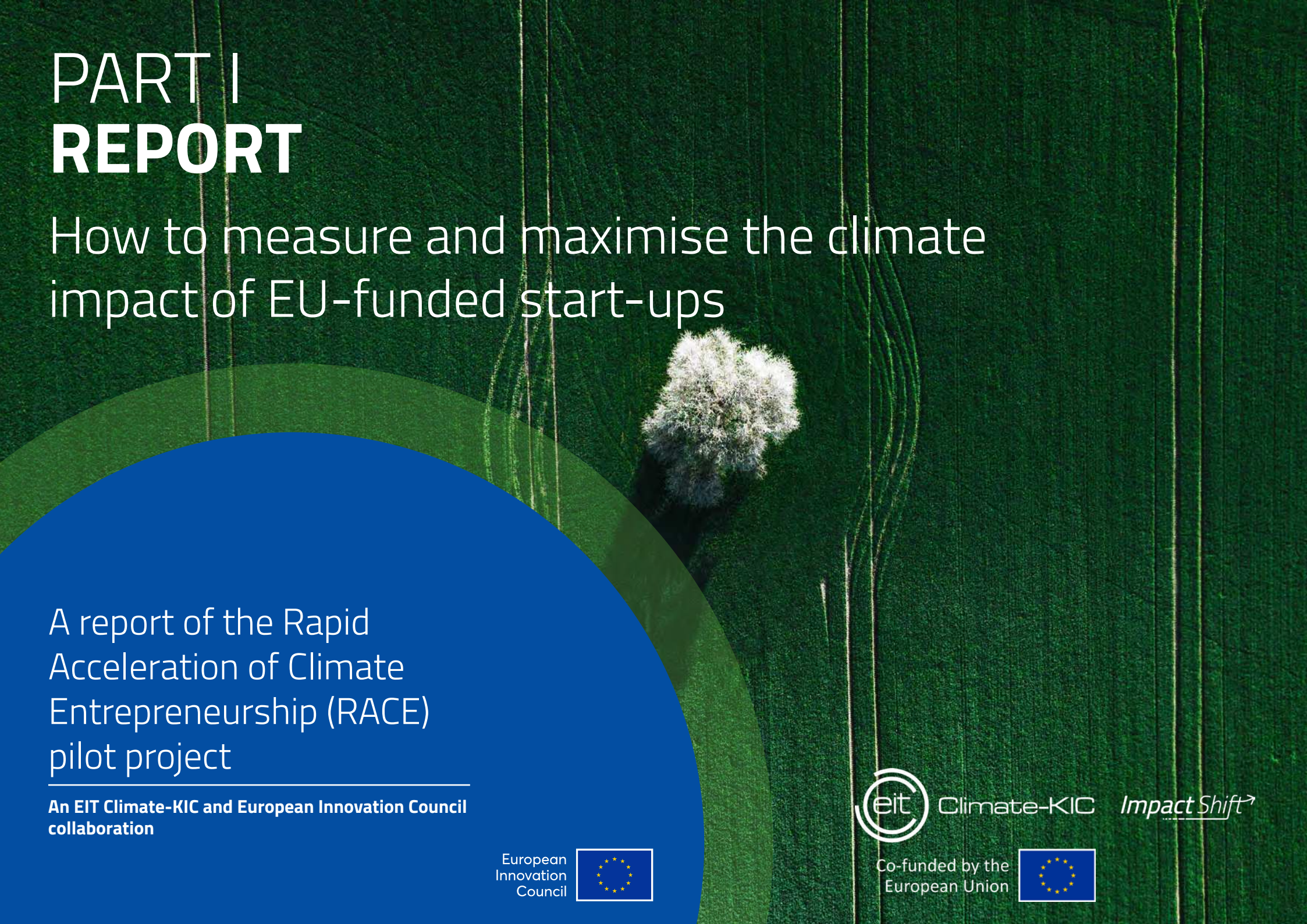

PART I
REPORT

How to measure and maximise the climate impact of EU-funded start-ups

A report of the Rapid Acceleration of Climate Entrepreneurship (RACE) pilot project

An EIT Climate-KIC and European Innovation Council collaboration

European Innovation Council

eit Climate-KIC

ImpactShift

Co-funded by the European Union

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Section 1

Overview

Section 1 **Overview**

Europe wants to be the world's first climate-neutral continent

The right start-ups can help Europe achieve climate neutrality by 2050

Big companies and funders are looking to start-ups for new technologies and solutions to accelerate Europe's transformation.

But with EU members having pledged to cut emissions by 55 per cent by 2030, good intentions are not enough; we need a reliable measure of the climate impact potential of start-ups to help direct EU funding.

EIT Climate-KIC has been working over the past ten years to develop **Impact Shift, a suite of services for measuring, forecasting and monitoring a wide range of environmental and social impact metrics.** It offers a streamlined approach to Life Cycle Assessment (LCA) to simplify the process of calculating the avoided emissions potential of start-ups.

This report demonstrates the value of integrating climate impact analysis into broader decision making at very early stages – for both investors and start-ups.

Start-ups use the information to significantly reduce their emissions and thereby maximise the climate impact of their business operations and to communicate their impact potential to investors and other stakeholders.

Investors and funders – both public and private – can use the information to reduce and avoid carbon dioxide equivalent (CO_2eq) and to maximise the climate impact of their portfolios and interventions.

This report:

- Highlights opportunities for the EU to maximise the climate impact of start-ups supported by the European Innovation Council (EIC) Accelerator and other EU-funded business support programmes
- Summarises the Rapid Acceleration of Climate Entrepreneurs (RACE) pilot project, which implemented a climate impact forecasting service for start-ups
- Includes case studies of nine start-ups that participated in RACE
- Provides a 'portfolio view' of the 61 start-ups that participated in RACE and the 46 companies that graduated from the programme
- Explains EIT Climate-KIC's 'portfolio approach' to climate innovation and investment
- Provides an overview of the European Green Deal (EGD) and EU-supported innovation

The report also includes an indicative calculation of the climate impact potential of a set of start-ups that the EIC has already supported. This provides an indication of the potential to shape current and future portfolios more deliberately, for climate and systemic impact, using climate impact forecasting in the early stages of start-up selection and support.

Who is it for?

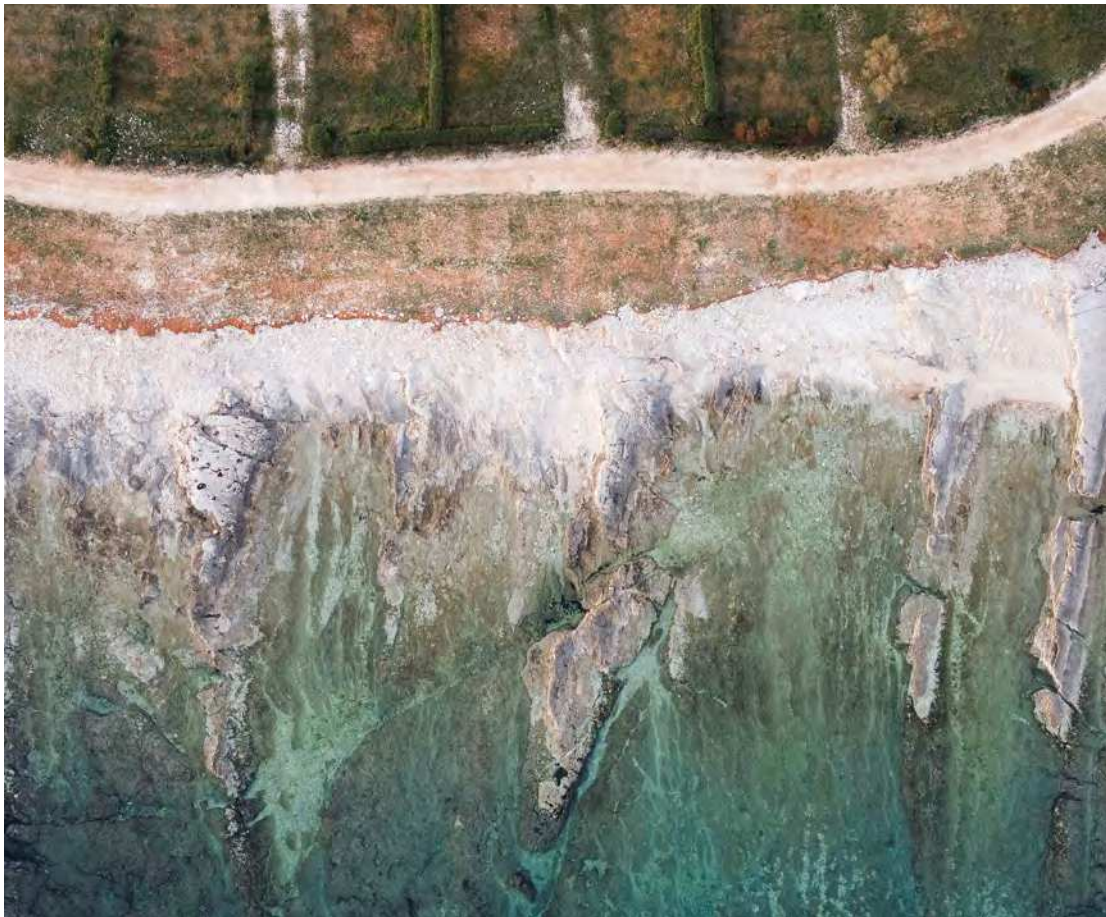
The report contains information of interest to anyone who is:

- tasked with the delivery of the European Green Deal (EGD)
- interested in identifying and supporting start-ups that have the potential to contribute to climate mitigation
- interested in methods to measure the avoided emissions potential of start-ups
- shaping and co-ordinating climate impact portfolios
- interested in understanding the European innovation landscape in the context of the EGD
- part of a start-up or thinking about creating one
- looking for inspiration from the climate innovations covered in the case study section.

