European Commission

A DEEP DIVE INTO THE EUROPEAN GREEN DEAL RESEARCH & INNOVATION CALL

ANALYSIS REPORT

October 2021

Image source:
Word Cloud: ©EC, generated using proposals' keywords
Cover: ©Fotolia

Research and Innovation

TABLE OF CONTENTS

THE EUROPEAN GREEN DEAL CALL

by RTD C5, G2

THE EUROPEAN GREEN DEAL CALL
Key overview data

€ 1b of EC contribution	**73 Projects for funding** from 1 550 proposals	**1 778 Participants** from 28 000 Applicants	**75 Countries participating** from 141 applying countries	**26 000 collaborations** within projects selected for funding

Key Overall Messages

- The European Commission launched in 2020 a EUR 1 billion impact-focused call in support of the European Green Deal.
- The call contained 20 topics spread across ten thematic areas. Eight of them reflect the structure of the European Green Deal and two are horizontal thematic areas. Area 10 "Empowering citizens for the transition towards a climate-neutral, sustainable Europe" attracted 373 proposals, almost 25% of the total number of proposals, followed by Area 6 "Farm to fork" with 260 proposals and Area 2 "Clean, affordable and secure energy" with 256 proposals.
- A significant percentage of the proposals received particularly high scores. The amount that would be required to fund all proposals that exceeded all quality thresholds was of the order of 8.8 billion euro.
- EU countries and the UK represent, as expected, the large majority of *successful participants* as well as of the EU requested contribution in the successful proposals, with 90% of the total in both categories. Spain, Italy, Germany, Netherlands and Belgium top in both lists. Among the Associated Countries Norway, Switzerland and Israel are the best performing. A particular feature of the call is the high *application* number of third countries. Ninety-seven third countries were involved in the call, most of them though in a limited way. There were 32 third countries with more than 10 applicants, 19 of which from Africa.
- In terms of type of organisation, 38% of the successful participants come from the private sector. About half of those were SMEs, showing a high representation of SMEs in the call. Research and technology organisations represent 25% of total participants followed by higher education establishments with 19%. About 7% of participants come from public bodies, while approximately 11% fall under the category "other".

Introduction

With the European Green Deal Communication[1], the new Commission placed at the centre of its priorities the need to take immediate and drastic actions to fight climate change and to make Europe climate-neutral by 2050. In this context, the Commission launched in 2020 a EUR 1 billion dedicated call in support of the European Green Deal, with a view to mobilise the European research and innovation community and contribute to this central priority of the Commission. The Call addressed directly the main priorities of the Green Deal and laid the groundwork for additional, related research and innovation initiatives in the context of Horizon Europe.

The call was different in structure and approach from other Horizon 2020 calls. Responding to the urgency of the current situation and the ambition of the new Commission, it sought to demonstrate **the key ability of R&I to provide concrete solutions** within a relatively short time frame.

As a result, the call adopted **a clear 'impact focussed' approach** supporting the development of ideas into pilot applications and demonstration projects, innovative products, experiments and approaches able to show their value in practice and be ready for further scale-up. To this end, it gathered a critical mass of resources and efforts around a small number of 'thematic' topics, directly relevant to the European Green Deal objectives.

At the same time, transition to sustainability is a process engaging society and aiming at **'leaving nobody behind'**. In addition, therefore, to technology development and demonstration, the call addresses issues of governance, cultural and behavioural aspects and social innovation for new ways to engage civil society and empower consumers to make more sustainable choices.

Given the ambition of the Commission to **establish the EU as a global leader in the transition towards a climate-neutral economy and society**, international cooperation is important. International cooperation aspects were addressed in individual topics, but also with a dedicated topic to encourage cooperation with Africa on issues of energy and green transition.

The Call contained 20 topics spread across ten thematic areas. Eight of them reflect the structure of the European Green Deal and are complemented by two horizontal thematic areas on knowledge systems and research infrastructures, and citizen engagement, respectively[2].

[1] COM (2019)640 final

[2] *Area 1* Increasing Climate Ambition: Cross sectoral challenges; *Area 2* Clean, affordable and secure energy; *Area 3* Industry for a clean and circular economy; *Area 4* Energy and resource efficient buildings; *Area 5* Sustainable and smart mobility; *Area 6* Farm to fork; *Area 7* Biodiversity and ecosystem services; *Area 8* Zero-pollution, toxic-free environment; *Area 9* Strengthening our knowledge in support of the EGD; *Area 10* Empowering citizens for the transition towards a climate-neutral, sustainable Europe.
Detailed structure of the call's areas and topics can be found in the Annex of this document.

Response to the Call

The Call opened on 17 September 2020 and closed on 27 January 2021. **1 550 proposals were submitted, involving approximately 28 000[3] applicants, from over 140 countries** across the globe. The total funding requested by the 1550 proposals amounted to over 16 billion euro, demonstrating the strong potential for Research and Innovation in the areas of the European Green Deal and the readiness of the research and innovation community to take on the challenges at hand.

The 1550 proposals were not equally distributed among the 10 thematic areas of the call. Area 10 *"Empowering citizens for the transition towards a climate-neutral, sustainable Europe"* attracted 373 proposals, almost 25% of the total number of proposals. This was followed by Area 6 *"Farm to fork"* with 260 proposals and Area 2 *"Clean, affordable and secure energy"* with 256 proposals. Together, these 3 areas account for 56% of all proposals submitted. On the contrary, Area 5 "*Sustainable and smart mobility"* with 44 proposals and Area 7 *"Biodiversity and ecosystem services"* with 72 proposals attracted fewer proposals. However, given the expected large size of projects, despite the relatively small number of proposals submitted, the requested funds in these two areas amounted to 1 billion and 1.3 billion euro respectively (Annex Table 1).

Applications per country can be assessed in three complementary ways: Number of coordinators of proposals per country; number of total applicants per country; and amount of funds requested by all applicants per country (Annex Table 3). Among EU member states, Spain and Italy showed a particular interest in the Green Deal Call. There were approximately 200 coordinators from each of the two countries, while they registered around 3.000 applicants each in all proposals submitted. Spain and Italy also requested the biggest amount of funding, 1.86 and 1.6 billion euro, respectively. Germany, France, Greece and Netherlands also performed very well in terms of applicants. They had between 75-130 coordinators and between 1 320 – 2 100 applicants each. In terms of EU contribution, Germany, France, Greece and Netherlands requested 1.52, 1.03, 0.71, 1.02 billion euro, respectively.

The lowest rates of applications is found among the newer Member States and more specifically the Baltic states, Malta, Slovakia and Croatia. These countries had around 5 coordinators and 150-200 applicants each and the funds requested are below 70 million euro in each case. One should note however, that some of these countries also have among the smallest population in the EU, which is not accounted for in these indicators. Poland and Romania, were the most represented newer Member States in this Call with around 35 coordinators and over 500 applicants each – similar to countries like Ireland, Austria, Sweden and Denmark – followed by Cyprus, Slovenia, Hungary and Bulgaria with approximately 10 coordinators and between 250-350 applicants each. In terms of funds requested, Polish and Romanian applicants requested approximately 400 million each, while applicants from Bulgaria and Slovenia requested approximately 105 million and 150 million respectively.

[3] This figure refers to applications and not unique applicants who responded to the Call. For example, if the same institute applies in 5 different proposals, it is counted 5 times.
The call attracted around 14 000 unique applicants.

As regards Associated countries, the highest interest in the Call has been expressed by Turkey, Norway and Switzerland. They coordinated around 40 proposals and recorded more than 500 applicants each, followed by Israel with 20 coordinators and over 300 applicants. Norwegian applicants requested in total some 500 million euro, followed by Swiss and Turkish applicants with around 350 million euro, each, and Israeli applicants with approximately 200 million euro.

A particular feature of the Green Deal Call was the high application number of third countries. Ninety-seven third countries were involved in the Call, most of them though in a limited way. There were 32 third countries with more than 10 applicants, 19 of which from Africa. The high application number of African states was attributed primarily to topic 2.3 "Accelerating the green transition and energy access partnership with Africa" which received 142 proposals. South Africa, Kenya and Thailand had more than 100 applicants each, while several countries more registered more than 20 applicants. In terms of funds involved, South Africa and Thailand clearly stood out with requests of 300 and 190 million euro, while all other third countries requested amounts below 60 million euro.

In terms of type of organisation, more than 40% of the applicants were from the private sector. Higher education establishments represented almost 24% of total applicants followed by public research institutes with 18% of applicants. Almost 7% of applicants came from public bodies while slightly more than 10% fell under the category "other," which includes several types of organisations (civil society, non-governmental organisations, international organisations, associations, etc). The high application number of the private sector can be probably attributed to the focus of the Green Deal Call on quite mature technological solutions and innovation and demonstration actions. There was also a relatively important number of public bodies' applicants, which can be attributed also to the demonstration and pilot activities foreseen in several topics.

Evaluation and Outcome of the Call

Only a small minority of the 1550 submitted proposals were evaluated as ineligible (47 proposals). From the remaining 1503 proposals, 799 or 54% reached scores above all required thresholds, which means that they could potentially receive funding if the available amount for the Call was sufficient. **The amount that would be required to fund all proposals that exceeded all quality thresholds was of the order of 8.8 billion euro.**

A significant percentage of the proposals received particularly high scores demonstrating the very good quality of the proposed R&I activities in response to the European Green Deal. This outcome was particularly prominent in certain topics that attracted a lot of interest from the research community, such as those related to topics 2.3, 3.2, 8.1, 10.1, 10.2, 10.3, where only proposals with a score of 15 out of 15 will be able to receive funding. Only in very few topics, there are proposals with a score below 14, which are retained

for funding, and this is mainly in cases where the topics covered distinct thematic fields and there were explicit specific conditions in the work programme to ensure coverage of all of them. This may lead to useful conclusions for the support of further R&I activities in these fields in the context of Horizon Europe. The submission of many proposals with very good quality inevitably translates in a relatively low real success rate[4] (i.e. proposals funded over total number of proposals with adequate quality) of the order of 9%, which varies significantly between the various topics (from 3-6% in some topics to 50% in a couple of topics, Annex Table 1). The overall success rate[5] over the total number of evaluated proposals is naturally lower (5%) but this indicator does not take into account important quality aspects. In total, there are **73 proposals**[6] **proposed for funding (main list) involving almost 1800 participants and requesting an EU contribution of 1 003 million euro**.

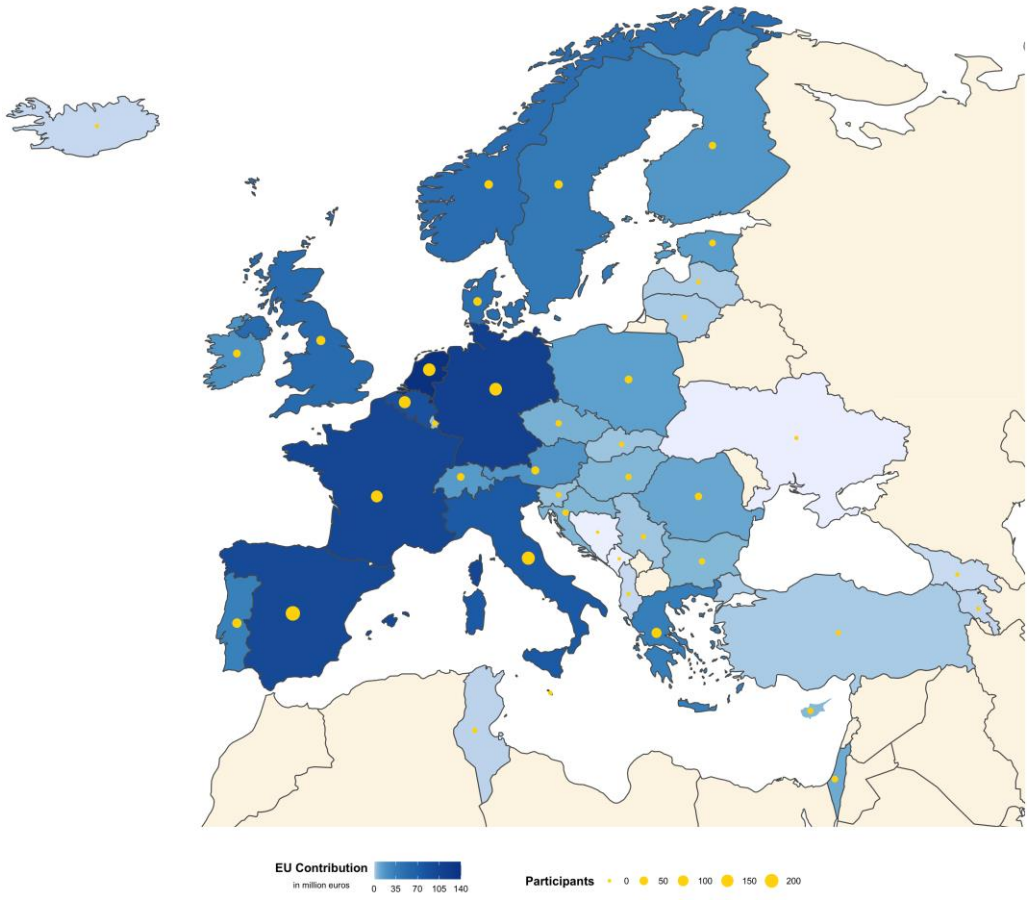
EU countries[7] **represent, as expected, the large majority of successful participants as well as of the EU requested contribution in the successful proposals, with 90% of the total in both categories.** Among EU member states, Spain and Italy have the highest number of successful participants (including coordinators) with 229 and 177 participations respectively (Annex Table 3). They are followed by Germany, Netherlands, Belgium and France with 160, 155, 138 and 132 successful participants respectively. In terms of EU requested contributions, the first six countries are the same, although the order changes. Successful participants from Netherlands and Germany request approximately 135 and 108 million euro respectively, followed by French, Spanish, Belgian and Italian successful participants with requested EU contribution of 98, 93, 83 and 73 million euro respectively. There are 61 UK successful participants asking for an EU contribution of 50 million euro, while Greece and Portugal also perform relatively well with 83 and 66 successful participations each, requesting EU contributions of approximately 31 million each.

