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294 How to accelerate positive impact innovation to address climate change?

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Abstract: How to accelerate positive impact innovation to address climate change?

EIT Climate-KIC is Europe's largest public-private climate innovation initiative focused on cities, industry, land use and finance. EIT Climate-KIC has been successfully engaging with startups over the past decade. Several thousand business proposals and startup applications to accelerators and within them at certain selection stages have been evaluated, selected, and supported. Therefore, EIT Climate-KIC has comprehensive and deep experience on how to select and support start-ups for the highest possible impact. The ultimate objective is to trigger seed and venture capital investments in those startups and young businesses with the highest climate impact and business growth potential.

This paper focuses on answering the following questions. - How can climate impact forecasts (CIF) be useful for startups, organizers of startup support programmes, jury members and startup investors? - How to choose and support the right startups to get to climate impact? - How can we leverage the opportunity of impact investment? - How to ask innovators for impact?

The paper describes the Climate Impact Framework developed and used by EIT Climate-KIC and one of its key tools, the Climate Impact Forecast (CIF) Tool. Both, the Climate Impact Framework and its support mechanisms as well as the CIF Tool are described and illustrated. The climate impact of three startups is described in detail to provide examples. In terms of results the paper describes what start-ups, organisers of start-up programmes, jury members and startup investors get out of working with the Climate Impact Framework and CIF. Following a discussion of the questions from above, the paper concludes with three key recommendations. These emphasize the importance of a clear process and standard for climate impact assessment at multiple startup support selection stages, the need to make investment contingent on substantiated, data-driven and transparent impact claims and the value of a tool and dataset to support startups to substantiate their climate impact claims in a scientific, transparent, data-driven and comparable way.

Keywords: Climate Impact, Mitigation, Entrepreneurship, Avoided Emission Potential, Innovation

How does EIT Climate-KIC support startups?

The EIT Climate-KIC community has worked to identify, support and scale climate impact startups for the benefit of society for nearly a decade. The ultimate objective is to trigger seed and venture capital investments in those startups and young businesses with the highest climate impact and business growth potential. Several thousand business proposals and accelerator startups have been evaluated, selected, and supported as part of the Climate Launchpad and the ClimAccelerator Programme (Figure 1). Across all programmes the focus has continuously been on maximizing climate impact with scalable commercial solutions resulting in a very comprehensive and deep experience on how to select and support startups for the highest possible impact.