Objectives of this report

The key objective of this report is to motivate EU decision makers to take a proactive approach to measuring, forecasting and monitoring the avoided emissions potential of start-ups. This is important for maximising impact, so that public money can better support the objectives of the European Green Deal, in particular the objective to drive climate mitigation.

The report also encourages decision makers to take a 'portfolio approach' of start-up investment decisions.



Section 1 **Overview**

The RACE pilot project and Impact Shift Overview

The RACE pilot project implemented EIT Climate-KIC's impact forecasting service for start-ups, known as one of the Impact Shift services.

From 2021–2023 EIT Climate-KIC helped a cohort of start-ups to calculate, validate and communicate the avoided emissions potential of their products or services. The cohort of 61 start-ups was selected from EIC's existing entrepreneurship portfolio.

Impact Shift, EIT Climate-KIC's emissions service combines:

- an open-source dataset of more than 1000 materials, services, production processes and end-of-life scenarios
- an online tool that links open-source data to a start-up's data, to arrive at a quantified avoided emissions potential for the start-up in comparison with their beachmarket
- 1:1 coaching and expert support to help the start-up refine their data inputs and optimise use of the tool
- external validation of the results
- provision of a validation report, including a plain language impact narrative and certificate.

Using this service, start-ups can compare the CO_2eq avoided emissions potential of their product or service with a 'business-as-usual' baseline that is already in the market. Start-ups and established businesses can also use the tools at the design stage, e.g. for new product lines.

The purpose of the RACE pilot project

The project was funded by the European Innovation Council (EIC) under the Horizon Europe programme. Its purpose was to foster the institutional collaboration between EIT Climate-KIC and the EIC, but also – by doing so - to improve existing and future innovation portfolios in support of European Green Deal goals.

In a first cooperation of this kind EIT Climate-KIC worked with companies that had already gained support from the prestigious EIC Accelerator Programme but did not necessarily have an explicit mission to mitigate climate change.

Results in brief

Of the 61 companies that joined the pilot programme, only 46 submitted initial calculations of their climate mitigation potential for external validation. Some of the 16 start-ups that did not reach the validation stage lacked the necessary data or time, and others were not able to demonstrate avoided emissions. Of the 46 companies that remained:

- 28 were judged to have submitted impact forecasts that were valid, positive and significant[1]
- a further 7 were judged to be plausible, positive and significant
- 11 of the remaining 46 were judged to be incomplete or invalid

A detailed analysis of the climate mitigation potential of these start-ups can be found in "Section 3".

EIT Climate-KIC's Impact Shift

Impact Shift is a suite of services for measuring, forecasting, and monitoring a wide range of environmental and social impact metrics. EIT Climate-KIC offers these services to help start-ups build a comprehensive view of their long-term impact which can be translated into simplified reports for investors and other stakeholders. Our team of technical advisors can deliver tailored workshops, frameworks, and tools to extract reliable and accessible data for scaling start-ups towards maximising their impact.

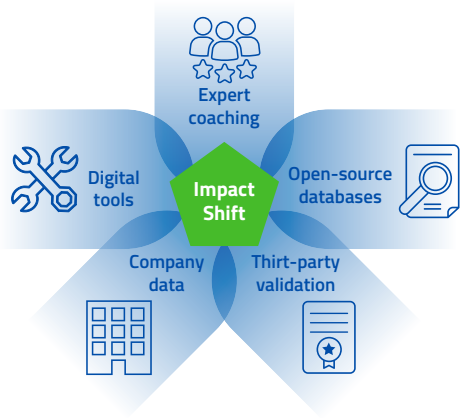


Figure 1: components of the avoided emissions methodology

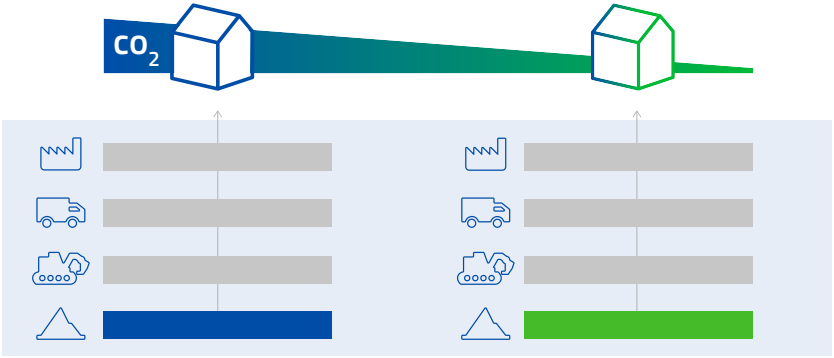


Figure 2: Avoided emissions in comparison to the baseline

Figure 3: Process for calculating avoided emissions

Section 1 **Overview**

Components

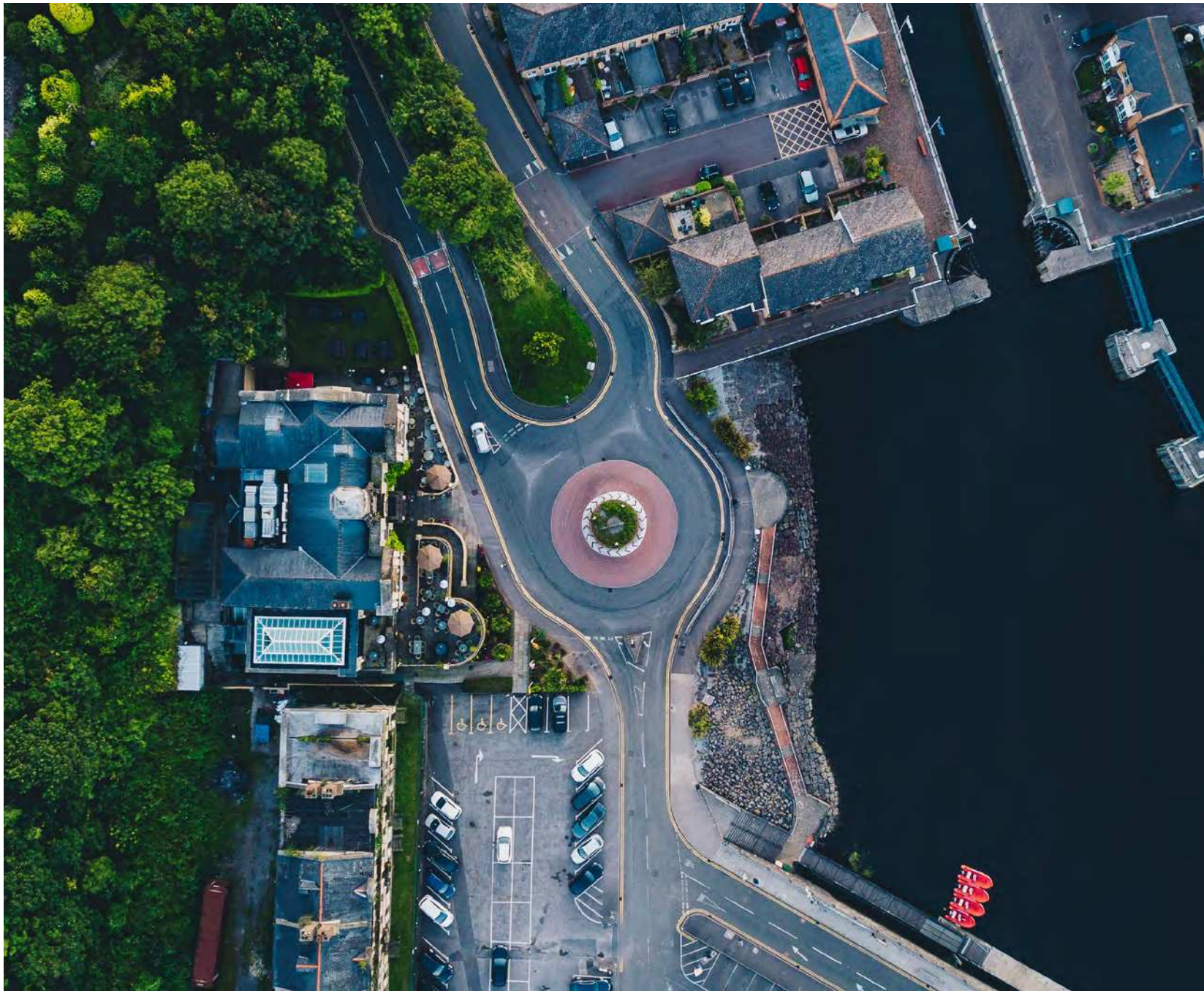
As part of Impact Shift, a streamlined approach to Life Cycle Assessment (LCA) has been developed to simplify the process of calculating the avoided emissions potential of start-ups. This Impact Shift emissions strand of work brings together open-source databases, online tools, expert coaching and third-party validation to enable companies to calculate and validate their climate mitigation potential – in terms of CO_2eq avoided.

