Environment, Climate Change and Low Carbon Economy Programme

'Environment Programme'

European Economic Area (EEA) Financial Mechanism 2014-2021

Final Report

30/11/2022

05_SGS#2 – C+D - Close the loop by Disclosing the benefits of buildings' deconstruction and materials re-use

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

Table of contents

I. Detailed description

C+D is a project developed by Instituto Superior Técnico (IST), as Project Promoter, together with the Norwegian Institute for Sustainability Research (NorSus, former Østfoldforskning - OST), as Partners Entity.

This is the final report of this project. The project implementation started on 1 September 2020 and finished on 30 November 2022, and during this period the following activities were completed:

- Activity 1 - Development of databases of costs and environmental impacts
- Activity 2 - Collection of national and international data;
- Activity 3 - Development of an indicator of the economic and environmental advantages of circularity;
- Activity 4 - Development of the C+D platform;
- Activity 5 - Development of the C+D handbook;
- Activity 6 - Communication and dissemination of the results of the project.

The summary of these activities is presented below.

The whole technical component of the project was already accomplished (see table in part III. Description of costs and financial impact assessment).

Activity 1 - Development of databases of costs and environmental impacts

IST developed the first version of the database of economic and environmental (2E) impacts of processes of the end-of-life of buildings, including the following processes:

a) Buildings' deconstruction;

b) Transport and re-use of demolition waste;

c) Traditional demolition of buildings;

d) Transport, recycling, energy recovery, incineration and landfilling of demolition waste processes, including their corresponding benefits and burdens.

The most important Construction and Demolition Waste (CDW) streams from buildings in Portugal were identified from reference literature and statistical data, to be considered in this project. The most common disposal scenarios in Portugal for these CDW were also identified.

Methodologies for 2E assessment of the referred processed were summarized. Then, the 2E impacts of processes a)-d) were calculated considering previous studies completed at IST and generic databases. It was not necessary to consider EPD to have enough data, and for that reason EPD was included only in the review that was completed in Activity 2.

This activity was finished during the third quarter (by November 2020). The report that describes the first version of the databases of costs and environmental impacts developed was finished and reviewed by the partner (C+D_Report_Activity1_DTC_12_21.pdf in appendix).

Activity 2 - Collection of national and international data

From activity 1 it was found that, for some CDW streams, information collected may be insufficient. The following action was implemented to fill in those gaps and to confirm the EOL scenarios: search for available data on existing literature, including research studies and EPD, regarding these materials and processes.

This activity was finished during the fifth quarter (by November 2021). The report that describes the development and content of the final version of the databases developed in activities 1 and 2 is presented in appendix (C+D Project Report2_jul22.pdf).

Activity 3 - Development of an indicator of the economic and environmental advantages of Circularity

The development of the CircularEE indicator formula for the environmental dimension was finished and tested for practical cases and generated a paper that was submitted to an international journal (*GOMES, R.; BASTOS, D.; SILVESTRE, J. D. (2021). Development of an indicator of the environmental advantages of circularity of construction materials. Sustainability. Submitted for publication;* indicator_environmental_circularity.docx in appendix). A similar procedure was implemented for the economic dimension.

This activity was also finished during the fifth quarter (by November 2021). The report that describes the development of the CircularEE indicator is presented in appendix (C+D Project Report3_jul22.pdf).

Activity 4 - Development of the C+D platform

The methodology for the construction of the environmental part of the platform was firstly defined and generated a paper already published in an international journal (*ANTUNES, A.; MARTINS, R.; SILVESTRE, J. D.; CARMO, R. do; COSTA, H.; JÚLIO, E.; PEDROSO, P. (2021).*

Environmental impacts and benefits of the end-of-life of building materials: database to support decision making and contribute to circularity. Sustainability. 13, 12659, DOI: 10.3390/su132212659; sustainability-13-12659-v2.pdf in appendix).