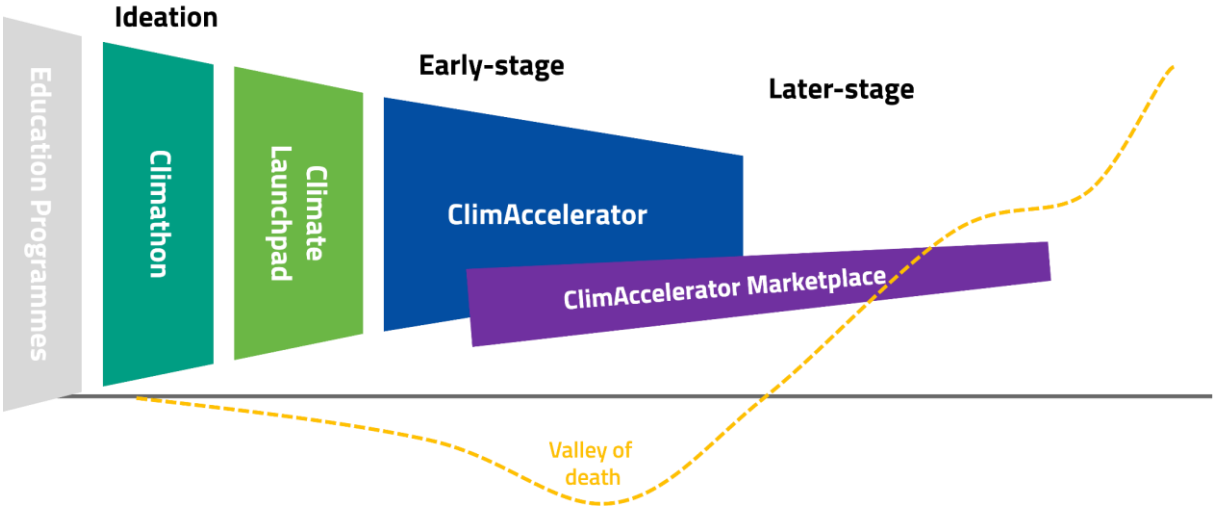

Figure 1. Startup support programmes of EIT Climate-KIC

The most relevant programmes and services provided by EIT Climate-KIC includes the (1) **Climathon**, a city-based programme, that offers a clear pathway to action and interaction - an opportunity for cities and citizens to co-create local ideas to share climate challenges. At the core of the programme is an ideathon organised by passionate local organisers - the people who know their cities and climate challenges the best (Climathon, 2021).

The Climathon gives the opportunity to innovators to explore ideas and decide to pursue them in the form of start-up companies. Teams that decide to do so can then apply to the (2) **Climatelaunchpad**, a competition that creates a stage for new ideas and operates in more than 50 countries worldwide to support hundreds of new climate startups each year. In many parts of the world, particularly in developing countries, it is the only platform supporting such businesses. It is therefore particularly active in Africa, Asia and Latin America. The competition creates a stage for climate business ideas, has a 6-year track record, and has supported approximately 900 entrepreneurs every year (ClimateLaunchpad, 2021), hence a total of about 5400 climate impact entrepreneurs over the past six years.

After the ClimateLaunchpad some of the startups enter the (3) **ClimAccelerator**, a global programme that gives startups access to innovate, catalyse, and scale the potential of their climate solutions. In a global community of organisers, Climate-KIC runs both theme-based and place-based acceleration programmes. It goes beyond European borders, building a bridge between world's industry experts and systems to break new ground in carbon reduction (ClimAccelerator, 2021).

Parallel to the ClimAccelerator the (4) **ClimAccelerator Marketplace** offers a comprehensive overview of the investment opportunities into early-stage startups. The dealflow stems from EIT Climate-KIC's ClimAccelerator programme and is therefore, also linked to the Climate Impact Framework (EIT Climate-KIC, 2021).

During all the programmes the **Climate Impact Forecast** (CIF) tool is used to measure the environmental impact of the startups. The CIF tool was developed by EIT Climate-KIC in collaboration with Impact Forecast (www.impact-forecast.com) to allow early-stage innovations to calculate and gain views of the emissions reduction potential of innovations easily and in an interactive manner. It is based on a modified model of the Life Cycle Assessment (LCA) to meet the particular needs of innovations at very early-stages. This tool is embedded in the Climate Impact Framework EIT Climate-KIC applies in its entrepreneurship programming to help forecast the positive or negative climate impact of the ventures it supports.

Most recently EIT Climate-KIC has been awarded funding from the European Innovation Council for the Project "Rapid Acceleration of Climate Entrepreneurs", which aims at aligning and improving innovation portfolios towards the European Green Deal goals. One area of work is supporting the European Innovation Council and 60-80 of its beneficiaries to test EIT Climate-KIC's climate impact framework to forecast the climate impact of early stage innovations and integrate a methodology for measuring systems transformation potential at a portfolio level, supporting a 1,5° scenario.

Methods: The Climate Impact Framework

While many different impact methodologies and tools have been applied over the years, the field of impact measurement has developed a lot within and outside the EIT Climate-KIC community. The Climate Impact Framework is bringing these different experiences together in a joint approach on how to set common impact targets for the individual startups, how to monitor progression and how to do programme evaluation.

Figure 2. Climate Impact Framework

The Climate Impact Framework (Figure 2) offers to build narratives which the participating startups and partners can use for gaining a solid understanding of their expected climate impacts from their specific innovations. It will help them build a stronger narrative around climate impact outcomes. This will also support the programme in general. The tool is based on the benchmark Life Cycle Assessment (LCA) method, used by design engineers, but with a narrower scope - only modelling differences between the innovation and baseline.