Among the newer Member States, Poland, Romania and Estonia are the best performing with 35, 29 and 20 successful participants respectively, while in terms of EU contribution, Polish and Estonian successful participants request approximately 12 million each, followed by Romanian successful participants with slightly over 9 million euro. A group of 5 newer Member States (Bulgaria, Croatia, Czech Republic, Hungary and Cyprus) have very similar levels of participation with around 15-16 successful participants each, requesting an EU contribution of 5-6 million euro, while other newer Member States (Slovenia, Slovakia, Latvia, Lithuania and Malta) have a rather low number of successful participants in the call.

[4] *Real success rate:* number of proposals selected for funding over the total number of proposals that reached all quality thresholds during the evaluation.
[5] *Overall success rate:* number of proposals selected for funding over the total number of submitted and evaluated proposals.
[6] A sample of abstracts of proposals selected for funding can be found in the Annex. For more information on all the proposals selected for funded, see the supplementary material.
[7] The Green Deal Call is under Horizon 2020, therefore the UK was considered as EU Member State. Nevertheless, for the purposes of the individual country participation we examine the UK separately, whereas in the analysis per group of countries we include it under the Associated Countries group, in view of the situation in Horizon Europe.

As regards associated countries (AC), Norway, Switzerland and Israel are the best performing (and part of the 20 best performing countries in the Call). There are 49 successful participants from Norway, 32 from Switzerland and 17 from Israel, asking for an EU contribution of 49, 14 and 8 million respectively.

Figure 1: Requested EU Contribution and number of successful participants in the Green Deal Call



Note: Data is shown only for EU and Associated Countries

Third countries participation in the selected proposals is quite limited, compared to their applications, with the exception of African countries, which record 50 participations and request an EU contribution of 17 million euro. The relatively strong participation of African countries is attributed to topic *LC-GD-2.3 "Accelerating the green transition and energy access partnership with Africa"*. African participants aside, there are in total 21 participations from 13 other third countries.

The 73 successful projects have enabled a large and dense collaboration network, with more than 26 000 connections of organisations across 75 countries[8], ranging from 33 connections for the US to over 6 100 connections for Spain (Annex Figure 3). Member States appear in almost 98% of all collaborations, Associated Countries in almost 14% and Third Countries 6%[9]. Considering all the successful projects it participates, a Member State collaborates with other 24 Member States, 7 Associated Countries and 10 Third Countries[10]. Similarly, an Associated Country collaborates with 16 Member States, 4 Associated Countries and 4 Third Countries, while, a Third Country collaborates with 8 Member States, 2 Associated Countries and 6 Third Countries.

In terms of type of organisations participating in successful proposals, 38% come from the private sector, making it by far the largest participating group. About half of those were SMEs, showing a high representation of SMEs in the Green Deal Call. Research and technology organisations represent 25% of total participants followed by higher education establishments with 19%. About 7% of participants come from public bodies, while approximately 11% fall under the category "other", which includes several types of organisations (civil society, non-governmental organisations, international organisations, associations, etc.) for which more detailed analysis is required at the stage of grant agreement preparation.

Collaborations between the different types of participants follow the same order. Private entities appear in 54% of all the collaborations, research and technology organisations in 38%, higher education establishments in 30%, other organisations in 19% and public bodies in 13%. Similarly, all different types of participants collaborate mostly with private entities, making almost 40% of their collaborations (except for private entities for which collaborations with other private entities accounts for around 30%). The second, in order of collaborations, type of organisation is mostly research and technology organisations among the different types. Private entities collaborate with research and technology organisation in around 30% of their collaborations. Research and technology organisations collaborate with higher education establishments in 24% of their collaborations and 16% with other research and technology organisations (auto-collaborations). Higher education establishments collaborate 30% with research and technology organisations and auto-collaborate in 12% of their total collaborations. Other institutions collaborate 25% with research and technology organisations. Last, public bodies collaborate 24% with research and technology organisations and 20% with higher education establishments (Figure 2).

[8] A collaborative link is assumed to exist between each pair of participants in each project. The number of collaborative links created by a project is calculated in the following way:
(a) When there are n participants from a given country (or type of organisation) in a project, the number of collaborative links between participants from the given country (or type of organisation) formed as a result of the project is assumed to be n*(n-1)/2.
(b) When there are m participants from one country (or type of organisation) and p from another country (or type of organisation) in a project, the number of collaborative links created between the two countries (or types of organisation) as a result of the project is assumed to be m*p.

[9] These figures do not add up to 100% as in one collaboration organisations of different groups of countries might appear (e.g. consider a single collaboration between an EU and an Associated Country, then EU will appear in 100% of the collaboration(s) and the same will be true for the Associated Countries).

[10] These figures refer to the "average" Member State (or Associated/Third Country). They report a collaboration if two countries collaborate in at least one of all the successful projects they take part.

Figure 2: Collaborations between the different types of participants[11]

[11] *PRC*: Private for-profit entities (excl. Higher or Secondary Education Establishments); *REC*: Research and Technology Organisations; *HES*: Higher or Secondary Education Establishments; *OTH*: Others; *PUB*: Public bodies (excl. Research Organisations & Secondary or Higher Education Establishments)

Annex

Table 1: Areas and Topics

AREA	TOPIC	SUBMITED PROPOSALS	SELECTED FOR FUNDING	SUCCESS RATE Overall (Real)	REQUESTED BUDGET OF SELECTED in million EUR
Area 1 Increasing Climate Ambition: Cross sectoral challenges	1.1. Preventing and fighting extreme wildfires with the integration and demonstration of innovative means	55	4	7.3 % (10.3 %)	62.3
	1.2. Towards climate-neutral and socially innovative cities	13	1	8.3 % (16.7 %)	53
	1.3. Climate-resilient innovation packages for EU regions	33	4	12.1 % (18.2 %)	44.6
Area 2 Clean, affordable and secure energy	2.1. Innovative land-based and offshore renewable energy technologies and their integration into the energy system	98	5	5.5 % (11.6 %)	74.1
	2.2. Develop and demonstrate a 100 MW electrolyser upscaling the link between renewables and industrial applications	16	3	21.4 % (42.8 %)	92.4
	2.3. Accelerating the green transition and energy access partnership with Africa	142	5	3.7 % (7.6 %)	44.3
Area 3 Industry for a clean and	3.1. Closing the industrial carbon cycle to combat climate change	16	2	14.3 % (28.6 %)	56.6

circular economy	3.2. Demonstration of systemic solutions for the territorial deployment of the circular economy	91	4	4.4 % (6.9 %)	61.1
Area 4 Energy and resource efficient buildings	4.1. Building and renovating in an energy and resource efficient way	116	3	2.9 % (7.9 %)	60.1
Area 5 Sustainable and smart mobility	5.1. Green airports and ports as multimodal hubs for sustainable and smart mobility	44	5	11.9 % (18.5 %)	124.8
Area 6 Farm to fork	6.1. Testing and demonstrating systemic innovations for sustainable food from farm to fork	260	7	2.7 % (5.1 %)	70
Area 7 Biodiversity and ecosystem services	7.1. Restoring biodiversity and ecosystem services	72	4	6.5 % (19 %)	82.1
Area 8 Zero-pollution, toxic-free environment	8.1. Innovative, systemic zero-pollution solutions to protect health, environment and natural resources from persistent and mobile chemicals	94	3	3.2 % (5 %)	35.6
	8.2. Fostering regulatory science to address chemical and pharmaceutical mixtures: from science to evidence-based policies	21	3	14.3 % (17.6 %)	16.1
Area 9 Strengthening our knowledge in	9.1. European Research Infrastructures' capacities and services to address European Green Deal challenges	13	3	25 % (42.9 %)	28

support of the EGD	9.2. Developing end-user products and services for all stakeholders and citizens supporting climate adaptation and mitigation	89	5	5.6 % (8.5 %)	25.1
	9.3. A transparent and accessible ocean: towards a digital twin of the ocean	4	1	25.0 % (50 %)	17
Area 10 Empowering citizens for the transition towards a climate-neutral, sustainable Europe	10.1. European capacities for citizen deliberation and participation for the Green Deal	52	2	3.8 % (6.3 %)	11.8
	10.2. Behavioural, social and cultural change for the Green Deal	117	2	1.8 % (3.1 %)	10
	10.3. Enabling citizens to act on climate change and environmental protection through education, citizen science, observation initiatives, and civic involvement	204	7	3.5 % (8 %)	34.7

Table 2: Correspondence between call's Topics and Horizon 2020 Sections[12]

TOPIC	HORIZON 2020 SECTION
1.1. Preventing and fighting extreme wildfires with the integration and demonstration of innovative means	Cross-cutting across several societal challenges
1.2. Towards climate-neutral and socially innovative cities	Cross-cutting across several societal challenges
1.3. Climate-resilient innovation packages for EU regions	Climate action, environment, resource efficiency and raw materials
2.1. Innovative land-based and offshore renewable energy technologies and their integration into the energy system	Secure, clean and efficient energy

[12] https://ec.europa.eu/programmes/horizon2020/en/h2020-sections

2.2. Develop and demonstrate a 100 MW electrolyser upscaling the link between renewables and industrial applications	Secure, clean and efficient energy
2.3. Accelerating the green transition and energy access partnership with Africa	Secure, clean and efficient energy
3.1. Closing the industrial carbon cycle to combat climate change	Leadership in enabling and industrial technologies (LEIT)
3.2. Demonstration of systemic solutions for the territorial deployment of the circular economy	Climate action, environment, resource efficiency and raw materials
4.1. Building and renovating in an energy and resource efficient way	Secure, clean and efficient energy
5.1. Green airports and ports as multimodal hubs for sustainable and smart mobility	Smart, green and integrated transport
6.1. Testing and demonstrating systemic innovations for sustainable food from farm to fork	Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
7.1. Restoring biodiversity and ecosystem services	Climate action, environment, resource efficiency and raw materials
8.1. Innovative, systemic zero-pollution solutions to protect health, environment and natural resources from persistent and mobile chemicals	Climate action, environment, resource efficiency and raw materials
8.2. Fostering regulatory science to address chemical and pharmaceutical mixtures: from science to evidence-based policies	Climate action, environment, resource efficiency and raw materials
9.1. European Research Infrastructures' capacities and services to address European Green Deal challenges	Research Infrastructures
9.2. Developing end-user products and services for all stakeholders and citizens supporting climate adaptation and mitigation	Climate action, environment, resource efficiency and raw materials
9.3. A transparent and accessible ocean: towards a digital twin of the ocean	Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
10.1. European capacities for citizen deliberation and participation for the Green Deal	Europe in a changing world - inclusive, innovative and reflective societies
10.2. Behavioural, social and cultural change for the Green	Europe in a changing world - inclusive, innovative and

Deal	reflective societies
10.3. Enabling citizens to act on climate change and environmental protection through education, citizen science, observation initiatives, and civic involvement	Climate action, environment, resource efficiency and raw materials

Table 3: Applicants and Participants[13]

