

# Integration of Sustainable Design and Circular Economy Concepts in Civil Engineering Curricula

O1: Defining the Sustainable Design/Circular Economy Principles and Methods to Transform the Contemporary Civil Engineering Curricula

Task 1.2 – Deliverable 1

SUSTAIN-CE skills matrix survey for identifying the skills gap







## **SUSTAIN-CE Project**

**IO Number: 1 (Task 1.2 – D1)** 

Output name: SUSTAIN-CE skills matrix survey for identifying the skills gap

Submission Date:	15/06/2021
Leading Partner:	YASAR

**Document Revision History** 

Version	Date	Comment	Author(s)
1.0	15 June 2021	Final Document	YASAR



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### 1. Introduction

This document provides an overview of the results of the skills matrix survey. A skills matrix survey was conducted in each three countries to identify the skills gap in terms of employee skills and students' skills related to Sustainable Design (SD)/Circular Economy (CE) concepts. The results of the surveys were used in determining the "List of the specific areas/thematics in the main-curriculum areas for intervention" (Task 1.2\_D4); which later formed the bases of the "List of SD/CE themes that will be incorporated to the design courses' contents, for each of the selected thematics".

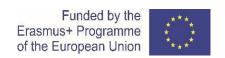
Four questionnaires were developed to conduct the survey: a) For academicians, b) For industry professionals, c) for Non-Governmental and Governmental Organizations (NGOs / GOs), and d) For students. The total number of responses achieved are listed in Table 1.

**Table 1** Number of responses for the questionnaires

	English	Portugal	Greek	Turkis
Academicians	4	4	9	16
Industry Professionals	1	30	5	17
NGOs & GOs	-	8	1	8
Students	9	8	67	44

The questionnaires in English for academicians, industry professionals, NGOs / GOs, and students are presented next, followed by the summary of responses in all four languages.





## 2. Questionnaires in English

#### **For Academicians:**

#### SUSTAIN-CE project

IO Number: 1

Deliverable name: Questionnaire for the Skill Gap specialization

Deliverable/Task number: 1.2

#### Training Needs Analysis (Skill Gap) Survey for ACADEMICIANS

Submission Date:	15.06.2021
Leading Partner:	YASAR

#### **Document Revision History**

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01	01 23.01.2021 First draft/structure		SEERC
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03	03 16.04.2021 Draft		YU
04 20.04.2021		Draft	YU
05 25.04.2021 Draft		Draft	SEERC
06	29.04.2021	Draft	YU
07	10.06.2021	Draft	ISQ
08	15.06.2021	Final	YASAR





#### Dear Participant,

This questionnaire is part of a European project (SUSTAIN-CE) aiming at developing an innovative, evidence-based transnational framework that will markedly improve the knowledge and skills of academic institutions to produce more innovative curricula on sustainable/circular civil engineering.

In such context, this questionnaire aims to identify the market's (industry) training needs and the available skills in the field of sustainable/circular civil engineering.

Please read each of the following items carefully and mark the answer that best represents your beliefs and experiences (for any doubts, please refer to the glossary - Section F).

Your participation is voluntary, and you are free to withdraw from the study without prior notice at any given time. All the responses and the data you provide will be kept confidential and will be analyzed solely for statistical purposes in the context of the project to develop scientific articles and technical reports.

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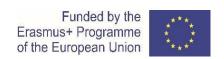
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# To proceed with the survey completion, please read the following sentences carefully and mark the relevant boxes as appropriate.

I confirm that I have read and understood the terms and conditions for participation
in the study.
I understand that my participation is voluntary and that I am free to withdraw at any
time, without giving reason and with no foreseeable consequence.
I agree to take part in the above study.
I agree that my data gathered in this study (according to the GDPR principles) may be
stored (after it has been anonymised) in a secure storage facility and will be
destroyed five years after the study ends.

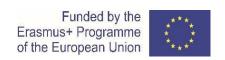




#### **SECTION A. Respondent's Affiliation**

<b>A.1</b> I a	m / I belong to (more options allowed)?
	Civil engineering department
	Architectural department
	Other (please specify)
<b>A.2</b> Ho	ow many faculty members does your Higher Education Institute have?
	Under 10
	11 to 20
	21 to 30
	More than 30
<b>A.3</b> W	hen was your Higher Education Institute founded?
	Last 10 years
	From 10 to 30 years ago
	More than 30 years ago
<b>A.4</b> W	hat is your Heigher Educaiton Institute's target market (more options allowed)?
	Local
	National
	European
	International
	Other (please specify)

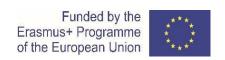




#### **SECTION B. Respondent's Information**

D'T AA	hat is your gender?
	Male
	Female
	Prefer not to say
<b>B.2</b> W	hat is your age group?
	18 to 25 years
	26 to 35 years
	36 to 50 years
	51 to 65 years
	Over 65
B.3 W	hat is your current position in the Higher Education Institute?
	Assistant Professor
	Associate Professor
	Professor
	Post-Doc researcher
	Other (please specify)
B.4 D	o you have any practical experience in the field of sustainable/circular civil engineering
practi	ices?
	No, I do not
	I attended courses at university
	I attended training sessions
	I have been involved in related projects
	I had held some responsibility (technical and/or managerial) for related projects





#### **SECTION C. Drivers and Barriers**

The following list shows possible drivers and barriers.

Please, mark every option with a number in the scale range of 1 (minimum) to 5 (maximum) in order to understand how relevant these barriers and drivers are in impeding or implementing sustainable/circular civil engineering practices in your HEI.

**C.1** How relevant are the following drivers in pushing the integration of sustainable/circular civil engineering concepts in your curriculum?

Pressures from accreditation institutes	1	2	3	4	5
Governmental/EU regulations and laws	1	2	3	4	5
HEI's green/innovation strategies and improvements	1	2	3	4	5
The role of professional group activities	1	2	3	4	5
Management commitment to environmental	1	2	3	4	5
improvements					
Global environmental challenges	1	2	3	4	5
Pressures from local society	1	2	3	4	5
Other (please specify and value)					
	1	2	3	4	5

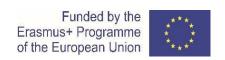
**C.2** How relevant are the following barriers in order to actually integrate sustainable/circular civil engineering concepts in your curriculum?

Lack of know-how/intellectual capital
Lack of technology support
Weak commitment of top management
Academic faculty resistance to change
Not enough pressure from the accredidation institutions
Time needed to implement such solutions
Lack of short term benefits
Other (please specify and value)

1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

1	2	3	4	5





#### **SECTION D. Skills**

In the following, the identified Areas for Sustainable Design and Circular Economy Concepts in Civil Engineering are broken down into specific skills.