It was only possible to adjudicate during the sixth quarter (by January 2022) to an external company the implementation in computer of the databases developed in activities 1, 2 and 3. That company, Sitana, started that work, and the project coordinator (José Silvestre) had periodic meetings with a representative of that company to follow-up the development of the C+D platform and clarify questions related with its requirements and working mode, but without meeting minutes. Nevertheless, this work had some delay because of incompatibilities of the platform with the two servers available at IST, and this activity needed to be extended for 3 months (see *Detours from the initial Workplan*).

Sitana finished implementing in computer the databases developed in activities 1, 2 and 3 during the nineth quarter (by September 2022), and therefore the whole content and functionalities of the final version of the C+D platform was presented during the first closing seminar of this project that occurred in Lisbon on 27 September (see Silvestre_Plataforma C+D_27set22.pdf in appendix) and also during the second closing seminar that occurred in Oslo, Norway, on 27 October (see Silvestre_C+Dpresentation_27Oct22.pdf in appendix). At that time, this platform was made available to be tested and validated by the project partners and fine-tuned by Sitana, in the address https://my.cplusd-platform.pt/. The validation process by the project partners generated a summary file (Sitana_Website_Plataforma_Validacao_IST.docx in appendix and in Portuguese), where only the text in red correspond to adjustments yet to be implemented at that time, while green and grey text corresponds to comments already solved.

Specific criteria were defined during this Activity for the selection of stakeholders for the testing and validation stages, including the experience in the development of CDW management plans and in the environmental assessment of buildings. This platform was then tested and validated by the following selected stakeholders:

Target group	Company	Contact person
Expert in waste management and prevention plans	IST	Manuel Pinheiro
Expert in waste management and prevention plans	3Drivers	Vera Durão
Construction company	dst	Patrícia Pinto
CDW management operator		

Two representatives of design offices were also contacted to contribute to this validation process, but they were not available to collaborate.

Therefore, the C+D platform is now available online to the public, but it is required a preliminary contact with the project partners to declare the interest on using it and contribute to its testing

as a Beta Tester. This information will be provided on the C+D project website and to all participants in the closing seminars.

It was already requested to the IST's Technology Transfer Office the registration of the database that supports the C+D platform, of its trademark and logo at the national level (see formulario-comunicacao-base de dados.docx in appendix), since it was consensual in a meeting between them and the research team that a computer-implemented invention (CII) will not be successful because of the lack of innovation in the information technology area. Nevertheless, this type of registration also provides a legal protection for the C+D platform content, name, and image. If accepted by IGAP, this registration will avoid the replication of the platform and guarantee and improve its market value.

Activity 5 - Development of the C+D handbook

For the reasons referred in Activity 4, this activity also needs to be extended for 2 months (see *Detours from the initial Workplan*) given the interconnection between their results and indicators and the strong interdependence of these tasks.

This activity was finished based on the outcomes of activity 4, namely the paper referred above, and a report describing the development of the C+D platform (working as guidelines for developing data to feed the platform) and of the handbook was concluded (see C+D Project Report5_Apr23.pdf in appendix).

Activity 6 - Communication and dissemination of the results of the project

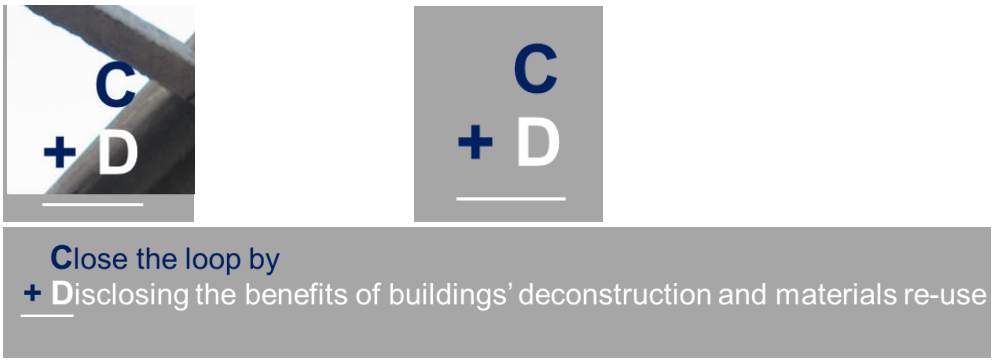
Under this activity, several contacts between the promoter and the partner have been established via telephone and e-mail to coordinate the development of the activities and to ensure an efficient project implementation.