COUNTRY	COORDINATORS Proposals (Selected)	PARTNERS Proposals (Selected)	PARTICIPANTS Proposals (Selected)	REQUESTED BUDGET in million EUR[14] Proposals (Selected)
ES	201 (15)	3336 (214)	3537 (229)	1 866.9 (93.9)
IT	203 (7)	2961 (170)	3164 (177)	1 597.1 (73.3)
DE	133 (11)	2091 (149)	2224 (160)	1 528 (108.1)
FR	101 (4)	1681 (128)	1782 (132)	1 030.5 (97.9)
EL	97 (3)	1484 (80)	1581 (83)	711.8 (31.4)
NL	74 (7)	1323 (148)	1397 (155)	1 016.2 (135.5)
BE	60 (7)	1212 (131)	1272 (138)	691.3 (83.2)
UK	85 (2)	1064 (59)	1149 (61)	819.8 (50.7)
PT	57 (2)	971 (64)	1028 (66)	549.2 (31.3)
SE	39 (1)	684 (46)	723 (47)	495.6 (36.8)
DK	39 (2)	655 (46)	694 (48)	484.6 (46.6)
AT	36 (0)	628 (40)	664 (40)	364.9 (16.8)
FI	44 (3)	571 (26)	615 (29)	349.9 (16.1)
PL	38 (1)	535 (34)	573 (35)	350.4 (11.7)
TR	40 (0)	508 (6)	548 (6)	338.3 (1.2)
NO	44 (6)	495 (43)	539 (49)	511.8 (48.6)

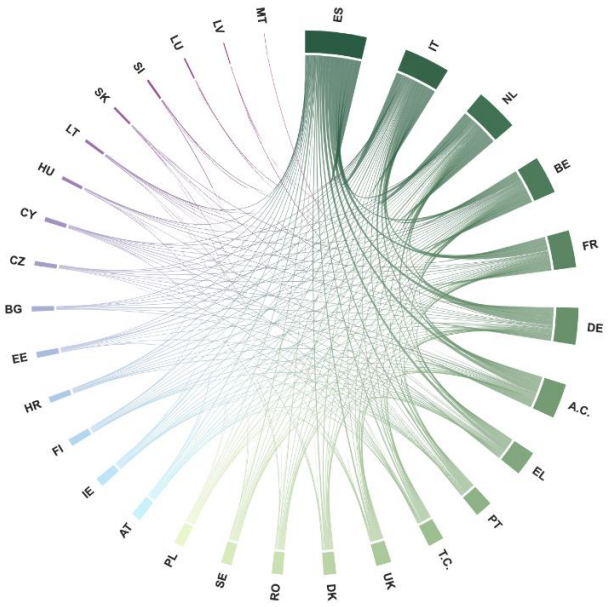
[13] For brevity, numbers are reported for countries that belong to the EU or Associated Countries, or, Third Countries from which at least one project was selected and requested budget

[14] Amounts are rounded. This might lead to slightly different figures from the ones reported in the main section.

RO	36 (0)	492 (29)	528 (29)	473.1 (9.2)
CH	28 (0)	495 (32)	523 (32)	339 (14.2)
IE	37 (2)	454 (32)	491 (34)	361.3 (17.6)
SI	13 (0)	358 (8)	371 (8)	144.9 (2.7)
IL	22 (0)	317 (17)	339 (17)	194.3 (8.1)
CY	14 (0)	303 (13)	317 (13)	122.6 (4.6)
HU	10 (0)	294 (15)	304 (15)	113.6 (5)
CZ	7 (0)	252 (15)	259 (15)	120.3 (6.5)
BG	11 (0)	235 (15)	246 (15)	105 (4.9)
HR	6 (0)	211 (16)	217 (16)	68.7 (5.4)
EE	5 (0)	209 (20)	214 (20)	90.5 (12.5)
RS	3 (0)	150 (6)	153 (6)	48.7 (1.9)
LT	6 (0)	143 (7)	149 (7)	69.9 (1.2)
ZA	3 (0)	146 (7)	149 (7)	306.2 (3.5)
SK	10 (0)	134 (6)	144 (6)	70.4 (2.1)
LV	2 (0)	139 (3)	141 (3)	53 (1)
KE	2 (0)	138 (7)	140 (7)	58.5 (1.7)
TN	1 (0)	104 (5)	105 (5)	34.4 (0.6)
LU	8 (0)	96 (6)	104 (6)	71.1 (3)
MA	1 (0)	91 (4)	92 (4)	42.8 (1.5)
UA	6 (0)	82 (1)	88 (1)	58.3 (0)
MT	6 (0)	78 (2)	84 (2)	38.8 (0.4)
UG	1 (0)	79 (3)	80 (3)	30.3 (0.8)
IS	5 (0)	49 (1)	54 (1)	26.5 (0.3)
GH	0 (0)	51 (4)	51 (4)	19.8 (1.1)

TZ	0 (0)	51 (2)	51 (2)	14.7 (0.3)
AL	2 (0)	47 (1)	49 (1)	14.8 (0.3)
EG	1 (0)	45 (2)	46 (2)	16.8 (0.2)
MK	1 (0)	43 (1)	44 (1)	16.9 (0.3)
CL	0 (0)	35 (3)	35 (3)	13 (0.9)
BA	1 (0)	26 (0)	27 (0)	15.8 (0)
NA	0 (0)	18 (6)	18 (6)	7.3 (3.6)
GE	0 (0)	17 (1)	17 (1)	4 (0.3)
ME	0 (0)	17 (0)	17 (0)	3.7 (0)
MD	0 (0)	14 (0)	14 (0)	6.9 (0)
CI	0 (0)	12 (2)	12 (2)	3.5 (0.3)
RU	0 (0)	11 (3)	11 (3)	0.4 (0)
AM	0 (0)	9 (1)	9 (1)	1.7 (0.4)
FO	0 (0)	4 (0)	4 (0)	4.7 (0)

Figure 3: Collaboration between countries participating in selected projects funded



Note: Associated (A.C.) and Third (T.C) Countries are grouped

Sample of Abstracts of Proposals selected for funding[15]

Area 1 *Increasing Climate Ambition: Cross sectoral challenges*

SILVANUS: Integrated Technological and Information Platform for wildfire Management

SILVANUS envisages to deliver an environmentally sustainable and climate resilient forest management platform through innovative capabilities to prevent and combat against the ignition and spread of forest fires. The platform will cater to the demands of efficient resource utilisation and provide protection against threats of wildfires encountered globally. The project will establish synergies between (i) environmental; (ii) technology and (iii) social science experts for enhancing the ability of regional and national authorities to monitor forest resources, evaluate biodiversity, generate more accurate fire risk indicators and promote safety regulations among citizens through awareness campaigns. The novelty of SILVANUS lies in the development and integration of advanced semantic technologies to systematically formalise the knowledge of forest administration and resource utilisation. Additionally, the platform will integrate a big-data processing framework capable of analysing heterogeneous data sources including earth observation resources, climate models and weather data, continuous on-board computation of multi-spectral video streams. Also, the project integrates a series of sensor and actuator technologies using innovative wireless communication infrastructure through the coordination of aerial vehicles and ground robots. The technological platform will be complemented with the integration of resilience models, and the results of environmental and ecological studies carried out for the assessment of fire risk indicators based on continuous surveys of forest regions. The surveys are designed to take into consideration the expertise and experience of frontline fire fighter organisations who collectively provide support for 47,504x104 sq. meters of forest area within Europe and across international communities. The project innovation will be validated through 11 pilot demonstrations across Europe and internationally using a two sprint cycle.

Area 2 *Clean, affordable and secure energy*

HYPERGRYD: Hybrid coupled networks for thermal-electric integrated smart energy Districts

HYPERGRYD aims at developing a set of replicable and scalable cost effective technical solutions to allow the integration of RES with different dispatchability and intrinsic variability inside Thermal Grids as well as their link with the Electrical Grids, including the development of innovative key components, in parallel with innovative and integrated ICT services formed by a scalable suite of tools for the proper handling of the increased complexity of the systems from building to Local Energy Community (LEC) levels and beyond, accelerate the sustainable transformation, planning and modernization of District Heating and Cooling (DHC) toward 4th and 5th generation. HYPERGRYD also aims at developing real time management of both electrical and thermal energy flows in the coupled energy network complex, including the synergies between them. Therefore, HYPERGRYD aims at three over-arching General Objectives:

- To prove Smart Energy Networks as the future of Efficient Energy Management in DHC in synergy with the Electrical Grids in LEC/Smart Cities of the future,
- To define the roadmap to design and planning of future DHC as well as the modernization of the existing ones in different climates and RES penetration levels toward 4th-5th generation,
- To demonstrate HYPERGRYD RES-based Enabling Technologies, Smart Energy Grid Solutions empowered by new ICT tools and services as the key for this evolution.

During the project, the HYPERGRYD?s solutions will be implemented across 4 Live-In-the-Labs cases in 3 representative climates provided by the consortium, with special consideration to their cost effectiveness and potential replicability to

[15] For more information on all the proposals selected for funded, see the supplementary material.

finally achieve these 3 main objectives. All these tasks will follow the proposed work program activities to ensure systematic and scientific performance measures, feedback and powerful exploitation.

Area 3 *Industry for a clean and circular economy*

FRONTSH1P: FRONTrunner approacTransition to a circular & resilient future: deployment of systemic solutions with the support of local clusters and the development of regional community-based innovation schemes

FRONTSH1P aims at ensuring green and just transition of the Polish Łódzkie Region towards decarbonization and territorial regeneration through demonstration at TRL7 of highly replicable circular systemic models and MONAD aims is to create a territorial cluster of circular initiatives to accelerate the transition to a more green, resilient economy, able to provide sustainable responses to the need of the involved regions. The proposed model will be implemented and demonstrated in Łódzkie Region, where key territorial partners, and particularly the Regional Institution, the scientific partner, the representative of civil society and Industry Groups, will play a relevant role in promoting, facilitating and enabling systemics and circular economy at regional scale. The involvement of those relevant actors will allow the promotion of the circular economy and to reach relevant actors, such as municipalities, companies, consumers and civil society, which will be engaged in a participatory approach to collect needs and perceived constraints. From this activity, the cluster system will identify and define a circular economy strategy, with clear objectives, measurable targets and a proper monitoring method. Moreover, the cluster will facilitate collaborations and co-operations among relevant actors for boosting circularity. It will mean to:

- Identify already available initiatives and policies at local, regional, national and international level
- Create platforms to explore opportunities and to share information, best practices and successful examples
- Activate a strong communication between universities, businesses and civil society for the technological transfer
- Exchange information and experiences with other Regions and Countries

The proposal will foresee activities, such as the definition of regulatory instruments aimed at accelerating the transition to a circular economy creating a Circular Economy Action Plan (CEAP) in which the proposed systemic solution is embedded.

Area 4 *Energy and resource efficient buildings*

ARV: Climate Positive Circular Communities

The vision of the ARV project is to contribute to speedy wide scale implementation of Climate Positive Circular Communities (CPCC) where people can thrive and prosper for generations to come. The overall aim is to demonstrate and validate attractive, resilient, and affordable solutions for CPCC that will significantly speed up the deep energy renovations and the deployment of energy and climate measures in the construction and energy industries. To achieve this, the ARV project will employ a novel concept relying on a combination of 3 conceptual pillars, 6 demonstration projects, and 9 thematic focus areas. The 3 conceptual pillars are integration, circularity and simplicity. Integration in ARV means the coupling of people, buildings, and energy systems, through multi-stakeholder co-creation and use of innovative digital tools. Circularity in ARV means a systematic way of addressing circular economy through automated use of LCA, digital logbooks and material banks. Simplicity in ARV means to make the solutions easy to understand and use for all stakeholders, from manufacturers to end-users. The 6 demos are urban regeneration projects in 6 locations around Europe. They have been carefully selected to represent the different European climates and contexts, and due to their high ambitions in environmental, social and economic sustainability. Renovation of social housing and public buildings are specifically focused. Together, they will demonstrate more than 50 innovations in more than 150,00 m2 of buildings. The 9 thematic focus areas are 1) Effective planning and implementation of CPCCs, 2) Citizen engagement, environment and well-being, 3) Sustainable building re(design) 4) Resource efficient manufacturing and construction workflows, 5) Integrated renewables and storage, 6) Energy management and flexibility, 7) Monitoring and evaluation, 8) Business models, financial mechanisms, policy and exploitation, 9) Communication, dissemination, and stakeholder outreach.

