under the project; letter **M** stand for making/producing the result; letter **U** stands for using the result; letter **L** stands for licensing the result; and letter **O** stands for other, i.e. any other exploitation means such as consultancy. The filled-in BFMULO matrix cannot be attached due to confidentiality issues.

Technology Readiness Level estimation

The TRL scale is a metric for describing the maturity of a technology. The scale consists

of 9 levels. Each level characterises the progress in the development of a technology, from the idea (level 1) to the full deployment of the product in the marketplace (level 9). The average expected TRL after the project's conclusion is 7.

IPR management

Creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.

Intellectual Property Rights are private legal rights that protect the intangible assets and give the owner a legal advantage. They are commonly divided into two categories, those are: **Industrial Property Rights** (e.g. patents, trademarks, industrial designs, geographical indications) and **Copyright and Related rights** (e.g. rights of the authors/creators and those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programmes). The following table summarizes IP protection measures suggested for project's exploitable results.

No.	Exploitable Result	IPR protection proposals
1	Fully prefabricated energy-efficient building made from CDW-derived materials and structures	Patent Industrial design Copyright
2	Sorting system for high quality CDW-derived materials	Patent Copyright
3	Machinery for extruded concrete product with CDW-derived materials	Patent Industrial design
4	Concrete and timber façade panels	Patent Industrial design
5	Industrial precast RE^4 load bearing façade elements	Patent Industrial design Copyright
6	BIM-compatible tool and platform for CDW estimation and management	Copyright
7	Design of innovative prefab components with high ratios of CDW-derived materials	Industrial design Copyright
8	Innovative concrete made of Portland cement or alkali activated binder and recycled aggregate from CDW-derived materials	Patent
9	Machine learning, robot-based CDW sorting system for high-quality CDW-derived materials (Method + Equipment)	Copyright (Patent)
10	Innovative earth plaster made from recycled fine fraction (clay and silt) from CDW	Patent
11	Mix design system for self-compacting concrete containing	Trade secret

	large quantities of recycled materials	
12	Ultra-high performance/high performance concrete with CDW as aggregate and filler	Trade secret
13	Innovative concrete made of brick and tiles from CDW-derived materials	Patent

Protection of the intellectual property rights generated within RE⁴ project can be ensured also by commercial strategies implemented by project partners, such as confidentiality implied for confidential business information, trade secrets and know how.

Risk assessment

A risk is any area of uncertainty that represents a possible threat to the project. To manage and mitigate risks, there is a need to identify them first, then assess the likelihood of their occurrence and finally estimate the impact they might have on the project. Actions should be taken to avoid or limit the likelihood of events that might endanger the exploitation of the project results.

Before and during the exploitation workshop, partners were encouraged to assess previously identified risks. As this exercise was mainly meant to make partners familiar with the risk assessment methodology, the risks assessment was performed for the RE⁴ ER1 only. The risk assessment was not yet performed for all individual exploitable results.

The inputs from partners were collected and the average grade was given. The content of the Risk register table will be regularly reviewed throughout the life of the project. The most significant risk was standardization.

Partners individual exploitation plans

Each of the project partners described their company, explained their role in the project, and stated their expectations. This part of the report is treated as confidential.

Market assessment

The market assessment was conducted to support both the exploitation activities as well as business related activities such as business model and plan definition. First, the CDW situation in Europe and relevant markets were examined; those are European construction market, European retrofit market, and European prefabricated construction market.

The target audience RE⁴ project addresses are house owners who wish to retrofit, those who are aiming to own a house, construction companies and demolition companies. The following factors summarize the reasons and motives for purchasing prefabricated construction components and what parameters are taken into consideration while choosing specific type.

- Low construction cost
- Improved functionality
- Superior aesthetics
- Weather resistance
- Flexibility to add another component
- Energy efficiency
- Shorter period of construction
- Flexibility in sizes

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