A general online meeting with C+D researchers from the promoter and the partner was organised on May 14th, 2021. Another online meeting occurred on 19 April 2022, between the coordinators of both research teams, to present and discuss the ongoing activities and pending challenges. It was discussed the scientific exchange developed so far in this project, which had some limitations until now that led to the need of requesting the extension of the project duration for 3 months (see Detours from the initial Workplan). Moreover, a scientific in-person meeting between the coordinators of both teams (José Silvestre and Anne Rønning) occurred on 8 June 2022 at NorSus office in Oslo, Norway, to discuss the tasks and deliverables already completed in the project and plan in detail the program of the closing seminars. The other members of both teams participated online in this meeting. The full program of this meeting is presented in appendix (IST_NORSUS_Oslo_8June2022_Agenda.docx), and a photo is shown next.

It was not possible to organize the kick-off seminar at OST, in Norway, in the beginning of the project due to the travel restrictions related with the COVID19 pandemic. It was planned that a representative of the German project: "Resource Efficient Structures - EPD for Construction Products: Demolition and Recycling Information (Modules C and D) and Pollutant Information" would be present in this seminar to describe the development and results of that project. The seminar did not occur, but project partners have been in contact with a responsible of that German project and had access to the corresponding final report.

Nevertheless, the following activities were developed in the context of the communication and dissemination plan:

- News published in the EEA website: developed by the promoter, following the signature of the project contract, to describe the partners, aim and activities of the C+D: www.eeagrants.gov.pt/pt/programas/ambiente/noticias/bases-de-dados-de-custos-economicos-e-ambientais-do-fim-de-vida-dos-edificios/ (in Portuguese);
- Audio-visual material for the EEA website: a video (in Portuguese) and a PowerPoint presentation (in English and in Portuguese) of the project were produced by the promoter, at the beginning of the project implementation, describing the C+D main issues: www.eeagrants.gov.pt/en/programmes/environment/projects/projects/cplusd-close-the-loop-by-disclosing-the-benefits-of-buildings-deconstruction-and-materials-re-use/;
- Visual identity of the project: developed by the promoter considering the scope, aim and title, by request of the Programme Operator, and presented in a meeting organized by the Programme Operator on the 26th of November:



- News at the promoter's main website, Linkedin and Facebook webpages describing the aims, partners and researchers involved in this project (https://tecnico.ulisboa.pt/en/news/campus-community/promoting-circular-economy-in-the-construction-sector-tecnico-researchers-participate-in-projects-with-a-total-allocation-of-more-than-1me/, https://www.linkedin.com/posts/ist_investigadores-do-t%C3%A9cnico-participam-em-projetos-activity-6782304645881634816-1YmM and https://www.facebook.com/tecnico.ulisboa.pt/?ref=page_internal);
- Round table organised by the Programme Operator and dedicated to the theme "Increased application of the Circular Economy principles in the Construction sector" at the Portugal Smart Cities Summit 2020, on the 23th September: by the promoter, represented by Professor José Silvestre (https://twitter.com/FundoAmbiental/status/1308704268300345347?s=20, in Portuguese);
- The press event planned in the communication plan for the middle of the project occurred in October 2021. That resulted in the publication of an interview with the project coordinator (José Silvestre) and of the project framework, aim and planned results in the November/December issue of Construção Magazine (Entrevista Construção Magazine_Nov21.pdf in appendix);
- The first closing seminar occurred in Lisbon on 27 September 2022. The poster, dissemination email, list of participants (85), and selected photos are presented in the ClosingSeminarLisbon.pdf file (in appendix). In the scope of this seminar, a scientific in-person meeting between both research teams occurred in the morning of that day at IST to discuss the tasks and deliverables already completed in the project and plan in detail the program of the second closing seminar, and a photo of that event was also included in the referred file.
- The second closing seminar occurred in Oslo on 27 October 2022, with 15 participants (2 from Portugal; 1 from Germany – a representative of the German project: Resource Efficient Structures - EPD for Construction Products: Demolition and Recycling - Modules C and D - and Pollutant Information; and the remaining ones from Norway). The poster, dissemination email and selected photos are presented in the ClosingSeminarOslo.pdf file (in appendix). It is important to highlight that, as planned in the project proposal, it was possible to have one