Area 5 *Sustainable and smart mobility*

OLGA: OLympics & Green Airports

Our world is facing unprecedented environmental challenges. Keeping the global temperature rise below 1.5°C implies a mandatory drop in CO2 emissions. Against this backdrop, the EC has issued the European Green Deal: an ambitious plan towards a fully sustainable economy, including aviation. With one million species endangered, biodiversity restoration is another key issue. Once aviation has recovered from the COVID pandemic effects, global air traffic as a major enabler of connectivity and economic growth will resume and keep increasing. This emphasizes the challenge of reducing the environmental impact of the air transportation sector as a whole. OLGA partners (airports, airline, handler, industry, research, SMEs) unite a wealth of expertise to contribute to solving this complex challenge: efficient and carbon neutral airport and airline operations, sustainable logistics, smart energy & mobility, intermodality for passengers and freight, emission/air quality assessments, green construction and circular end-of-life solutions. Sustainable Aviation Fuels supply chains will be integrated in conventional jet fuel infrastructure. Complementary types of low-emission mobilities, electric ground support equipment, hydrogen infrastructure and reduced carbon airside operations will be demonstrated. OLGA will achieve significant quantified advances already within the first three years, ready for exploitation by partners. This will lead to proven CO2 reduction, air quality improvement and biodiversity preservation with involvement of the entire sector's value chain. Sustainable impacts will be realised on societal, environmental and economic levels at local, national and EU scale. OLGA will have a duration of 60 months, requesting a 25 MEuros grant. With the 2024 & 2026 Olympics (Paris, Milano), OLGA's airports are uniquely positioned to showcase the environmental innovations, while the airports of Zagreb and Cluj will prove scalability and EU-wide applicability.

Area 6 *Farm to fork*

SISTERS: Systemic Innovations for a SusTainable reduction of the EuRopean food waStage

Only in the EU, we generate every year around 89M tonnes of Food Loss and Waste (FLW), accounting for 20% of the total food produced, with costs estimated at 143 , impacting each stage of the Food Value Chain. In SISTERS, we propose a set of systemic innovations addressed to reduce FLW generated in every stage of the Food Value Chain in Europe that will solve main existing challenges in Production, Processing, Marketing (retailing/wholesaling), Consumption, and the Logistics among stages. SISTERS will design the 1st European Short Chain Platform for farmers to sell their discarded production, favouring local economies, providing access to nutritious and healthy food to the less favoured consumers. Smart and reusable food containers will be designed to diminish food losses during transportation, maintain bulk and packed food in ideal conditions with new accurate sensors allowing immediate reaction. Moreover, to improve the preservation and quality of food a set of bio-based and home-compostable packaging solutions will be created reducing their potential negative impacts in the environment. A novel SISTERS Seal of Excellence will promote sustainable practices among retailers. While the information provided to the consumers with QR and dynamic labelling incorporated in the packaging is expected to impact on retailers and consumers sustainable awareness, thusreducing the discard of food and associated FW. With these cross-sectorial innovations, we will achieve an ambitious environmental & economic impact of the current dynamics in the food system, contributing to the reduction of FLW and to change the unsustainable consumer behaviours. With the support of the EC, SISTERS will be a key EU project addressing the problem in a holistic way, reducing FLW by 27.4% and CO2 emissions by around 20% in the case studies. Our interdisciplinary SISTERS consortium consists of 18 partners from 8 European countries, with wide expertise in fighting FLW from Farm

Area 7 *Biodiversity and ecosystem services*

MERLIN: Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling and transformation

Europe's environment is in an alarming state, with climate change effects aggravating. To secure economic prosperity, human wellbeing and social peace, systemic transformative change of our society is imperative. Ecosystem restoration using nature-based solutions (NbS) is key to this change, in which freshwaters hold a pivotal role. MERLIN will demonstrate freshwater restoration best-practice; implement innovative NbS at landscape-scale; upscale systemic restoration seizing green growth and private investment opportunities; mainstream restoration by co-development with local communities and economic sectors; multiply solutions for transformative restoration to key players of systemic change. MERLIN will capitalise on successful freshwater restoration projects across Europe. Success factors of 17 flagship projects will be scrutinized, generating a blueprint for proficient NbS implementation. With investments of 10 mio Euro in hands-on upscaling measures along scalability plans, MERLIN will transform these projects into beacons of innovation for systemic change. Upscaling to the European level, MERLIN will identify landscapes with high potential for transformative restoration and will analyse cost-benefits of restoration scenarios. Economic analyses of European regions will seize green growth opportunities arising from restoration. MERLIN will delineate models for private investment into restoration alongside public funding. MERLIN's initiatives will co-design win-win solutions with economic sectors (agriculture, water supply, insurance, navigation) and local communities, spearheading systemic economic, social and environmental change. The MERLIN Academy and virtual marketplace will multiply innovations to the community of practice, investors and policy makers across Europe and beyond. MERLIN is committed to a sustainable, climate-neutral and -resilient, inclusive and transformative path, mainstreaming restoration as a cornerstone for systemic change.

Area 8 *Zero-pollution, toxic-free environment*

ZeroPM: Zero pollution of Persistent, Mobile substances

ZeroPM will interlink and synergize prevention, prioritization and removal strategies to protect the environment and human health from persistent, mobile (PM) substances. To do this, ZeroPM will establish an evidence-based multilevel framework to guide policy, technological and market incentives to minimize use, emissions and pollution of entire groups of PM substances. To prevent pollution, ZeroPM will activate the momentum of the EU's Chemicals Strategy for Sustainability and support its implementation through the development of scientific, policy and market tools supporting essential use and mitigation of prioritized PM substances, resulting in substitution to safe and sustainable alternatives. ZeroPM will prioritize PM substances and substance groups through the development and application of robust screening and prioritization tools aimed at identifying all PM substances on the global chemical inventory. These tools will take into consideration production, use, presence in the circular economy, hazard and risk established by advancing in silico and in vitro new approach methodologies (NAM) using non-animal approaches. ZeroPM will develop next generation remediation techniques to remove prioritized PM substances from water resources, drinking water and sludge-derived products sustainably. ZeroPM unites leading researchers, regulators and green chemistry innovation experts that have been instrumental in advancing the science and awareness of PM substances, to form an exemplary multidisciplinary team. ZeroPM will deliver policy improvements, an increase in business opportunities and competitiveness, an improved livelihood for EU citizens and beyond state of the art methods, to prevent regrettable substitution and regrettable remediation of PM substance groups. ZeroPM will be the pathfinding project enabling the ambitions of the Chemical Strategy to become an on-the-ground reality, supporting the movement towards a zero pollution, toxic-free environment.

Area 9 *Strengthening our knowledge in support of the EGD*

I-CISK: Innovating Climate services through Integrating Scientific and local Knowledge

Climate Services (CS) are crucial in empowering citizens, stakeholders and decision-makers in defining resilient pathways to adapt to climate change and extreme events. Despite advances in scientific data and knowledge (e.g. Copernicus, GEOSS), current CS fail to achieve their full value-proposition to end-users. Challenges include incorporation of social and behavioural factors, local needs, knowledge and the customs of end-users. I-CISK will develop a next generation of end-user CS, which follow a social and behaviourally informed approach to co-producing services that meet climate information needs at a relevant spatial and temporal scale. I-CISK takes a trans-disciplinary approach to developing CS by working with stakeholders in 7 Living Labs established in climate hotspots in Europe, it's neighbours, and Africa, to address climate change and extremes (droughts, floods and heatwaves) faced by agriculture, forestry, tourism, energy, health, and the humanitarian sectors. With end-users, I-CISK will co-design, co-create, co-implement, and co-evaluate pre-operational CS that provide a step-change in integrating local knowledge, perceptions and preferences with scientific knowledge. This co-production framework is unique as it (i) links climate impact and adaptation at different temporal scales from (sub)-seasonal forecasts through to climate scale projections, and (ii) explicitly considers the human-climate feedbacks of adaptation and options in a multi-timescale, multi-sector, and multi-hazard setting. The novel CS will be built on a highly customisable cloud-based web platform that I-CISK develops; freely available, and easily replicable. The I-CISK co-production framework, supported by online open courses, guidelines, business stories and strategic dissemination, will catalyse the production and adoption of CS that integrate end-user local knowledge with scientific knowledge, contribute to improved decisions and policies, and a flourishing market for end-user CS

Area 10 *Empowering citizens for the transition towards a climate-neutral, sustainable Europe.*

REAL_DEAL: Reshaping European Advances towards green Leadership Through Deliberative Approaches and Learning

REAL_DEAL will stimulate a pan-European debate to reshape citizens' and stakeholders' active participation through deliberative processes around the European Green Deal. It brings together researchers and practitioners of deliberative democracy from a wide range of disciplines including environmental rights and the law of public participation, ethics and responsible innovation, gender studies and ecofeminism, psychology, geography, urban planning and sustainability studies. It includes the EU's largest civil society networks advocating on the environment, climate, sustainable development, local democracy and the European movement. It teams up with youth climate, social justice and women's organisations, SMEs, universities and research institutes, mobilising networks with thousands of CSOs, uniting millions of citizens and activating contacts to thousands of policymakers. In a large co-creation exercise, REAL_DEAL will develop, test and validate innovative tools and formats to propel deliberative democracy to the next level. It will tests its innovations at citizens' assemblies for the transition in at least 13 countries. We will scrutinise pan-European formats ranging from digital deliberation through our online platform www.CitizensGreenDeal.eu to in-person processes such as an Assembly for a Gender-Just Green Deal and a pan-European Youth Climate Assembly. REAL_DEAL will co-create a comprehensive protocol for meaningful citizens' participation and deliberation to work towards the objectives of the EGD. It will validate recommendations on how to design such processes and how they can be applied by European institutions, Member States and civil society alike. Gender equality will be embedded into the project's DNA. It pays specific attention to the leave-no-one-behind principle, fostering the engagement of disenfranchised groups that are disproportionally burdened by environmental damage. REAL_DEAL will develop a new model of environmental citizenship across Europe.

HOW TO ASSESS CLIMATE CHANGE MITIGATION POTENTIALS AT PROJECT-LEVEL?

AN ESTIMATION BASED ON LIFE CYCLE ASSESSMENT OF PROPOSALS SUBMITTED UNDER THE GREEN DEAL CALL

by JRC D3, RTD G2

Key Lessons

- There is a need for a harmonised methodology for evaluating the climate impact of EU-funded projects to report on the Green Deal objectives.
- The Environmental Footprint method recommended by the European Commission can be used to this end, allowing comparability of results across projects.
- The European Commission piloted during the Green Deal Call a common programme level methodology for tracking the climate impact of EU-funded projects, enabling the ex-ante estimation of lifetime carbon savings from investment projects.
- The exercise revealed that estimates should consider both potential benefits and impacts of the proposed mitigation solutions.
- A possible approach to harmonize the calculations of net climate change mitigation potentials would be the development of a calculator enabling the applicants to estimate the expected net climate change mitigation potential based on the estimated savings and additional use of materials and energy.
- This methodology can serve as a basis for recommendations of any ex-ante analysis of projects serving towards the objectives of the Green Deal.

Research and Innovation

Introduction

The European Green Deal Call contributes towards the European Green Deal (EGD), the plan of the EU to fight climate change and to make Europe the first climate-neutral continent by 2050. To finance the EGD, besides the European Green Deal Call, the EU is investing around €600 billion from the NextGenerationEU Recovery Plan, and its seven-year budget[16]. However, budgetary spending is only the beginning of the story on how Europe combats climate change. Europe needs to be able to show how this spending leads the transition towards climate-neutral society.

In this context, the Commission piloted during the EGD Call a common programme level methodology for tracking the climate impact of EU-funded projects to report on the EGD objectives. In February 2021, subsequently to the call's deadline, DG RTD launched a Climate Impact Pilot survey with the aim of assessing the expected climate benefits from projects applying to the call. This report[17] presents an approach enabling the ex-ante estimation of lifetime carbon savings from investment projects. This approach, which builds on the methodology introduced by Rentschler et al. (2020), is adopted to perform a plausibility check of the expected climate change mitigation potentials of investment projects, through parallel calculations of the expected benefits, leveraging on the approach suggested by the 'Green Deal Tracking Tool' (Flachenecker et al., 2021). The suggested methodology is applied to several project proposals, as reported in the above-mentioned survey, and the resulting estimated climate change mitigation potentials are compared with those reported by the survey respondents.

As a result of this assessment, a number of lessons learned are reported and suggestions are provided on how to design future surveys to ensure the relevant data is collected to apply the methodology here presented. This methodology can serve as a basis for recommendations of any ex-ante analysis of projects serving towards a net-zero emissions future.

