Environment, Climate Change and Low Carbon Economy Programme

'Environment Programme'

European Economic Area (EEA) Financial Mechanism 2014-2021

10º and Final Report

30/06/2023

16_CALL#2 – CirMat - CIRcular aggregates for sustainable road and building MATerials

Accordingly, with the Articles 25.2.j) and 29.4 of the 'Applicants Guide for Financing of Projects Supported

by Environment, Climate Change and Low Carbon Economy Programme'

https://www.eeagrants.gov.pt/media/2994/applicants-guide-for-financing-eea-grants_environment-projects_28112019.pdf

Index

i. Detailed description

CirMat was developed by Domingos da Silva Teixeira, S.A. (DST), as Project Promoter, together with Instituto Superior Técnico (IST), Universidade do Minho (UM) and Norwegian University of Science and Technology (NTNU), as Partner Entities. Hereinafter, "all partners" means both the Partner Entities and the Project Promoter.

The project implementation was initiated on the 15th of September 2020 and was finished in May 2023.

This report is the tenth, covering the period from January 1 to May 31, 2023, additionally, it is also the project's final report.

Table 1 lists the project's activities and respective actions, which have been concluded with success during the project's execution.

Table 1 - Summary of actions performed

Activity ID	Action	Description	Status	Obs
1	**Project management**			
	1.1	Technical Management	Executed	Extension accepted in amendment of Dec.2021, in amendment of Dec. 2022 and in amendment of march 2023.
	1.2	Financial Management	Executed	Extension accepted in amendment of Dec.2021, in amendment of Dec. 2022 and in amendment of march 2023.
2	**State of the art, Requirements and Regulations**			
	2.1	State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in concrete;	Executed	-
	2.2	State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures;	Executed	-
	2.3	Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in concrete;	Executed	-
	2.4	Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures;	Executed	Extension accepted in amendment of Dec.2021
	2.5	Production of recycled aggregates from CDW and processing of EAF Slag aggregates in fractions for the concrete and asphalt mixtures	Executed	Extension accepted in amendment of Dec./2021 and new extension requested in Report n.7
3	**Demonstration and Production of Prototypes with incorporation of recycled aggregates from CDW**			
	3.1	Characterization tests on recycled aggregates from CDW	Executed	Extension requested in Report n.6
	3.2	Development of concrete with recycled aggregates from CDW, and corresponding characterisation tests in the fresh state, for use at an industrial scale	Executed	Extension requested in Report n.6
	3.3	Mechanical and rheological characterization tests of concrete with recycled aggregates from CDW in the hardened state	Executed	Extension requested in Report n.6
	3.4	Development of bituminous mixtures with recycled aggregates from CDW for use at an industrial scale	Executed	-
	3.5	Tests for mechanical and rheological characterization of bituminous mixtures with recycled aggregates from CDW	Executed	-
	3.6	Production at industrial scale of prototypes in concrete and bituminous mixtures with incorporation of recycled aggregates	Executed	Extension requested in Report n.6
4	**Demonstration and Production of Prototypes with incorporation of ASIC aggregates from the steel mill**			
	4.1	EAF Slag aggregates characterization tests from the steelwork mill	Executed	Extension accepted in amendment of Dec.2021
	4.2	Development of EAF Slag aggregates concrete for use on an industrial scale	Executed	Extension accepted in amendment of Dec.2021
	4.3	Tests for mechanical and rheological characterization of concrete with EAF Slag aggregates	Executed	Extension accepted in amendment of Dec.2021
	4.4	Development of bituminous mixtures with EAF Slag aggregates for use on an industrial scale	Executed	Extension accepted in amendment of Dec.2021
	4.5	Tests for mechanical and rheological characterization of bituminous mixtures with EAF Slag aggregates	Executed	Extension accepted in amendment of Dec.2021
	4.6	Production of industrial-scale prototypes with EAF Slag aggregates-incorporated concretes and bituminous mixtures	Executed	Extension accepted in amendment of Dec.2021
5	**Prototype Sustainability Assessment**			
	5.1	Environmental and economic life cycle assessment of the recycled aggregates from CDW and of the prototypes in concrete with incorporation of recycled aggregates from CDW and with EAF Slag aggregates	Executed	Extension requested in Report n.6 and n.7
	5.2	Environmental and economic life cycle assessment of the prototypes in bituminous mixtures with recycled aggregates from CDW and with EAF Slag aggregates	Executed	Extension requested in Report n.6 and n.7
	5.3	Development of environmental labels for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures - Type III Environmental Product Declarations (EPD)	Executed	Extension accepted in amendment of Dec.2021 and new extension requested in Report n.7
	5.4	Development of circularity passport for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures	Executed	Extension accepted in amendment of Dec.2021 and new extension requested in Report n.7
	5.5	Benchmarking of the performance and of the environmental, economic and social advantages of the recycled aggregates from CDW and EAF Slag aggregates and of the prototypes with identical and / or competing products	Executed	Extension accepted in Report n.4 and Extension requested in Report n.7
6	**Communication and Dissemination**			
	6.1	Communication and dissemination plan	Executed	Extension accepted in amendment of Dec.2021 and new extension requested in Report n.7
	6.2	Project Website and Social Networks	Executed	Extension accepted in amendment of Dec.2021 and new extension requested in Report n.7
	6.3	Technical-Scientific Publications	Executed	Extension accepted in amendment of Dec.2021 and new extension requested in Report n.7

The abovementioned activities and subsequent actions are presented in more detail in the following paragraphs.

Activity 1 - Project management

Action 1.1 - Technical Management

Under the scope of this action, several meetings have been held between the promoter and the partners to coordinate the development of the different activities and actions to ensure an efficient project implementation, namely on the 10th and 31st of January, 17th of February, 17th of March, 4th and 26th of April and 22nd june of 2023. In parallel, several contacts between the project's partners have been established via telephone, e-mail and videoconferences.

Two closing events focused on the research outputs have been held during the project's execution, respectively, one in Norway (Trondheim) on the 13th of April and another one in Portugal (Braga) on the 5th of May.

Action 1.2 - Financial Management

Under the scope of this action, the financial execution of the project had been monitored and assessed quarterly. In total, seven payment requests were submitted to the Programme Operator.

Activity 2 - State of the art, Requirements and Regulations

Action 2.1 State of the art on the technical, environmental, and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in concrete and Action 2.2 State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures

These actions were finished in mid-January 2021, and the respective report was delivered.

Action 2.3 - Requirements and technical specifications to be met by recycled aggregates from CDW and EAFS in concrete

IST made a summary of the requirements and technical specifications to be met by recycled aggregates from Construction and Demolition Waste (CDW) to be used in concrete. European and national standards and regulations were considered. This first draft served as a basis for the development of the workplan for Actions 3.2 and 3.3.