of the coordinators of a similar project developed in Germany as a speaker in this seminar (Wolfram Trinius), and profit from the lessons learned.

The project coordinator (José Silvestre) referred to this project aim, activities, and results, on his participation on the following international and national events:

- International:
  - Web meeting on June 30th 2021 of the international W115 Commission on 'Construction Materials Stewardship' (https://cibworld.org/commissions/w115-construction-materials-stewardship/) from the International Council for Research and Innovation in Building and Construction (Conseil International du Bâtiment - CIB);
  - Invited speaker at the International Webinar on 'Sustainable and Digital Building'. This event was streamed live on July 14th 2021 and the recording is available on: https://sdb.ipleiria.pt/webinar/;
  - Invited lecture at the Faculty of Civil Engineering from the Budapest University of Technology and Economics – BME, in Hungary, on 29 March 2022;
  - invited lectures in the Seminar 'Flows and links: materials for the 21st century', of the University Master's degree in "Sustainable City and Architecture", XVI edition 2021-22, at Universidad de Sevilla, Spain, in May 2022;
- National:
  - Invited expert for the TechOnBUILT | WebTalk'Series, a series of online conversations under the Digital and Climate Transition in the AEC sector. This talk was streamed live on youtube on June 29th 2021, and the theme was 'Green Deal and the Built Environment. Challenges of Contracting, Design and Construction in the Life Cycle of Buildings'. The recording is available on: https://www.youtube.com/watch?v=VYeL_DwMYaQ;
  - Invited expert for the video podcast of the Circular Buildings project, which is funded by the EEA Grants under the same Programme as this project. This podcast was recorded on September 3rd 2021 and was about the importance of Environmental Product Declarations, and of their challenges and recommendations. It is available on: https://www.youtube.com/watch?v=B1ZgEYh_X-E;
  - Reference to the aim, activities, results, and critical domains of this Project, including the Project's Needs and Offers, on the "Webinar Synergies Circular Economy in Construction Sector, EEA Grants - PT Environment Programme - Call#2 e SGS#2" organized by the Programme Operator on 1 October 2021;
  - Conference on 12 July 2022 of SECClasS project (https://secclass.pt/2022/06/29/transformacao-digital-ao-servico-da-construcao-sustentavel/), which was also funded by EEA.

In addition, the promoter has also participated in the meetings organized by the Programme Operator on 2020 (16th and 26th of October, and 26th of November) and 2021 (21st of January, 6th of May and 4th follow-up meeting in September 8th).

IST adjudicated the development of the project website also to Sitana, and this work also started on 17 January 2022. The validation of its content was made by the project partners and this website is available online in the corresponding address (https://cplusd-platform.pt/en/). This validation process generated a summary file (Sitana_Website_Plataforma_Validacao_IST.docx in appendix and in Portuguese), where only the text in red correspond to adjustments yet to be implemented, while green and grey text corresponds to comments already solved.