Please, answer each question marking a value in the scale range from 1 (minimum) to 5 (maximum)

#### **SECTION D.1 Sustainable design practices**

**D.1.1** How familiar are you with the following concepts, in terms of what is particular to each of them?

a) Vernacular architecture	1	2	3	4	5
b) Bioclimatic architecture		2	3	4	5
c) Passive house (Passive Haus)		2	3	4	5
d) Therma Bridge					
e) Design for sustainability	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.2** To what extent are you familiar with the concept of "Design for Disassembly?"

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.3** To what extent are you are familiar with "*Building Reuse*" as a design decision made at the planning stage of a project?

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.4** To what extent are you familiar with the fact that sustainable hydraulic structure design considering sediment transport principles is essential to ensure their successful long-term operation.

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.5** To what extent are you familiar with the fact that significant sustainability benefits can be derived by integration of sustainable design and circular economy concepts in transportation decision making?

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.6** Do you consider sustainable design skills as an important criterion in your faculty member hiring process?

1	2	3	4	5

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized



#### **SECTION D.2 Circular economy inspired engineering**

**D.2.1** To what extent are you familiar with circular economy<sup>1</sup>?

1	1	2	4	L
1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.2** To what extent are you familiar with the following basic principles of circular economy concept?

a)	Design to minimize waste	1	2	3	4	5
b)	b) Use waste as a resource (recycle, reuse)		2	3	4	5
c)	Prioritize regenerative resources	1	2	3	4	5
d)	Preserve and extend what is already made	1	2	3	4	5
e)	Reducing reliance on raw materials by keeping products in use?	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.3** Do you consider circular economy inspired engineering skills as an important criterion in your faculty member hiring process?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialize



#### SECTION D.3 Sustainability of construction materials

**D.3.1** To what extent are you aware of what **Ashby diagrams** are and what they are used for in research of new materials?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.2** To what extent are you aware of the fact that recyclability and recycled content are two similar, but different characteristics of materials related to sustainability?

1	2	3	4	5
	_			

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.3** Are you familiar with the hazardous substances present in building materials that pose a threat to public health and environmental security at the dismantling or demolition phase?

1 | 2 | 3 | 4 | 5 | 1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.4** To what extent are you aware of the fact that reuse is a characteristic of materials related to sustainability?

				,
1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.5** To what extent are you familiar with alternative construction materials and wastes that are being used to make them (e.g., geopolymer cement-based concrete, ferro-cement laminated sandwich panels, fly ash, blast-furnace slag)?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.6** Do you consider skills related to sustainable construction materials as an important criterion in your faculty member hiring process?

1 2	3	4	5
-----	---	---	---

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized



#### **SECTION D.4 Lifecycle assessment**

**D.4.1** To what extent are you familiar with life cycle assessment (LCA) procedures and what is quantified by this assessment tool?

1	2	3	4	5	

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.4.2** To what extent are you aware of the fact that the material quantities used in the LCA are only half of the necessary data upon which the calculations are to be performed. The other half are the values associated with the inventory of the environmental impacts of the product.

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

D.4.3 To what extent are you aware of the following environmental impact categories?

a)	Global warming	1	2	3	4	5
b)	Primary energy use	1	2	3	4	5
c)	Toxicity	1	2	3	4	5
d)	Resource depletion	1	2	3	4	5
e)	Land use	1	2	3	4	5
f)	Water use	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.4.4** Do you consider life cycle assessement skills as an important criterion in your faculty member hiring process?

1 2 3 4 5

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized



#### SECTION D.5 Smart and sustainable urban design (civil engineering) principles

**D.5.1** Are you familiar with the NZEB (Near Aero Energy Buildings) concept brought about by Directive 2010/31/UE on the energy performance of buildings)?

Yes	No

**D.5.2** To what extent are you familiar with practices to make buildings more energy efficient?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.5.3** Do you consider smart and sustainable urban design principles as an important criterion in your faculty member hiring process?

1	2	3	4	5	

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

#### SECTION D.6 Civil engineering policies and regulations on sustainability

**D.6.1** To what extent are you aware of the following regulations, standards, declerations, etc.?

a)	Environmental product declarations (EPDs³)	1	2	3	4	5
b)	LEED V4 <sup>4</sup> rating system	1	2	3	4	5
c)	Green building codes (Ex: IgCC <sup>6</sup> )	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.6.2** To what extent are you familiar with the waste legislation in your country, in particular to what pertains to the licencing procedures for Construction and Demolition Waste (CDW)?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D6.3** Do you consider skills related to sustainable civil engineering policies and regulations as an important criterion in your faculty member hiring process?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

#### **SECTION E. Knowledge and Skills Improvement**

In this section, some questions related to your personal interest in improving your knowledge and skills in the field of sustainable/circular civil engineering are listed.

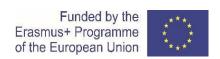
**E.1** Are you used to undertake continuous learning activities in order to increase your knowledge in the areas mentioned in Part D (more options allowed)?

	_
Yes	No

E.2 What kind of methods do you usually adopt?

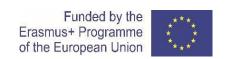
□ Books





	Workshops Scientific Papers E-learning Webinars (on-line seminars) Other (please specify)  ould you be interested in the future to undertake training activities to improve your
	edge in these areas (more options allowed)?
	Energy efficient structures design Sustainable structural design of infrastructure Energy efficient life-cycle analysis Life-cycle analysis that considers sustainability as a main parameter Circular cities Nature based solutions at the urban level Circular design solutions Reversible building design¹ (space, structure and/or material) Waste prevention and management Preventive maintenance Construction and demolition waste management Deconstruction of building structures and parts Any other areas? Please mention which ones:
E.4 WI	ny do you think that skills improvement is an important issue?





#### **SECTION F Glossary**

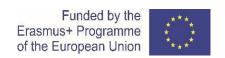
<sup>1</sup> **Circular Economy:** A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources (Source: <a href="https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-controllers/20cspapers

- <sup>2</sup> Living Buildings: Living buildings have fully closed water, nutrition, material, and energy loops. An important element of living buildings is renewable, non-toxic materials that increase reusability/recyclability, and ultimately allow for materials to be safely returned to the biosphere at end of life, thereby acting as 'nutrients' to grow new materials.
- <sup>3</sup> Environmental Product Declaration (EPD): is a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle. EPDs rely on the results of life-cycle assessments to provide information on a number of environmental impacts related to the manufacture of the product, including global warming potential, ozone depletion, acidification, eutrophication, and ozone creation.
- <sup>4</sup> **LEED (Leadership in Energy and Environmental Design) v4:** is the most widely green building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, highly efficient, and cost-saving green buildings. **LEED v4** is the most inclusive and transparen LEE yet, driving meaningful reductions in GHG emissions associated with building construction and operations and putting a stronger emphasis on human health and wellbeing.
- f) <sup>5</sup> American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) **189.1**: ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings.
- g) <sup>6</sup> International Green Construction Code (IgCC): The 2018 International Green Construction Code (IgCC) provides the design and construction industry with the single, most effective way to deliver sustainable, resilient, high-performance buildings. The 'IgCC-powered-by-189.1' joint initiative frames the essential sustainable construction building blocks on which future resilient initiatives can develop and expand.