Comparison

The process compares the innovative product or service with a 'business-as-usual' baseline. It calculates the difference in CO_2eq emissions between the two scenarios and then forecasts the climate mitigation potential of the innovative product or service for a given time in terms of avoided emissions potential. The scenarios compared may include components, production methods, transport, end-of-life processing, and other factors.

Process

- Companies prepare their climate impact hypothesis.
- They participate in a training workshop to learn about Life Cycle Assessment (LCA) and how to use the tool to do their own calculations in CO_2eq.
- They receive one-to-one coaching to refine their calculations and to create a narrative summary of their climate mitigation potential.
- The calculations are independently assessed and validated by an external expert, who produces a validation report.
- A certificate is issued showing the annual avoided emissions potential of the company in CO_2eq.



Section 2

EU Policy and Innovation Landscape

Section 2 **EU Policy and Innovation Landscape**

The European Green Deal

The ability to forecast climate mitigation potential is important in the context of the European Green Deal

Europe's exciting ambition to be the world's first climate-neutral continent is supported by the set of policies known as the European Green Deal (EGD). All 27 EU Member States have committed to turning the EU into a climate-neutral continent by 2050 and have pledged to reduce emissions by at least 55 per cent by 2030, compared to 1990 levels.

The European Union (EU) will put €528 billion of its own budget behind the EGD, which will include public funds for research and innovation in construction, energy, transport, food, biodiversity and other green deal priorities.

The ambition of the EGD is so large that Ursula von der Leyen, President of the European Commission (EC), has described it as Europe's "man on the moon moment".

"It is very ambitious," she said, *"but it will be very careful in assessing the impact of every single step we're taking."* [2]

EU funding for start-ups is one of these steps.

The new European growth strategy

With this set of policies, the intention is to create new opportunities for innovation and investment, reduce emissions, create jobs and growth, address energy poverty, reduce external energy dependency and improve health and wellbeing.

The EGD has been described as "the new European growth strategy" by the Commission's president. Making Europe climate neutral and protecting its natural habitat will be good for people, planet and economy. It is expected that the EU will:

- become climate neutral by 2050
- protect human life, animals and plants, by cutting pollution
- help companies become world leaders in clean products and technologies
- help ensure a just and inclusive transition.

European Green Deal priorities[3]

The EGD is also a commitment to tackling climate and environment-related challenges, for which six environmental objectives have been defined:

1. Climate mitigation
2. Climate change adaption
3. Sustainable use and protection of water and marine resources
4. Transition to a arisear economy
5. Pollution prevention and control
6. Protection and restoration of biodiversity and ecosystems

Eight sectors have been identified as key to achieving the EGD goals. These sectors are shown on the right.

1. Supplying clean, affordable and secure energy

The EGD strategy focuses on three key principles for the clean energy transition, which will help reduce greenhouse gas emissions and enhance the quality of life of its citizens:

- ensuring a secure and affordable EU energy supply
- developing a fully integrated, interconnected and digitalised EU energy market
- prioritising energy efficiency, improving the energy performance of buildings and developing a power sector based largely on renewable sources.

Figure 4: European Green Deal Priorities

Section 2 **EU Policy and Innovation Landscape**

2. Mobilising industry for a clean and circular economy

According to Fetting (2020) [4], 50 per cent of total greenhouse gas emissions and more than 90 per cent of biodiversity loss in Europe can be related to resource extraction and processing of materials, fuels and food. Until now, only 12 per cent of materials in the EU have come from recycling.[5]

The Industrial Strategy for Europe (published ten March 2020) sees digitalisation as a key enabler of green transformation. The new strategy will lead twin green and digital transitions to enable the region to become even more competitive globally. It will help industry to reduce their carbon footprint by providing affordable clean technology solutions and by developing new business models[6].

The EC's Action Plan on the Circular Economy (CEAP), also published in March 2020, and the new industrial strategy complement each other. The CEAP highlights the need to decouple economic growth from resource use. The Commission estimates that applying circular economy principles could raise GDP by an additional 0.5 per cent and could create up to 700 000 jobs.[7]

3. Building and renovating in an energy and resource-efficient way

Buildings account for 40 per cent of the energy consumed in the European Union.[8] To reach the 2030 climate target of a 55 per cent emissions reduction, greenhouse gas emissions from buildings need to be reduced by 60 per cent, and energy consumption lowered by 14 per cent. Old buildings need to be brought to the newest standards, especially with regards to energy efficiency and insulation.

Currently, the renovation rate in different European Member States varies between 0.4 per cent and 1.2 per cent. The Commission intends to double this rate by 2030 through different incentives and funding schemes. In addition, it will enforce the regulation on the energy performance on buildings more strictly to ensure that new buildings and renovated old buildings will adhere to the newest standards.

4. A zero pollution ambition for a toxic-free environment

The objective is to recover the natural functions of ground and surface water. This is tightly linked to the Farm to Fork Strategy, which focuses on restricting nutrient excess in the ground. In addition, the Commission will review measures that address and prevent pollution by large industrial installations, so that they become coherent with Europe's other climate, energy, and circular economy targets.

5. Preserving and restoring ecosystems and biodiversity

Europe's seas, oceans and environment are a source of natural and economic wealth. There is a need to preserve and protect them to ensure that they continue sustaining us in the future. EGD priorities include:

- protecting our biodiversity and ecosystems
- reducing air, water and soil pollution
- moving towards a circular economy
- improving waste management
- ensuring the sustainability of our blue economy and fisheries sectors.

6. Farm to Fork: a fair, healthy and environmentally-friendly food system

According to the EC[9], "the link between healthy people, healthy societies and a healthy planet puts sustainable food systems at the heart of the EGD. The European agriculture and food system, supported by the Common Agricultural Policy, is already a global standard in terms of safety, security of supply, nutrition and quality. Now it must also become the global standard for sustainability. A shift to a sustainable food system can bring environmental, health and social benefits, and offer fairer economic gains".

The goals are to:

- ensure food security in the face of climate change and biodiversity loss
- reduce the environmental and climate footprint of the EU food system
- strengthen the EU food system's resilience
- lead a global transition towards competitive sustainability from farm to fork.

7. Accelerating the shift to sustainable and smart mobility

With transport contributing around 5 per cent to EU GDP and employing more than ten million people in Europe, the transport system is critical to European businesses and global supply chains. At the same time, transport is not without costs to society, including: greenhouse gas and pollutant emissions; noise; road crashes and congestion.

Today, transport emissions represent around 25 per cent of the EU's total greenhouse gas emissions and these emissions have increased over recent years. The goal of the EGD to be the first climate-neutral continent by 2050 requires ambitious changes in transport. A clear path is needed to achieve a 90 per cent reduction in transport-related greenhouse gas emissions by 2050.

8. Pursuing green finance and investment and ensuring a just transition

To achieve the goals set by the EGD, the EC has pledged to mobilise at least €1 trillion in sustainable investments over the next decade. Thirty per cent of the EU's multiannual budget (2021-2028) and the unique Next Generation EU (NGEU) instrument to recover from the COVID-19 pandemic, has been allocated for green investments.