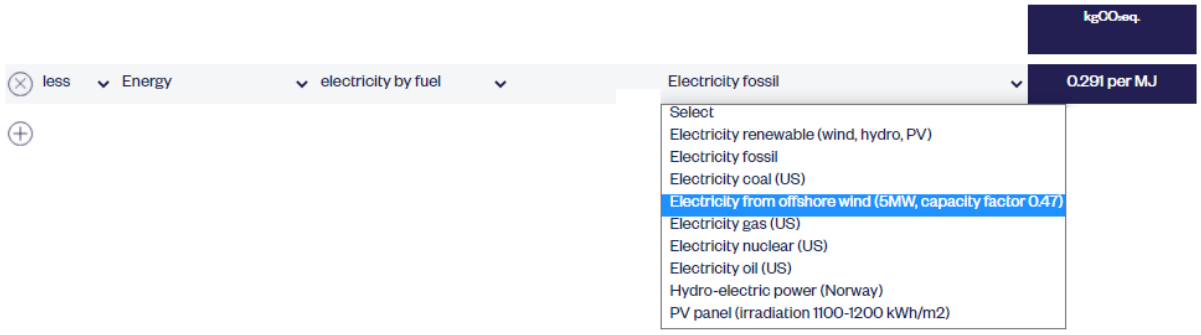

Figure 3. Impact bars dropdown

Impact bars make it easy to see which of the modeled resources and activities reduce or add to climate change (Figure 3). The database behind the tool provides the opportunity to explore options with the drop-down lists of materials, fuels, foods, etc. Users can discover new options that can be added easily, to make a big contribution towards a positive impact.

Climate impact, in tons or kilograms of CO_2 equivalent, is the key metric of the tool. Climate is not the only kind of impact, the tool also includes human health, eco-toxicity and resource depletion. Depending on the innovation it may be important and relevant to look at other data and indicators such as, e.g water footprints, DALY or ReCiPe scores, marine life effects, biodiversity, and many more LCA indicators.

The tool has been designed to be a fast-track LCA that allows the startups to measure their impact in one day, decreasing the time frame and need of resources drastically in comparison to a complete LCA. Furthermore, the tool is designed to be used iteratively by the startups, allowing them to keep developing their innovation and updating their climate impact at the same time.

Table 1. Support mechanisms within the Climate Impact Framework

Step 1: Workshop	Step 2: Coaching	Step 3: Validations	Step 4: Reporting
Full-day workshop, which consists of a climate impact quiz, an introduction to the science of impact assessment, examples of impactful companies and their best practices, a CIF demo and a 2-hours guided workshop on using the tool. By the end of the day the startups will know how to forecast their impact and have a preliminary climate impact in kgCO2 eq.	One hour support from an impact expert, to improve how to calculate and communicate impact with the CIF tool. The impact experts are experienced impact assessment specialists, ready to support the startups to do their impact forecasts, unearth relevant LCA data and find potential for improvement of their calculations.	The validation is a structured check of a climate impact forecast by a third party LCA expert, who provides feedback and time for a revision before determining if the impact forecast is positive, significant, and valid.	Consist of production of an executive summary & impact story, and a validated climate impact forecast file, impact projection and a future scenario. The report can be shared with investors or showcased online.

Sample climate impact of three startups

Three startups were selected based on an open call sent to startups that had already got an external validation of their climate impact forecast.

Brill Power provides BrillMS EV Battery Management System with zero battery replacements per vehicle lifetime instead of one battery replacement

per vehicle lifetime. The difference in impact is calculated per year for 353775 times the electric vehicle battery is not replaced (52 KWh, 356Kg).

Rebel Meat provides burgers with 50% beef and 50% plant based ingredients instead of 100% beef. The difference in impact is calculated per year for 60,000 pieces of 135g burgers.

Soil Steam international provides steaming machines with steam technology instead of using pesticides. The difference in impact is calculated per 5 years for 80 machines produced.

After applying the Climate Impact Framework the validation results where showcased like this:

Table 2. Climate Impact Forecast for selected startups.