Regarding the social networks, the project is being promoted trough the promoter social networks:

- CERIS LinkedIn: www.linkedin.com/company/ceris-civil-engineering-research-and-innovation-for-sustainability/;
- CERIS Facebook: www.facebook.com/CERIS-Investiga%C3%A7%C3%A3o-e-Inova%C3%A7%C3%A3o-em-Engenharia-Civil-para-a-Sustentabilidade-100280764995062.

The project digital communication dossier has been updated in this regard.

II. Results achieved

Detours from the initial Workplan:

Activities 1, 2, 4 and 6 presented some delay (due to bureaucratic issues, and also influenced by the COVID19 pandemic, that delayed the hiring by IST of a researcher for this project with an adequate profile), but these Activities suffered a significant retardation due to the COVID19 pandemic situation and corresponding state of emergency that affected Portugal in the beginning of 2021. Therefore, a proposal of change of the initial workplan and of extension of the duration of the project without changes in the budget was made. This extension corresponded to an added duration of three months of all the Activities, given the interconnection between their results and deliverables and their strong interdependency of these tasks. The Programme Operator approved in April 2021 the modified workplan requested by the promoter.

However, in August 2021, the promoter requested another extension of the duration of the project without changes in the budget. This extension corresponds to an added duration of three

months of Activities 2 to 6, given the interconnection between their results and indicators and the strong interdependence of these tasks. The Programme Operator approved the modified workplan. These modifications to the workplan were expressed in addenda to the initial Contract that was signed by the promoter and by the Programme Operator. This second extension of the duration of the project was necessary due to bureaucratic issues that delayed Activity 4 (adjudication process through prior consultation), that is the longest scientific activity of the project, and from which Activity 5 depends. These unexpected occurrences delayed the Activities and obligated to change the workplan of the project.

The Programme Operator approved a new modification to the workplan requested by the promoter in November 2021, including a new extension of the duration of the project without changes in the budget. This extension corresponds to an added duration of some Activities, that were expressed in addenda to the initial Contract already signed by the promoter and by the Programme Operator.

Because of the reasons described in Section 1, the Project Promotor requested in 2022 to the Programme Operator the extension of Activities 4 for 3 months and 5 for 2 months and of Activity 6, and of this project, for 5 months, without changes in the budget. This was also justified by:

- the uncertainty generated by the international context;
- the need to have time to communicate and disseminate the results of both final seminars;
- the need to prepare all the documentation and evidences to complete the last payment request and the final financial report. Instituto Superior Técnico has a large volume of research projects. There were about 150 projects with International Funding in execution and, given the contractual requirements, it was needed to hire Financial Auditing Companies through a public tender. We also needed 1 to 2 months to process the acquisition processes, so that everything is ready to be financially verified by the Auditing firm.

These extensions were accepted by the Programme Operator and a new addendum to the initial Contract was signed by the Promotor and by the Programme Operator. Thus, 30/11/2022 was the new end-date of Project 05_SGS#2 - C+D. The updated workplan is presented in Appendix I and the updated list of project indicators is presented in the “Project indicators” subsection and in Appendix II.

Project indicators:

Activity	End date	Indicator	Development state
1	2021-05-30	Number of draft databases (first version of the databases of costs and environmental impacts developed)	Report with the first version of the databases of costs and environmental impacts developed already finished
2	2021-09-30	Number of finished databases (final version of the databases of costs and environmental impacts developed)	Report with the development and content of the final version of the databases developed in activities 1 and 2 already finished
3	2021-10-31	Number of circularity indicators (CircularEE indicator defined, including the rules for its calculation)	Report describing the development of the CircularEE indicator already finished
4	2022-10-31	Number of circularity platforms (C+D platform finished and tested and validated by the project partners and selected stakeholders); +Number of patent requests (Computer-implemented invention (CII) request finished) (1+1)	C+D platform finished and made available online. Validation by the project partners and selected stakeholders finished. Registration of the database that supports the C+D platform, of its trademark and logo already requested at the national level.
5	2022-10-31	Number of standards of best practices developed (materialized in the C+D platform and corresponding handbook)	Report describing the development of the C+D platform and handbook already finished
6	2022-11-30	Events, conferences, seminars or press events organized (press event and two closing seminars) + Website developed (3+1)	The promoter gave an interview to a national publication that was published in November 2021. Website developed. Two closing seminars organised: 27 September and 27 October 2022.