Thank you very much for completing this survey! In case of further questions, please contact:

XXXXXX





#### **For Industry Professionals:**

#### **SUSTAIN-CE** project

IO Number: 1

Deliverable name: Questionnaire for the Skill Gap specialization

Deliverable/Task number: 1.2

#### Training Needs Analysis (Skill Gap) Survey for INDUSTRY

Submission Date:	15.06.2021
Leading Partner:	YASAR

#### **Document Revision History**

Version	Date	Comment	Author(s)
01	23.01.2021	First draft/structure	SEERC
02	22.3.2021	Draft	IYTE
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#### Dear Participant,

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Your participation is voluntary, and you are free to withdraw from the study without prior notice at any given time. All the responses and the data you provide will be kept confidential and will be analyzed solely for statistical purposes in the context of the project to develop scientific articles and technical reports.

For any issues related to the project, please contact:

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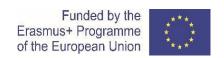
- Lara Olívia P. Ramos – (Portugal)

**Project Manager** 

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Phone: +351 214 228 100

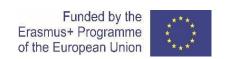




# To proceed with the survey completion, please read the following sentences carefully and mark the relevant boxes as appropriate.

I confirm that I have read and understood the terms and conditions for participation
in the study.
I understand that my participation is voluntary and that I am free to withdraw at any
time, without giving reason and with no foreseeable consequence.
I agree to take part in the above study.
I agree that my data gathered in this study (according to the GDPR principles) may be
stored (after it has been anonymised) in a secure storage facility and will be
destroyed five years after the study ends.

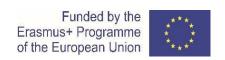




#### **SECTION A. Respondent's Affiliation**

<b>A.1</b>   a	am / I belong to (more options allowed)?
	Civil engineering graduate
	Architectural graduate
	Construction company
	Structural design office
	Architectural design office
	Material supplier
	Other (please specify)
<b>A.2</b> H	ow many employees does your organization have?
	Under 25
	26 to 50
	51 to 250
	More than 250
<b>A.3</b> W	hen was your company founded?
	Last 10 years
	From 10 to 30 years ago
	More than 30 years ago
<b>A.4</b> W	'hat is your company's target market (more options allowed)?
	Local
	National
	European
	International
	Other (please specify)

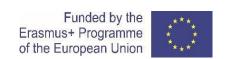




#### **SECTION B. Respondent's Information**

B.1	Wr	nat is your gender?
		Male
		Female
		Prefer not to say
B.2	Wł	nat is your age group?
		18 to 25 years
		26 to 35 years
		36 to 50 years
		51 to 65 years
		Over 65
В.3	Wł	nat is your current position in the company?
		Managerial Staff
		Technical Staff
		Administrative Staff
		Other (please specify)
B.4	Wł	nat is the highest level of qualification you gained?
		Upper Secondary Education
		Bachelor's Degree
		Master's Degree
		PhD
		Other (please specify)
B.5	Do	you have any practical experience in the field of sustainable/circular civil engineering
pra	ctic	es?
		No, I do not
		I attended courses at university
		I attended training sessions
		I have been involved in related projects
		I had held some responsibility (technical and/or managerial) for related projects





#### **SECTION C. Drivers and Barriers**

The following list shows possible drivers and barriers.

Please, mark every option with a number in the scale range of 1 (minimum) to 5 (maximum) in order to understand how relevant these barriers and drivers are in impeding or implementing sustainable/circular civil engineering practices in your company.

	nable/circular civil engineering practices?	ng t	ne	impi	emer	ntatic	n o
sustaii 	Market pressures from local customers	1	2	3	4	5	
	Market pressures from international customers	1	2	3	4	5	
П	Governmental/EU regulations and laws	1	2	3	4	5	
	Competitor's green/innovation strategies and	1	2	3	4	5	
	improvements				<u>'</u>		
	The role of professional group activities	1	2	3	4	5	
	Operational cost reduction through energy efficiency	1	2	3	4	5	
	Corporate social responsibility strategy	1	2	3	4	5	
	Management commitment to environmental	1	2	3	4	5	
	improvements						
	Global environmental challenges	1	2	3	4	5	
	Benefits and savings	1	2	3	4	5	
	Pressures from local society	1	2	3	4	5	
	Pressures from investors	1	2	3	4	5	
	Competitive advantages	1	2	3	4	5	
	Other (please specify and value)						
		1	2	3	4	5	
	ow relevant are the following barriers in order to actually ngineering practices?	integ	grate	sust	ainak	ole/ci	rcula
	Operational costs	1	2	3	4	5	
	Training costs	1	2	3	4	5	
	Costs of improvement implementations	1	2	3	4	5	
	Lack of know-how/intellectual capital	1	2	3	4	5	
	Lack of technology support	1	2	3	4	5	
	Weak commitment of top management	1	2	3	4	5	
	Employee resistance to change	1	2	3	4	5	
	Lack of suppliers commitment	1	2	3	4	5	
	Not enough pressure from the market	1	2	3	4	5	
	Time needed to implement such solutions	1	2	3	4	5	
	Lack of short term benefits	1	2	3	4	5	
	Other (please specify and value)						

4 5





#### **SECTION D. Skills**

In the following, the identified Areas for Sustainable Design and Circular Economy Concepts in Civil Engineering are broken down into specific skills.

Please, answer each question marking a value in the scale range from 1 (minimum) to 5 (maximum)

#### **SECTION D.1 Sustainable design practices**

**D.1.1** How familiar are you with the following concepts, in terms of what is particular to each of them?

f) Vernacular architecture	1	2	3	4	5
g) Bioclimatic architecture	1	2	3	4	5
h) Passive house (Passive Haus)	1	2	3	4	5
i) Therma Bridge					
j) Design for sustainability	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

<b>D.1.2</b> To what extent are you familiar with the concept of "Design for Disassembly?"
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
<b>D.1.3</b> To what extent are you are familiar with "Building Reuse" as a design decision made
at the planning stage of a project?
1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
D.1.4 To what extent are you familiar with the fact that sustainable hydraulic structure design
considering sediment transport principles is essential to ensure their successful long-term
operation.
1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
D.1.5 To what extent are you familiar with the fact that significant sustainability benefits can
be derived by integration of sustainable design and circular economy concepts in transportation
decision making?
1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
D.1.6 Do you consider sustainable design skills as an important criterion in your civil
engineer/architect hiring process?
1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized



#### **SECTION D.2 Circular economy inspired engineering**

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
<b>D.2.2</b> To what extent are you familiar with the following basic principles of circular economy concept?