Company	Sector	Unit	No. Units per year	Kg CO_2 per Unit	Tonnes CO_2 per company/year
Brill Power	Transport	52KWh battery	363,775	-12566	-4445505
Rebel Meat	Food	135g patty	60,000	-0.198	-11.88
Soil Steam	Agriculture	1 machine produced	80	-81543	-6521

The following image (Figure 3) showcases how the Rebel Meat validation results are shown on the Impact Forecast Platform:

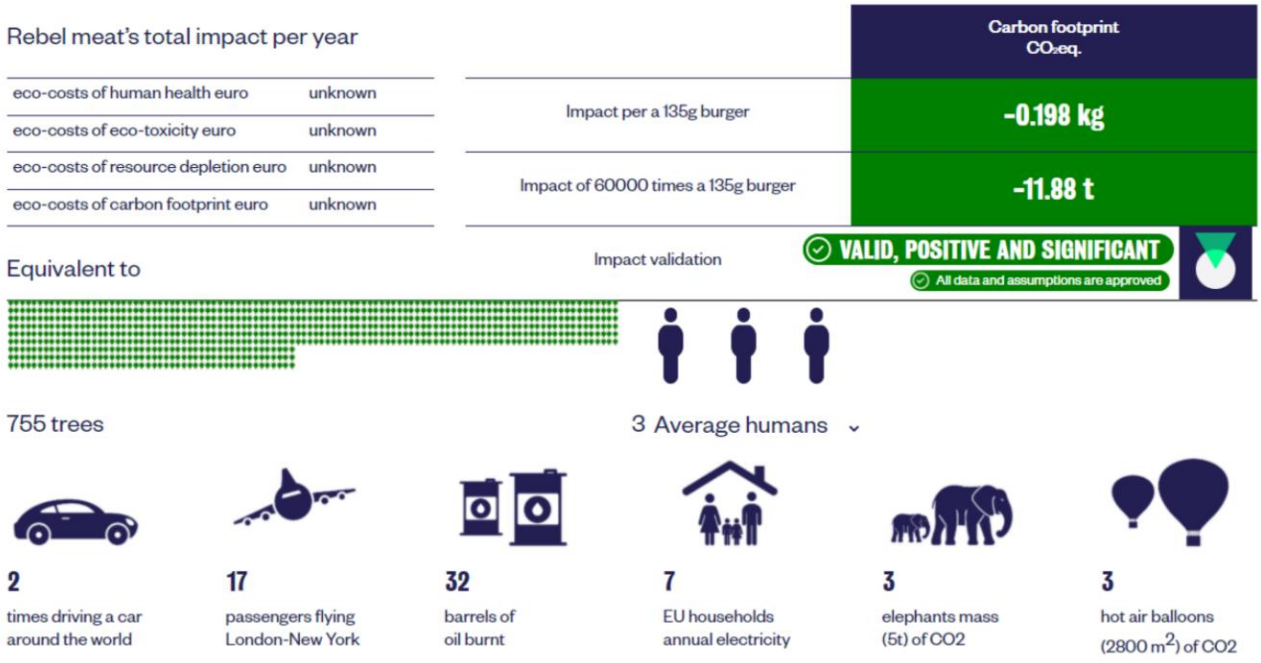

Figure 3. Rebel Meat Validation result 2021.

Results

How can climate impact forecasts be useful for startups?

The Climate Impact Framework helps **startups** to understand their climate impact potential in an early stage of their development. This can then have a positive influence in terms of integration of climate mitigation thinking on the further development of their products and services. In addition, having their own climate impact narrative gives them more trust from potential funders.

Organisers of startup support programmes are reporting in a similar way; “Two years ago we held the first impact forecast workshop for accelerator startups, and have since then also tried other impact assessment tools from different LCA consultancies and impact organisations. I find the Climate impact forecast to be the best fit for the needs of our startups, not only providing a forecast of the impact in a short time, but also for delivering a very pedagogic exercise bringing the startups an important understanding around their impact assumptions and how to improve their value proposition.” – Mikkel Trym, former Startup Accelerator manager in Denmark, Sweden and Norway.

Jury members of programme selection committees have reported: "The Impact Framework allows us to to gain new insights and helps us to take science-based decisions on innovations where the potential positive or negative climate impact is not always obvious" – Beñat Egaña, Entrepreneurship Co-lead Europe of EIT Climate-KIC.