III. Description of costs and financial impact assessment

A first payment request was submitted by the promoter in May 2021 and accepted by the Programme Operator. I.The costs incurred during the period under review were only related with human resources, in line with the approved Budget.

The second payment was already partially submitted to the Programme Operator for verification, regarding IST expenses.

For the moment, 100% of the financial component of the project was already accomplished, as described in the following table. Nevertheless, the values presented in the two last columns are only for reference, since the final map of expenses by tasks and partner is not yet concluded because of the IST expenses are being verified by the Programme Operator and NorSus financial documents are still being finished.

Detours from the initial Budget:

The Programme Operator approved the following budget reallocations requested by the promoter:

- From the kick-off seminar to a closing seminar in Norway with similar aims to the closing seminar that is already planned to IST, in Portugal;
- From permanent staff (Human Resources) to a researcher permanently dedicated for this project.

Because of the reasons described in Section 1 and of the following justifications, the Project Promotor also requested to the Programme Operator the following budget reallocations:

- Travel and subsistence allowances for staff - Reg. Art. 8.3.1.b: €900 from Activity 2(since it was not necessary to make visits to national companies for data collection) to Activity 6 (for the Scientific Meeting in Norway);
- Travel and subsistence allowances for staff - Reg. Art. 8.3.1.b: Activity 6 - €300 from the closing seminar to the Scientific Meeting in Norway.

Because of workmanship cost inflation, of work not foreseen in the initial proposal to develop the C+D platform with more complexity than estimated, and of the cost of web hosting from April to November 2021, the Project Promotor also requested to the Programme Operator the following budget reallocations, without changes to the total value funded:

- From "Travel and subsistence allowances for staff - Reg. Art. 8.3.1.b" to "Costs entailed by other contracts awarded by PP for the purpose of carrying out the project - Reg. Art. 8.3.1.f": €412.3 from Activity 6 (since the Two-days mission to Norway of two researchers from IST to participate in the closing seminar organized by NORSUS will be cheaper than expected) to Activity 4 (for the increased cost of the Development of the "C+D" platform by an external company);
- From "Custos com consumíveis e outros fornecimentos / Costs of consumables and supplies - Reg. Art. 8.3.1.e" to "Costs entailed by other contracts awarded by PP for the purpose of carrying out the project - Reg. Art. 8.3.1.f": €758.12 from Activity 6 (since the Cost of the end of the project seminar organized by IST was lower than expected) to Activity 4 (for the increased cost of the Development of the "C+D" platform by an external company);
- From "Travel and subsistence allowances for staff - Reg. Art. 8.3.1.b" to "Costs entailed by other contracts awarded by PP for the purpose of carrying out the project - Reg. Art. 8.3.1.f": €555.52 from Activity 6 (since the Two-days mission to Norway of a researcher from IST to participate in a scientific meeting with NORSUS team was cheaper than expected) to Activity 4 (for the increased cost of the Development of the "C+D" platform by an external company).

All these changes are included in Orcamento_budget_act_C+D_updated_20abr_2022.xlsx in appendix.

External audit:

The Programme Operator promoted a first external audit (local verification) to this project. This audit took place on July 19th, 2021, via Microsoft Teams. The promoter already implemented the small changes requested in the project digital communication dossier.

The Programme Operator also promoted a second external audit (local verification) to this project. This audit took place on May 13th, 2022, via Microsoft Teams. The promoter already implemented the small changes requested in the project digital communication dossier.

