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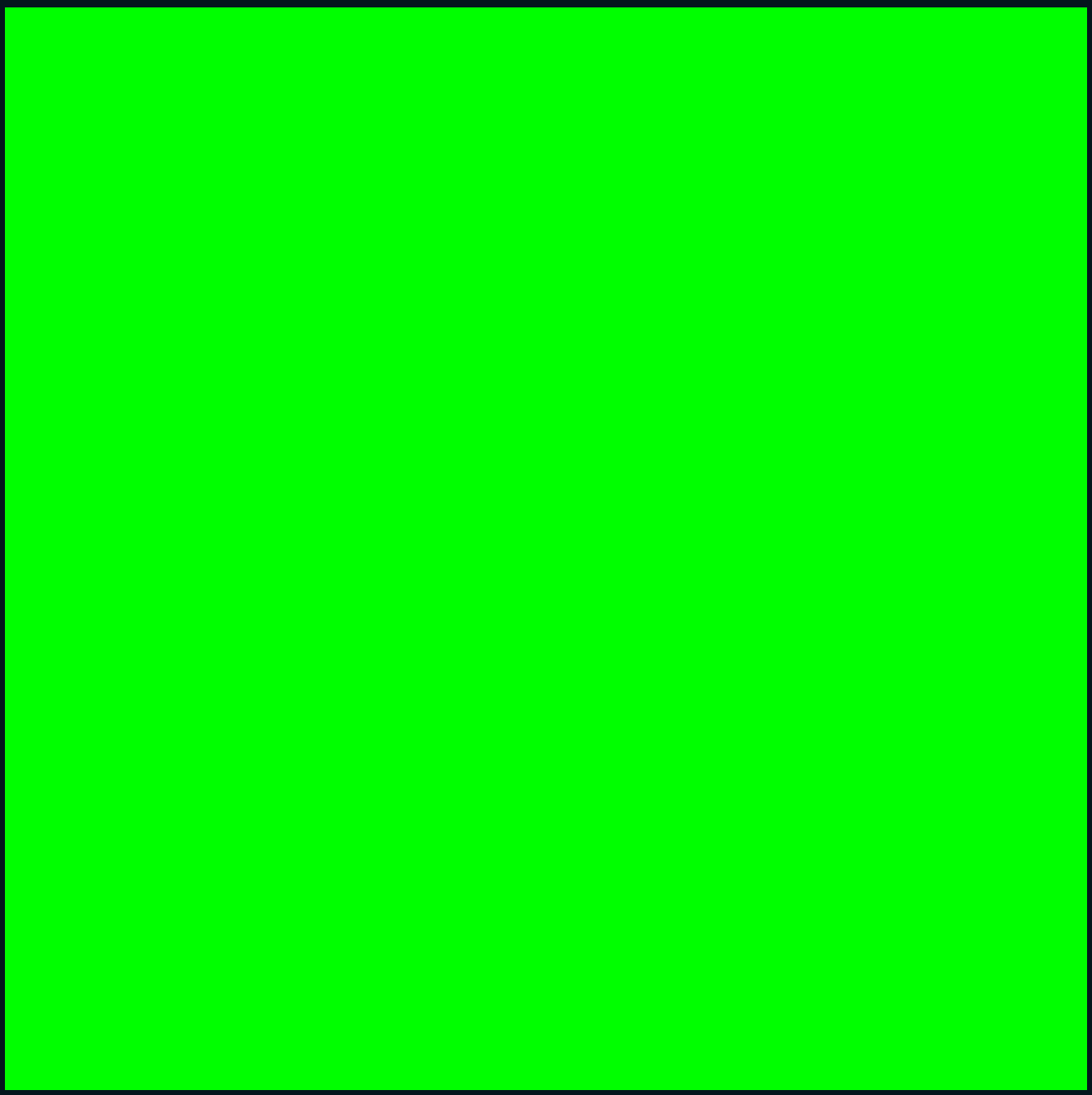

The Gigatonne Open Protocol

10 in 10

THE GIGATONNE OPEN PROTOCOL

VERSION 1.5.8
MAY 2022

INDEX

1. INTRODUCTION

1.1 WHAT IS THE GIGATONNE CHALLENGE?

THE GOAL OF the Gigatonne Challenge is to show how to reduce 1 gigatonne of CO_2e in one year. This is the figure that climate scientists have endorsed to effectively deal with the climate emergency the world is facing. With emissions rising steadily and showing no sign of peaking[1], the scientific community has indicated that pathways to limit global warming are getting significantly harder but are still possible. If we hope to stay within the carbon budget, we need a net reduction of emissions of at least 1 billion tonnes (a gigatonne) per year for the next 30-50 years[2].

The Gigatonne Challenge is a bold, bottom-up response[3] to the substantial undertaking of averting dangerous climate change. The goal is to demonstrate in practice how to reduce global emissions by one gigatonne of CO_2e[4] per year, thus contributing to keeping the global temperature rise well below 2°C, in line with the Paris Agreement[5].