Methodology and Estimation

Methodological Framework

The survey[18] aimed at gathering general information on the projects (e.g. sectors covered, geographical scope, project's short description, reference system, etc.), together with quantitative data to assess baseline climate impacts and the expected projects' life cycle climate change mitigation potentials in 2030. The respondents had to select a method employed for the calculation of the climate change mitigation potentials choosing between: (i) an approach based on avoided emissions (direct emissions); (ii) an approach based on life cycle assessment; (iii) an approach based on the "Product/Organisation environmental footprint"; or (iv) other approaches to be specified. The selection of none or more than one approach was possible. To understand the main elements leading to the climate change mitigation potentials, disaggregated information was collected in terms of

[16] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[17] For a more detailed analysis, see De Laurentiis et al. 2021, forthcoming on the R&I paper series.
[18] For more details on the survey please look section *The Climate Impact Survey* of the document

materials and energy savings, such as energy sources (e.g.: savings of primary energy sources such as natural gas, savings of secondary energy sources such as grid electricity), materials (e.g., savings of cement, savings of steel), water (e.g., savings of tap water) and other resources. However, no questions on the quantities of potential substituting materials and energy were posed. A total of 678 unique proposals responded to the survey (out of 1550 submitted proposals), of which 640 completed the survey and 566 expected to contribute to decreasing the CO_{2eq} emissions by 2030.

To perform a plausibility check of the expected climate benefits reported by the survey respondents, a parallel calculation of the expected climate benefits was performed building on the approach suggested by the 'Green Deal Tracking Tool' (Flachenecker et al., 2021).

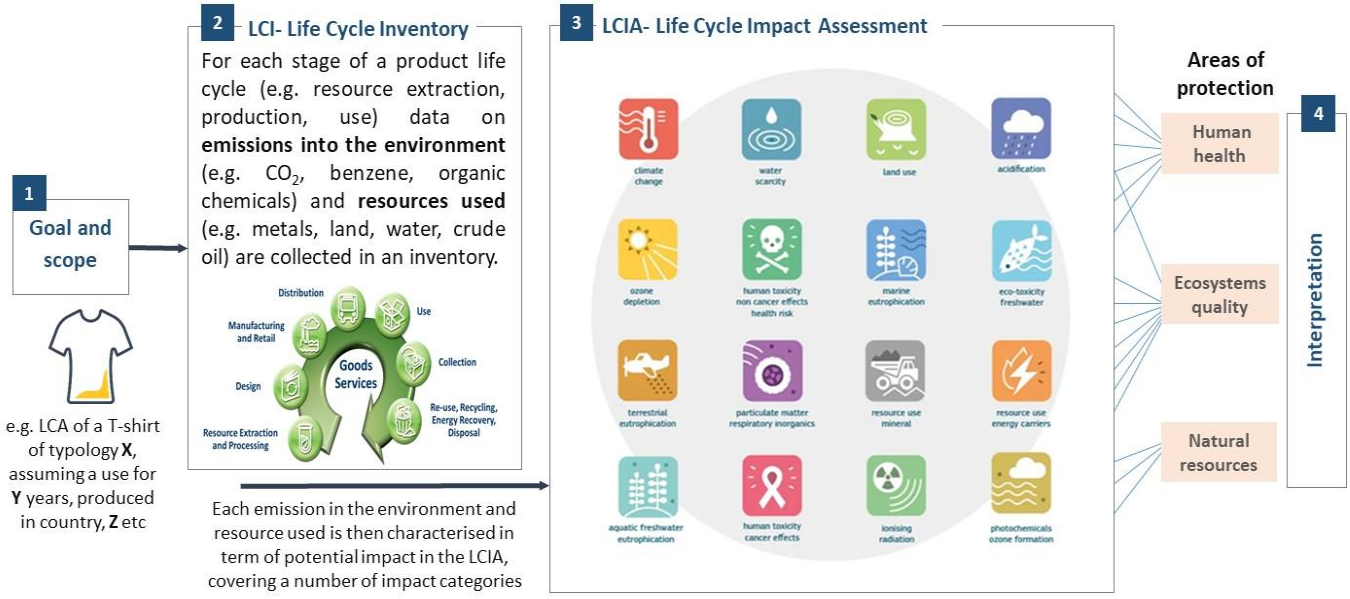
The climate change impacts per unit of materials and energy use are calculated by adopting a Life Cycle Assessment (LCA)-based approach, considering the life cycle impact on climate change caused by the production, distribution and use of energy and materials (i.e., from cradle to gate). The amount of materials and energy used (for replacement purposes) or saved by a project (e.g., energy from grid electricity, fossil fuel consumption) is multiplied by the correspondent climate change impact per unit of resource, to derive, respectively, the associated climate change impacts or avoided impacts. The net climate change mitigation potential of a project is then estimated by subtracting the impacts associated with the expected uses of the substituting materials and energy from the benefits associated with the materials and energy savings. The information on the quantities of each substituting material and energy was not asked explicitly in the survey.

The LCA methodology (Figure 1) provides quantitative information on the environmental performance of goods and services and can therefore be also a valuable approach for assessing environmental impacts associated with projects. In the impact assessment phase of LCA, emissions of substances into the environment, and resources used in the life cycle of goods and services, collected within the Life Cycle Inventory (LCI) analysis step and therefore defined "inventory flows", are associated to environmental impact categories and indicators through Life Cycle Impact Assessment (LCIA) methods. LCIA methods firstly classify inventory flows into midpoint impacts categories (e.g., climate change) and secondly characterize them to common units to allow comparison within the same impact category (e.g., kg CO_2 equivalent). Following this phase, midpoint impacts can be aggregated to endpoint impact categories (e.g., human health, ecosystem quality, etc.) and interpreted in accordance with the goal and scope of the LCA study.[19]

This report adopted the Environmental Footprint (EF) method, the EU recommended Life Cycle Assessment based method to quantify the environmental impacts of products and organisations. This method introduced significant improvements and guidance compared to the existing LCA standards (ISO, 2006 a, b) concerning key methodological choices and data quality requirements, and established rules for the development of life cycle inventories, the so-called EF-compliant datasets (Fazio et al., 2020). In the EF method environmental impacts are assessed in 16 environmental domains, nevertheless this report is limited to assessing impacts on climate change.

[19] For more details, see De Laurentiis et al. 2021

Figure 1. Overview of the Life Cycle Assessment method.



Estimating the net climate change mitigation potential of the projects

Following the initial screening of the 678 unique proposals that responded to the survey, 34 projects were selected, since they were mentioning the Product and Organisation - Environmental Footprint (PEF and OEF, respectively) methods amongst the methods employed to calculate climate change mitigation potentials. The first selection criterion was set as it was expected that projects following a similar approach to the one suggested here in estimating climate change mitigation potentials would more likely reach similar results, as opposed to projects adopting different approaches. The list was then further refined to include only projects providing quantitative information on the expected climate change mitigation potential and providing detailed information on energy and material savings and baselines, leaving a total of 9 projects selected for further assessment.

The net climate change mitigation potential of each selected project was derived from the information provided by the respondents on materials and energy saved (obtained by comparing the use in the baseline year with their expected use in 2030), and, if relevant, on the substituting materials and energy used[20], and then compared with the climate change mitigation potential reported by the respondents, by adopting a procedure articulated in six steps.

Step 1. By analyzing the projects information, projects were classified into two different groups.

- Group A: projects achieving an absolute reduction of inputs. Energy, water, and other resources are saved due to e.g. improvements in the efficiency of materials, design. However, if the reduction of

[20] For more details, see De Laurentiis et al. 2021

impacts is achieved by implementing a new technology (e.g. increasing the energy efficiency of a building), this will most likely have some associated impacts which should be taken into account (red bar in figure 2);

- Group B: projects performing at least one substitution of inputs with greener alternatives. Energy, water and materials are saved due to substitution with alternative sources (e.g., renewable energy, rainwater harvesting).

Step 2. The projects were analysed to identify the list of materials and energy for which climate change impacts were needed.

Step 3. Relevant EF-compliant datasets were selected for the materials and energy identified in Step 2. In some cases, a proxy dataset was built based on the average of more than one dataset.

Step 4. The environmental impacts of the selected EF datasets were calculated using the EF3.0 method (Fazio et al., 2018) and the software Look@LCI (EU, 2021), Climate change impacts per unit of materials and energy use were derived from life cycle impacts of EF compliant datasets. These unitary impacts were then used to convert the predicted materials and energy savings into climate change avoided impacts.

Step 5. Climate change avoided impacts associated with the reported savings of materials and energy were derived based on the following methodology, further elaborated from Flachenecker et al. (2021).

Step 6. The resulting net climate mitigation potential estimated by means of EF-compliant datasets was compared with climate mitigation potential reported by the survey respondents.

Figure 2 illustrates the conceptual framework for assessing net climate change mitigation potential for group A projects. Figure 3 illustrates the conceptual framework for assessing the net climate change mitigation potential for group B projects, with the example of a project aiming at replacing all the electricity taken from the grid with electricity from solar photovoltaic (PV).

Figure 2. Conceptual framework for assessing net climate change mitigation potential for group A projects.

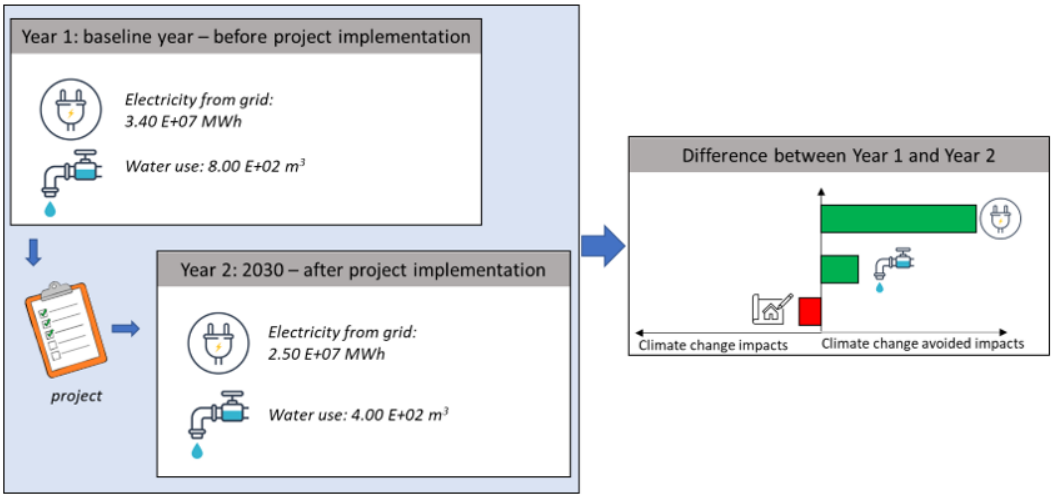
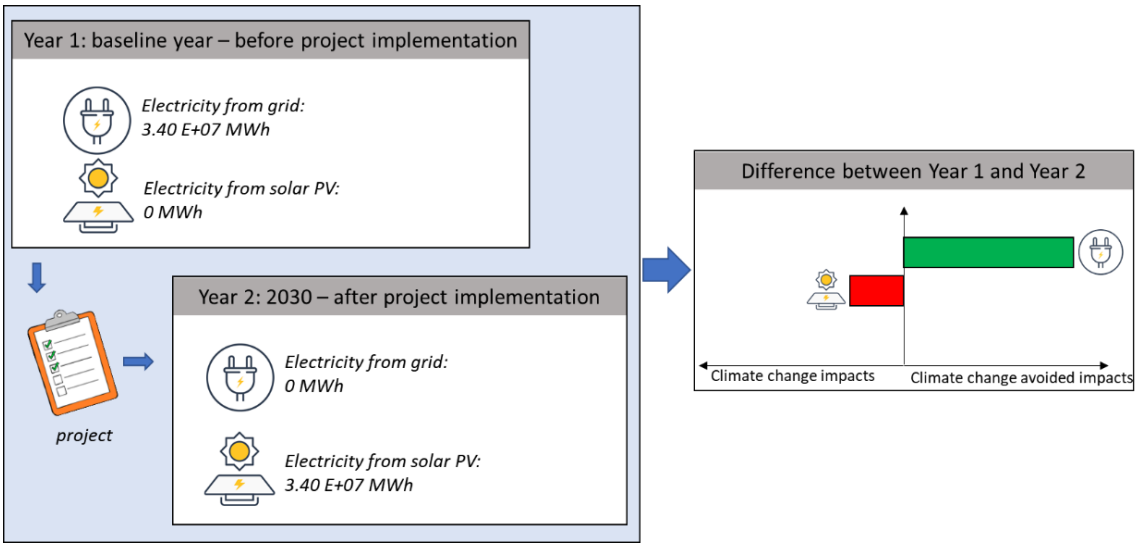


Figure 3. Conceptual framework for assessing net climate change mitigation potential for group B projects.



Results

Results of the assessment

Most of the projects expected to achieve savings in electricity production (especially grid electricity or electricity from natural gas) and proposed substitutions with greener alternatives such as electricity production from photovoltaic or hydrogen, while the most common material savings were related to steel and cement as well as tap water. A synthetic overview of the results of the assessment is reported in Table 1.