Additionally, UM carried out the same assessment regarding the utilization of the Electric Arc Furnace Steel Slag aggregates (EAF SSA) in structural concrete, also based on National and European standards / recommendations.

Action 2.3 ended on January 15th, 2022. A report containing and discussing the requirements and technical specifications for both CDW and EAF SSA were elaborated by IST and UM, respectively.

Action 2.4 - Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures

This action was finalized in mid-January 2022, and the respective report was delivered.

Action 2.5 - Production of recycled aggregates from CDW and processing of EAF Slag aggregates in fractions for the concrete and bituminous mixtures

The screening of the EAF SSA was completed both for the experimental section in bituminous concrete and for the concrete prototype. Grinding and screening of RCA (recycled concrete aggregates) were also completed.

Activity 3: Demonstration and Production of Prototypes with the incorporation of recycled aggregates from CDW

Action 3.1 - Characterization tests on recycled aggregates from CDW

The tests provided for in this action are all completed, and the report with LNEC results is delivered in Annex 1.

Action 3.2 - Development of concrete with recycled aggregates from CDW, and corresponding characterisation tests in the fresh state, for use at an industrial scale

IST finished the experimental campaign. The size grading of aggregates was characterised, and macroscopic tests were completed. The water absorption with time and density of recycled aggregates from CDW were determined. Sixteen concrete mixes were produced, and characterisation tests in the fresh state were completed (slump test, density and air content). The report describing the results of this action was developed jointly with the results of action 3.3.

Action 3.3 - Mechanical and rheological characterization tests of concrete with recycled aggregates from CDW in the hardened state

IST has finished the experimental campaign. The particle size classification of the aggregates was characterized and macroscopic tests were completed. Water absorption over time and density of recycled RCD aggregates were determined. Six reference concrete mixes and another six mixes with recycled aggregates were produced and characterization tests were completed in the hardened state (compressive strength, modulus of elasticity, resistance to carbonation and chloride penetration). For four of the latter, retraction and creep tests were completed. The composition with which the prototype was made incorporated 30% RCA. The report describing the results of this action was developed together with the results of action 3.2 and has already been delivered.

Action 3.4 - Development of bituminous concrete with recycled aggregates from CDW for use on an industrial scale and Action 3.5 - Tests for mechanical and rheological characterization of bituminous mixtures with recycled aggregates from CDW

These actions have been completed since December 2021 and March 2022, respectively, and the results were included in action report 3.4.

Action 3.6 - Production at industrial scale of prototypes in concrete and bituminous mixtures with the incorporation of recycled aggregates

This action was completed in March 2023. In the case of bituminous mixtures, an experimental section was carried out at the dst facilities in Braga by dst operational team and using dst own equipment. The bituminous mixtures were produced at DST's asphalt plant in Braga. The location of the stretch was chosen in an area with a lot of heavy traffic, and it will be possible to monitor the mechanical behaviour in the long term. Regarding the concrete prototype, a reinforced concrete wall was built including recycled aggregates, using the composition developed in actions 3.2 and 3.3. The wall was also built in March at the dst facilities in Seixal. Figure 1 shows images of these prototypes.

a) b)

Figure 1 – a) reinforced concrete wall with RCA; b) experimental section of bituminous mixtures with RCA

Activity 4: Demonstration and Production of Prototypes with the incorporation of ASIC aggregates from the steel mill

Action 4.1 - EAF Slag aggregates characterization tests from the steelwork mill

This action was finished in mid-October 2021.

Action 4.2 - Development of structural concrete with EAF slag for use on an industrial scale

This action has finished with the execution of a real-scale prototype produced at an industrial scale with the concrete composition which has been developed comprising EAF SSA and ceramic powder residue, the latter as a replacement of the fly ash. The mechanical characterization of the mixtures, developed at the industrial scale, for the production of the prototype have corroborated the strengths obtained on the laboratorial scale.

Action 4.3 - Tests for mechanical and rheological characterization of concrete with EAF Slag aggregates

At a laboratorial scale, both rheological and mechanical properties of the developed concrete compositions; i) exclusively with the EAF SSA and ii) EAF SSA with ceramic powder, have been carried out. Composition i) incorporated about 70% EAF SSA, while composition ii) incorporated about 75% residue (EAF SSA + ceramic powder). These degrees of incorporation lead, in both cases, to reduction ratios of the amount of natural aggregate in concrete higher than 75%. The mechanical characterization will be completed with the corroboration of the laboratorial results at an industrial scale upon the construction of the concrete prototype, namely with the assessment of the properties of the composition produced at an industrial scale. The report presenting the physical, microstructural and mechanical properties of the developed mixture is comprised in Annex 1.

Action 4.4 - Development of bituminous concrete with EAF slag for use on an industrial scale

This action was finished in mid-March 2022. The report of this action was delivered together with action 4.5 in mid-June 2022.

Action 4.5 - Tests for mechanical and rheological characterization of bituminous mixtures with EAF Slag aggregates

This action was finished in mid-June 2022. The report of this action was delivered together with action 4.4 in mid-June 2022.

Action 4.6 - Production of industrial-scale prototypes with EAF Slag aggregates-incorporated concretes and bituminous mixtures

The pavement trial with the developed bituminous mixtures was executed in January at Muda, in the municipality of Grândola, by dst operational team and using dst own equipment. The

bituminous mixtures were produced at DST's asphalt plant in Seixal. The concrete prototype was a reinforced wall built in Braga also at the end of January. The name of the project was inscribed on this wall. Figure 2 shows images of these prototypes.

a) b)

Figure 2 - a) reinforced concrete wall with EAF SSA and ceramic powder; b) experimental section of bituminous mixtures with EAF SSA

Activity 5: Prototype Sustainability Assessment

Action 5.1 - Environmental and economic life cycle assessment of the recycled aggregates from CDW and of the prototypes in concrete with the incorporation of recycled aggregates from CDW and with EAF Slag aggregates

This action was implemented by IST, including the preparation of the Life Cycle Inventory (LCI) file of the CDW stocking and recycled aggregates production by DST and of the concrete production at IST. The LCI file was used in the data collection of the input and output flows from the production of recycled aggregates by DST (Action 2.5) and was used in the data collection of the input and output flows from concrete production at IST (Actions 3.2 and 3.3). When this experimental campaign finished, the final mixes were defined, and the Life Cycle Assessment (LCA) study started. This environmental study was developed, along with the corresponding economic study. The report describing the results of this action was developed jointly with the results of action 5.3.