1.2 GREENHOUSE EFFECT AND GLOBAL WARMING

THE GREENHOUSE EFFECT[6] is the process of heating the surface of Earth up into the troposphere. It occurs because of higher concentrations of carbon dioxide, water vapour, methane and other gases in the atmosphere. Sunlight typically heats up Earth's surface, and subsequently, the energy is reflected back to space in the form of infrared radiation. The greenhouse effect results from the concentrated gases absorbing the energy instead, thereby increasing the global temperature. Hence, the greenhouse effect and global warming are connected.

1.3 CAUSES OF GREENHOUSE GAS EMISSIONS

HUMAN ACTIVITIES HAVE led to an increase in greenhouse gas emissions leading to global warming. We are now facing weather extremes, including more extreme temperature shifts; increased incidence of hurricanes, flooding, wildfires, tornadoes, tsunamis,

1. UNEP, *The Emissions Gap Report 2018 (Nairobi: United Nations Environment Programme, 2018)*, http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf

2. Rogeli et al., "Mitigation pathways compatible with 1.5°C in the context of sustainable development" in *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, ed. Masson-Delmotte et al. (in Press), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf

3. The origins of this strategy lie in a strategy formation exercise conducted for the Climate Action Network (CAN) following the collapse of the climate negotiations in Copenhagen in 2009. See more in Zaid Hassan, *"Taking Disappointment Seriously – Strategy & the Climate Action Network in a post-Copenhagen World"*, Internal Report for CAN, 2010

4. CO_2e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints. It expresses the impact of different greenhouse gases in terms of the amount of CO_2 that would create the same amount of warming.

5. 2015: COP 21/CMP 11, Paris, France Main articles: *2015 United Nations Climate Change Conference* (https://en.wikipedia.org/wiki/2015_United_Nations_Climate_Change_Conference) and *Paris Agreement* (https://en.wikipedia.org/wiki/Paris_Agreement). The COP 21 was held in Paris from 30 November to 12 December 2015.Negotiations resulted in the adoption of the Paris Agreement on 12 December, governing climate change reduction measures from 2020. The adoption of this agreement ended the work of the Durban platform, established during COP 17.

and melting of ice sheets; as well as a rise in sea levels. Global emissions are continuing to rise and are currently projected to continue if nothing is done. The world is at the tipping point for climate change, with some scientists arguing that tipping points may have already been passed. This may lead to untold sufferings, extinction of more animal and plant species, and even human life may be under threat.

Several primary causes of greenhouse gas emissions including:

1. Burning of fossil fuels (coal, oil, gas, etc.)
2. Deforestation
3. Industrial agriculture and farming
4. Industrial waste and landfills
5. Depletion of the ozone layer
6. Air pollution
7. Acidification of water bodies

Historically, the majority of CO_2e emissions have come from the West. Despite this, the people who will suffer the most from the climate crisis are located in the Global South. However, in the future, emissions are expected to come more significantly from the Global South as China and India continue to grow[7].

For solutions to work at a global scale, there is a need to involve and benefit those communities who will be most impacted by the climate crisis. Working towards equity and benefiting marginalised communities[8], or the communities that will suffer more because of the changes, is central to the Gigatonne Challenge.

1.4 DEMAND FOR URGENT CLIMATE ACTION IS GATHERING MOMENTUM

THERE HAS BEEN a recent shift in the perception of the public as they have become more aware of the seriousness of the climate crisis, driven partly by the mobilization of young people by Greta Thunberg. This has led to increasing demand for immediate and effective action. In September 2019, an estimated 4 million people in 163 countries took part in the Global Climate Strike inspired by Greta Thunberg[9], launching a new cycle of global

The agreement will enter into force (and thus become fully effective) on 4 November 2016. On 4 October 2016 the threshold for adoption was reached with over 55 countries representing at least 55% of the world's greenhouse gas emissions ratifying the Agreement.

6. For one of the first accounts of the relation between coal and oil combustion and the concentration of CO_2 in the atmosphere, see Jack C. Pales and Charles David Keeling, "The Concentration of Atmospheric Carbon Dioxide in Hawaii," *Journal of Geophysical Research.* 70, no 24 (December 1965): 6053–6076, doi:10.1029/JZ070i024p06053. Charles David Keeling started the monitoring program at the Mauna Loa Observatory which has been recording the accumulation of CO_2 in the atmosphere since 1958 — as expressed in the Keeling Curve.

7. COP26 (31 October 2021 – 12 November 2021 in Glasgow) saw 197 countries meet for two weeks in Glasgow to agree on strategies to combat the world's biggest existential threat: climate change. The 26th edition of the Conference of the Parties, to give the event its full name, was the site of important progress on eradicating coal, electrifying transport, and convincing countries to join the fight.It fell short in a number of areas, with China, India, and the US all failing to recognise the devastating impact of a phenomenon which has already increased the global temperature by 1.1°C since pre-industrial times.