Eight out of nine projects were categorized as proposing substitutions of inputs with greener alternatives (Group B projects), whilst one project aimed at achieving an absolute reduction of inputs (Group A projects). This highlights the importance of considering substitution effects when calculating climate change mitigation potentials of projects. Notably, two projects (project 8 and 9) were classified as "Group B (substitution)" from the information provided, even though the respondents did not provide enough information to quantify the substitution.

Overall, large discrepancies were found between the climate change mitigation potentials reported by the respondents and those estimated in this work. The largest variations were found for project 6, with estimated mitigation potentials three orders of magnitude lower than the reported ones, and for project 1, with estimated mitigation potential four orders of magnitude higher than those reported. The calculated EF-based net climate change mitigation potentials were higher than the corresponding climate change mitigation potentials reported in only two cases (project 1 and 5). In all the remaining cases, the calculated EF-based net climate change mitigation potentials were lower than the climate change mitigation potentials provided by the survey respondent. The highest agreement between the two estimates was found in the case of project project 3 (EF-

based climate change net mitigation potential 62% lower than the reported climate change mitigation potential) and in the case of project project 4 (EF-based climate change mitigation potential 83% lower than the reported climate change mitigation potential).

Table 1. Comparison of the climate change mitigation potentials reported and estimated and project categorization. The column "Type of the project" refers to Group A projects (absolute reduction of input) and Group B (substitution of inputs with greener alternatives) projects.

Project	Climate change savings reported from survey responses [ton CO2 eq.]	Estimated net climate change savings–EF datasets [ton CO2 eq.]	Type of project
1	4.41E+04	1.14E+08	B
2	3.00E+05	2.55E+03	B
3	3.60E+06	1.37E+06	A
4	8.28E+03	1.54E+03	B
5	6.80E+03	3.48E+05	B
6	1.73E+06	6.02E+03	B
7	1.61E+05	7.65E+04	B
8	1.95E+05	1.75E+04	B
9	6.33E+02	4.34E+01	B

Note: Arrow in third column indicates whether the estimated change using EF-datasets was higher or lower than the reported one (second column).

In general, the comparison between the net climate change mitigation potentials estimated in this work and those reported in the survey showed significant differences for most of the projects assessed. This might be due to:

- not considering “substitution” effects in the case of Group B projects (reporting the climate change mitigation potential rather than the net climate change mitigation potential);
- different underlying modelling approaches that might limit the comparability of the results;
- different underlying data and data assumptions, in particular regarding the climate change impacts per unit of materials and energy (respondent might have used country-specific coefficients, whilst EU datasets were used in the estimation of climate change mitigation potentials conducted in this work);
- differences in the results due to the selection of the datasets used to calculate climate change impacts per unit of materials and energy (in case the technology used in the project is not well represented by the EF-datasets which are modelled considering the average product on the market).

Project Example

Project 3, Group A

Project - Material and energy savings and methodological assumptions [information derived from the survey]:

To calculate the avoided impacts, the project considered the average per capita estimation of CO_2 equivalents for the cities involved in the case studies of the project, multiplied by the local population. The project estimated a 10% reduction in CO_2 emissions by the adoption of the solution proposed. In addition, it assumed that thanks to the project citizens would reduce their electricity and water consumption by 10%.

Numerical information was provided for the:

- Savings of grid electricity: 3.00E+06 MWh
- Savings of tap water: 6.00E+05 m^3
- Total climate change mitigation potential: **3.60E+06 ton CO2 eq.**

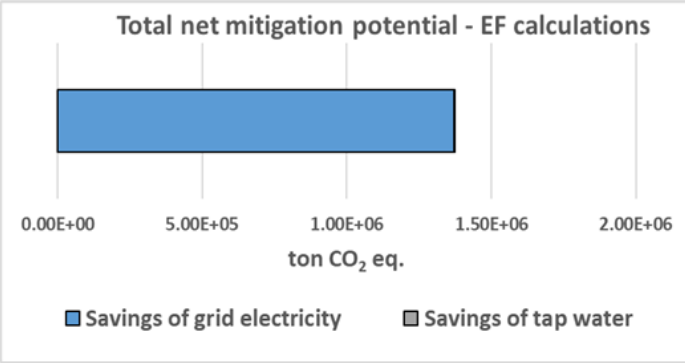
EF calculations – Net climate change mitigation potential and methodological assumptions [calculated with the methodology presented in this report]:

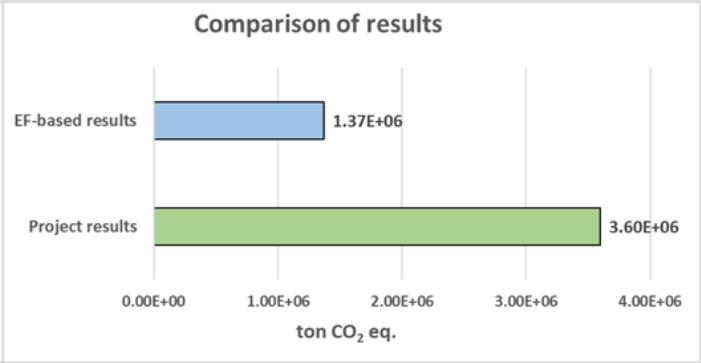
The total net climate change mitigation potential was derived from:

- Avoided impacts due to savings of grid electricity: 1.37E+06 ton CO_2 eq.
- Avoided impacts due to savings of tap water: 1.95E+02 ton CO_2 eq.
- Total net climate change mitigation potential: **1.37E+06 ton CO_2 eq.**

Overview of the results of the analysis

When comparing the project results and the EF-based results, the EF-based results are **62% lower** than the project results.





Conclusion and Next Steps

The conducted analysis is an example of how Environmental Footprint methods can be used to calculate the net climate change mitigation potential of funded projects in the future and provide an aggregate estimate of the climate change mitigation potential of the Framework Programme.

The methodology was applied to 9 selected project proposals submitted under the EGD call, and the resulting estimated climate change mitigation potentials were compared with those reported by the survey respondents. For most of the projects assessed there were significant differences (as high as three order of magnitudes) between the two climate change mitigation potentials, highlighting the need for introducing a systematic approach to assess climate change mitigation potentials consistently across different projects.

In the future, to broaden the analysis, the application of the EF methodology for the full list of 16 EF impact categories could be explored, with the goal of highlighting potential trade-offs linked to the projects' implementation, i.e. situations in which a decrease in climate change impacts is leading to trade-offs in other environmental dimensions. While for projects achieving an absolute reduction of inputs (Group A), a reduction in climate change impacts is linked to a reduction in all the other impact categories, unless such reduction is achieved by implementing a new technology, this might not be the case for projects performing at least one substitution of inputs with greener alternatives (Group B).

A possible approach to harmonize the calculations of net climate change mitigation potentials would be the development of a calculator enabling the applicants to estimate the expected net climate change mitigation potential based on the estimated savings and additional use of materials and energy. To perform such calculations, the tool would use in the background climate change impacts per unit of materials and energy obtained from EF datasets. The calculator would be a important tool for overcoming issues with different underlying aproaches and non-compatible results.

References

European Commission (EC) (2013). Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations. 2013/179/EU.

European Commission (EC) (2021). User's instructions for 'Look@LCI' software. Available at: https://eplca.jrc.ec.europa.eu/permalink/TR_look_at_lci.pdf.

Fazio, S., Castellani, V., Sala, S., Schau, E., Secchi, M., Zampori, L., Diaconu E. (2018). Supporting information to the characterisation factors of recommended EF Life Cycle Impact Assessment method. New models and differences with ILCD Contents, European Commission. Available at: doi:10.2760/671368.

Fazio, S., Zampori, L., De Schryver, A., Oliver Kusche, O., Thellier, L., Diaconu, E. (2020). Guide for EF compliant data sets, Version 2.0 Luxembourg, European Commission. Available at: doi:10.2760/537292.

Flachenecker F., Marelli, L., Sala, S. (2021). Green Deal Tracking Tool Information Requirements, European Union, Joint Research Centre and University College London.

International Organization for Standardization (ISO) (2006a). ISO 14040, Environmental management – Life cycle assessment – Principles and framework, Geneva, Switzerland.

International Organization for Standardization (ISO) (2006b). ISO 14044, Environmental management – Life cycle assessment – Requirements and guidelines, Geneva, Switzerland.

THE CLIMATE IMPACT SURVEY

by RTD G2

Key overview data

695 proposal responses, out of 1 550 submitted proposals

90% of proposals expected to contribute to decreasing CO2 emissions by 2030

70% of respondents sees the value of such questions for their project proposals

56% believes such questions should be part of the proposals submissions

Key Overall Messages

- The Directorate-General for Research and Innovation (DG RTD) launched a Climate Impact Pilot survey to collect data for assessing the expected benefits from projects applying to the European Green Deal call
- 90% of proposals expected to contribute to decreasing CO2 emissions by 2030. Most of the projects aim at a reduction in CO2 through a change in the current technology used (66.4% of the respondents) or by influencing consumer behaviour (65.4%) or by changing the business models (47%)
- "Agriculture and forestry" (53.2%), "energy" (49.6%), "households" (44.9%) were the most selected economic sectors they expect to see the above-mentioned change, and, individuals / citizens" (82.5%), "companies" (78.2%) the most selected target users.
- About 65% of the respondents is expecting their solution to contribute towards saving energy, 54% materials, 47% water and 44% another resource.
- Only 29% of the respondents had already estimated the climate mitigation potential of their solution in tonnes of CO2 equivalent while preparing the project proposal. The lack of data availability for precise answers was mentioned by many the respondents.
- The lack of a methodological framework at European level for deriving the quantitative answers requested in the survey was highlighted. This could be solved by providing guidance on the methodology to use and indications on how to perform the calculations. Furthermore, the implementation of a dedicated calculator for performing the estimations could solve this issue and ensure comparability between results.

Introduction

In the context of the European Green Deal and the ambition to make Europe the first climate-neutral continent by 2050, there is a need for a harmonised methodology for evaluating the climate impact of EU-funded projects to report on the Green Deal objectives.

With this aim, the Directorate-General for Research and Innovation (DG RTD) launched in February 2021, subsequently to call's deadline, a Climate Impact Pilot survey[21] to collect data for assessing the expected benefits from projects applying to the European Green Deal call.

To perform a plausibility check of the expected climate benefits reported by the survey respondents, a parallel calculation of the expected climate benefits was performed building on the approach suggested by the 'Green Deal Tracking Tool' (Flachenecker et al., 2021). The suggested methodology[22] was applied to several project proposals, and the resulting estimated climate change mitigation potentials were compared with those reported by the survey respondents.

The current report presents the survey and its main findings, as well as feedback received from the respondents and provides brief conclusion and suggestions for future improvements.

The Survey

The survey was conducted via the online survey system "EUSurvey"[23]. A unique survey hyperlink was sent to the main contact person of all the 1 550 submitted proposals under the European Green Deal Call. The survey opened after the call's deadline and participation to it was voluntary and had no effect on the evaluation of the proposals. A total of 695 proposals responded to the survey.

The survey aimed at gathering general information on the projects (e.g. sectors covered, geographical scope, project's short description, reference system, etc.), together with quantitative data to assess baseline climate impacts and the expected projects' life cycle climate change mitigation potentials in 2030. The respondents had to select a method employed for the calculation of the climate change mitigation potentials choosing between: (i) an approach based on avoided emissions (direct emissions); (ii) an approach based on life cycle assessment; (iii) an approach based on the "Product/Organisation environmental footprint"; or (iv) other approaches to be specified. The selection of none or more than one approach was possible. To understand the main elements leading to the climate change mitigation potentials, disaggregated information was collected in terms of materials and energy savings, such as energy sources (e.g.: savings of primary energy sources such as natural gas, savings of secondary energy sources such as grid electricity), materials (e.g., savings of cement, savings of

[21] Replying to the survey was volitional and it was clearly mentioned it had no impact to the call's evaluation

[22] For more details on the methodology see previous section "HOW TO ASSESS CLIMATE CHANGE MITIGATION POTENTIALS AT PROJECT-LEVEL? AN ESTIMATION BASED ON LIFE CYCLE ASSESSMENT OF PROPOSALS SUBMITTED UNDER THE GREEN DEAL CALL" of the document

[23] https://ec.europa.eu/eusurvey/home/welcome

steel), water (e.g., savings of tap water) and other resources. However, no questions on the quantities of potential substituting materials and energy were posed.

Bellow, we present some of the main results of the survey. To do so we use aggregated data either at survey level (one figure summarising all the responses – "Total") or at Horizon-2020-section level[24] (one figure per section)[25].

The survey was responded by 695 proposals, or equivalently an approximately 45% response rate. A set of screening questions was performed at the beginning that reduced the sample analysed in this report further (though their responses were taken into consideration). Seventeen of the 695 proposals responded more than once, leaving 678 unique responses to the survey. Out of those, 38 did not complete the survey, mainly due to data limitations (e.g. no time to prepare such data, no data available), reducing the sample of the respondents to 640. Finally, it was asked to the respondents whether their project is expected to contribute to decreasing CO_2 emissions by 2030. Almost 90% of the remaining 640 proposals (566) responded positively, which is the main sample used for the purposes of this report.