Activity ID	Descrição Atividade / Activity Description	Duration (months)	Technical achievement (2022-11-30)	Relative Technical achievement (2022-11-30)	Finantial achievement (2022-03-31)	Total budget	Budget (2022-06-30)
	Project management	27	100%	27.00	100%	€ 3,051.24	€ 3,051.24
1	Development of databases of costs and environmental impacts	9	100%	9.00	100%	€ 5,411.63	€ 5,411.63
2	Collection of national and international data	10	100%	10.00	100%	€ 3,479.68	€ 3,479.68
3	Development of an indicator of the economic and environmental advantages of circularity (CircularEE)	9	100%	9.00	100%	€ 3,087.63	€ 3,087.63
4	Development of the C+D platform	20	100%	20.00	100%	€ 18,068.01	€ 18,068.01
5	Development of the C+D handbook	16	100%	16.00	100%	€ 4,041.84	€ 4,041.84
6	Communication and dissemination of the results of the project	27	100%	27.00	100%	€ 14,040.26	€ 14,040.26
	Total	118	Estimated accomplishment	100%			
					Total eligible costs	€ 51,180.29	€ 51,180.29
						Estimated accomplishment	100%

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

C+D project intends to contribute to multiple objectives of the "Environment, Climate Change and Low Carbon Economy" programme. In the case of the activities of the reported period, they will be essential to the development of the future activities that will prove and promote the project's contribution to achieve the objectives of EEA Grants.

Considering the target audience, and as a direct result of the C+D, it is expected a more frequent adoption of deconstruction. This is even more important for the medium and small construction and demolition companies that do not yet guarantee an adequate management of the Construction and Demolition Waste (CDW, or C+D waste), as referred in this Call text. Therefore, the C+D will also contribute to achieving the Environment Programme's **Outcome 1: "Increased application of circular economy principles in targeted sectors".**

C+D results will also create new business opportunities at the end-of-life stage of buildings and will contribute to the reduction of economic and social disparities between Portugal and countries in the European Economic Area with a higher rate of CDW re-use, which is one of the objectives of the EEA Financial Mechanism 2014-2021 (EEA FM). Since the partnership proposed includes institutions from a Donor State (Norway) and a Beneficiary State (Portugal), it is likely to **strengthen bilateral relations between both countries**, which is another objective of the EEA FM.

Project indicators' quantification:

Project 05_SGS#2.C+D		ID		5
		Indicator	Contribution of the project	Finished report describing the development of the C+D platform and handbook
			Unit	Number
			Results (Cumulative)	1
Environment Programe	Output 1.5	Number of standards best practices developed	1	-

Project Promotor

Name	José Dinis Silvestre
Date and Signature	2023/04/21 
Position	Associate Professor with Habilitation

Programme Operator – Secretary General for Environment

Name	Marco Rebelo
Date and Signature	Marco Rebelo Assinado de forma digital por Marco Rebelo Dados: 2023.10.25 08:10:39 +01'00'
Position	Director of Secretary General

Appendixes

Files sent by email in appendix to the report:

1. C+D_Report_Activity1_DTC_12_21.pdf;
2. C+D Project Report2_jan22.pdf;
3. indicator_environmental_circularity.docx;
4. C+D Project Report3_fev22.pdf;
5. sustainability-13-12659-v2.pdf;
6. Silvestre_Plataforma C+D_27set22.pdf;
7. Silvestre_C+Dpresentation_27Oct22.pdf;
8. Sitana_Website_Plataforma_Validacao_IST.docx;
9. Formulario-comunicacao-base de dados.docx;
10. C+D Project Report5_Apr23.pdf;
11. IST_NORSUS_Oslo_8June2022_Agenda.docx;
12. Entrevista Construção Magazine_Nov21.pdf;
13. ClosingSeminarLisbon.pdf;
14. ClosingSeminarOslo.pdf;
15. Orcamento_budget_act_C+D_updated_20abr_2022.xlsx.