сопсср	concept:					
h)	Design to minimize waste	1	2	3	4	5
i)	Use waste as a resource (recycle, reuse)	1	2	3	4	5
j)	Prioritize regenerative resources	1	2	3	4	5
k)	Preserve and extend what is already made	1	2	3	4	5
I)	Reducing reliance on raw materials by keeping products in use?	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.1** To what extent are you familiar with circular economy<sup>1</sup>?

D.2.3	Do y	ou co	onsid	er cir	cular economy insp	ired engineering	g skills as ar	n important	criterion
in yo	ur civ	il eng	ineer	/arch	itect hiring process	?			

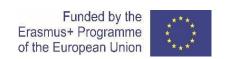




#### **SECTION D.3 Sustainability of construction materials**

D.3.1 To what extent are you aware of what Ashby diagrams are and what they are used for
in research of new materials?
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
D.3.2 To what extent are you aware of the fact that recyclability and recycled content are two
similar, but different characteristics of materials related to sustainability?
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
D.3.3 Are you familiar with the hazardous substances present in building materials that pose
a threat to public health and environmental security at the dismantling or demolition phase?
1 2 3 4 5
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
<b>D.3.4</b> To what extent are you aware of the fact that reuse is a characteristic of materials
related to sustainability?
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
<b>3</b>
<b>D.3.5</b> To what extent are you familiar with alternative construction materials and wastes that
are being used to make them (e.g., geopolymer cement-based concrete, ferro-cement
laminated sandwich panels, fly ash, blast-furnace slag)?
Tariffaced surface stage.
1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
1-None, 2- basic, 3-intermediate, 4-Advanced, 3-riiginy Specialized
<b>D.3.6</b> Do you consider skills related to sustainable construction materials as important
criterion in your civil engineer/architect hiring process?
1 2 3 4 5
1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized
, , , , , , , , , , , , , , , , , , , ,

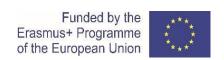




#### **SECTION D.4 Lifecycle assessment**

<b>D.4.1</b> To what extent are you familiar wind quantified by this assessment tool?	ith life cycle a	ssessment	(LCA) proce	edures and	what is
1=None; 2= Basic; 3=Intermediate; 4=Advar	nced; 5=Highly	Specialized			
D.4.2 To what extent are you aware of are only half of the necessary data upon half are the values associated with the in 1=None; 2= Basic; 3=Intermediate; 4=Advar	which the cal eventory of th nced; 5=Highly	culations a e environm Specialized	re to be per nental impa	formed. Th	ne other product.
<b>D.4.3</b> To what extent are you aware of t	_	1	_		
g) Global warming	1	2	3	4	5
h) Primary energy use	1	2	3	4	5
i) Toxicity	1	2	3	4	5
j) Resource depletion	1	2	3	4	5
k) Land use	1	2	3	4	5
I) Water use	1	2	3	4	5
1=None; 2= Basic; 3=Intermediate; 4=Advar		•			
<b>D.4.4</b> Do you consider life cycle asses	ssment skills	as an imp	ortant crite	erion in yo	our civil
engineer/architect hiring process?					
1=None; 2=Basic; 3=Intermediate; 4=Advan	ced; 5=Highly	Specialized			





#### SECTION D.5 Smart and sustainable urban design (civil engineering) principles

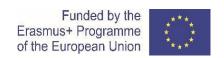
<b>D.5.1</b> Are you familiar with the NZEB (N	lear Aero Ene	rgy Building	gs) concept	brought al	oout by
Directive 2010/31/UE on the energy pe	rformance of	buildings)?			
Yes No					
<u> </u>					
D.5.2 To what extent are you familiar w	ith practices t	o make bui	Idings more	e energy ef	ficient?
1=None; 2= Basic; 3=Intermediate; 4=Adva	nced; 5=Highly	Specialized			
<b>D.5.3</b> Do you consider smart and sustain	าable urban de	esign princi	ples as an ir	mportant c	riterion
in your civil engineer/architect hiring pr	rocess?				
1=None; 2=Basic; 3=Intermediate; 4=Advar	nced; 5=Highly :	Specialized			
SECTION D.6 Civil engine	ering policies a	nd regulation	ons on susta	inability	
<b>D.6.1</b> To what extent are you aware of	the following	regulations	, standards	, decleration	ons,
etc.?					
d) Environmental product	1	2	3	4	5
declarations (EPDs <sup>3</sup> )					
e) LEED V4 <sup>4</sup> rating system	1	2	3	4	5
f) Green building codes (Ex: IgCC <sup>6</sup> )	1	2	3	4	5
1=None; 2= Basic; 3=Intermediate; 4=Adva	nced; 5=Highly	Special			
<b>D.6.2</b> To what extent are you familiar w					
•		_	•	• •	
to what pertains to the licencing proced	dures for Cons	truction ar	•	• •	
to what pertains to the licencing proced	dures for Cons	struction ar	•	• •	
to what pertains to the licencing proced	dures for Cons	struction ar	•	• •	

**D6.3** Do you consider skills related to sustainable civil engineering policies and regulations as an important criterion in your civil engineer/architect hiring process?

				,
1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized





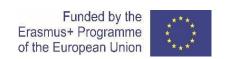
#### **SECTION E. Knowledge and Skills Improvement**

In this section, some questions related to your personal interest in improving your knowledge and skills in the field of sustainable/circular civil engineering are listed.

E.1 Are you used to undertake continuous learning activities in order to increase your

knowle	dge in the areas mentioned in Part D (more options allowed)?
	Yes No
	at kind of methods do you usually adopt?
	Books
	Workshops
	Scientific Papers
	E-learning
	Webinars (on-line seminars)
	Other (please specify)
<b>E.3</b> Wo	uld you be interested in the future to undertake training activities to improve your
	dge in these areas (more options allowed)?
	Energy efficient structures design
	Sustainable structural design of infrastructure
	Energy efficient life-cycle analysis
	Life-cycle analysis that considers sustainability as a main parameter
	Circular cities
	Nature based solutions at the urban level
	Circular design solutions Reversible building design <sup>1</sup> (space, structure and/or material)
	Waste prevention and management
	Preventive maintenance
	Construction and demolition waste management
	Deconstruction of building structures and parts
	Any other areas? Please mention which ones:
Г // \A/b.	v do vou think that akilla immuovament is an immontant issue?
E.4 WN	y do you think that skills improvement is an important issue?