Startup Investors want to be sure that they will have a return on their investment. When they sit on juries, they are looking for impact metrics and credible impact pathways. They want to see how the product or service of a startup is expected to achieve its impact and whether the logic behind it is credible. They will also check the assumptions and whether they are realistic and spelled out clearly. Startups are often over-optimistic when it comes to the assumed scale of the market their product or service is going to reach. This again is an aspect an investor or a jury would like to check to see whether the assumptions that were made seem to be realistic. The perceived impact equals the calculated impact multiplied by its credibility. This means that it is much better to have a few credible assumptions rather than something more complex that is harder to believe.

Investors appreciate the climate impact forecast tool and its results. They tend to say that it is cost-effective, in particular compared to consultancy (which is prohibitively expensive pre-funding). They find it great to have the climate impact forecast on a one-pager. This makes it easier to digest as they have to look at many key performance indicators with climate impact being just one of them.

“I have tested the Climate Impact Forecast and agree that it is a great tool both for startups themselves and venture capitalists / incubators / governments choosing who

to fund." – Jeremy Faludi, LCA specialist and educator at TU Delft, VentureWell, Autodesk

How to choose and support the right startups to get to climate impact?

Initially there was no standard for impact information, at interviews (application and selection stages 1 and 2). Selection relied on knowledge available with the local managers and investors, but this was not reliable information. So later, when we used life cycle assessment (LCA) to know the climate impact, sometimes we found out that it wasn't there.

Several scaled down versions of LCA consultancy were tried in parallel and each showed the benefit of LCA data and that a standardised and simplified method to assess impact would be very helpful.

Now there is a series of online tools that can be used to measure the environmental impact of companies. In the article "How to measure the climate performance potential of startups" by Višević, D. and Valenzuela, D. (2021), nine tools were described, from which only three are public, LCA based and have a bottom-up approach, these tools are Climate impact Forecast (Cif), Crane and One Click LCA. The fact that Cif was under that description in combination with the fact that Cif is a key component of EIT Climate-KIC's climate impact framework facilitated its implementation.

Discussion

The Climate Impact Framework aims to strengthen and cascade the climate impact outcome with the following impact innovation best practices:

- setting clear impact targets helps source and select the best startups;
- improving the selection and support of the most impactful startups throughout the different development stages of Climate Launchpade and the ClimAccelerator;
- defining a clear process and a tested and trusted methodology for climate impact measurement, from pre-revenue Climate Launchpad to Acceleration and growth;
- building climate impact competences across the startups and the partner community.
- Having a clear narrative centred around climate impact to promote programme startups, partners and the community, including building a strong value proposition around climate impact measurement for future funders.

What we have seen from an accelerator manager and programme design perspective, is that these impact innovation best practices do change the results we are seeing with the teams. Before entering the programme and getting in touch with tools from the Climate Impact Framework, startups often describe their potential impact in a very broad and unspecific way. Especially the first exercise of the Framework, which is to define the Key Differences and Functional Units to compare the innovative solution with a baseline solution, is challenging to most startups. But in the end, it always helps the startups not only to describe the climate impact potential, but also the value proposition and the target groups as impact and usage are clearly connected. So startups profit in terms of better understanding their impact and business and being able to create synergies out of the work with the tools of the Climate Impact Framework.

The Climate Impact Framework adapts to a progression model where the impact methodology advances according to the Technology Readiness Level (TRL) of the startup and adaptation of the product or services in the market. A reason for this is that the need for validated impact measurement becomes more critical as the venture grows, whereas also the probability of success and the calculation estimates becomes more certain.

We take caution interpreting the numbers. Large deviations in the results should be expected from assumptions on market size, and choice of baseline and functional unit. The solution is to focus not too much on the actual number but on how well the number can be trusted. With these uncertainties, choosing the highest impact startups is not the best approach, as these startups might also be the ones most prone to optimism bias. Instead, the value of an impact assessment in at early stage is in removing those solutions which cannot show a clear and credible impact pathway, or who even show with reasonable certainty, to create more emissions than their solution avoids. The emphasis must be put on the certainty with which a startup can realise significant CO_{2eq} reductions.

How can we leverage the opportunity of impact investment?