EU countries must devote at least 37 per cent of the financing they receive under the €672.5 billion Recovery and Resilience Facility to investments and reforms that support climate objectives. All investments and reforms to be financed in this way must do no significant harm to the EU's environmental objectives. The Commission intends to raise 30 per cent of the funds under NGEU through the issuance of green bonds.[10]

Section 2 **EU Policy and Innovation Landscape**

The EU's innovation landscape

Europe has built a unique set of institutions and programmes to provide government support for innovation and venture capital, at both national and EU level.

Horizon Europe

Horizon Europe is the EU's key funding programme for research and innovation with a budget of €95.5 billion.

It tackles climate change, helps to achieve the UN's Sustainable Development Goals and boosts the EU's competitiveness and growth.

The European Institute of Innovation and Technology (EIT)

The European Institute of Innovation and Technology (EIT)[11] is an EU body created in 2008 to strengthen Europe's ability to innovate. The EIT is an integral part of Horizon Europe. The Institute drives innovation across Europe by integrating business, education and research to find solutions to pressing global challenges.

The EIT supports the development of Knowledge and Innovation Communities (KICs).

The EIT's Knowledge and Innovation Communities (KICs)

KICs are dynamic, long-term pan-European partnerships among leading companies, research labs, higher education institutions and public sector organisations. Each KIC is dedicated to finding solutions to a specific global challenge.

To support the EIT's mission to create jobs and deliver sustainable economic growth opportunities for Europe, each KIC offers a wide range of innovation, entrepreneurship and (in some cases) systems orchestration and market-shaping activities. These include education courses that combine technical and entrepreneurial skills; tailored business creation and acceleration services; deep demonstrations of whole systems transformation; and other innovation-driven projects, partnerships and research.

The EIT KICs[12] have been set up to react in an effective and flexible way to new challenges and changing environments.

Each Knowledge and Innovation Community has been set up as a legal entity and has appointed a chief executive officer to run its operations – a first for an EU initiative. The EIT has provided the KICs with the autonomy to define their legal status, internal organisation and working methods.

As of 2023 there are nine KICs, with each focusing on a different societal challenge:

- **EIT Climate-KIC:** Working to accelerate transition to a circular, zero-carbon economy
- **EIT Digital:** Driving Europe's digital transformation
- **EIT Food:** Leading a global revolution in food innovation and production
- **EIT Health:** Giving EU citizens greater opportunities to enjoy a healthy life
- **EIT InnoEnergy:** Achieving a sustainable energy future for Europe
- **EIT Manufacturing:** Strengthening and increasing the competitiveness of Europe's manufacturing industry
- **EIT Raw Materials:** Developing raw materials into a major strength for Europe
- **EIT Urban Mobility:** Smart, green and integrated transport
- **EIT Culture & Creativity:** Transforming Europe's Cultural & Creative Sectors and Industries

The European Innovation Council (EIC)

The EIC was launched in March 2021 under the Horizon Europe programme, building on a pilot phase from 2018–2020. It has a budget of over €10 billion between in 2021–2027.

The EIC[13] supports a diverse portfolio of start-ups, scale-ups and cutting-edge deep-tech projects. Their portfolio has been shaped to support the UN Sustainable Development Goals (SDGs) with a focus on: affordable and clean energy; climate action; and good health and wellbeing. EU priorities around green and digital transition and strategic autonomy in critical technologies are also addressed.

The EIC Pathfinder programme supports deep-tech research and development. The EIC Transition programme carries ideas from lab to business. The EIC Accelerator supports start-up development and scaling up, including through the EIC Fund which provides investments from seed to early growth. In addition, the EIC awards Seals of Excellence to the many start-ups that go through their competitive evaluation process, meet the stringent criteria for support, but fall just below the threshold to be awarded a portion of the available budget.

Support from the EIC goes beyond funding. All beneficiaries receive access to tailor-made business acceleration services. This facilitates connections and support that can help scale up EIC-supported companies and enable researchers to take the first steps towards commercialising their results.

Section 2 **EU Policy and Innovation Landscape**

Why are start-ups essential to achieving Europe's climate goals?

1. Supplying clean, affordable and secure energy

Large corporations are searching for new technologies to give them a competitive edge as the world moves towards a zero-carbon economy. Increasingly, they are partnering with start-ups to leverage new technologies in their quest for compliance, sustainable growth and/or climate impact.

2. Mobilising industry for a clean and circular economy

A recent report by the International Energy Agency posits that global reduction of carbon dioxide emissions between now and 2030 will be achieved using technologies available today; **when it comes to the 2050 targets however, the technologies that will be needed are today mostly at the demonstration or prototype phase** (IEA, 2021[14])

3. Building and renovating in an energy and resource-efficient way

Today's start-ups are climate conscious from the outset. According to Hakovirta el al[15], most climate focused start-ups today are addressing industry areas such as **food systems (24%)**, **energy grid technology (18%)**, **green energy generation (16%)**, **electric transportation (12%)**, **mobile solutions** (enhanced mobility using digital devices services) **(10%)**, **land use (6%)**, **built environment (6%)**, **industry (5%)**, and **carbon technology (4%)**.

4. A zero pollution ambition for a toxic-free environment

The European Green Deal strategy points out that "digital technologies are a critical enabler for attaining the sustainability goals of the Green Deal in many different sectors". **Start-ups today are 'born digital'.** The rapid development of technologies in the last few years, particularly digital technologies, makes possible new value propositions to **achieve more positive impact on the environment that were unthinkable just a few years ago**.

5. Preserving and restoring ecosystems and biodiversity

Start-ups see beyond the 'traditional concerns' of business. According to Dyllic (2016)[16], a truly sustainable business – one which aims to survive and create value in the long term – reflects on questions such as, **"How can our business use its resources, competencies and experiences to address the big economic, social or environmental challenges of our time, e.g. climate change, migration, corruption, water, poverty, pandemics, youth unemployment, sovereign debt overload or financial instability?"**.

6. Farm to Fork: a fair, healthy and environmentally-friendly food system

Start-ups are agents of change. The private sector can **help to tackle climate change and related societal challenges through their ability to finance projects, develop technologies and innovations, deploy solutions world-wide and enhance the scale and effectiveness of climate change measures**. Entrepreneurs in particular are considered to be **"key actors"** in solving societal challenges, as they **"develop and implement financially viable and innovative business models that create positive impact"** (Gregori & Holzmann (2020, p. 1)[17].

7. Accelerating the shift to sustainable and smart mobility

Start-up hubs and tech hubs **shape the economy by creating new jobs, dramatically increasing competition and forcing the economy to scale up** by bringing new ideas to the market.[18] This makes start-ups essential to the future of business and essential in the global net-zero economy.

8. Pursuing green finance and investment and ensuring a just transition

Start-ups and tech ecosystems bring together capital, entrepreneurship, knowledge, frontier R&D and science. In other words, these ecosystems require talent, capital, innovation and enablers, as shown in Figure 5[19].

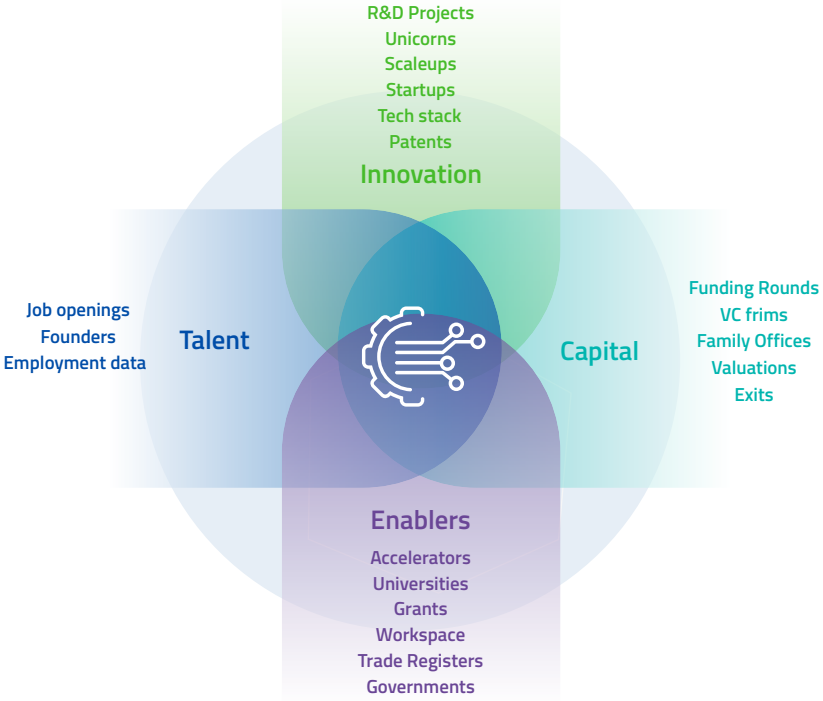


Figure 5: The next generation of tech ecosystems (2022), inspired by Dealroom.co

Section 3

A portfolio view of the RACE pilot project

Section 3 **A portfolio view of the RACE pilot project**

Trends, mapping and insights

The start-ups that participated in the RACE pilot project were not required to have an explicit goal to mitigate climate change, and many of them did not. They were also not selected to represent a balanced spread of green deal priorities or any other priorities or sectors. There was an open call directed to EIC Accelerator beneficiaries. From the start-ups that applied, the participants were selected according to the following criteria:

- EIC Accelerator beneficiaries
- Start-ups, scale-ups and SMEs with a legal-entity
- Current EIC beneficiaries and beneficiaries from the last 2 years
- Start-ups that claim to have a climate mitigation impact (direct mitigation or enabling mitigation)
- A **maximum of 20 per cent** of the total beneficiaries could be from the same country
- A **maximum of 65 per cent** of the beneficiaries could have only male founders

Section 3 presents a 'portfolio view' of the 46 companies that reached the validation stage of the RACE pilot project.