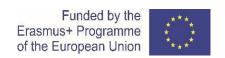
#### **SECTION F Glossary**

- <sup>1</sup> Circular Economy: A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources (Source: <a href="https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-etail#:~:text=A%20circular%20economy%20is%20a,the%20consumption%20of%20finite%20resources">https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-etail#:~:text=A%20circular%20economy%20is%20a,the%20consumption%20of%20finite%20resources</a>).
- <sup>2</sup> Living Buildings: Living buildings have fully closed water, nutrition, material, and energy loops. An important element of living buildings is renewable, non-toxic materials that increase reusability/recyclability, and ultimately allow for materials to be safely returned to the biosphere at end of life, thereby acting as 'nutrients' to grow new materials.
- <sup>3</sup> Environmental Product Declaration (EPD): is a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle. EPDs rely on the results of life-cycle assessments to provide information on a number of environmental impacts related to the manufacture of the product, including global warming potential, ozone depletion, acidification, eutrophication, and ozone creation.
- <sup>4</sup> **LEED (Leadership in Energy and Environmental Design) v4:** is the most widely green building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, highly efficient, and cost-saving green buildings. **LEED v4** is the most inclusive and transparen LEE yet, driving meaningful reductions in GHG emissions associated with building construction and operations and putting a stronger emphasis on human health and wellbeing.
- m) <sup>5</sup> American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) **189.1**: ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings.
- n) <sup>6</sup> International Green Construction Code (IgCC): The 2018 International Green Construction Code (IgCC) provides the design and construction industry with the single, most effective way to deliver sustainable, resilient, high-performance buildings. The 'IgCC-powered-by-189.1' joint initiative frames the essential sustainable construction building blocks on which future resilient initiatives can develop and expand.

Thank you very much for completing this survey! In case of further questions, please contact:

XXXXXX





#### **Questionnaire for NGOs / GOs:**

- o) SUSTAIN-CE project
  - p) IO Number: 1
- q) Deliverable name: Questionnaire for the Skill Gap specialization
  - r) Deliverable/Task number: 1.2

# s) Training Needs Analysis (Skill Gap) Survey for ASSOCIATIONS/GOVERNMENT ORGANIZATIONS/NON-GOVERNMENTAL ORGANIZATIONS

Submission Date:	15.06.2021
Leading Partner:	YASAR

#### **Document Revision History**

Version	Date Comment		Author(s)		
01	23.01.2021	23.01.2021 First draft/structure			
02	22.3.2021	Draft	IYTE		
03	16.04.2021	Draft	YU		
04	20.04.2021	Draft	YU		
05	25.04.2021	Draft	SEERC		
06	29.04.2021	Draft	YU		
07	10.06.2021	Draft	ISQ		
08	15.06.2021	Final	YASAR		





#### Dear Participant,

This questionnaire is part of a European project (SUSTAIN-CE) aiming at developing an innovative, evidence-based transnational framework that will markedly improve the knowledge and skills of academic institutions to produce more innovative curricula on sustainable/circular civil engineering.

In such context, this questionnaire aims to identify the market's (industry) training needs and the available skills in the field of sustainable/circular civil engineering.

Please read each of the following items carefully and mark the answer that best represents your beliefs and experiences (for any doubts, please refer to the glossary - Section F).

Your participation is voluntary, and you are free to withdraw from the study without prior notice at any given time. All the responses and the data you provide will be kept confidential and will be analyzed solely for statistical purposes in the context of the project to develop scientific articles and technical reports.

For any issues related to the project, please contact:

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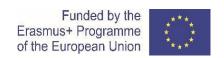
- Lara Olívia P. Ramos –(Portugal)

**Project Manager** 

R&Di - Training & Qualifications

Email: <a href="mailto:loramos@isq.pt">loramos@isq.pt</a>
Phone: +351 214 228 100





# To proceed with the survey completion, please read the following sentences carefully and mark the relevant boxes as appropriate.

I confirm that I have read and understood the terms and conditions for participation
in the study.
I understand that my participation is voluntary and that I am free to withdraw at any
time, without giving reason and with no foreseeable consequence.
I agree to take part in the above study.
I agree that my data gathered in this study (according to the GDPR principles) may be
stored (after it has been anonymised) in a secure storage facility and will be
destroyed five years after the study ends.





#### **SECTION A. Respondent's Affiliation**

<b>A.1</b> l a	m / I belong to (more options allowed)?
	Civil engineering graduate
	Architectural graduate
	Representative of civil engineers and architects assoiations
	Representative of environmental associations
	Government
	NGO
	Other (please specify)
<b>A.2</b> Ho	w many employees does your organization have?
	Under 25
	26 to 50
	51 to 250
	More than 250
<b>A.3</b> W	hen was your association/GO/NGO founded?
	Last 10 years
	From 10 to 30 years ago
	More than 30 years ago
<b>A.4</b> W	hat is your association/GO/NGO's target market (more options allowed)?
	Local
	National
	European
	International
	Other (please specify)

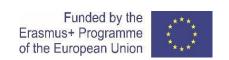




#### **SECTION B. Respondent's Information**

B.1	Wr	nat is your gender?
[		Male
[		Female
[		Prefer not to say
B.2	Wł	nat is your age group?
[		18 to 25 years
[		26 to 35 years
[		36 to 50 years
[		51 to 65 years
[		Over 65
B.3	Wł	nat is your current position in the association/GO/NGO?
[		Managerial Staff
[		Technical Staff
[		Administrative Staff
[		Other (please specify)
B.4	Wł	nat is the highest level of qualification you gained?
[		Upper Secondary Education
[		Bachelor's Degree
[		Master's Degree
[		PhD
[		Other (please specify)
B.5	Do	you have any practical experience in the field of sustainable/circular civil engineering
prac	ctic	ces?
[		No, I do not
[		I attended courses at university
[		I attended training sessions
[		I have been involved in related projects
[		I had held some responsibility (technical and/or managerial) for related projects





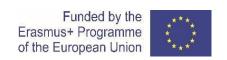
#### **SECTION C. Drivers and Barriers**

The following list shows possible drivers and barriers.

Please, mark every option with a number in the scale range of 1 (minimum) to 5 (maximum) in order to understand how relevant these barriers and drivers are in impeding or implementing sustainable/circular civil engineering practices in your association/GO/NGO.