At UM, the LCA study for the EAF SSA concrete mixtures has been developed concomitantly with action 5.3 similarly to what was carried out by IST for the concrete with CDW aggregates. A report presenting and discussing the results was elaborated.

Action 5.2 - Environmental and economic life cycle assessment of the prototypes in bituminous mixtures with recycled aggregates from CDW and with EAF Slag aggregates

This action started on June 15th, 2021, by UM and was concluded at the end of February, 2023. The LCI file of the bituminous mixtures with EAF SSA and the conventional bituminous mixtures was built with primary data from DST and secondary data from specific and updated databases (Ecoinvent), EPDs and other scientific studies. The model to assess and calculate the environmental impacts of the bituminous mixtures' LCA was assembled on SimaPro software, allowing the team to prepare two LCA Reports for both types of alternative aggregates (EAF SSA and CDW/RCA) External services were contracted to accelerate the execution of this action, namely for the LCA evaluation of bituminous mixtures with CDW/RCA aggregates. This environmental study was developed, along with the corresponding economic study. The report describing the results of this action was developed jointly with the results of action 5.3.

Action 5.3 - Development of environmental labels for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures - Type III Environmental Product Declarations (EPD)

This action started on February 15th, 2022, and is finished. A review of similar EPD at the national and international levels was performed. This action depended on the previous actions 5.1 and 5.2 and evolved together with those actions. Thus, it was only concluded by February 2023, and the corresponding reports or EPDs (7) describing the results of this action were developed jointly with the results of action 5.1 (2 reports) and 5.2 (2 reports). The seven EPDs were already submitted for review in the DAPHabitat System, which are waiting the Certif verification audits.

Action 5.4 - Development of circularity passport for the prototypes in concrete and bituminous mixtures

This action started on May 15th 2022. IST team firstly completed a survey in research projects and in journal papers about models for circularity passports, and UM and DST contributed to the completion of this task. This action depended on the previous actions 5.1 and 5.2 and evolved together with those actions. Thus, it was only concluded by February 2023. The corresponding

report describing the results of this action, and including 7 circularity passports, was already delivered.

Action 5.5 - Benchmarking of the performance and of the environmental, economic and social advantages of the recycled aggregates from CDW and EAF Slag aggregates and of the prototypes with identical and / or competing products

This action started on February 15th, 2022, by all partners. The first stage corresponded to a review of identical or competing products, but this action depends on the previous actions of this activity. Thus, it was only concluded by April 2023. The corresponding report that presents the 7 eco-design files developed in this action was already delivered.

Activity 6: Communication and Dissemination

Action 6.1 - Communication and dissemination plan

The communication and dissemination plan was fulfilled.

During the course of the project, events were held to present both the project and the final results.

The presentation event was held on 24th November 2020, and was held in online format due to the pandemic situation that started in March 2020.

Figure 3 - Presentation event, online

The two final presentation events of the project results were held in a face-to-face format.

The first event was held on 13 April in Trondheim, Norway. This event was attended by the university and companies linked to the construction sector, in particular roads.

Figure 4 - Event held in Trondheim, Norway

The second event, held on 5 May, in Braga, at dstgroup's premises, was attended by various stakeholders. It was also possible to count with the presence of the Norwegian Ambassador in Portugal, Tove Bruvik Westberg.

Figure 5 - Event held in Braga, Portugal

A IST researcher (Pedro Pedroso) referred to this project's aim, activities, and results, on his participation on the following international event: Seminar "Improve data for module C and D", NHO, Oslo, Norway, 27 October 2022 ().

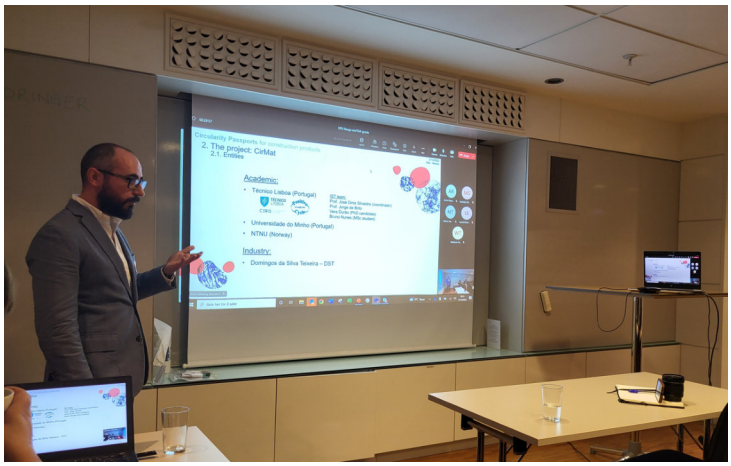


Figure 6 - Seminar "Improve data for module C and D", NHO, Oslo, Norway, 27 October 2022

Also, other team members from all partners have been disseminating the project and its results in several forums and events.

During the course of the project, press releases were published and some of the press references are presented below:

- https://ominho.pt/braga-produzir-betao-a-partir-de-residuos-da-construcao-e-a-nova-aposta-da-dst/
- https://www.diarioimobiliario.pt/Portuguesa-dst-cria-betao-a-partir-de-residuos-da-construcao
- https://casa.sapo.pt/noticias/betao-ecologico-vai-reduzir-o-impacto-da-construcao-no-ambiente/?id=30992
- https://www.pressmediaonline.com/public/news/3849798
- https://edificioseenergia.pt/noticias/1905-cirmat-mafalda-rodrigues-tratar-reintroduzir-residuos-subprodutos-construcao-indispensavel/
- https://aipor.pt/betao-ecologico-vai-reduzir-impacto-da-construcao-no-ambiente

The CirMat project was also referenced by EEA Grants under the theme "Towards a more circular construction sector in Portugal" and "How the EEA and Norway Grants contribute to the EU Green Deal".

Action 6.2 - Project Website and Social Networks

The project website became available in February 2021 at https://cirmat.pt/. During the course of the project the website was updated with relevant information related to its development.

Project pages were also created in different social networks to enhance its communication with stakeholders:

- https://www.facebook.com/cir.mat2020
- https://www.linkedin.com/company/71016396/
- https://www.instagram.com/cir.mat/

At the end of the project, the no. of followers on social media was as follows:

Social Network	Number of followers
Facebook	168
Linkedin	188
Instagram	134

During the course of the project, and similarly to what happened with the social networks, newsletters were made available as a means of dissemination. At the end the number of subscribers was 210 people.