This exercise is intended to demonstrate the potential to shape current and future EU innovation portfolios more deliberately, for climate and systems impact, through measuring the avoided emissions potential in the early stages of start-up selection and support.

The 46 companies as a portfolio for climate action

46 companies submitted initial calculations of their climate mitigation potential for external validation. Hence these 46 companies form a portfolio for climate action (a portfolio refers to the entire group of 46 companies). It is important to mention that while the European Green Deal (EGD) has a total of six objectives (see Section 2), the 46 companies were selected for their potential contribution towards the first objective of the EGD only – climate mitigation.

The 46 companies have a diverse focus such as energy, manufacturing, medicine, fashion etc. with the **potential to reduce greenhouse gas (GHG) emissions and address some of the EGD priority areas, including several societal challenges**.

Eleven of the start-ups in the RACE portfolio are related to the energy sector. Another 20 start-ups fall under the broad category of manufacturing, which satisfies a broad range of the population's needs, from medicine to fashion. Other key sectors include transport (the focus of three start-ups in the portfolio), farming (four start-ups), construction, packaging, delivery, finance and water management. The following image illustrates the rich diversity of innovations within the portfolio.

Figure 6: Schematic representation of the type of sectors and climate solutions that are part of the portfolio of start-ups.

Section 3 **A portfolio view of the RACE pilot project**

Despite being a 'self-selected' group, these companies do in fact cover seven of the eight priority areas of the EGD (see Table 1)

Systems mapping and a 'portfolio view' could reveal opportunities to catalyse larger reductions – in CO_2eq emissions, pollution, congestion, resource extraction and other negative externalities of economic activity – and/or increases in wellbeing.

Table 1 lists the number of companies in the portfolio according to the EGD sector.

The RACE start-ups as a portfolio for achieving the objectives of the EGD

Focus on climate mitigation

As described in much more depth in "Section 2", the six environmental objectives of the European Green Deal are: **(1) Climate mitigation, (2) Climate change adaptation, (3) The sustainable use and protection of water and marine resources, (4) The transition to a circular economy, (5) Pollution prevention and control and (6) The protection and restoration of biodiversity and ecosystems.**

The set of start-ups participating in the RACE project have been assessed for their potential contribution towards the first objective only: climate mitigation. These companies are however very likely to also have the potential to contribute to one or more other EGD objectives.

Climate mitigation is not the only factor that should be considered when awarding public money to start-ups or building a portfolio of innovations for climate and systems impacts. Therefore, EIT Climate KIC has been developing Impact Shift, a suite of services for measuring and monitoring a wide range of social and environmental impact metrics. In the future these could also be valuable and useful to public institutions such as the EIC to inform their funding decisions. In addition, "Section 5" of this report discusses the importance of taking a 'portfolio approach' to innovation which could equally be important for decision making.

Table 1: Number of companies per sector according to EGD sector

EGD sector	Examples of companies/ technologies	Number of companies
A zero-pollution ambition for a toxic-free environment	Packaging companies	2
Accelerating the shift to sustainable and smart mobility	Last mile delivery, Driver behaviour, Use of hydrogen, Improved batteries, New transport system	5
Building and renovating in an energy and resource efficient way	Construction waste management, New coatings, IoT monitoring of buildings	3
From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system	Digital solutions for dairy farms, New fertilisers, Reduction of manure emissions, Testing sex of eggs during incubation	4
Mobilising industry for a clean and circular economy	Novel biomaterials, Water management and water treatment, Data management of supply chains, Renewables-based paper packaging, Green capital, Cooling solution, Mining, Battery improvement, Telemedicine, Cloud seeding, Other	20
Supplying clean, affordable and secure energy	Microturbines, Hydrogen fuel cells, Energy storage systems, Solar and wind energy generation, Hydrogen-based liquid carrier.	11
Preserving and restoring ecosystems and biodiversity	-	0
Pursuing green finance and investment and ensuring a just transition	Simplifying financial services and creating a transparent marketplace for invoice trading	1
TOTAL	**-**	**46**

Section 3 **A portfolio view of the RACE pilot project**

EIC financial contribution in terms of EGD priorities

The **EIC provided a total of €66 975 689** (including grants and loans) **to the 46 start-ups through its Accelerator Programme** (i.e. before the start-ups joined the RACE programme).

The following table shows how this budget of nearly 67 million (€66 975 689) was **distributed among the eight EGD priority areas** and how that mapped onto the 46 companies in the RACE pilot project.

Table 2: Total investment per sector

EGD sector	Number of companies	Investment (in €)	Comment
A zero-pollution ambition for a toxic-free environment	2	3 525 776	-
Accelerating the shift to sustainable and smart mobility	5	6 790 189	Third in the financial allocation ranking, taking 10% of the total capital allocated. Solutions included relate to: last mile delivery; driver behaviour; use of hydrogen in public transport; improved batteries; and new transport systems.
Building and renovating in an energy and resource efficient way	3	4 191 043	-
From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system	4	4 269 169	-
Mobilising industry for a clean and circular economy	20	32 591 663	Accounts for almost half of the grants and loans and largest percentage of companies. Solutions include: novel biomaterials; water management and water treatment systems; data management for supply change; renewables-based paper packaging; green capital; cooling solutions; battery improvement; tele-medicine; cloud seeding; and waste management for mining companies, among others.
Supplying clean, affordable and secure energy	11	14 003 558	Second in funding (21%) and number of companies. Technologies in the RACE portfolio in this category include: microturbines; hydrogen fuel cells; energy storage systems; solar and wind energy generation; and a hydrogen-based liquid carrier, among others. Energy makes up nearly three-quarters of global emissions, followed by agriculture[20].
Preserving and restoring ecosystems and biodiversity	0	-	-
Pursuing green finance and investment and ensuring a just transition	1	1 604 293	-
TOTAL	**46**	**66 975 689**	**-**

Section 3 **A portfolio view of the RACE pilot project**

Scenario analysis: avoided emissions

To calculate the potential mitigation from a greenhouse gas perspective of the portfolio, we implemented a **climate impact forecasting tool which is based on the start-up's benchmark fast-track Life Cycle Assessment (LCA) method**, and used by design engineers, but with a narrower scope. It only calculates the difference between the innovation and the baseline (the comparable 'business-' or 'service-as-usual'). Impact Shift and the climate impact forecasting tool and process are described in "Section 1". Important to emphasize here that **at the end of the process start-ups can ask for an independent validation of the results of their calculation**.

As shown in the figure below, from the 46 companies (Scenario A, page 18) that initially submitted calculations of their climate mitigation potential for external validation, 28 companies (Scenario C, page 18) got valid and significant results of their avoided emissions potential. A further 7 companies were judged to have plausible results. These companies were added to the 28 companies with valid and significant results to form the group of 35 companies (Scenario B, page 18). 11 of the 46 did neither reach a plausible nor a valid emission reduction calculation.

Figure 7: The RACE start-ups as a portfolio

Section 3 **A portfolio view of the RACE pilot project**

Scenario analysis of different cuts of the portfolio and per EGD sector

Table 3 contains more detail about the cohort of companies and their emission reduction potential in each of the three scenarios. It includes all companies who submitted their calculations in Scenario A, companies with valid and plausible assessments in Scenario B and companies with valid assessments in Scenario C.

Optimising the climate impact of a portfolio

In all cases, understanding the reasons for these results can lead to identifying opportunities and subsequently providing targeted support that could improve the overall climate impact potential of a portfolio, and ultimately, the actual climate impact achieved in real life.

As can be observed in Table 3, a total of 35 companies were assessed as "valid and significant" or as "plausible and significant". The total expected carbon avoidance decreased substantially when the 11 invalid forecasts were removed. The remaining 35 companies represent only 20 per cent of the initial emission reduction potential, i.e. 1343 kt CO_2eq.