8. 'Unacceptable' inequity. The most recent report of the Intergovernmental Panel on Climate Change (IPCC) details the ongoing suffering, as "each increment of global heating" further increases the "frequency and intensity of extreme weather events," warned Mr Guterres. He said it was unacceptable that one-third of the world's people – living mainly in least developed countries (LDCs) and small island developing States (SIDS) – are still not covered by early warning systems. "In Africa, it is even worse: 60 per cent of people lack coverage." Retrieved from: https://news.un.org/en/story/2022/03/1114462

protest. People are demanding action from governments and corporations, but they are routinely met with vague reassurances and insufficient measures.

In the UK, a YouGov survey revealed that more than half the population supports total decarbonization of the economy by 2030, which is almost two decades ahead of the government's proposed timetable. This sense of urgency was recently reinforced by a stark warning endorsed by 11,000 scientists that the planet is "clearly and unequivocally" facing a climate emergency and immediate action is required to avoid "untold suffering"[10].

The world's climate and ecosystems are being hit harder and sooner than expected, and the risk of crossing critical tipping points is increasing.

9. Eliza Barclay and Brian Resnick, "How big was the global climate strike? 4 million people, activists estimate.", *Vox*, September 22, 2019, https://www.vox.com/energy-and-environment/2019/9/20/20876143/climate-strike-2019-september-20-crowd-estimate

10. William J Ripple, Christopher Wolf, Thomas M Newsome, Phoebe Barnard, William R Moomaw, "World Scientists' Warning of a Climate Emergency", *BioScience*, biz088 (November 2019), https://doi.org/10.1093/biosci/biz088

1.5 IMPACT OF GLOBAL WARMING IF RIGHT STEPS ARE NOT TAKEN

THE CLIMATE IMPACTS of atmospheric greenhouse gas levels are clear: the rise in global average temperature reached 1.1°C above pre-industrial levels in 2017 and is due to continue increasing at a rate of 0.2°C per decade.

The current level of political pledges to reduce emissions puts us on a trajectory of 2.9°C to 3.4°C global temperature rise by the end of the century. To meet the Paris target of 2°C, the scale and ambition of such efforts would need to triple[11]. Faced with the results of such inaction, public anger will continue to mount. The crowds of protesters will swell. However, without a feasible set of operational proposals, protests demanding government or policy action will likely fail to generate significant change[12].

In 2018, more than 16 million people had to leave their homes due to weather-related disasters, like typhoons, hurricanes, cyclones, floods, and drought[13]. By 2050, the number of climate refugees might reach between 25 million and 1 billion. The complex interplay between climate drivers of migration and societal responses makes this number unpredictable[14].

11. World Meteorological Organization (ed.), *United in Science.*

12. Micah White, *The end of protest: A new playbook for revolution* (New York: Knopf Canada, 2016).

13. "The global displacement landscape," *Global Report on Internal Displacement 2019, Internal Displacement Monitoring Centre*, accessed September 2019, http://www.internal-displacement.org/global-report/grid2019/

14. Oli Brown, "Migration and Climate Change", *IOM Migration Research Series no 31*, Switzerland: International Organization for Migration, 2008

Effective action requires a different understanding of the nature of climate change. It must be a global approach and be able to deal with complex situations. This is the intent of the Gigatonne Challenge.

1.6 SOLUTIONS

CURRENT EFFORTS UNDERTAKEN by governments are insufficient to address the scale and speed of the climate crisis. The current level of political commitments under the Paris Agreement puts us on a trajectory of 2.9°C to 3.4°C global temperature rise by the end of the century[15]. Such warming carries a significant risk of triggering tipping cascades of ice sheet melting, circulation changes, and biome loss that could turn the planet into an inhospitable place unable to accommodate more than 1 billion people[16]. However, the targets laid out in the Agreement still represent our best chance to curb emissions and limit warming. The need for new strategic responses to achieve these targets is now apparent.

Our goal is to reduce worldwide CO_2e emissions by 1 gigatonne per year for the next 10 years (and beyond). By doing so, we will achieve the desired result of both containing and reversing substantial changes to the global climate, in line with the Paris Agreement[17]. This is equivalent to 212 million passenger cars, or the entire African continent, and therefore it cannot be accomplished by a single individual or a single team located in one place. Consequently, we must form many teams worldwide and give them smaller targets that can be achieved within a given time.

Logically, if more teams are working, the targets will be smaller and easier to handle. It will also be more helpful if the teams are distributed globally. Since every region has its own demography, the problems are best understood by the people who live there, so local people will be in a better position to tackle the issues. Thus, they have better chances of success. Together, their activity will produce a global impact of 1 gigatonne per year.