Action 6.3 - Technical-Scientific Publications

As planned, the three articles initially defined were submitted and can be found in the following links:

- https://www.mdpi.com/2071-1050/14/9/5022?type=check_update&version=1
- https://ascelibrary.org/doi/abs/10.1061/JMCEE7.MTENG-14776
- https://www.sciencedirect.com/science/article/pii/S0959652623002664

Additionally, 2 other papers were submitted to be presented at the international conference Wastes: Solutions, Treatments and Opportunities (https://www.wastes2023.org/).

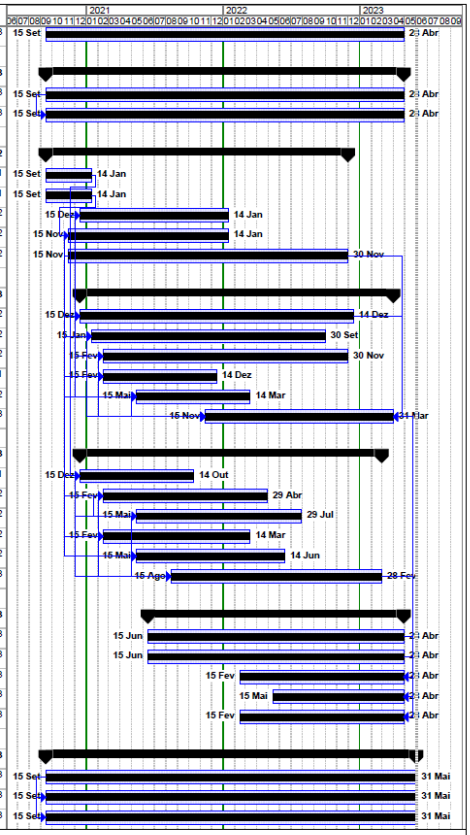
ii. Results achieved

In this part of this report, the results obtained for the whole project will be described.

The Gantt diagram included in Table 2 and in annex 2, shows the completion of all actions. . The global technical execution rate is 100%.

Table 1 – Project Gantt diagram

ID	Activity Action	Task name	Technical execution	Financial execution	Indicators	Promoter	Partners	Status	Duration	Start	Finish
1		**EEA Grants - CirMat project (2020-2023)**	**100%**	**98%**					690 d	15-09-20	28-04-23
2											
3	**1**	**Project management**	**100%**	**120%**					**690 d**	**15-09-20**	**28-04-23**
4	1.1	Technical Management	100%		-	DST	IST, UM, NTNU	Executed	690 d	15-09-20	28-04-23
5	1.2	Financial Management	100%		-	DST	IST, UM, NTNU	Executed	690 d	15-09-20	28-04-23
6											
7	**2**	**State of the art, Requirements and Regulations**	**100%**	**128%**					**583 d**	**15-09-20**	**30-11-22**
8	2.1	State of the art on the technical, environmental and e	100%		State of the art	IST	UM	Executed	89 d	15-09-20	14-01-21
9	2.2	State of the art on the technical, environmental and e	100%		State of the art	UM	DST	Executed	89 d	15-09-20	14-01-21
10	2.3	Requirements and technical specifications to be met	100%		Technical spec	IST	UM, DST	Executed	286 d	15-12-20	14-01-22
11	2.4	Requirements and technical specifications to be met	100%		Technical spec	UM	IST, DST	Executed	308 d	15-11-20	14-01-22
12	2.5	Production of recycled aggregates from CDW and pr	100%		-	DST	IST	Executed	539 d	15-11-20	30-11-22
13											
14	**3**	**Demonstration and Production of Prototypes with inc**	**100%**	**93%**					**604 d**	**15-12-20**	**31-03-23**
15	3.1	Characterization tests on recycled aggregates from C	100%		-	DST	IST	Executed	527 d	15-12-20	14-12-22
16	3.2	Development of concrete with recycled aggregates fr	100%		Percentage rec	IST	DST	Executed	451 d	15-01-21	30-09-22
17	3.3	Mechanical and rheological characterization tests of	100%		-	IST	DST	Executed	473 d	15-02-21	30-11-22
18	3.4	Development of bituminous mixtures with recycled ag	100%		Percentage rec	DST	IST	Executed	219 d	15-02-21	14-12-21
19	3.5	Tests for mechanical and rheological characterizatior	100%		-	DST	-	Executed	218 d	15-05-21	14-03-22
20	3.6	Production at industrial scale of prototypes in concret	100%		Number of Innc	DST	IST	Executed	363 d	15-11-21	31-03-23
21											
22	**4**	**Demonstration and Production of Prototypes with inc**	**100%**	**86%**					**581 d**	**15-12-20**	**28-02-23**
23	4.1	EAF Slag aggregates characterization tests from the	100%		-	UM	DST	Executed	220 d	15-12-20	14-10-21
24	4.2	Development of EAF Slag aggregates concrete for us	100%		Percentage rec	UM	DST	Executed	317 d	15-02-21	29-04-22
25	4.3	Tests for mechanical and rheological characterizatior	100%		-	UM	DST	Executed	319 d	15-05-21	29-07-22
26	4.4	Development of bituminous mixtures with EAF Slag a	100%		Percentage rec	UM	DST	Executed	283 d	15-02-21	14-03-22
27	4.5	Tests for mechanical and rheological characterizatior	100%		-	UM	DST	Executed	286 d	15-05-21	14-06-22
28	4.6	Production of industrial-scale prototypes with EAF Sl	100%		Number of Innc	DST	UM	Executed	406 d	15-08-21	28-02-23
29											
30	**5**	**Prototype Sustainability Assessment**	**100%**	**109%**					**493 d**	**15-06-21**	**28-04-23**
31	5.1	Environmental and economic life cycle assessment o	100%		Number of eco	IST	UM, DST, NTNU	Executed	493 d	15-06-21	28-04-23
32	5.2	Environmental and economic life cycle assessment o	100%		Number of eco	UM	IST, DST, NTNU	Executed	493 d	15-06-21	28-04-23
33	5.3	Development of environmental labels for recycled agg	100%		Number of EPD	IST	UM, DST, NTNU	Executed	317 d	15-02-22	28-04-23
34	5.4	Development of circularity passport for recycled aggr	100%		Number of circ	UM	UM, DST	Executed	252 d	15-05-22	28-04-23
35	5.5	Benchmarking of the performance and of the environ	100%		Number of eco	IST	UM, DST, NTNU	Executed	317 d	15-02-22	28-04-23
36											
37	**6**	**Communication and Dissemination**	**100%**	**87%**					**713 d**	**15-09-20**	**31-05-23**
38	6.1	Communication and dissemination plan	100%		Number of artic	DST	IST, UM, NTNU	Executed	713 d	15-09-20	31-05-23
39	6.2	Project Website and Social Networks	100%		I) Nbr of follow	DST	IST, UM, NTNU	Executed	713 d	15-09-20	31-05-23
40	6.3	Technical-Scientific Publications	100%		Number of scie	DST	IST, UM, NTNU	Executed	713 d	15-09-20	31-05-23



CirMat - Project Date: 31-05-2023 | Task | Critical task | Progress | Summary

This Gantt chart includes all adjustments to the initial plan (in some Activities).