If we further exclude those rated plausible (a worst-case scenario, Scenario C), then the figures of the avoided emissions are reduced even further to an 826 kt CO_2eq saving achieved by 28 companies.

Table 3: Scenario Analysis

	SCENARIO A 46 companies		SCENARIO B 35 companies		SCENARIO C 28 companies	
EGD Sector	**Number Companies**	**Avoided emissions (kt CO_2eq)**	**Number of Companies with valid + plausible calculations**	**Avoided emissions (kt CO_2eq)**	**Number of companies with valid calculations**	**Avoided emissions (kt CO_2eq)**
A zero-pollution ambition for a toxic-free environment	2	457	1	455	0	-
Accelerating the shift to sustainable and smart mobility	5	1 359	2	59	0	-
Building and renovating in an energy and resource efficient way	3	9	3	9	3	9
From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system	4	3	4	3	3	3
Mobilising industry for a clean and circular economy	20	635	16	623	15	621
Supplying clean, affordable and secure energy	11	4 215	9	194	7	193
Preserving and restoring ecosystems and biodiversity	0	-	0	-	0	-
Pursuing green finance and investment and ensuring a just transition	1	24	0	-	0	-
TOTAL	46	**6 702**	35	**1 343**	28	**826**

Section 3 **A portfolio view of the RACE pilot project**

Zooming in on Scenario B in relation to EIC funding

In terms of EIC funding, **78 per cent of the total budget allocated went to the 35 companies** with valid and plausible avoided emission calculations (also called climate impact forecasts), equivalent to €52 441 455).

78%
of the total
EIC investment

This represents only **20% of the avoided emissions** claimed by 46 companies (Scenario A)

Table 4: Avoided emissions potential of start-ups with valid and plausible calculations, and distribution of investment

	SCENARIO B 35 companies		
EGD Sector	**Number of Companies with valid + plausible calculations**	**Avoided emissions (kt CO_2eq)**	**Investment (in €)**
A zero-pollution ambition for a toxic-free environment	1	455	2 318 663
Accelerating the shift to sustainable and smart mobility	2	59	4 201 426
Building and renovating in an energy and resource efficient way	3	9	4 191 043
From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system	4	3	4 269 169
Mobilising industry for a clean and circular economy	16	623	24 999 380
Supplying clean, affordable and secure energy	9	194	12 461 774
Preserving and restoring ecosystems and biodiversity	0	-	-
Pursuing green finance and investment and ensuring a just transition	0	-	-
TOTAL	**35**	**1 343**	**52 441 455**

Section 3 **A portfolio view of the RACE pilot project**

Impact unicorns, digital climate solutions and scalability

Only nine of the 35 start-ups in Scenario B (with valid or plausible emission reduction calculations) can be classified as either a digital solution or a mix. **These nine start-ups achieved nearly half the impact, a projected carbon avoidance of 602 kt CO_2eq of 1 343 kt CO_2eq.**

One of the advantages of digital solutions in terms of carbon impact is their scalability. Digital solutions have the potential – by their very nature – to be far reaching and many digital companies are born with the ambition to become global payers.

Black Poplar[21] is an example of a digital start-up from our portfolio. The start-up provides a block-chain-based solution that enables traceability in plastic supply chains, which drastically improves recyclability of products and materials. The start-up has developed a software platform to provide end-to-end traceability and secure data exchange for industrial supply chains. The impact forecast of the start-up estimates a potential carbon avoidance of 551 kt CO_2eq per year, per ten supply change actors they change with their service. The scalability of this solution helps us imagine much larger carbon avoidance numbers, as well as a massive decrease in raw material extraction.

Impact unicorns

Black Poplar described above with avoided emissions of 551 kt CO_2eq per year is digital start-up and also one of the three 'climate mitigation unicorns' in the RACE portfolio. The other two are Horse Chestnut, with an impact forecast of 75 kt CO_2eq, and Linde, with a forecast of 94 kt CO_2eq. Both start-ups develop innovative technologies in the energy sector, one an innovative battery and the other a hydrogen-based liquid carrier.

Impacts beyond CO_2eq avoidance

The EGD was designed to drive sustainability impacts well beyond emission reduction.

In addition to climate mitigation, the EGD also considers:

- climate change adaptation;
- the protection of water and marine resources; transition to a circular economy;
- pollution prevention and control;
- and the protection and restoration of biodiversity and ecosystems.

Many of the start-ups in this portfolio have the potential to offer significant positive impacts in these other dimensions of sustainability. Given the climate mitigation focus of the RACE project, we have not measured these alternative or additional potential positive impacts. This means that if a start-up excels in other areas of the EGD, for example if it has a significant impact on water savings, yet has low or marginal impact on emissions reduction, this positive impact may not be reflected by the climate impact forecast. In some cases, these additional positive impacts are flagged in the start-up's narrative impact story – an introductory section included in the Impact Shift emissions validation report.

These additional impacts will of course be of interest to key stakeholders in the start-up's ecosystem and start-ups will weave this information into pitches, proposals and presentations, together with their certificate showcasing their avoided emissions potential.

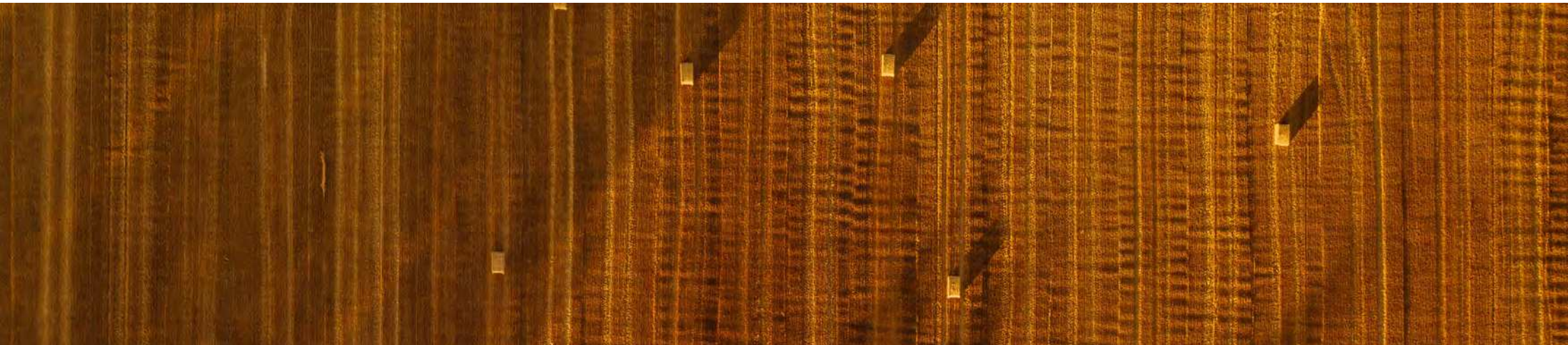
Two examples give a flavour of these additional impacts.

Purpleheart

Purpleheart has developed a novel approach to cloud seeding – the use of weather balloons for dispersing an agent into the atmosphere. Cloud seeding is used to reduce the risk of hail damage to crops and to bring rain to arid places. Cloud seeding has traditionally been carried out by small airplanes that burn large amounts of kerosene and therefore having a high carbon footprint. According to their validation, Purpleheart's innovation has an emissions reduction potential of 0,075 kt CO_2eq/year. Although clearly well below the climate mitigation potential of other innovations in the portfolio, it is still considered significant, according to the methodology. It is also highly likely that this solution has additional relevant benefits in relation to other environmental objectives of EGD, such as: contributing to climate change adaptation; the sustainable use and protection of water resources; pollution prevention and control; and potentially the protection and restoration of biodiversity and ecosystems. None of these impacts has been quantified.

Azobe

Another example: The water utility sector suffers significant water losses in the piping system worldwide, where on average 20 per cent of water is lost. This is clearly a sustainability challenge, particularly in countries experiencing water scarcity. Azobe has developed a digital solution for leak detection and for managing water meters. Azobe has the potential to make a significant impact on "climate change adaptation" and the "sustainable use and protection of water and marine resources", goals 2 and 3 of the EGD. In terms of their validation, however, its contribution was assessed as "invalid, unclear and marginal". In other words, the merit of the solution may still stand, even if the emission reduction potential is not so appealing.



Section 3 **A portfolio view of the RACE pilot project**

Key Findings

1. The start-ups that participated in the RACE pilot project were not "climate start-ups" per se, as they were not required to have explicit climate mitigation goals in their initial application for EIC funding. To participate in RACE the start-ups simply applied and were eligible to participate if they were part of the EIC Accelerator. The companies used the Impact Shift tools and data, in particular the climate impact forecasting tool, to explore different options and pathways in the design phase of their products (for example in terms of alternative materials, different energy inputs, location decisions based on the energy mix, etc.). This gave entrepreneurs an insight into the size of their potential climate contribution through avoided emissions and the opportunity to steer their start-up in new directions.