The real strategic challenge is redesigning society. We have to move from a thought process in which natural systems are simply considered as fuel for our machines, to one in which the

15. World Meteorological Organization (ed.), *United in Science* (UN Climate Action Summit, 2019), https://public.wmo.int/en/resources/united_in_science

16. Oli Brown, "Migration and Climate Change", *IOM Migration Research Series no 31*, Switzerland: International Organization for Migration, 2008

17. 2015: COP 21/CMP 11, Paris, France Main articles: *2015 United Nations Climate Change Conference* (https://en.wikipedia.org/wiki/2015_United_Nations_Climate_Change_Conference) and *Paris Agreement* (https://en.wikipedia.org/wiki/Paris_Agreement). The COP 21 was held in Paris from 30 November to 12 December 2015.Negotiations resulted in the adoption of the Paris Agreement on 12 December, governing climate change reduction measures from 2020. The adoption of this agreement ended the work of the Durban platform, established during COP 17. The agreement will enter into force (and thus become fully effective) on 4 November 2016. On 4 October 2016 the threshold for adoption was reached with over 55 countries representing at least 55% of the world's greenhouse gas emissions ratifying the Agreement.

18. *"The point here is not that emissions don't matter. It is a call for a shift in priorities. On the policy level, we need to shift toward protecting and*

ecosystems we depend on, and are a part of, are protected[18, 19]. Our actions should also reflect this thought.

At the initial levels of the Challenge, teams will be trained and coached on how to reduce the required amount of CO_2e. Later on, we want this activity to also give them an opportunity to earn a living while they work on the climate crisis, effectively creating professional, efficient climate teams working consistently on carbon abatement. This will be an overall benefit for both members of the team and the local community as they do their part to tackle the global climate crisis.

Our starting point however is a current reality where unfortunately the notion of a "living planet" is an abstraction for most people. Our journey is then from the current abstraction of carbon as a framing to the reality of what it means to live on a healthy planet.

healing ecosystems on every level, especially the local. On a cultural level, we need to reintegrate human life with the rest of life, and bring ecological principles to bear on social healing. On the level of strategy and thought, we need to shift the narrative toward life, love, place, and participation. Even if we abandoned the emissions narrative, if we do these things emissions will surely fall as well."
— CHARLES EISENSTEIN / CLIMATE: A NEW STORY

19. Zaid Hassan, *"Notes on a Strategic Vacuum,"* October 19, 2011, https://www.roller.sg/s/Notes-On-A-Strategic-Vacuum.pdf

1.7 THE NEED FOR THE GIGATONNE PROTOCOL

OUR ROLE IS to build the social, operational, and financial infrastructure of the Gigatonne Challenge. We are expecting the number of Gigatonne Challenge teams to increase exponentially. The teams will need more significant support when they are in the training phase to learn the theory behind the Gigatonne Challenge and how to translate that into real, on-the-ground decreases in carbon output. As they become more established, we expect the needs of teams to shift, where the support they need will be expertise, infrastructure, and funding. As a result, there must be a simple, uniform approach to tap into this support available for all teams.

This need has led to the formation of this document, the Gigatonne Protocol, a core element of the infrastructure. It provides the operational requirements to become part of this strategic response, allowing Gigatonne teams to be self-organised by the public sector, private sector, or civil society. The Gigatonne Infrastructure will also include the process by which the teams deliver prototypes; a reporting tool to collect, audit, and share impact and performance data; and a Marketplace where teams can seek further funding once they meet the standards for higher levels of the Challenge.

1.8 THE PURPOSE OF THE GIGATONNE PROTOCOL

THIS PROTOCOL WILL specify a set of performance standards for teams to meet in order to become part of the Gigatonne Challenge, as well as to progress to higher levels of the Challenge. Teams will have access to support across a number of areas and each team's performance level, as defined by the Gigatonne Protocol, will decide the amount and types of support they are eligible to receive. Teams that do not meet requirements will be asked to repeat the same level before being able to move up to higher levels of the Challenge.

Teams can either be:

1. Formally recognized as Gigatonne Challenge teams; or
2. Independent teams that still meet Gigatonne requirements, and then decide what supports they want.

The Gigatonne Challenge's commitment is to share our learning in the public domain. This will help to support other such pathways that may not exist within the Gigatonne Challenge, but nonetheless are also working to make impacts on climate change. Teams that undertake the Challenge independently or through other pathways are welcome to make use of any knowledge, data, and resources that we make public.

1.9 THE FOUNDATION OF THE GIGATONNE PROTOCOL

THE GIGATONNE PROTOCOL builds on two sets of experiences:

- First, the two decades of experience in practice, iterating, and testing responses to complex challenges that is based on the work of the staff of 10-in-10, Complexity University, and the Gigatonne Challenge.
- Second, the knowledge and experience that comes from existing Gigatonne Challenge teams that have been working since 2020. As the number of teams participating in the Gigatonne Challenge grow, they will bring in evidence of what works and what does not work based on their experience.

1.10 DEVELOPMENT OF THE GIGATONNE PROTOCOL

THE GIGATONNE PROTOCOL is fundamentally based on practice, not just theory. It is therefore subject to peer review by the larger community. It is open to change and will become clearer, more detailed, and grounded as more and more teams reach higher levels of performance standards.