The following table 3 shows the material execution rates of activities.

Table 2 - Material execution rate for each activity

ID	Description	Indicator	Target	Result	Material Execution (%)	Fonte de verificação
1.1	Technical Management	NA	NA	NA	NA	NA
1.2	Financial Management	NA	NA	NA	NA	NA
2.1	State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in concrete;	State of the art Report	1	1	100%	"CirMat_Report_Activity2.1_DTC_36_2020_CERIS".
2.2	State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures;	State of the art report	1	1	100%	"CirMat_Report_Action2.2_ISISE_2021_DEC-E-6".
2.3	Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in concrete;	Technical specifications report	1	1	100%	Report on the requirements and technical specifications to be met by recycled aggregates from CDW and EAFS in concrete.
2.4	Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures;	Technical specifications report	1	1	100%	CirMat Project Report Activity 2 – Action 2.4.
2.5	Production of recycled aggregates from CDW and processing of EAF Slag aggregates in fractions for the concrete and asphalt mixtures	NA	NA	NA	NA	NA
3.1	Characterization tests on recycled aggregates from CDW	NA	NA	NA	NA	NA
3.2	Development of concrete with recycled aggregates from CDW, and corresponding characterisation tests in the fresh state, for use at an industrial scale	% reduction of the amount of natural aggregate in concrete	30%	30%	100%	Report detailing the physico-chemical, mechanical and durability properties of the developed compositions formulations within an industrial enviornment.
3.3	Mechanical and rheological characterization tests of concrete with recycled aggregates from CDW in the hardened state	NA	NA	NA	NA	NA
3.4	Development of bituminous mixtures with recycled aggregates from CDW for use at an industrial scale	% reduction of the amount of natural aggregate in bituminous concrete	35%	62%	100%	"CirMat_Report_Activity 3.4_2022 dst"
3.5	Tests for mechanical and rheological characterization of bituminous mixtures with recycled aggregates from CDW	NA	NA	NA	NA	NA
3.6	Production at industrial scale of prototypes in concrete and bituminous mixtures with incorporation of recycled aggregates	Number of Innovative solutions for increased resource efficiency piloted	2	2	100%	Application in projects under construction by dst of prototypes with concrete and bituminous mixtures with incorporation of recycled aggregates.
4.1	EAF Slag aggregates characterization tests from the steelwork mill	NA	NA	NA	NA	NA
4.2	Development of EAF Slag aggregates concrete for use on an industrial scale	% reduction of the amount of natural aggregate in concrete	75%	>75%	100%	Report detailing the physico-chemical, mechanical and durability properties of the developed compositions formulations within an industrial enviornment.
4.3	Tests for mechanical and rheological characterization of concrete with EAF Slag aggregates	NA	NA	NA	NA	NA
4.4	Development of bituminous mixtures with EAF Slag aggregates for use on an industrial scale	% reduction of the amount of natural aggregate in bituminous concrete	75%	>75%	100%	Report detailing the physico-chemical, mechanical and durability properties of the developed compositions formulations within an industrial enviornment.
4.5	Tests for mechanical and rheological characterization of bituminous mixtures with EAF Slag aggregates	NA	NA	NA	NA	NA
4.6	Production of industrial-scale prototypes with EAF Slag aggregates-incorporated concretes and bituminous mixtures	Number of Innovative solutions for increased resource efficiency piloted	2	2	100%	Application in projects under construction by dst of prototypes with concrete and bituminous mixtures with incorporation of EAF SSA.
5.1	Environmental and economic life cycle assessment of the recycled aggregates from CDW and of the prototypes in concrete with incorporation of recycled aggregates from CDW and with EAF Slag aggregates	Number of eco-design files	4	7	100%	Four eco-design files of recycled aggregates from CDW, and of concrete and bituminous mixtures with incorporation of recycled aggregates from CDW and with EAF SSA.
5.2	Environmental and economic life cycle assessment of the prototypes in bituminous mixtures with recycled aggregates from CDW and with EAF Slag aggregates	Number of eco-design files	4	7	100%	Four eco-design files of recycled aggregates from CDW, and of concrete and bituminous mixtures with incorporation of recycled aggregates from CDW and with EAF SSA.
5.3	Development of environmental labels for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures - Type III Environmental Product Declarations (EPD)	Number of EPD	4	7	100%	EPD ready for verification and registration.
5.4	Development of circularity passport for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures	Number of circularity passport	4	7	100%	Circularity passport.
5.5	Benchmarking of the performance and of the environmental, economic and social advantages of the recycled aggregates from CDW and EAF Slag aggregates and of the prototypes with identical and / or competing products	Number of eco-design files	4	7	100%	Four eco-design files of recycled aggregates from CDW, and of concrete and bituminous mixtures with incorporation of recycled aggregates from CDW and with EAF SSA.
6.1	Communication and dissemination plan	Number of articles in the media and press releases -	3	3	100%	Press news archives and press releases archive.
6.2	Project Website and Social Networks	I) Nbr of followers in social media; II) Nbr of registered people for newsletter III) Annual average of website visitors	I) > 50; II) > 50; III) A 10% increase in the total	I) 490; II) 210; III) 238% (2021 to 2022);	100%	Report on the number of registrations in the database; Website analytics and social media insights.
6.3	Technical-Scientific Publications	Number of scientific publications submitted	3	5	100%	Publications archive.

Activity 1 - Project management

Action 1.1 - Technical Management and Action 1.2 - Financial Management

Frequent meetings have been an essential tool for the effective follow-up of planned activities and the early identification of possible deviations from the project schedule.

The quarterly reports produced are a relevant record of the development of the project's activities and actions. The first quarterly report, which was simultaneously the annual report for the year 2020, covered the period from 15th of September 2020 to 15th of December 2020. The second quarterly report was for the period from 16th of December to 31st of March 2021, the third report referred to the period from 1st April to 30th of June 2021, the fourth quarterly report was for the period from 1st of July to 30th of September 2021 and the fifth quarterly report was simultaneously the annual report for the year 2021, covering the period from October 1st to December 31st, the sixth report covered the period from January 1st to March 31st 2022, the seventh report covered the period from April 1st to June 30th , the eighth report covered the period from July 1 to September 30, the 9th quarterly and simultaneously annual referring to the period from October 1 to December 30, 2022. This is the tenth report and also the Final Report of the Project, with a reporting period until 31st May, 2023.