2. The RACE portfolio of 46 start-ups represents seven of the EGD's eight priority areas. This diversity is a strength, given that **all industrial sectors** must make a contribution to decreasing GHG emissions if we are to tackle the climate crisis and other pressing societal challenges.

3. Preliminary estimations indicated a total climate impact, namely an avoided emissions potential of 6 702 kt CO_2eq per year across the portfolio of 46 companies. An equivalent measure of carbon avoidance would roughly be **1 860 wind turbines** (of 1,82 MW capacity) running for a year[22].

4. Early insights into the climate impact or avoided emissions of a portfolio of start-ups are very valuable for optimising its climate impact. Once opportunities are identified, targeted support can be provided to improve the overall emission reduction, carbon abatement or climate impact potential of the portfolio.

5. Digital solutions have a significant impact in this portfolio, both in terms of number of companies and even more in terms of impact. In Scenario B (companies with a valid + plausible validation result) the potential impact of digital solutions in terms of carbon avoidance is 602 kt CO_2eq (nine companies). This represents 45 per cent of the total emission reduction potential of the portfolio.

6. The companies had the chance to use the Impact Shift forecasting tool and data to **explore different options and pathways in the design phase of their products** (for example in terms of alternative materials, different energy inputs, location decisions based on the energy mix, etc.). In this way, the avoided emissions calculations were used as a planning and forecasting tool. This gave entrepreneurs an insight into the size of their potential climate contribution and the opportunity to steer their start-up in new directions.

7. If a start-up received an invalid evaluation, or a marginal impact, this does not necessarily reflect the actual potential impact of the start-up. In some cases, the start-ups did not provide or have the right information to support their claims at the moment of the evaluation. **Future updates from these companies may change the result of the evaluation.**

8. The potential contribution by the start-ups to the other five environmental objectives set by the EGD (water, biodiversity, pollution, climate adaptation and circular economy) should also be analysed and considered. In some cases, this additional assessment lens could provide **valuable insights** in terms of the additional environmental benefits generated by a particular start-up.

Section 5

A portfolio approach to innovation

Section 5 **A portfolio approach to innovation**

Integrating avoided emissions calculations into investment decision-making

"Limiting global warming to 1.5 °C would require rapid, far-reaching and unprecedented changes in all aspects of society... [including] transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems."

IPCC Special Report, Global Warming of 1.5 °C, Summary for Policymakers

Direct CO_2eq avoidance is not the only measure of a start-up's potential value in a world where radical systems transformation is required to limit global temperature rise.

As we have seen, some start-ups deliver emissions savings directly and some (especially digital innovations) deliver impacts indirectly, by enabling large-scale emissions savings in other parts of a system.

Some start-ups cannot be compared with a single alternative. Qarnot for example (See "Case Study Quarnot") combines heat and IT services in one module, which also eliminates the need to build new datacentres. In this case, emissions from all three sources in the 'business-as-usual' scenario must be compared with emissions from Qarnot's compact solution.

In some decision-making frameworks a product with marginal climate mitigation potential may be selected over an alternative with larger savings, because of its outsize benefits to, for example, biodiversity, climate adaptation, circular economy or other goals of European policy.

It is nevertheless important to understand and nurture the potential of every new business to mitigate climate change and to integrate this into larger decision-making frameworks – especially when public money is awarded.

Information about climate impact potential can give an early indication of the 'cost per tonne of CO_2eq avoided' across an entire portfolio of innovations.

This information can also help place start-ups within larger innovation portfolios for systemic change and highlight where targeted support could maximise cost savings and climate impact.

"Section 3" provides some insights into EIT Climate-KIC's 'portfolio approach' to decision-making to illustrate how avoided emissions potential can be integrated into larger decision-making frameworks.

Section 5 **A portfolio approach to innovation**

The why, what and how of supporting start-ups: An EIT Climate-KIC case study

WHY

There is a 'why' behind every decision to support a start-up in the EU. EIT Climate-KIC's decision-making framework derives from our vision, mission and promise, and our 'portfolio approach' to innovation:

Our vision:

A prosperous, inclusive, climate-resilient society with a circular net-zero-emissions economy

Our mission:

To catalyse systemic change for climate action

Our promise:

Transformation, in time, through innovation

EIT Climate-KIC's portfolio approach to innovation

We build portfolios of deliberately chosen innovations (which include start-ups as well as larger projects, programmes and collaborations) that work together across technology, policy, finance, citizen engagement and other relevant levers of change.

A portfolio approach means supporting many different but connected initiatives, not only on their individual potential, but also as part of a spread of options or pathways to the world we envision.

Our 'why' for supporting a start-up is the role it can play within larger portfolios that aim to catalyse systemic change in support of Paris Agreement and European Green Deal objectives. (For more information on these larger portfolios search our website for 'Deep Demonstrations' and 'Spotlight Initiatives'.)

In other words, we do not back only the top performers in a simple avoided emissions ranking. This could lead to incremental change only or to 'doing the wrong things slightly better'.

WHAT

What outcomes are our portfolios designed to support?

A few examples of EIT Climate-KIC's current systems transformation work includes:

- Working with Irish Aid to nurture an adaptation innovation ecosystem in Tanzania
- Working with the Irish Department of Agriculture, Food, and the Marine to transform the agri-food system in Ireland
- Working with the EU Cities Mission to transform 100 city systems and reach climate neutrality by 2030
- Working with the Government of the Republic of Slovenia to transform Slovenia into a circular net-zero economy
- Working with Glasgow City Region to build a climate-smart forest economy in Glasgow.

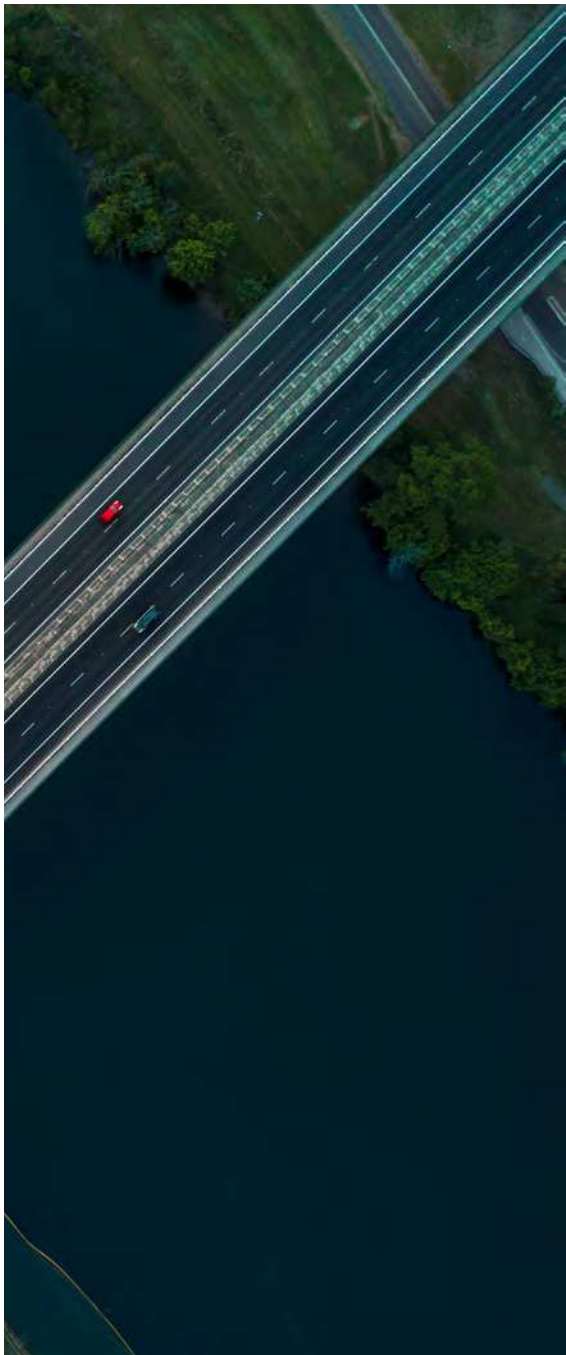
HOW

Emissions forecasting is one part of 'how' we help start-ups to maximise and communicate their impact in a rapidly changing world

It is also part of 'how' we add value to our start-up selection process, to business support programmes and to our larger portfolio projects for systemic change (see examples above). As part of these larger portfolios, start-ups can maximise their systemic impact through collaborations and experimentation.