1.11 USE OF THE GIGATONNE PROTOCOL

THE GIGATONNE PROTOCOL is primarily designed to support internal Gigatonne Challenge teams, although as noted, independent teams can also make use of it. Meeting the requirements outlined not only provides access to the associated supports of the Gigatonne Challenge, but provides guidelines for teams to focus and measure the success of their activities. This is important, as it is a practice-informed method to measure the effectiveness of climate solutions across scope, scale, and equity.

2. PROTOTYPING

PROTOTYPING IS AT the heart of the Gigatonne Challenge. There are procedural standards outlined by this document that teams must meet for prototyping (see Glossary for definition).

Why prototype? It is in response to the need to change our approach in tackling complex problems, as in a changing world, we cannot have the same solutions for every situation and every time. The four domains that are suggested by us for prototyping in the Gigatonne Challenge are:

1. **FOOD WASTE REDUCTION** (ie. composting raw food waste, preventing it from going to landfill)
2. **GENERAL WASTE REDUCTION** (ie. recycling plastics, old clothes, etc.)
3. **ENERGY EFFICIENCY** (ie. buildings, construction, and industry offering opportunities for energy efficiency initiatives, such as tapping into alternate energy sources like wind energy and solar energy)
4. **TRANSPORTATION** (ie. improving efficiencies in urban transportation systems, such as changing from diesel /petrol vehicles to electric vehicles)

A common trap for teams less familiar with a prototyping approach that must be avoided is spending too much time preparing or planning. With more 'conventional' projects, teams often feel obliged to have a complete understanding and specification of all stories before moving ahead. In prototyping, teams should be prepared to move forward quickly with only those stories[20] in which they have confidence. They will be learning from experience by doing, and this will prepare them for the next iteration.

Performance standards are structured to recognise and allow for bottom-up, incremental skill development. This development will be facilitated by support from coaches and Gigatonne members. Training and coaching will be commensurate with performance levels.

The core processes employed within Gigatonne teams are

20. Stories: typically used to define requirements and convey a message. "Teams must deal with new information, which may produce additional tasks for a story. If the new information prevents the story from being completed during the iteration, then it should be carried over to a subsequent iteration. However, it should be prioritised against all remaining stories, as the new information may have changed the story's original priority." Retrieved from: https://www.wikiwand.com/en/Agile_software_development

currently based upon Theory-U and Agile methodologies (see Glossary).

Initially, teams within Levels 1 to 3 will operate in a sprint process, stepping up to a more comprehensive and formal scrum process from Level 4 upwards. More details on these processes will be provided throughout this document.

Through incremental development, prototypes have room to "fail often and early" throughout each iterative phase, instead of failing drastically at the end of a more typical planning-based process. Multiple iterations might be required to design a prototype or determine new features.

Several prototypes should be tried quickly — and discarded just as quickly when they do not work — to ensure teams have enough time to complete the abatement by the end of the timeframe. There should be strong support from coaches and they should encourage the teams to try different prototypes and multiple options. One major reason for failure in achieving objectives in this process is a lack of people doing the actual work on the ground. Team members should be prepared to dirty their hands and work on the ground, as it is practical work and the learning results from doing, not from planning or designing projects.

Additionally, teams must consider the full life cycle of their prototypes in order for their designs to be considered successful. For example, if the domain chosen is food waste composting, team members must realise that their responsibility does not end with the end of the sprint timeframe for that level. They have to take ownership of the composting process and follow it until the compost is produced; it cannot be allowed to go into the landfill. What they do with the compost eventually produced is also equally important and they must share that information as part of the Gigatonne reporting process, which will be detailed later in this document.

3. PERFORMANCE LEVELS

A. THE CHALLENGE

THIS DOCUMENT OUTLINES an operational specification for reaching a net greenhouse gas emissions reduction of 1 billion tonnes of CO_2e per year. This will contribute in keeping the global temperature rise well below 2°C in line with the Paris Agreement. We will focus on answering the questions of 'how' to reduce global greenhouse gas emissions, at the scale and pace required, and 'who' will deliver such reductions equitably.

B. THE THREE ELEMENTS OF THE CHALLENGE

WE SEE THE broader challenge of reducing global emissions as having three distinct targets – Abatement, Temporality, and Equity. These can be thought of as three equations that must be tackled simultaneously, or equally, that the Gigatonne Challenge stands on the tripod of Abatement, Temporality, and Equity. The first two targets are straightforward and discussed briefly below, while Equity (due to its complexity and importance) is discussed in greater detail further on in this section.

ABATEMENT: Any operational response to the climate crisis must aim to reduce emissions at sufficient scale to impact planetary warming; this scale is gigatonnes of CO_2e. The science is saying[21] that, in order to hit a 66% probability of limiting global heating to 2°C by 2100, global CO_2e emissions must drop from the current level of 53.5 Gt to 40 Gt by 2030 and then to about 20 Gt by 2050.

21. UNEP, *The Emissions Gap Report 2018*, 20

TEMPORAL: As emissions increase, the pathways to solutions that avert dangerous climate change get steeper and steeper. To stay within the 2°C scenario, emissions need to peak within the next 10 years[22] and decline at a constant rate of about 3.5 % per year until 2050[23]. If we fail to meet the temporal targets for peaking and annual gigatonne-scale reductions, the scientific consensus is that we will cross irreversible tipping points which risk catalysing runaway climate change.