Subsequently a set of general information on the projects was asked. Most of the projects aimed at a reduction of greenhouse gases (GHGs) through a change in the current technology used (66.4% of the respondents) or by influencing consumer behaviour (65.4%) or by changing the business models (47%) or the type of energy used (46.8%), although most projects selected more than one area of intervention. Looking at the responses by the different Horizon 2020 sections, "technology used" was the prevailing answer for sections *Secure, clean and efficient energy* (87.8%), *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy* (76.9%), *Research Infrastructures* (100%), *Leadership in enabling and industrial technologies (LEIT)* (100%). "Consumer behaviour" was selected by the majority in *Europe in a changing world - inclusive, innovative and reflective societies* (91.5%), and the slight majority of *Climate action, environment, resource efficiency and raw materials* (65.9%, "technology used" second with 60.2%) and, last, "energy used" was selected by the majority of *Smart, green and integrated transport* (92.3%).

Responses regarding the economic sector in which they expect to see the above-mentioned change were more diverse. "Agriculture and forestry" (53.2%), "energy" (49.6%), "households" (44.9%) were the most selected answers, followed by "transport and mobility" (37.6%), "land use" (33.6%), "industry" (33%), and last, "construction and building" (25.1%), IT (18.6%) and finance (12.7%). Aggregating by H2020 sectors, "agriculture and forestry" was the most selected answer for *Climate action, environment, resource efficiency and raw*

[24] Individual responses are mapped to Horizon 2020 sections, using EC administrative data and the correspondence Table between Call's Areas and the Horizon 2020 Sections (Annex Table 2, "The European Green Deal Call" section of the document). For the shake of this exercise Topics 1.1 and 1.2 are mapped as "Climate action, environment, resource efficiency and raw materials".
The number of responses per H2020 section are the following: *Climate action, environment, resource efficiency and raw materials* (S1): 283; *Secure, clean and efficient energy* (S2): 133; *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy* (S3): 125; *Europe in a changing world - inclusive, innovative and reflective societies* (S4): 77; *Smart, green and integrated transport* (S5): 13; *Research Infrastructures* (S6): 5; *Leadership in enabling and industrial technologies (LEIT)* (S7): 3

[25] See Annex Table 1 for a synthetic presentation of some of the results that are presented here, along with additional ones

materials (50%), *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy* (92.3%) and LEIT (66.7%), "energy" was the most selected answer for *secure, clean and efficient energy* (87.8%) and *Research Infrastructures* (75%), and, "transport and mobility" for the *smart green and integrated transport* (100%), while 71.8% of the respondents from *Europe in a changing world - inclusive, innovative and reflective societies* selected "households".

The respondents also declared the target user of their proposed solution. Most of the respondents selected more than one answer, with "individuals / citizens" (82.5%), "companies" (78.1%) being the most selected, followed by "governments" (64.1%). *Climate action, environment, resource efficiency and raw materials* (83.2%), *Europe in a changing world - inclusive, innovative and reflective societies* (95.8%) and *Research Infrastructures* (75%) selected "individuals/citizens" the most, whereas, *Secure, clean and efficient energy* (86.3%), *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy* (87.2%), *Smart, green and integrated transport* (100%), and, *LEIT* (100%) selected "companies" the most.

The expected geographical scope of the proposed change was primarily the EU (68.7% of the respondents) or a specific region in a country (56%). *Climate action, environment, resource efficiency and raw materials* (71.7%), *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy* (81.2%) and *smart, green and integrated transport* (71.8%) selected "EU" the most, *Research Infrastructure* (75%) and *LEIT* (100%) selected "World" as the expected geographical scope, while *Europe in a changing world - inclusive, innovative and reflective societies* (76.1%) selected "city".

Subsequently, more specific questions that would allow to assess plausible climate impacts were asked. The respondents were asked whether they expected their intended solution to contribute to saving one or more of the following resources: energy, materials, water or other. About 65% of the respondents expect their solution to contribute towards saving energy, 54% materials, 47% water and 44% another resource (Figure 1). Across the sectors we observe some differences. For instance, *secure clean and efficient energy* projects would contribute more towards saving energy, as expected, while *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy,* mostly materials and water. For each type of resource, a subsequent, conditional question asked the respondents to specify the type of energy source expected to be saved (e.g. grid electricity for energy, groundwater for water, etc.[26])

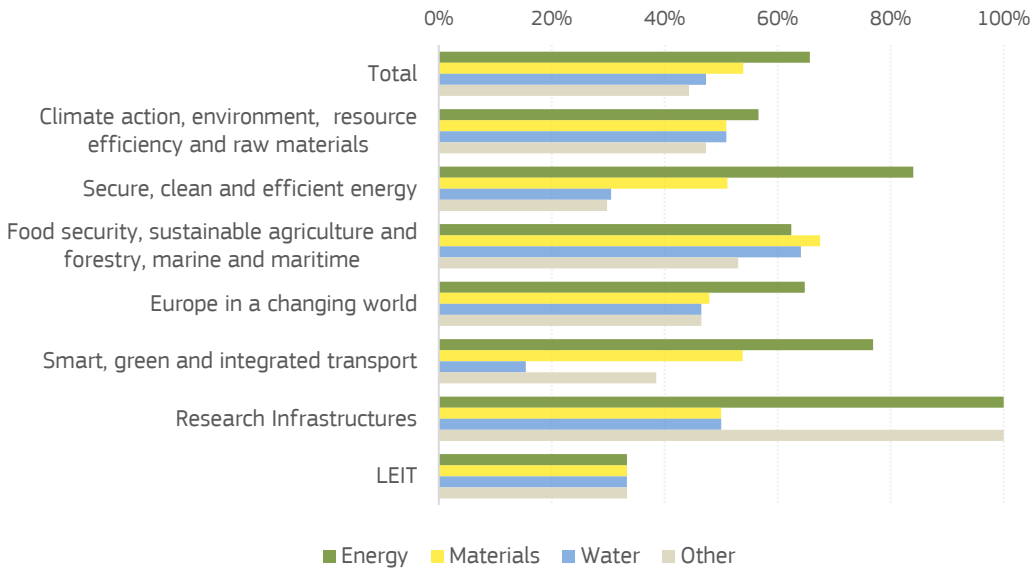
Only 29% of the respondents had already estimated the climate mitigation potential of their solution in tonnes of CO2 equivalent while preparing the project proposal. This varied from just 4.2% for *Europe in a changing world* to 61.5% for Smart Green and integrated transport. Most of the respondents reported data availability issues when asked a follow-up question on why they had not estimated the climate mitigation potential. Among those who had already estimated it, most had used "avoid emissions" method, followed by life cycle assessment. However, around 70% declared it had assessed other impacts, such as "Transition to a circular economy, waste prevention and recycling" (41.9%), "Pollution prevention and control" (37.5%), "Protection of healthy ecosystems" (34.6%), "Sustainable use and protection of water and marine resources" (30.7%), "Climate

[26] See Annex Table 1

adaptation" and other environmental impacts, such as, "land use" (31.4%), "water use" (29%) and "fossil resource use" (23%), among others.

Besides this qualitative information, quantitative questions were asked to assess baseline climate impacts and the project's expected life cycle climate change mitigation potentials in 2030[27] (e.g. *What is your total estimated climate mitigation potential of your solution in tonnes of CO2 equivalent by 2030?*). However, due to data issues we do not present the results here.

Figure 1: Share of projects expecting their solution to contribute to saving energy/materials/water/other

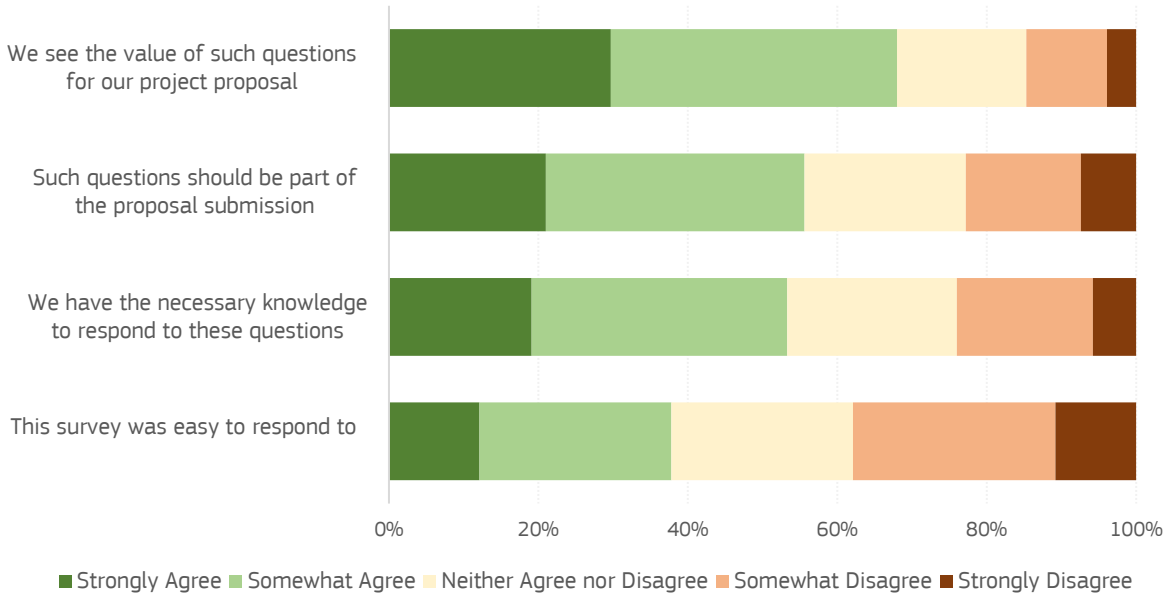


Question: Is your proposed solution expected to contribute to saving energy/materials/water/other resources?

Last, the respondents were asked to provide some feedback regarding the survey. Almost 70% of the respondents sees the value of such questions for their project proposals (either strongly agrees or somewhat agrees), while around 15% disagrees (either strongly or partially). Around 56%, either strongly or partially, believes that such questions should be part of the proposals submissions, whereas 23% believes that they should not. Approximately 53% declares having the necessary knowledge to respond to these questions, compared to 24% that does not. Responses are balanced regarding whether the survey was easy to respond; about 38% agrees and 38% disagrees to this statement.

[27] See previous section "HOW TO ASSESS CLIMATE CHANGE MITIGATION POTENTIALS AT PROJECT-LEVEL? AN ESTIMATION BASED ON LIFE CYCLE ASSESSMENT OF PROPOSALS SUBMITTED UNDER THE GREEN DEAL CALL" of the document

Figure 2. Feedback questions regarding the survey



Question: To what extent do you agree with the following statements?
Notes: number of respondents: 538

Conclusions and Reccomendations

Conclusions and suggestions for future improvements of the survey, collected amongst the feedback provided by the respondents were as follows:

- The lack of data availability for precise answers was mentioned by many the respondents. Furthermore, many respondents indicated a lack of quality in the answers provided, since many assumptions were frequently necessary. It would be helpful to add a specific question which can help understanding the quality of the data (e.g., by specifying any assumption, source, etc.).

- The lack of a methodological framework at European level for deriving the quantitative answers requested in the survey was highlighted. This could be solved by providing guidance on the methodology to use and indications on how to perform the calculations. Furthermore, the implementation of a dedicated calculator for performing the estimations could solve this issue and ensure comparability between results.

- It was underlined how the questions seemed to be more suited for granted projects rather than for proposals that are still under evaluation. This aspect might limit the reliability of the provided answer. It might be interesting to introduce a dedicated question to understand at which level of the project development the answers provided refer to.

- The survey focused on the climate change mitigation potentials of the projects. It would be interesting to add questions related to other environmental impacts beyond climate change (e.g. water security, land use[28]). In this way, a more comprehensive overview of the projects' expected environmental benefits and trade-off would be available.

- Besides the improvements that were suggested, almost 70% of the respondents sees the value of such questions for their project proposals and 56% believes that such questions should be part of the proposals submissions.