As part of Impact Shift, we offer to start-ups and other stakeholders our climate impact forecasting service which:

- provides a detailed calculation of a start-up's existing potential to avoid CO_2eq emissions compared with a 'business-as-usual' baseline product or service that is already in the market
- identifies intervention points for maximising climate impact along an entire value chain
- can support systems orchestrators to build effective innovation portfolios
- can help funders reduce the cost per tonne of greenhouse gas abatement, across a coherent portfolio



Section 6

Conclusions

Section 6 **Conclusions**

What gets measured gets done

Impact Shift is a suite of services for measuring, forecasting and monitoring a wide range of social and environmental and social impact metrics. As part of Impact Shift, a streamlined approach to Life Cycle Assessment (LCA) has been developed to simplify the process of calculating the avoided emissions potential of start-ups. Impact Shift climate impact forecasting service is a valuable part of a wider matrix of decision making for both investors and start-ups. In the context of Europe's transformation towards a climate-neutral society, it is a critical part of ensuring the EU is funding and building the right innovation portfolios, along with a portfolio approach to innovation.

The analysis in Section 5 demonstrates how vastly different the impact of an investment decision can be when impact is quantified and factored into decision-making at early stages and when interventions are made to maximise the climate impact of a portfolio.

For start-ups, the task of calculating their impacts is time-consuming, confusing, and complicated; most start-ups simply can't do it at the early stages. They, therefore, miss out on opportunities to maximise climate impact, to attract funding and to develop stronger and more concise pitches.

For investors and funders, it is difficult to get access to reliable forecasts of the avoided emissions potential, especially in the time available to decide on a deal or grant.

An 'LCA-light' approach can satisfy these needs at early stages and create significant knock-on effects as start-ups and portfolios grow over time.

Findings in brief

The climate impact forecasting service is not intended to replace later-stage, complete life-cycle assessments. It provides a forecasting of potential impacts; the numbers obtained from the process do not represent actual impacts. It also has a limited focus; it is not intended to cover all six environmental objectives of the EGD.

It does, however, provide a robust and quantitative measure of avoided emissions potential as well as a qualitative description of additional potential impacts related to EGD goals. The process integrates data from open-source databases, laboratory experiments, demonstrators and pilot projects.

EIT Climate-KIC invites partners to help shape and scale its Impact Shift service and portfolio approach to innovation to help Europe deliver a transformative Green Deal.

Impact Shift is beneficial to start-ups and funders in different ways. Our pilot project demonstrates that the service:

Provides a useful alternative to full LCAs at early stages and **helps build climate literacy** in companies that use it

Increases the success rate of start-up pitches

Identifies strategic intervention points for **maximising climate impact**

Can be used to **decide on a method, materials or energy sources** to take forward at scale

Provides an **affordable way** to compare possible design routes for new product lines

Can be used to **demonstrate compliance**

Glossary

Glossary

CEAP	Circular Economy Action Plan
Climate impact forecast	A Climate Impact Forecast is a life-cycle-assessment based calculation of the green-house gas reduction potential of a project, meaning the net climate impact of the key differences between business as usual and their innovative solution.
Climate impact forecast validation	The validation is a review process performed by an impartial impact expert to determine if a climate impact forecast is valid, positive and significant.
CO2eq	A CO_2 equivalent (CO_2eq) is a unit of measurement that is used to standardise the climate effects of various greenhouse gases.
EC	European Commission
EIC	European Innovation Council
EIT	European Institute of Innovation and Technology
EGD	European Green Deal
GHG	Green House Gases
Impact Shift	Impact Shift is a suite of services for measuring, forecasting, and monitoring a wide range of social and environmental impact metrics. EIT Climate-KIC offers these services to help start-ups build a comprehensive view of their long-term impact which can be translated into simplified reports for investors and other stakeholders. Our team of technical advisors can deliver tailored workshops, frameworks, and software tools to extract reliable and accessible data for scaling start-ups towards maximum impact.
KIC	Knowledge and Innovation Community
LCA	Life Cycle Assessment
QB	Quarnot Boiler
RACE	Rapid Acceleration of Climate Entrepreneurs, a programme that was funded by EIC and implemented by EIT Climate-KIC between July 2021 and February 2023.
Start-up	A startup is an independent, organisation, which is younger than five years and is aimed at creating, improving and expanding a scalable, innovative, technology-enabled product with high and rapid growth.
$tCO_2eq.$ / year	Metric tonnes of carbon dioxide equivalent per year. A measure of global warming potential or greenhouse gas emission reduction potential.

Endnotes

1 Please find the definitions in the glossary in the annex.
2 https://www.theparliamentmagazine.eu/news/article/europes-man-on-the-moon-moment-von-der-leyen-unveils-eu-green-deal
3 Sources: https://www.consilium.europa.eu/en/policies/green-deal/ and https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
4 Fetting, C. (2020). "The European Green Deal", ESDN Report, December 2020, ESDN Office, Vienna.
5 This section about the EIC is an exact copy from the European Innovation Council Impact Report 2022 https://eic.ec.europa.eu/news/eic-impact-report-2022-2022-12-07_en
6 https://eit.europa.eu/what-are-eit-knowledge-and-innovation-communities-kics and https://eit.europa.eu/our-communities/eit-innovation-communities
7 Fetting, C. (2020). "The European Green Deal", ESDN Report, December 2020, ESDN Office, Vienna.
8 https://eit.europa.eu/what-are-eit-knowledge-and-innovation-communities-kics and https://eit.europa.eu/our-communities/eit-innovation-communities
9 https://eit.europa.eu/what-are-eit-knowledge-and-innovation-communities-kics and https://eit.europa.eu/our-communities/eit-innovation-communities
10 Unless specified otherwise, these descriptions were extracted from the European Commission website, "European Green Deal". https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
11 Information about the European Institute of Innovation and Technology (EIT) taken from the EIT website, its factsheet https://eit.europa.eu/sites/default/files/eit_at_a_glance_-_factsheet.pdf and the summary on Wikipedia
12 https://eit.europa.eu/what-are-eit-knowledge-and-innovation-communities-kics and https://eit.europa.eu/our-communities/eit-innovation-communities
13 This section about the EIC is an exact copy from the European Innovation Council Impact Report 2022 https://eic.ec.europa.eu/news/eic-impact-report-2022-2022-12-07_en
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15 Hakovirta, M., Kovanen, K, Martikainen, S., and Mannine, J. (2022), "Corporate net zero strategy—Opportunities in start-up driven climate innovation", Business Strategy and the Environment. 1–12.
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18 Overview of the European Startup Landscape 2022, https://community.hros.io/
19 Adapted from "The next generation of tech ecosystems (2022), from Dealroom.co"
20 Climate Watch, 2023, https://www.climatewatchdata.org/
21 We are using coded names
22 https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
This section about the EIC is an exact copy from the European Innovation Council Impact Report 2022 https://eic.ec.europa.eu/news/eic-impact-report-2022-2022-12-07_en

Glossary: possible validation results of the independent external evaluation of the start-ups' climate impact forecast statements. These validation results were used as the basis for this report.

Valid	A climate impact forecast is valid if it is representative of the project, using appropriate data and well justified assumptions. Therefore, the climate impact forecast and its results are representative of the potential for the project to mitigate, enable or adapt to climate change.
Positive	A climate impact forecast is positive when it shows that the project has a lower climate impact than business as usual, or improved climate resilience in the case of adaptation. A positive mitigation or enabler climate impact forecast shows the avoided GHG emissions in -tCO_2eq.
Significant **Marginal**	A climate impact forecast is significant when the project has a climate impact (positive or negative) greater than 5 tonnes of CO_2eq per year. This is roughly the global average annual CO_2 emissions per person. Below this amount we consider the impact to be marginal.
Plausible	It is not quite valid as we could not verify all assumptions. At most one input has raised a concern with the validator, and it is not a key input, or otherwise not a priority to resolve the concern.
Improbable	It is not quite plausible. At least one key input has raised a concern or rejection with the validator; the uncertainty may be too high, there may be a calculation error or lack of evidence, or there is contrary evidence.
Invalid	Not valid. At least one input does not meet requirements and is rejected. (e.g. an assumption without clarification, data without source, overly optimistic, wrongly scoped, or another error)
Positive within limits	Lesser than positive but not negative. The positive impact is possible within limits for energy consumption, material use or adoption rates.
Unclear	Insufficient information, unsupported assumptions, lack of referencing or other gaps, of such magnitude that they make it impossible to say if the impact is positive or negative.
Sensitive	Positive impact, but with considerable risk of negative impact in a worst case.
Negative	The forecast shows that the innovation creates additional CO_2eq impact (e.g. +1kg CO_2eq)