22. Rogeli et al., *"Mitigation pathways,"* 96.

23. UNEP, *The Emissions Gap Report 2018*, 8

C. SEVEN PERFORMANCE LEVELS

THE GIGATONNE PROTOCOL defines seven Performance Levels (L1 to L7). For a team to obtain a particular level, the performance standard must be met (or exceeded) for each performance metric at that level, before teams are able to attempt the next level (and receive the increased supports that come with higher levels).

- All teams meeting requirements for L1 and up are eligible for **peer and process support**.
- All teams meeting requirements for L3 and up are eligible for **technical support**.
- All teams meeting requirements for L3 and up are eligible for **financial support**. Teams in L1 to L2 may be provided financial support on a case-by-case basis.

D. SUPPORT STRUCTURES

1. **COACHES:** team coaches will be there to provide structure and support to the members of the team. They will help your team and provide insights into your team's prototyping and impact reporting.
2. **THE GIGATONNE TEAM:** beyond your team's coaches, members of the wider Gigatonne Challenge network will be there to support you.

At L1 and L2, the primary focus is on training, initial practice, and team-building. The team structure has been kept simple at these levels in order to remove barriers to entry and allow teams to get started. It is expected that the teams will build multiple capitals (including team diversity) as they learn, gain experience, and progress to more advanced levels of the Challenge (for more on multiple capitals, please see section 4.7.1.)

3.1 LEVEL 1 (L1)

PURPOSE: To create and implement a prototype that results in 1 tonne of CO_2e abatement.

TIME PERIOD: 2 weeks

PROCESS: Sprint

MEMBERS: Ideally 8-10 team members. Maximum 15 and minimum 5 members, as it has been seen that it is difficult to achieve targets if the members fall to fewer than 5.

STANDARD: The team should be committed i.e., they should all stay the course of the 2 weeks, attend the scheduled meetings, participate in team activities, and diligently complete jobs entrusted to them.

FOCUS: Level 1 is primarily focused on training, early practice, and initial development and team-building of Gigatonne teams. Though there have been instances where the members have been in different locations, countries, and cities, it is helpful to be in the same geographical location to have more direct impact and cooperation. Having diversity in the team always helps, but at Level 1, it is not as important as higher levels, as this level is focussed more on learning the prototyping process and beginning to function as a team.

REQUIREMENTS: Level 1 is done with minimal formal reporting requirements (compared to subsequent levels), and informal equity and team architecture requirements. It is generally held within the container of the Gigatonne Challenge and coaches will guide the teams to meet the informal reporting requirements. However, the initial standard at this level is for any independent team to establish themselves as committed to achieving the target.

The formal requirements at Level 1 are:

REQUIREMENT 1.1
Abate 1 tonne CO_2e in 2 weeks.

REQUIREMENT 1.2
Create profiles for the members, as well as the overall team.

REQUIREMENT 1.3
Photographic reporting to showcase the process and scale of abatement, utilising methods such as (for food waste prototypes):

- photos of weighing scales;
- photos of containers/transportation of waste;
- photos of output e.g., compost pit, team activities;
- record of relevant numbers and calculations relating to abatement.

3.2 LEVEL 2 (L2)

PURPOSE: To create and implement a prototype that results in 10 tonnes of CO_2e abatement.

TIME PERIOD: 2–4 weeks

PROCESS: Sprint

STANDARD: The team should be committed i.e., they should all stay the course of the 2-4 week period, attend the scheduled meetings, participate in team activities, and diligently complete jobs entrusted to them.

FOCUS: Level 2 is focused on further strengthening the team developed in Level 1, while increasing the abatement from the initial prototype from 1 tonne to 10 tonnes — or creating new prototypes if that is not possible. Otherwise, the focus does not markedly change from L1.

REQUIREMENTS: Similar to Level 1, Level 2 is done with informal equity, architecture, and reporting requirements and generally held within the container of the Gigatonne Challenge with support from the coaches, though teams are expected to begin taking more responsibility for their data reporting, in preparation for the transition to Level 3.

The formal requirements at Level 2 are:

REQUIREMENT 2.1
Abate 10 tonnes of CO_2e in 2-4 weeks.

REQUIREMENT 2.2
- Update team and members' profiles,
- Submit details of ad-hoc actions like waste collection, waste transportation, and processed output (for more on CROI reporting and requirements, see section 4.7).

REQUIREMENT 2.3
Photographic reporting to showcase the process and scale of abatement (same as L1).

Beyond the L1 and L2 sprints, additional requirements and standards will be applied to the teams. These are discussed below in detail, beginning with Equity.