<b>C.1</b>	How relevant are the following drivers in pushir	ng t	he	imple	emer	ntatio	n of
susta	inable/circular civil engineering practices?						
	Market pressures from local associates	1	2	3	4	5	
	Market pressures from international associates	1	2	3	4	5	
	Governmental/EU regulations and laws	1	2	3	4	5	
	Other organization's green/innovation strategies and	1	2	3	4	5	
	improvements		ı	1	T	1	1
	The role of professional group activities	1	2	3	4	5	
	Operational cost reduction through energy efficiency	1	2	3	4	5	
		1	2	3	4	5	
	improvements		_	Τ_		-	
	5 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	1	2	3	4	5	
	5 5 5 5 5 5 6	1	2	3	4	5	
	, , , , , , , , , , , , , , , , , , , ,	1	2	3	4	5	
	Other (please specify and value)		T _	T _	I _		Ī
		1	2	3	4	5	
	ow relevant are the following barriers in order to actually engineering sustainable/circular civil engineering practices	_	grate	sust	ainab	ole/ci	rcular
	Operational costs	1	2	3	4	5	
	Training costs	1	2	3	4	5	
	Costs of improvement implementations	1	2	3	4	5	
	Lack of know-how/intellectual capital	1	2	3	4	5	
	Lack of technology support	1	2	3	4	5	
	Weak commitment of top management	1	2	3	4	5	
	Employee resistance to change	1	2	3	4	5	
	Not enough pressure from the market	1	2	3	4	5	
	Time needed to implement such solutions	1	2	3	4	5	
	Lack of short term benefits	1	2	3	4	5	
	Other (please specify and value)						
_		1	2	3	4	5	





#### **SECTION D. Skills**

In the following, the identified Areas for Sustainable Design and Circular Economy Concepts in Civil Engineering are broken down into specific skills.

Please, answer each question marking a value in the scale range from 1 (minimum) to 5 (maximum)

#### **SECTION D.1 Sustainable design practices**

**D.1.1** How familiar are you with the following concepts, in terms of what is particular to each of them?

k) Vernacular architecture	1	2	3	4	5
Bioclimatic architecture		2	3	4	5
m) Passive house (Passive Haus)		2	3	4	5
n) Therma Bridge					
o) Design for sustainability		2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.2** To what extent are you familiar with the concept of "Design for Disassembly?"

1					
	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.3** To what extent are you are familiar with "*Building Reuse*" as a design decision made at the planning stage of a project?

1	2	3	4	5

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.4** To what extent are you familiar with the fact that sustainable hydraulic structure design considering sediment transport principles is essential to ensure their successful long-term operation.

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.5** To what extent are you familiar with the fact that significant sustainability benefits can be derived by integration of sustainable design and circular economy concepts in transportation decision making?

1 2 3 4 5
-----------

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.6** Do you consider sustainable design skills as an important criterion in your civil engineer/architect hiring process?

- 0	,			
1	2	3	4	5



# **SECTION D.2 Circular economy inspired engineering**

**D.2.1** To what extent are you familiar with circular economy<sup>1</sup>?

1 2 3 4 5	
-----------	--

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.2** To what extent are you familiar with the following basic principles of circular economy concept?

t)	Design to minimize waste	1	2	3	4	5
u) Use waste as a resource (recycle, reuse)		1	2	3	4	5
v) Prioritize regenerative resources		1	2	3	4	5
w) Preserve and extend what is already made		1	2	3	4	5
x) Reducing reliance on raw materials by keeping products in use?		1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.3** Do you consider circular economy inspired engineering skills as an important criterion in your civil engineer/architect hiring process?

1 2 3 4 5



#### SECTION D.3 Sustainability of construction materials

**D.3.1** To what extent are you aware of what **Ashby diagrams** are and what they are used for in research of new materials?

1	2	3	4	5
<b>-</b>	_	3	-	

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.2** To what extent are you aware of the fact that recyclability and recycled content are two similar, but different characteristics of materials related to sustainability?

|--|

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.3** Are you familiar with the hazardous substances present in building materials that pose a threat to public health and environmental security at the dismantling or demolition phase?

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.4** To what extent are you aware of the fact that reuse is a characteristic of materials related to sustainability?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.5** To what extent are you familiar with alternative construction materials and wastes that are being used to make them (e.g., geopolymer cement-based concrete, ferro-cement laminated sandwich panels, fly ash, blast-furnace slag)?

				•
1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.6** Do you consider skills related to sustainable construction materials as an important asset in your civil engineer/architect hiring process??

		· · · · · ,	<b>-</b>		060	
	1	2	3	4	5	



# **SECTION D.4 Lifecycle assessment**

**D.4.1** To what extent are you familiar with life cycle assessment (LCA) procedures and what is quantified by this assessment tool?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.4.2** To what extent are you aware of the fact that the material quantities used in the LCA are only half of the necessary data upon which the calculations are to be performed. The other half are the values associated with the inventory of the environmental impacts of the product.

1					
	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.4.3** To what extent are you aware of the following environmental impact categories?

m) Global warming	1	2	3	4	5
n) Primary energy use	1	2	3	4	5
o) Toxicity	1	2	3	4	5
p) Resource depletion	1	2	3	4	5
q) Land use	1	2	3	4	5
r) Water use	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.4.4** Do you consider life cycle assessement skills as an important criterion in your civil engineer/architect hiring process?

_	,			U
1	2	3	4	5



#### SECTION D.5 Smart and sustainable urban design (civil engineering) principles

**D.5.1** Are you familiar with the NZEB (Near Aero Energy Buildings) concept brought about by Directive 2010/31/UE on the energy performance of buildings)?

Yes No

D.5.2 To what extent are you familiar with practices to make buildings more energy efficient?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.5.3** Do you consider smart and sustainable urban design principles as an important criterion in your civil engineer/architect hiring process?

1 2 3 4 5

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

# SECTION D.6 Civil engineering policies and regulations on sustainability

**D.6.1** To what extent are you aware of the following regulations, standards, declerations, etc.?

<b>.</b>	Environmental product declarations (EPDs³)	1	2	3	4	5
h) L	.EED V4 <sup>4</sup> rating system	1	2	3	4	5
i) G	Green building codes (Ex: IgCC <sup>6</sup> )	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.6.2** To what extent are you familiar with the waste legislation in your country, in particular to what pertains to the licencing procedures for Construction and Demolition Waste (CDW)?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D6.3** Do you consider skills related to sustainable civil engineering policies and regulations as an important criterion in your civil engineer/architect hiring process?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

# **SECTION E. Knowledge and Skills Improvement**

In this section, some questions related to your personal interest in improving your knowledge and skills in the field of sustainable/circular civil engineering are listed.

**E.1** Are you used to undertake continuous learning activities in order to increase your knowledge in the areas mentioned in Part D (more options allowed)?