As for the financial execution, in total seven payment requests were submitted: the first payment request was submitted in August 2021 and the final payment requests were submitted at the end of June 2023 (DST, UM, NTNU) and at the beginning of August 2023 (IST, which has completed some missing information in September and October 2023).

Due to the current pandemic situation, the partners faced some restrictions on the availability of their laboratories for testing, which caused delays in the execution of some tasks, as mentioned in the 4th report, and, therefore, it was requested an extension of the project by 4 months. To this end, an addendum to the contract was prepared and signed in December 2021, reflecting the new project schedule.

In the 7th quarterly report, a further extension of the end of the project to April 30, 2023, was requested due to delays with the acquisition of software for the advancement of activity 5, which was accepted. So, the Second Amendment to the Project Contract was signed in December 2022.

Due to the incompatibility of dates with the Norwegian partner to hold the events in April, it was necessary to request a new extension of the end of the project to May 31st. For this reason, the Third Amendment to the Project Contract was drawn up and signed in March 2023.

Activity 2 - State of the art, Requirements and Regulations

Action 2.1 State of the art on the technical, environmental, and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in concrete and 2.2 State of the art on the technical, environmental and economic performance of incorporating recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures

These actions were completed in mid-January 2021. The corresponding state-of-the-art reports were already submitted together with Interim report no. 2. These actions were completed at 100%.

Action 2.3 - Requirements and technical specifications to be met by recycled aggregates from CDW and EAFS in concrete

From Action 2.3, a summary of the requirements and technical specifications to be met by recycled aggregates from CDW to be used in concrete was already finished. Regarding EAF SSA, it was also finished. This action has been completed, and the final report was delivered with Interim report no. 8, with dispositions provided by IST and UM for CDW and EAF SSA, respectively. Therefore, 100% of this action is completed.

Action 2.4 - Requirements and technical specifications to be met by recycled aggregates from CDW and EAF Slag aggregates in bituminous mixtures

Action 2.4 was concluded. A report summarising the requirements and technical specifications to be met by recycled aggregates from CDW and EAF SSA to be used in bituminous mixtures was submitted together with Interim report no. 6. Therefore, 100% of this action is completed.

Action 2.5 - Production of recycled aggregates from CDW and processing of EAF Slag aggregates in fractions for the concrete and asphalt mixtures

Action 2.5 was concluded with the end of the preparation of AR and EAF SSA for the execution of prototypes on an industrial scale. So, this action is completed.

Activity 3: Demonstration and Production of Prototypes with incorporation of recycled aggregates from CDW

Action 3.1 - Characterization tests on recycled aggregates from CDW

The tests foreseen for the characterization of the concrete RAs were concluded, so the action is at 100% execution.

Action 3.2 - Development of concrete with recycled aggregates from CDW, and corresponding characterisation tests in the fresh state, for use at an industrial scale

From action 3.2, the following results were already achieved: the experimental campaign of tests in the fresh state of concrete with recycled aggregates from CDW was already planned; the raw

materials were received, stored and prepared; the size grading of aggregates was characterised, and macroscopic tests were completed; the water absorption with time and density of recycled aggregates from CDW were determined; characterisation tests in the fresh state completed for the twelve mixes of the 1st stage and for the four mixes of the 2nd stage. At this stage, 100% of this action has been completed.

Action 3.3 - Mechanical and rheological characterization tests of concrete with recycled aggregates from CDW in the hardened state

From action 3.3, the following results were already achieved: the experimental campaign of tests in the hardened state of concrete with recycled aggregates from CDW was already planned; the raw materials were received, stored and prepared; the size grading of aggregates was characterised, and macroscopic tests were completed; the water absorption with time and density of recycled aggregates from CDW were determined; characterisation tests in the hardened state were also completed (compressive strength, modulus of elasticity, carbonation and chlorides penetration resistances). For four of the latter, shrinkage and creep tests are also finished. As mentioned in point I, the composition with 30% RCA was defined. The report for action 3.2 and 3.3 was already delivered. At this stage, in global terms, 100% of this action has been completed.

Action 3.4 - Development of bituminous concrete with recycled aggregates from CDW for use on an industrial scale and Action 3.5 - Tests for mechanical and rheological characterization of bituminous mixtures with recycled aggregates from CDW

These actions are finished, and were performed at 100%.

Action 3.6 - Production at industrial scale of prototypes in concrete and bituminous mixtures with incorporation of recycled aggregates

As mentioned in part I, the realization of the concrete prototype and the experimental section of bituminous mixtures with recycled aggregates took place in March 2023. Although with some challenges in the industrial transposition, it was possible to carry out the intended compositions and the final result was very positive. In this way, it was possible to demonstrate the industrial viability of these products, as well as to understand the necessary adjustments in the industrial units for their manufacture. In the case of bituminous mixtures, two mixtures were produced and applied incorporating 66% of recycled concrete aggregates (fine and coarse). A mixture of type AC20 bin/reg 35/50 and another type AC14 surf 35/50. Regarding the concrete prototype, the composition of C30/37 S3 D20 was produced with the incorporation of 30% of coarse recycled concrete aggregates. Thus, this activity is finished.

Activity 4: Demonstration and Production of Prototypes with incorporation of ASIC aggregates from the steel mill

Action 4.1 - EAF Slag aggregates characterization tests from the steelwork mill

Action 4.1 was completed in the 5th quarter of the project, as reported in Interim report no. 5. Therefore, 100% of this action is completed.

Action 4.2 - Development of structural concrete with EAF slag for use on an industrial scale

At this stage, 100% of this action has been completed with the realization of the retaining-wall prototype, which was produced at an industrial scale. The mechanical properties of the developed concretes produced at an industrial scale revealed that the scaling up from the laboratorial scale did not affect the concrete strength class as well as the workability. A concrete mixture comprising EAF SSA and ceramic powder with a C30/37 strength class a S3 slump class were successfully used on the real-scale prototype.

Action 4.3 - Tests for mechanical and rheological characterization of concrete with EAF Slag aggregates

In Action 4.3, the characterization at a laboratorial scale has been completed. At the end of this Projectf this task is 100% completed.

Action 4.4 - Development of bituminous concrete with EAF slag for use on an industrial scale

Action 4.4 was completed in the 6th quarter of the project. Thus, 100% of this action is completed. The corresponding report was submitted with the results and conclusions of action 4.5 in Interim report no. 7.

Action 4.5 - Tests for mechanical and rheological characterization of bituminous mixtures with EAF Slag aggregates

Action 4.5 was completed in the 7th quarter of the project, as previously reported in Interim report no. 7. Therefore, 100% of this action is completed.