[28] See Figure 1 on the previous section "HOW TO ASSESS CLIMATE CHANGE MITIGATION POTENTIALS AT PROJECT-LEVEL? AN ESTIMATION BASED ON LIFE CYCLE ASSESSMENT OF PROPOSALS SUBMITTED UNDER THE GREEN DEAL CALL" of the document

Annex

Table 1: Presentation of some of the main survey's results[29]

Question	Answer	Obs.	Total in %	S1 in %	S2 in %	S3 in %	S4 in %	S5 in %	S6 in %	S7 in %
Does your project contribute to decreasing CO2 by 2030?	Yes	566	88.4	79.9	98.5	93.6	92.2	100	80	100
	No	74	11.6	20.1	1.5	6.4	7.8	0	20	0
What does the project aim to change to reduce or prevent emissions of greenhouse gases? The project aims to change the current: (select all that apply)	Technology used	376	66.4	60.2	87.8	76.9	23.9	84.6	100	100
	Consumer behaviour	370	65.4	65.9	53.4	64.1	91.5	53.8	50	66.7
	Business models	266	47	40.7	57.3	53	35.2	61.5	50	66.7
	Energy used	265	46.8	37.2	79.4	37.6	25.4	92.3	50	33.3
	Materials used	224	39.6	35.4	45	53.8	16.9	53.8	25	66.7
	Energy efficiency of production	201	35.5	22.6	58	47	9.9	76.9	50	0
	Product characteristics	161	28.4	21.2	30.5	50.4	9.9	30.8	25	66.7
	Other	84	14.8	22.1	9.9	5.1	21.1	0	0	0
	Not Answered	1	0.2	0.4	0	0	0	0	0	0
In which economic sector do you expect to see this change? (select all that apply)	Agriculture and forestry	301	53.2	50	36.6	92.3	40.8	0	25	66.7
	Energy	281	49.6	39.8	87.8	18.8	59.2	69.2	75	0
	Households	254	44.9	42	50.4	33.3	71.8	0	50	33.3
	Transport and mobility	213	37.6	38.5	30.5	21.4	64.8	100	50	0
	Land use	190	33.6	38.9	22.9	38.5	32.4	23.1	0	33.3

[29] ***Obs***: Number of respondents that selected the particular answer.
Statistic provided (in %) for: ***Total***: total population of the survey; ***S1***: Horizon 2020 Section: Climate action, environment, resource efficiency and raw materials; ***S2***: *Secure, clean and efficient energy;* ***S3***: *Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy;* ***S4***: *Europe in a changing world - inclusive, innovative and reflective societies;* ***S5***: *Smart, green and integrated transport;* ***S6***: *Research Infrastructures;* ***S7***: *Leadership in enabling and industrial technologies (LEIT)*

	Industry	187	33	34.1	36.6	32.5	26.8	23.1	25	33.3
	Construction and building	142	25.1	26.5	38.9	2.6	31	38.5	25	0
	IT	105	18.6	16.8	19.8	12.8	26.8	46.2	25	0
	Finance	72	12.7	15	12.2	5.1	19.7	7.7	25	0
	Other	79	14	20.8	4.6	12.8	14.1	0	0	33.3
	Not Answered	2	0.4	0	0	0	2.8	0	0	0
Who is the target user of the solution? (select all that apply)	Individuals / citizens	467	82.5	83.2	81.7	77.8	95.8	61.5	75	66.7
	Companies	442	78.1	71.7	86.3	87.2	66.2	100	50	100
	Governments	363	64.1	72.6	51.9	53	80.3	61.5	50	66.7
	Don't know	1	0.2	0	0	0	1.4	0	0	0
	Other	79	14	15.5	12.2	10.3	16.9	15.4	25	33.3
	Not Answered	1	0.2	0	0	0.9	0	0	0	0
What is the expected geographical scope of this change? (select all that apply)	EU	389	68.7	71.7	51.9	81.2	71.8	69.2	75	33.3
	Region (in a country)	317	56	58	55	47.9	67.6	61.5	0	66.7
	City	268	47.3	46.9	48.1	29.1	76.1	61.5	25	66.7
	Country	264	46.6	42.9	52.7	46.2	47.9	53.8	25	66.7
	World	249	44	41.2	44.3	54.7	32.4	38.5	75	100
	Don’t know	5	0.9	0.9	0.8	0.9	1.4	0	0	0
	Other	39	6.9	6.2	14.5	3.4	2.8	0	0	0
	NA	0	0	0	0	0	0	0	0	0
What is your reference point for providing climate impact data?	Service	140	24.7	35.4	14.5	12	26.8	53.8	25	0
	Production process	129	22.8	14.6	35.9	37.6	2.8	7.7	0	66.7
	Product	100	17.7	13.3	26.7	23.1	7	15.4	0	33.3
	Macro-scale	69	12.2	14.6	8.4	8.5	16.9	0	75	0

	Business level (overall production)	49	8.7	5.3	10.7	15.4	5.6	7.7	0	0
	Other	69	12.2	14.2	3.8	4.3	36.6	7.7	0	0
	Not Answered	10	1.8	2.7	0	0	4.2	7.7	0	0
Your solution contributes to saving: Energy?	Yes	372	65.7	56.6	84	62.4	64.8	76.9	100	33.3
	No	102	18	24.3	12.2	18.8	9.9	15.4	0	0
	Not Answered	92	16.3	19	3.8	19.7	25.4	7.7	0	66.7
What type of energy will be saved?	Grid electricity	213	37.6	32.3	48.1	36.8	33.8	61.5	50	0
	Natural gas	116	20.5	16.4	26.7	18.8	22.5	38.5	25	0
	Coal	73	12.9	10.6	19.8	9.4	15.5	0	25	0
	Bioenergy Biomass, Biogas and Biofuels	62	11	7.5	13.7	14.5	8.5	15.4	25	33.3
	Solar: photovoltaic	57	10.1	5.3	21.4	5.1	9.9	23.1	25	0
	Solar: thermal	32	5.7	4.9	9.9	1.7	7	0	25	0
	Wind	30	5.3	4.4	9.9	2.6	5.6	0	0	0
	Hydropower, Geothermal or Ocean	26	4.6	5.3	5.3	3.4	4.2	0	0	0
	Lignite	23	4.1	4	3.1	4.3	5.6	0	25	0
	Hydrogen	21	3.7	2.2	5.3	0.9	5.6	23.1	25	0
	Other	67	11.8	10.6	9.9	13.7	15.5	15.4	25	0
	Not Answered	236	41.7	51.3	19.8	44.4	49.3	23.1	50	66.7
Your solution contributes to saving: Materials?	Yes	305	53.9	50.9	51.1	67.5	47.9	53.8	50	33.3
	No	121	21.4	23	22.9	18.8	15.5	30.8	50	0
	Not Answered	140	24.7	26.1	26	14.5	36.6	15.4	0	66.7
What type of material will be saved?	Fossil-fuels	104	18.4	11.9	25.2	25.6	11.3	38.5	25	0
	Chemicals	75	13.3	10.6	9.2	28.2	8.5	0	0	0

	Fossil-based plastic	73	12.9	15	6.9	16.2	11.3	7.7	25	33.3
	Biomass	58	10.2	8.8	6.1	22.2	2.8	7.7	25	0
	Others	52	9.2	10.2	5.3	12	9.9	7.7	0	0
	Cement	43	7.6	5.8	15.3	3.4	5.6	7.7	25	0
	Steel	36	6.4	5.3	9.9	3.4	7	15.4	0	0
	Aluminium	30	5.3	4.4	7.6	3.4	5.6	7.7	25	0
	Non-metallic minerals	21	3.7	4.9	3.1	3.4	2.8	0	0	0
	Not Answered	321	56.7	60.6	57.3	39.3	73.2	46.2	75	66.7
Your solution contributes to saving: Water?	Yes	268	47.3	50.9	30.5	64.1	46.5	15.4	50	33.3
	No	152	26.9	28.3	36.6	18.8	14.1	46.2	50	0
	Not Answered	146	25.8	20.8	32.8	17.9	39.4	38.5	0	66.7
What type of water will be saved?	Groundwater	122	21.6	23.9	11.5	36.8	12.7	0	25	0
	Surface water	113	20	26.1	10.7	25.6	11.3	7.7	25	0
	Tap water	89	15.7	17.7	7.6	17.9	22.5	0	25	33.3
	Other	19	3.4	4	2.3	5.1	1.4	0	0	0
	Not Answered	353	62.4	57.1	76.3	46.2	74.6	92.3	75	66.7
Your solution contributes to saving: Other resources?	Yes	251	44.3	47.3	29.8	53	46.5	38.5	100	33.3
	No	106	18.7	18.6	26	17.1	11.3	15.4	0	0
	Not Answered	209	36.9	34.1	44.3	30.8	42.3	46.2	0	66.7
Did you already estimate the climate mitigation potential of your solution in tonnes of CO2 equivalent while preparing the project proposal?	No	355	62.7	71.7	42	65.8	76.1	30.8	25	66.7
	Yes	166	29.3	22.6	51.9	29.1	4.2	61.5	25	33.3
	Not Answered	45	8	5.8	6.1	6	19.7	7.7	50	0
What method did you employ to calculate the	Avoided emissions (direct emissions)	118	20.8	14.6	40.5	18.8	2.8	53.8	25	0

MtCO2 equivalent estimate?	Life cycle assessment	61	10.8	7.5	20.6	11.1	0	23.1	0	33.3
	Product/Organisation environmental footprint	30	5.3	3.5	10.7	3.4	0	30.8	0	0
	Other	9	1.6	2.7	0	2.6	0	0	0	0
	Not Answered	411	72.6	79.2	49.6	74.4	97.2	46.2	75	66.7
Have you assessed other impacts beyond climate change mitigation?	Yes	391	69.1	73.5	61.8	72.6	60.6	76.9	100	66.7
	No	155	27.4	23.9	35.1	22.2	36.6	15.4	0	33.3
	Not Answered	20	3.5	2.7	3.1	6	2.8	7.7	0	0
Which other impacts have been assessed? (select all that apply)	Transition to a circular economy, waste prevention and recycling	237	41.9	39.8	44.3	47	36.6	46.2	25	33.3
	Pollution prevention and control	212	37.5	42	37.4	33.3	25.4	61.5	50	33.3
	Protection of healthy ecosystems	196	34.6	41.2	22.9	43.6	23.9	23.1	25	33.3
	Sustainable use and protection of water and marine resources	174	30.7	34.1	22.1	40.2	25.4	15.4	0	33.3
	Climate adaptation	170	30	35.4	28.2	20.5	32.4	15.4	75	33.3
	Other	48	8.5	7.5	13	4.3	11.3	7.7	0	0
	Not Answered	178	31.4	26.5	38.9	29.1	40.8	23.1	0	33.3
Which other environmental impacts have been assessed? (select all that apply)	Land use	178	31.4	35.4	26	40.2	16.9	23.1	25	33.3
	Water use	164	29	31.4	23.7	38.5	18.3	15.4	25	33.3
	Fossil resources use	131	23.1	20.4	27.5	26.5	12.7	46.2	50	33.3
	Freshwater ecotoxicity	76	13.4	18.6	6.1	18.8	4.2	7.7	0	0
	Particulate matter	67	11.8	14.6	11.5	6.8	4.2	38.5	50	33.3
	Mineral and metals	66	11.7	10.2	13	14.5	11.3	7.7	0	0

	resources use									
	Human toxicity, non-cancer	59	10.4	13.7	6.9	11.1	4.2	7.7	25	33.3
	Human toxicity, cancer	56	9.9	11.9	7.6	10.3	5.6	7.7	25	33.3
	Freshwater eutrophication	56	9.9	10.6	6.1	17.1	2.8	7.7	25	0
	Terrestrial eutrophication	49	8.7	8.4	4.6	17.9	4.2	0	0	0
	Acidification	45	8	8	7.6	10.3	4.2	7.7	25	0
	Marine eutrophication	40	7.1	10.6	2.3	7.7	4.2	7.7	0	0
	Ozone depletion	31	5.5	4.4	6.9	6	2.8	15.4	25	0
	Photochemical ozone formation	14	2.5	2.7	3.1	2.6	1.4	0	0	0
	Ionizing radiation	6	1.1	0.4	1.5	0.9	1.4	7.7	0	0
	Other	34	6	6.2	4.6	6	8.5	7.7	0	0
	Not Answered	235	41.5	34.5	45.8	41	60.6	38.5	0	33.3
Is your project generating benefits in any of these environmental impacts?	Yes	338	59.7	64.6	55.7	63.2	45.1	69.2	75	33.3
	No	34	6	7.1	3.8	5.1	7	7.7	0	33.3
	Not Answered	194	34.3	28.3	40.5	32.5	47.9	23.1	25	33.3
Is your project generating trade-offs in any of these environmental impacts?[30]	No	227	40.1	42	36.6	45.3	28.2	61.5	50	33.3
	Yes	124	21.9	26.5	19.1	18.8	16.9	15.4	50	33.3
	Not Answered	215	38	31.4	44.3	36.8	54.9	23.1	0	33.3

[30] A trade-off is an increase in another environmental impact resulting from the intervention to reduce the climate impact of your project.