Appendix I - Workplan

Activity ID	Descrição Atividade / Activity Description	2020				2021												2022											
		9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	
	Project management																												
1	Development of databases of costs and environmental impacts																												
2	Collection of national and international data																												
3	Development of an indicator of the economic and environmental advantages of circularity (CircularEE)																												
4	Development of the C+D platform																												
5	Development of the C+D handbook																												
6	Communication and dissemination of the results of the project																												
					1st report			2nd report			3rd report			4th report				5th report			6th report			7th report			8th report			Final report

Appendix II - List of project indicators

ID Atividade / Activity ID	Designação Atividade / Name of Activity	Data Início / Beginning Date	Data Fim /End Date	Descrição / Description	Público Alvo / Target Audience	Entidade Executora / Executing Entity	Indicador / Indicator	Unidade / Unit	Meta / Target	Fonte Verificação / Verification Source
1	Development of databases of costs and environmental impacts	2020-09-01	2021-05-30	These databases will include the following processes: a) Buildings' deconstruction; b) Transport and reuse of demolition waste; b) Traditional demolition of buildings; c) Transport, recycling, energy recovery, incineration and landfilling of demolition waste.	Designers, construction work owners, contractors, demolition companies, recycling plants and public and private building owners	Responsible: IST; Participant: Østfoldforskning	Number of draft databases (first version of the databases of costs and environmental impacts developed)	Number	1	Finished report with the first version of the databases of costs and environmental impacts developed
2	Collection of national and international data	2020-12-01	2021-09-30	Contact national demolition companies and recycling plants and search for available data on existing literature regarding the targeted materials and on their demolition and or processing.	National demolition companies and recycling plants at the national level	Responsible: IST; Participant: Østfoldforskning	Number of finished databases (final version of the databases of costs and environmental impacts developed)	Number	1	Finished report with the final version of the databases of costs and environmental impacts developed
3	Development of an indicator of the economic and environmental advantages of circularity (CircularEE)	2021-02-01	2021-10-31	CircularEE indicator will be defined based on best practices at the international level, namely on material efficiency labels.	Designers, construction work owners, contractors, demolition companies, recycling plants and public and private building owners	Responsible: Østfoldforskning; Participant: IST	Number of circularity indicators (CircularEE indicator defined, including the rules for its calculation)	Number	1	Finished report describing the development of the CircularEE indicator
4	Development of the C+D platform	2020-12-01	2022-10-31	Build a web-based platform to provide the calculation of the economic and environmental impacts associated with the EOL of buildings.	Designers, construction work owners, contractors, demolition companies, recycling plants and public and private building owners	Responsible: IST; Participant: Østfoldforskning	Number of circularity platforms (C+D platform finished and tested and validated by the project partners and selected stakeholders); +Number of patent requests (Computer-implemented invention (CII) request finished) (1+1)	Number	2	C+D platform made available online; Computer-implemented invention (CII) for the content of the platform requested
5	Development of the C+D handbook	2021-04-01	2022-10-31	Develop a proper handbook for the user of the platform developed in activity 4.	Designers, construction work owners, contractors, demolition companies, recycling plants and public and private building owners	Responsible: Østfoldforskning; Participant: IST	Number of standards best practices developed (materialized in the C+D platform and corresponding handbook)	Number	1	Finished report describing the development of the C+D platform and handbook
6	Communication and dissemination of the results of the project	2020-12-01	2022-11-30	Dissemination and promotion activities, at the national and international level, based on the Communication Plan.	Designers, construction work owners, contractors, demolition companies, recycling plants and public and private building owners	Responsible: IST; Participant: Østfoldforskning	Events, conferences, seminars or press events organized (kick-off seminar, press event and closing seminar) + Website developed (3+1)	Number	4	Entity holding the events