EQUITY PRINCIPLES, DATA, AND REPORTING STANDARDS

A. EQUITY PRINCIPLES

LEVEL 1 AND 2 are about learning to develop your prototype to address the abatement criteria and to build a strong team. Once a team successfully passes Level 2 and gets to Level 3, we require a formal Equity component to become part of the design of the prototype. It also gives teams a chance to redesign their prototype to adapt to the new requirement in L3 – that abatement targets become recurring.

Agile and Asana: From L3 on, we recommend using Asana, an online project management and collaboration tool. We will give access to all the team members and encourage them to use Asana.

Teams are required to use the agile approach which is discussed in more details in the Glossary. The benefit of this approach is that it empowers teams to make choices given that they are closest

to their local problems and context. It gives them the required flexibility to use more timely information in decision-making, especially in cases that are repetitive in nature.

Below are Equity Principles to help guide your process. Please read and discuss them with your coaches.

PRINCIPLE 1: *Equity is about fairness*.
At Level 3, 100 individual people must have been positively impacted or benefited by your prototype at the end of 3 months.

Examples: In our approach, we want to benefit those people who are the most impacted by the climate crisis – for example, through the creation of livelihoods like building composting systems, transportation, or maintenance. Paying for people to sort waste is another example because it is labour you are supporting. Supporting local businesses is another way — buying your materials, tools, or other supplies is also equity. Lastly, offering support that they might otherwise have to pay for i.e., food, a bicycle, free compost, etc.

PRINCIPLE 2: *Identify your primary beneficiaries.*

Example: When you design your prototype for Level 3, it helps to decide one group of people to benefit first – for example, school children, coconut vendors, or a community living close to a river. As a team, think of what benefits might help to positively impact the conditions and lives of these communities. Level 3 is where we begin to understand equity and begin implementing measurable impacts before applying them further in Level 4. The prototype should also be adding some kind of new equity benefit to communities. The targeted group must receive something additional to what they would have received without the team's intervention, in order for it to qualify as equity.

PRINCIPLE 3: *Local context matters.*
"Warm Data", or data that incorporates qualitative and relational factors (see Glossary for more detail), should be collected for understanding local context and setting standards for fair dealing.

Examples: As with Level 1 and 2, the Gigatonne Challenge encourages the capture of warm (or primary) data based on conversations the team will have with those impacted or involved - for example, speaking with labourers to find out what a fair wage is in the city or town you are working in and applying that as the baseline for payment; making sure you know the price of materials; or speaking with community members to understand if the equity you are offering will impact their lives. Based on this warm data, teams can design their prototype and confirm their budget.

Note: For level 1 and 2, teams are encouraged to collect warm data to assist prototype design, but only on an informal basis; equity performance and primary beneficiaries only formally become reporting requirements in L3.

PRINCIPLE 4: *Paying fair wages.*

Example: How much is fair to pay per person? How much money is enough to count as equity? This will range depending on local context. Our rule of thumb is to understand what a fair wage is for one day of work and use that as a basis to begin with. We also encourage you to gather warm data and ask those who you want to employ if they feel fairly compensated. Conversations with all stakeholders are important to create inclusion.

PRINCIPLE 5: *One "equity" benefit per person impacted.*

Example: At Level 3, we are prototyping the equity impact to understand what will work best for the community and assess how it will work in L4. If a single individual receives multiple benefits at Level 3, they are counted as one person. At Level 3, teams should have discussions with the communities they are seeking to benefit and get feedback on what types of equity will help.

PRINCIPLE 6: *We're not here to game or manipulate the system.*

Example: While designing prototypes, it must be kept in mind that it is a requirement to truly integrate all three elements of the Challenge – Abatement, Temporality, and Equity. It is not just a checklist to be completed.

B. DATA

ALL THE DATA that we ask for through the Gigatonne Reporting Tool will be protected according to General Data Protection Regulation (GDPR) compliance and standards in the UK, namely:

1. All personally identifiable data will be stored in an encrypted format.
2. Once a team exits the Gigatonne Challenge, personal identifiable data will be deleted.

In addition, we do not share that data with any third party without the consent of the team. With funding being provided to teams at Level 3, certain performance matrices are introduced and the teams must report back diligently on all three elements (Abatement, Temporality, Equity).

In conjunction with meeting these higher reporting standards, at Level 3, teams will automatically be added to the global Gigatonne Marketplace, which will require sharing of data (that is not personally identifiable, with the exception of photos) to increase funding. The more a team decides to share about their progress and journey, the more likely it is that a funder would want to contribute to the team's work.

C. REPORTING

THE MORE STRENUOUS reporting standards that come into play in Level 3 are detailed below.

Note: these are minimum requirements for the standards, so if there is bronze in one category while gold in others, the reporting standard is still considered as bronze.