Action 4.6 - Production of industrial-scale prototypes with EAF Slag aggregates-incorporated concretes and bituminous mixtures

As mentioned in part I of this report, the execution of the concrete prototype and the pavement trial with bituminous mixtures with EAF SSA took place in January 2023. Some challenges observed at industrial scale production did not compromise the achievement of the intended compositions and the result was very positive. Thus, it was possible to demonstrate the industrial viability of these products, as well as to understand the necessary adjustments in the industrial units for their manufacture. In the case of bituminous mixtures, two mixtures were produced and applied incorporating approximately 60% EAF SSA and 20% RA, a mixture for binder courses (AC20 bin/reg 50/70) and another for surface courses (AC14 surf 35/50). Regarding the concrete

prototype, the composition of C30/37 S3 D20 was produced with the incorporation of 79% residue (69% EAF SSA + 10% ceramic powder). Thus, this activity is finished.

Activity 5: Prototype Sustainability Assessment

Action 5.1 - Environmental and economic life cycle assessment of the recycled aggregates from CDW and of the prototypes in concrete with incorporation of recycled aggregates from CDW and with EAF Slag aggregates

IST has prepared the inventory file of the CDW stocking and recycled aggregates production, and of the concrete production. IST used this file in the data collection of the input and output flows from the production of recycled aggregates by DST (Action 2.5) and from concrete production at IST (Actions 3.2 and 3.3), and then developed the environmental and economic life cycle assessment. UM has prepared the inventory files for the production of the developed mixtures with EAF SSA. At this stage, 100% of this action has been completed.

Action 5.2 - Environmental and economic life cycle assessment of the prototypes in bituminous mixtures with recycled aggregates from CDW and with EAF Slag aggregates

UM Group has prepared the inventory file of the AC14 and AC20 bituminous mixtures with reclaimed asphalt (RA) and EAF SSA according to the standard EN 15804:2012+A2:2019. In addition, the same procedure was used to complete the LCI for the AC14 and AC20 bituminous mixtures with CDW/RCA. This action was completed with the preparation of two LCA reports (one for the two mixtures with EAF SSA+RA and another for the two mixtures with CDW/RCA).

Action 5.3 - Development of environmental labels for recycled aggregates from CDW and EAF Slag aggregates for the prototypes in concrete and bituminous mixtures - Type III Environmental Product Declarations (EPD)

UM started by reviewing similar EPD at the national and international levels. IST and UM prepared all the documentation for EPDs verification also based on the results from action 5.1. This action is completed.

Action 5.4 - Development of circularity passport for the prototypes in concrete and bituminous mixtures

This action started on May 15th, 2022, and IST team started by completing a survey in research projects and in journal papers about models for circularity passports and proposed a structured template that was developed, tested and validated by all partners in this action. Then, all partners prepared 7 circularity passports for the products previously mentioned. This action is completed.

Action 5.5 - Benchmarking of the performance and of the environmental, economic and social advantages of the recycled aggregates from CDW and EAF Slag aggregates and of the prototypes with identical and / or competing products

All partners reviewed identical or competing products for benchmarking evaluation, and prepared eco-design files for each developed product. This action is completed.

Activity 6: Communication and Dissemination

Action 6.1 - Communication and dissemination plan, Action 6.2 - Project Website and Social Networks and Action 6.3 - Technical-Scientific Publications

Three press releases were published during the course of the project, as indicated above, which contributed to disseminating the project in different media. Action 6.1 was the one that in the previous report did not have the full execution rate, having now reached 100%.
Regarding action 6.2, the execution rate is 100%. The targets related to the indicators of action 6.2 are presented below according to the communication plan:

I) Number of followers on social media > 50
II) Number of registered people for newsletter > 50
III) Annual average of website visitors: 10% increase in the total number of traffic

Table 4 presents the number of followers on each of the social networks and the variation over the last 4 quarters and between the end of 2021 and September 2022.

Table 3 - Number of followers on social media in the last four quarters

Social network	December 2021	March 2022	June 2022	September 2022	December 2022	May 2023
Facebook	108	120	129	136	141	168
Instagram	101	101	108	120	122	134
LinkedIn	111	110	122	139	141	188
Total number of followers	**320**	**331**	**359**	**395**	**404**	**490**
Comparison of the number of followers in relation to the last quarter	-	3%	8%	10%	2%	21%*
Annual comparison of the number of followers	-	-	-	23%	26%	21%**

* This figure does not relate to the comparison with the last quarter, but rather to the figure at the end of last year, since 2023 presented only one report.

** Comparison with the no. of followers at the end of 2022 and not 2021, as performed for the other quarters. If compared with the no. of followers at the end of 2021, the increase in the no. of followers is 53%.

In Annex 3 it can be found the social networks report with information on the number of followers at the end of May.

During 2023, there was an increase in the number of subscribers to the newsletter (from 115 to 210). As mentioned in previous reports, it is not possible to present evidence of the number of subscribers because the eGoi platform does not issue a report, so the only information is an Excel file with subscribers' contacts.

Table 5 presents the analysis between the number of website visitors in the years 2021, 2022 and 2023.

Table 4 - Number of website visitors in the year 2021, 2022 and 2023

Description	2021	Jan/ Mar2022	Apr/ Jun2022	Jul/ Sep2022	Oct/ Dec2022	2022	Jan/ Mar 2023	Apr/ May 2023	2023
website visitors	60	69	46	55	33	203	167	145	312
Annual variation of visitors	-	**15%** (69-60/60)	-			**238%** (203-60/60)			**54%** (312-203/203)

During 2021 the number of website visitors was 60. In 2022, at the end of December, the number of visits to the website was 203, which represents an increase of 238% compared to 2021. The increase in the number of visitors between the year 2022 and the period covered by this report is 54% (312 visitors).

The reports on visits to the website can be found in annex 3.