Impact funding is available from many sources such as e.g., the large-scale European Commission Horizon 2020 Programme as well as specific mission driven venture capital. However, to get funding from these organisations, a claim in a defined impact standard is not always needed. The application for such funding asks startups to define their impact, often without reference to a standard, tool, or dataset to be used. As a result, the definitions of impact given by applicants, are difficult to compare and base a decision on.

It is possible, even easy in some cases, to overlook “the possible adverse effects of the solution [Pedrós Cayo, L. 2021]. It may for instance go unnoticed that the recycling of a material uses so much energy, that the climate impact of the recycled material is higher than that of the virgin material it is aimed to replace. When the energy use is known, we can find a break-even point and determine whether it is realistic to keep energy use well below this point.

In enabling technologies, the impact depends on the behavior of the enabled users. For instance. the impact of a ride sharing app depends on people sharing rides. And the impact of a hybrid car depends on how people fuel or charge it. The startup usually has to emit greenhouse gases to produce a solution, and the GHG reductions come from its intended use. When the degree of behavior change is known, we can find the required levels of adoption and engagement, and make it a priority to test if the market responds well above these levels.

Science based impact standards (LCA based CO_2 footprints in the case of climate impact) address the potential impact costs and benefits of a solution and help to prevent the omission of adverse effects. Without a data-driven approach to impact claims, there is a risk of funding startups that have the opposite impact of what they themselves and those funding them were aiming to achieve.

Impact data and standards are available which can be used to distinguish proposals on their ability to make the impact that the funding is dedicated to. When startups are asked to substantiate their impact claims, we have seen them increase their awareness and knowledge of their impact and gain the know-how to improve it. Therefore, making impact funding contingent on impact claims has a multiplying effect on the overall impact of the funding.

How to ask innovators for impact?

Firstly, simply asking for impact data, and defining precisely what you want to know, is creating value on its own. It lets the startups know you are basing decisions on substantiated, data-driven and transparent impact claims. In the case of climate impact innovations we ask for ‘the GHG reduction potential in tCO_2eq per year, for years 1 through 5, in the beachhead market’ to be substantiated with a CIF. This is better than asking for the ‘GHG reduction potential’ without further specification, which returns answers that differ in geographical scope, timeframe, tool, dataset, calculation method and impact metric. The problem is defining is asking for enough detail, while keeping the amount of work manageable for the startup and the selection committee.

A highly detailed assessment of the innovation is neither useful nor feasible; a full life cycle assessment (LCA) in the case of climate impact -or more broadly a full impact

report of corporate social responsibility (CSR), Global Reporting Initiative (GRI), Green House Gas (GHG) emissions or Sustainable Development Goals (SDG) contribution-contains too much information to be legible in a selection procedure. These full assessments are also too time-consuming for the startups to create and costly to outsource to specialists. The solution in the Climate Impact Forecast is to simplify the procedure of LCA with an accessible tool, containing climate impact data, and focused on key differences between an innovation and business as usual. In simple terms, CIF asks what you use, produce and reduce, and calculates the corresponding climate impact. As such CIF is asking information which any credible startup will have, and translate it into the climate impact forecast needed for decision making.

So, to ask innovators for impact we leverage existing standards, ask for key information, offer consistent impact data, and require startups to quantify their resource use. Across the Impact Framework, we require increasing levels of accuracy and transparency, and have to offer increasing levels of specialist support, as the startups progress.

Conclusions

How to choose and support the right startups to get to climate impact?

It is important to set out a clear process and standard for climate impact assessment at multiple selection stages and reject teams which cannot show or describe a clear impact. The understanding of the own impact case also helps the startup but also the programme organisers to find the right coaches or mentors to further improve the impact case.

How can we leverage the opportunity of impact investment?

Making investment contingent on substantiated, data-driven and transparent impact claims drives startups to understand and improve their impact, which in turn improves and multiplies the overall impact of the funding.

How to ask innovators for impact?

It is important to ask for a standardized impact claim, and offer a tool and dataset to support startups to substantiate their climate impact claim in a scientific, transparent, data-driven and comparable way. By using one methodology and a certain set of tools, also the language gets more comparable.

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