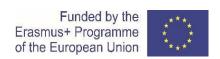
Yes No

**E.2** What kind of methods do you usually adopt?

□ Books

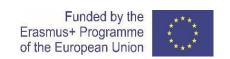
☐ Workshops





	Scientific Papers E-learning Webinars (on-line seminars) Other (please specify)
	ould you be interested in the future to undertake training activities to improve your edge in these areas (more options allowed)?
	Energy efficient structures design  Sustainable structural design of infrastructure  Energy efficient life-cycle analysis  Life-cycle analysis that considers sustainability as a main parameter  Circular cities  Nature based solutions at the urban level  Circular design solutions Reversible building design <sup>1</sup> (space, structure and (or material))
	Circular design solutions Reversible building design <sup>1</sup> (space, structure and/or material)  Waste prevention and management  Preventive maintenance  Construction and demolition waste management  Deconstruction of building structures and parts  Any other areas? Please mention which ones:
E.4 W	hy do you think that skills improvement is an important issue?





#### **SECTION F Glossary**

- <sup>1</sup> Circular Economy: A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources (Source: <a href="https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-etail#:~:text=A%20circular%20economy%20is%20a,the%20consumption%20of%20finite%20resources">https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-etail#:~:text=A%20circular%20economy%20is%20a,the%20consumption%20of%20finite%20resources</a>).
- <sup>2</sup> Living Buildings: Living buildings have fully closed water, nutrition, material, and energy loops. An important element of living buildings is renewable, non-toxic materials that increase reusability/recyclability, and ultimately allow for materials to be safely returned to the biosphere at end of life, thereby acting as 'nutrients' to grow new materials.
- <sup>3</sup> Environmental Product Declaration (EPD): is a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle. EPDs rely on the results of life-cycle assessments to provide information on a number of environmental impacts related to the manufacture of the product, including global warming potential, ozone depletion, acidification, eutrophication, and ozone creation.
- <sup>4</sup> **LEED (Leadership in Energy and Environmental Design) v4:** is the most widely green building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, highly efficient, and cost-saving green buildings. **LEED v4** is the most inclusive and transparen LEE yet, driving meaningful reductions in GHG emissions associated with building construction and operations and putting a stronger emphasis on human health and wellbeing.
- y) <sup>5</sup> American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) **189.1**: ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings.
- z) <sup>6</sup> International Green Construction Code (IgCC): The 2018 International Green Construction Code (IgCC) provides the design and construction industry with the single, most effective way to deliver sustainable, resilient, high-performance buildings. The 'IgCC-powered-by-189.1' joint initiative frames the essential sustainable construction building blocks on which future resilient initiatives can develop and expand.

Thank you very much for completing this survey! In case of further questions, please contact:

**XXXXXX** 





# **Questionnaire Students:**

# aa) SUSTAIN-CE project

bb) IO Number: 1

cc) Deliverable name: Questionnaire for the Skill Gap specialization

dd) Deliverable/Task number: 1.2

# ee) Training Needs Analysis (Skill Gap) Survey for STUDENTS

Submission Date:	15.06.2021
Leading Partner:	YASAR

# **Document Revision History**

Version	Date	Comment	Author(s)
01	23.01.2021	First draft/structure	SEERC
02	22.3.2021	Draft	IYTE
03	16.04.2021	Draft	YU
04	20.04.2021	Draft	YU
05	25.04.2021	Draft	SEERC
06	29.04.2021	Draft	YU
07	10.06.2021	Draft	ISQ
08	15.06.2021	Final	YASAR





#### Dear Participant,

This questionnaire is part of a European project (SUSTAIN-CE) aiming at developing an innovative, evidence-based transnational framework that will markedly improve the knowledge and skills of academic institutions to produce more innovative curricula on sustainable/circular civil engineering.

In such context, this questionnaire aims to identify the market's (industry) training needs and the available skills in the field of sustainable/circular civil engineering.

Please read each of the following items carefully and mark the answer that best represents your beliefs and experiences (for any doubts, please refer to the glossary - Section F).

Your participation is voluntary, and you are free to withdraw from the study without prior notice at any given time. All the responses and the data you provide will be kept confidential and will be analyzed solely for statistical purposes in the context of the project to develop scientific articles and technical reports.

For any issues related to the project, please contact:

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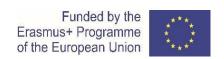
- Lara Olívia P. Ramos – (Portugal)

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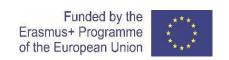




# To proceed with the survey completion, please read the following sentences carefully and mark the relevant boxes as appropriate.

I confirm that I have read and understood the terms and conditions for participation
in the study.
I understand that my participation is voluntary and that I am free to withdraw at any
time, without giving reason and with no foreseeable consequence.
I agree to take part in the above study.
I agree that my data gathered in this study (according to the GDPR principles) may be
stored (after it has been anonymised) in a secure storage facility and will be
destroyed five years after the study ends.

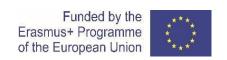




# **SECTION A. Respondent's Affiliation**

<b>A.1</b> I a	m / I belong to (more options allowed)?
	Civil engineering student
	Architectural student
	Other (please specify)
<b>A.2</b> Ho	ow many students does your department have?
	Under 200
	201 to 400
	401 to 600
	More than 600
<b>A.3</b> W	hen was your Higher Education Institute founded?
	Last 10 years
	From 10 to 30 years ago
	More than 30 years ago
<b>A.4</b> W	hat is your Heigher Educaiton Institute's target market (more options allowed)?
	Local
	National
	European
	International
	Other (please specify)

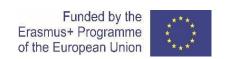




# **SECTION B. Respondent's Information**

B.1 W	nat is your gender?
	Male
	Female
	Prefer not to say
<b>B.2</b> W	hat is your age group?
	18 to 25 years
	26 to 35 years
	36 to 50 years
	51 to 65 years
	Over 65
B.3 W	hat is the degree you are pursuing?
	Bachelor's Degree
	Master's Degree
	PhD Degree
	Other (please specify)
B.4 Do	you have any practical experience in the field of sustainable/circular civil engineering
practi	ces?
	No, I do not
	I attended courses at university
	I attended training sessions
	I have been involved in related projects
	I had held some responsibility (technical and/or managerial) for related projects

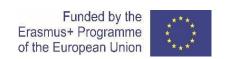




# **SECTION C. Drivers and Barriers**

# **SECTION C IS INTENSIONALLY LEFT BLANK**





#### **SECTION D. Skills**

In the following, the identified Areas for Sustainable Design and Circular Economy Concepts in Civil Engineering are broken down into specific skills.

Please, answer each question marking a value in the scale range from 1 (minimum) to 5 (maximum)

#### **SECTION D.1 Sustainable design practices**

**D.1.1** How familiar are you with the following concepts, in terms of what is particular to each of them?

p) Vernacular architecture		1	2	3	4	5
q) Bioclimatic architecture		1	2	3	4	5
r) Passive house (Passive Haus)		1	2	3	4	5
s) Therma Bridge						
t) Design for sustainability		1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.2** To what extent are you familiar with the concept of "Design for Disassembly?"