The execution rate of action 6.3 is 100%. As mentioned earlier, 5 papers related to the CirMat project were submitted.

iii. Description of costs and financial impact assessment

The following table presents the original budget (annexed to the project contract) of the project, which amounts to a total cost of 588.196,08 €:

Table 6 - Original Budget

Output / Activity Project Partner	Management costs / Activity 1	Output/ Activity 2	Output/ Activity 3	Output/ Activity 4	Output/ Activity 5	Output/ Activity 6	TOTAL DIRECT COSTS	INDIRECT COSTS Reg. Art. 8.5	TOTAL COSTS
DST	19.626,42	32.146,88	80.739,58	71.058,98	53.306,05	33.009,07	289.886,97	42.207,40	**332.094,37**
IST	6.291,94	4.456,79	36.600,20	0,00	26.189,14	14.010,89	87.548,95	17.509,79	**105.058,74**
Uminho	3.518,98	12.998,19	0,00	46.003,46	35.519,21	16.593,17	114.633,02	12.169,95	**126.802,97**
NTNU	0,00	0,00	0,00	0,00	8.100,00	12.100,00	20.200,00	4.040,00	**24.240,00**
TOTAL	**29.437,34**	**49.601,86**	**117.339,78**	**117.062,43**	**123.114,40**	**75.713,13**	**512.268,94**	**75.927,14**	**588.196,08**

During the project implementation, some necessary adjustments to the budget (with no impact on the amount per entity) had been requested and approved. The budget resulting from those adjustments is presented in the table below:

Table 7 - Reprogrammed Budget

Output / Activity Project Partner	Management costs / Activity 1	Output/ Activity 2	Output/ Activity 3	Output/ Activity 4	Output/ Activity 5	Output/ Activity 6	TOTAL DIRECT COSTS	INDIRECT COSTS Reg. Art. 8.5	TOTAL COSTS
DST	23.126,42	23.151,88	98.319,58	74.308,98	37.806,05	33.874,07	290.586,97	41.507,40	**332.094,37**
IST	6.291,93	4.456,79	40.089,81	0,00	22.699,53	14.010,89	87.548,95	17.509,79	**105.058,74**
Uminho	3.518,98	12.998,19	0,00	36.030,60	46.652,71	18.593,17	117.793,65	9.009,32	**126.802,97**
NTNU	0,00	0,00	0,00	0,00	8.100,00	12.100,00	20.200,00	4.040,00	**24.240,00**
TOTAL	**32.937,33**	**40.606,86**	**138.409,39**	**110.339,57**	**115.258,29**	**78.578,13**	**516.129,57**	**72.066,51**	**588.196,08**

The total costs executed and submitted in the payment requests amount to 576.362,31 €, corresponding to a global **execution rate of 98,0%.** The table below presents the total costs and execution rate, per activity and per entity:

Table 8 - Total financial execution per Entity and Activity (expenditure submitted in payment requests)

Output / Activity Project Partner	Management costs / Activity 1	Output/ Activity 2	Output/ Activity 3	Output/ Activity 4	Output/ Activity 5	Output/ Activity 6	TOTAL DIRECT COSTS	INDIRECT COSTS Reg. Art. 8.5	TOTAL COSTS	Execution rate per Entity
DST	23.834,27	33.153,20	89.294,65	61.755,12	46.723,52	33.219,14	287.979,90	34.839,04	**322.818,95**	**97,2%**
IST	12.000,58	4.953,24	39.297,29	0,00	18.975,47	19.234,98	94.461,56	18.892,31	**113.353,87**	**107,9%**
Uminho	3.544,56	13.703,65	0,00	33.254,53	43.210,75	8.918,46	102.631,96	9.948,34	**112.580,29**	**88,8%**
NTNU	0,00	0,00	0,00	0,00	16.925,96	6.643,24	23.569,20	4.040,00	**27.609,19**	**113,9%**
TOTAL	**39.379,42**	**51.810,10**	**128.591,93**	**95.009,65**	**125.835,69**	**68.015,82**	**508.642,62**	**67.719,69**	**576.362,31**	**98,0%**
Execution rate per Activity	**119,6%**	**127,6%**	**92,9%**	**86,1%**	**109,2%**	**86,6%**	**98,5%**	**94,0%**	**98,0%**	

Additionally, the following table presents the breakdown of the expenditure executed per payment request and the comparison with the budget approved:

Table 9 - Breakdown of expenditure per payment request

Payment request Project Partner	1º Payment request	2º Payment request	3º Payment request	4º Payment request	5º Payment request	6º Payment request	7º Payment request	TOTAL COSTS	Budget approved	Differences
DST	33.535,46	71.933,60	62.492,92	40.781,01	--	114.075,96	--	322.818,95	332.094,37	-9.275,42
IST	13.742,37	10.527,06	--	--	--	--	89.084,44	113.353,87	105.058,74	8.295,13
Uminho	4.367,31	22.215,19	--	41.516,46	--	44.481,33	--	112.580,29	126.802,97	-14.222,67
NTNU	--	--	--	--	27.609,19	--	--	27.609,19	24.240,00	3.369,19
TOTAL	51.645,14	104.675,85	62.492,92	82.297,48	27.609,19	158.557,29	89.084,44	576.362,31	588.196,08	-11.833,77

iv. Description of the Project's contribution to achieving the overall objectives of EEA Grants and the 'Environment Programme'

The CirMat project aimed to contribute to the objectives of the program "Environment, Climate Change and Low Carbon Economy", namely result 1 and product 1.4 of the PA11 programmatic area.

Activity 2 is concluded with regard to actions related to the state of the art and requirements and technical specifications, so that in the future several companies, nationally and beyond, have access to more comprehensive information on the use of the materials studied in the scope of this project. This contribution will make it possible at national level to achieve higher targets for the recovery of CDW and the promotion of secondary raw materials in nobler applications than those currently occurring in Portugal.

Activities 3 and 4 contribute to result 1 of programmatic area PA11, through the high degree of valorization of CDW in higher value applications, namely in concrete and bituminous concrete and in the increase and promotion of the use of secondary raw materials, with high degree of incorporation of EAF SSA.

At the same time, activities 3 and 4 made an important contribution to the Output 1.4 of that programme, through the execution of four Pilot Works, for each products developed, namely: Structural Concrete with recycled RCD aggregates; Structural concrete with EAF SSA; Bituminous concrete with recycled CDW aggregates; Bituminous concrete with EAF SSA. Table 8 shows the contribution of activities with a direct impact on program indicators and targets.

Table 10 - Contribution of the CirMat project to the objectives of the EEA Grants and the Environment Program

	Indicator	Related activity ID	Project contribution (results cumulative, at the end of project)
PA 11 – Outcome 1	Use of secondary materials increased in the supported sectors (%)	2 and 4	100%
	Number of jobs created	NA	
	Construction and demolition waste saved in the supported sectors (%)	2 and 3	100%
PA 11 – Output 1.4	Number of innovative solutions for increased resource efficiency piloted	3 and 4	4
	Number of SMEs supported	NA	
	Number of demonstration buildings constructed	NA	

Projector Promotor

Name	
Date and Signature	
Position	

Programme Operator – Secretary General for Environment

Name	Marco Rebelo
Date and Signature	Marco Rebelo Assinado de forma digital por Marco Rebelo Dados: 2023.11.10 10:14:25 Z
Position	Secretary General

Assinado por: **José Gonçalves Teixeira**
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