_					
1	-	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.3** To what extent are you are familiar with "*Building Reuse*" as a design decision made at the planning stage of a project?

1	2	3	4	5	

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.4** To what extent are you familiar with the fact that sustainable hydraulic structure design considering sediment transport principles is essential to ensure their successful long-term operation?

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.5** To what extent are you familiar with the fact that significant sustainability benefits can be derived by integration of sustainable design and circular economy concepts in transportation decision making?

1	2	3	4	5			

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.1.5** Do you consider sustainable design skills as an important asset in your employment search process?

1	2	3	4	5



# **SECTION D.2 Circular economy inspired engineering**

**D.2.1** To what extent are you familiar with circular economy<sup>1</sup>?

1 2 3 4 5	
-----------	--

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.2** To what extent are you familiar with the following basic principles of circular economy concept?

concep	• •					
ff)	Design to minimize waste	1	2	3	4	5
gg) Use waste as a resource (recycle,		1	2	3	4	5
	reuse)					
hh)	Prioritize regenerative resources	1	2	3	4	5
ii)	Preserve and extend what is	1	2	3	4	5
	already made					
jj)	Reducing reliance on raw	1	2	3	4	5
	materials by keeping products in					
	use?					

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.2.3** Do you consider circular economy inspired engineering skills as an important asset in your employment search process?

1 2 3 4 5



#### **SECTION D.3 Sustainability of construction materials**

**D.3.1** To what extent are you aware of what **Ashby diagrams** are and what they are used for in research of new materials?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.2** To what extent are you aware of the fact that recyclability and recycled content are two similar, but different characteristics of materials related to sustainability?

1	2	3	4	5
_	_	_	-	_

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.3** Are you familiar with the hazardous substances present in building materials that pose a threat to public health and environmental security at the dismantling or demolition phase?

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.4** To what extent are you aware of the fact that reuse is a characteristic of materials related to sustainability?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.5** To what extent are you familiar with alternative construction materials and wastes that are being used to make them (e.g., geopolymer cement-based concrete, ferro-cement laminated sandwich panels, fly ash, blast-furnace slag)?

				•
1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.3.6** Do you consider skills related to sustainable construction materials as an important asset in your employment search process?

	, , `			
1	2	3	4	5



# **SECTION D.4 Lifecycle assessment**

**D.4.1** To what extent are you familiar with life cycle assessment (LCA) procedures and what is quantified by this assessment tool?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.4.2** To what extent are you aware of the fact that the material quantities used in the LCA are only half of the necessary data upon which the calculations are to be performed. The other half are the values associated with the inventory of the environmental impacts of the product.

1	2	3	4	5
_	_	_	-	_

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.4.3** To what extent are you aware of the following environmental impact categories?

s) Global warming	1	2	3	4	5
t) Primary energy use	1	2	3	4	5
u) Toxicity	1	2	3	4	5
v) Resource depletion	1	2	3	4	5
w) Land use	1	2	3	4	5
x) Water use	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.4.4** Do you consider life cycle assessment skills as an important asset in your employment search process?

1	2	3	4	5





#### SECTION D.5 Smart and sustainable urban design (civil engineering) principles

**D.5.1** Are you familiar with the NZEB (Near Aero Energy Buildings) concept brought about by Directive 2010/31/UE on the energy performance of buildings)?

Yes No

**D.5.2** To what extent are you familiar with practices to make buildings more energy efficient?

1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D.5.3** Do you consider smart and sustainable urban design principles as an important asset in your employment search process?

1 2 3 4 5

1=None; 2=Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

# SECTION D.6 Civil engineering policies and regulations on sustainability

**D.6.1** To what extent are you aware of the following regulations, standards, declerations, etc.?

j)	Environmental product declarations (EPDs³)	1	2	3	4	5
k)	LEED V4 <sup>4</sup> rating system	1	2	3	4	5
I)	Green building codes (Ex: IgCC <sup>6</sup> )	1	2	3	4	5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Special

**D.6.2** To what extent are you familiar with the waste legislation in your country, in particular to what pertains to the licencing procedures for Construction and Demolition Waste (CDW)?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

**D6.3** Do you consider skills related to sustainable civil engineering policies and regulations as an important asset in your employment search process?

1 2 3 4 5

1=None; 2= Basic; 3=Intermediate; 4=Advanced; 5=Highly Specialized

# SECTION E. Knowledge and Skills Improvement

In this section, some questions related to your personal interest in improving your knowledge and skills in the field of sustainable/circular civil engineering are listed.

**E.1** Are you used to undertake continuous learning activities in order to increase your knowledge in the areas mentioned in Part D (more options allowed)?

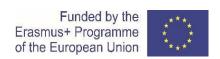
Yes No

E.2 What kind of methods do you usually adopt?

□ Books

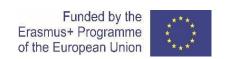
☐ Workshops





	Scientific Papers E-learning Webinars (on-line seminars) Other (please specify)
	ould you be interested in the future to undertake training activities to improve your edge in these areas (more options allowed)?
	Energy efficient structures design Sustainable structural design of infrastructure Energy efficient life-cycle analysis Life-cycle analysis that considers sustainability as a main parameter Circular cities
	Nature based solutions at the urban level Circular design solutions Reversible building design <sup>1</sup> (space, structure and/or material) Waste prevention and management
	Preventive maintenance  Construction and demolition waste management  Deconstruction of building structures and parts  Any other areas? Please mention which ones:
E.4 WI	ny do you think that skills improvement is an important issue?





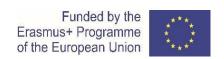
#### **SECTION F Glossary**

- <sup>1</sup> Circular Economy: A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources (Source: https://www.ellenmacarthurfoundation.org/explore/thecircular-economy-inetail#:~:text=A%20circular%20economy%20is%20a,the%20consumption%20of%20finit
- e%20resources |
- <sup>2</sup> Living Buildings: Living buildings have fully closed water, nutrition, material, and energy loops. An important element of living buildings is renewable, non-toxic materials that increase reusability/recyclability, and ultimately allow for materials to be safely returned to the biosphere at end of life, thereby acting as 'nutrients' to grow new materials.
- <sup>3</sup> Environmental Product Declaration (EPD): is a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle. EPDs rely on the results of life-cycle assessments to provide information on a number of environmental impacts related to the manufacture of the product, including global warming potential, ozone depletion, acidification, eutrophication, and ozone creation.
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Thank you very much for completing this survey! In case of further questions, please contact:

XXXXXX





# 3. Questionnaire Results