There are 3 standards of reporting:

PARTICULARS	GOLD	SILVER	BRONZE
PHOTO PROOF OF EACH RECEIPT IS AVAILABLE FOR:	EACH TRANSACTION: WORTH > $20 TOTAL EXPENSES: > 90% OF BUDGET (E.G. $4500, WHERE BUDGET IS $5000)	EACH TRANSACTION: WORTH > $100 TOTAL EXPENSES: > 70% OF BUDGET (E.G. $3500, WHERE BUDGET IS $5000)	EACH TRANSACTION: WORTH > $250 TOTAL EXPENSES: > 50% OF BUDGET (E.G. $2500, WHERE BUDGET IS $5000)
ACCURACY OF WEIGHT REPORTING VS WEIGH SCALE PHOTO EVIDENCE • PHOTO OF THE WEIGHING SCALE SHOULD CLEARLY SHOW THE NUMBER AND IF POSSIBLE, IT SHOULD ALSO SHOW THE WASTE BEING WEIGHED (PARTIALLY OR COMPLETELY). • ALL OTHER PHOTOS	90% E.G. WEIGHT ENTERED 100KG WITH PHOTOS SHOWING 90KG OR MORE EVERY INSTANCE THE TEAM COLLECTS WASTE AND WEIGHS IT, THERE IS A PHOTO	40% E.G. WEIGHT ENTERED 100KG WITH PHOTOS SHOWING 40KG OR MORE 50% OF THE COLLECTED WASTE AND WEIGHING SCALE IS PHOTOGRAPHED	25% E.G. WEIGHT ENTERED 100KG WITH PHOTOS SHOWING 25KG OR MORE 25% OF THE COLLECTED WASTE AND WEIGHING SCALE IS PHOTOGRAPHED
STORYTELLING THROUGH PHOTOS:	MULTIPLE BEFORE/ AFTER PHOTOS OF EACH SITE – TRACKING MICRO PROGRESS THROUGH PHOTOS	1 BEFORE/AFTER PHOTO OF EACH SITE	NO BEFORE/AFTER PHOTO OF EACH SITE
INFORMATION* IN THE REPORTING TOOL IS UPDATED: **Partnership scores, volunteer numbers, equity, expenses & incomes, waste collection, transportation and processing – whatever is available*	AT LEAST ONCE EVERY WEEK ON A REGULAR BASIS	MORE THAN ONCE EVERY MONTH, BUT ON AN IRREGULAR BASIS	ONCE A MONTH

DATA QUALITY AND NUMBER OF MISTAKES/MISMATCHES EXAMPLES: • RECEIPT NOT MATCHING AMOUNT ENTERED; • WRONG INFORMATION ENTERED IN ANY FORM *##Photos should clearly indicate the information / story of what it is intended for, ie. doesn't show the backs of people, should be clear and well-lit, etc.*	DATA IS ACCURATE, ENTERED WITH DUE DILIGENCE; PHOTOS ARE OF GOOD QUALITY## AND PRESENTATION	DATA IS LESS ACCURATE, ENTERED WITH LESS DUE DILIGENCE; PHOTOS ARE OF AVERAGE QUALITY	DATA HAS LOT OF MISTAKES/ MISMATCHES; PHOTOS ARE OF LESS THAN AVERAGE/POOR QUALITY

3.3 LEVEL 3 (L3)

PURPOSE: Create and implement a prototype that results in abatement of 10 tonnes of CO_2e emissions every month.

TIME PERIOD: 3 months (300 tonnes of CO_2e for the period).

PROCESS: Sprint

PRIMARY BENEFICIARIES: 100

FOCUS: At L1 and L2, we built muscles around team dynamics and practiced reducing CO_2e in growing amounts. At L3, we continue to build our muscles by incorporating new practices to meet new requirements. At Level 3, the team will continue to use a sprint process, but must now take ownership of their team architecture.

REQUIREMENTS: At this stage, teams tend to be stronger and more organised, so requirements get more strenuous and significant. Teams must provide quarterly reports and implement at least the three **core stacks** to their organization, which are **Governance, Information**, and **Innovation** (please see section 4.6 for greater details on the stacks). They must also contribute to the Open Archive (see Glossary).

This level of the Gigatonne Challenge requires team prototypes to meet the targets for all three elements (**Abatement**, **Temporality,**

Equity). Additionally, teams are required to use the **Reporting Tool**, which is based on **Capital Return on Investment** (CROI). *It is important to note that teams at this stage may need a complete redesign of their L1 or L2 prototype, as their previous design may no longer be sufficient to meet the new targets.*

The team can request funding at this level, but the prototype is still the most important requirement. The team must design and deliver a prototype in the three-month period which meets the requirements for the three elements. If the prototype is approved, the team will be eligible for funding.

The formal requirements at Level 3 are:

REQUIREMENT 3.1
Abate 10 tonnes of CO_2e per month, for 3 months.

REQUIREMENT 3.2
Provide benefits to 100 people, including those from communities most vulnerable to the effects of the climate crisis.

REQUIREMENT 3.3
Organise team architecture around the 3 core stacks and capacity-building (see section 4.6 for details).

REQUIREMENT 3.4
Quarterly reporting through the CROI Reporting Tool and Open Archive contributions.

The information the team reports back will also be shared (with consent) on Gigatonne's public Marketplace website so that other donors might view what the team accomplished and how. These standards help donors understand the depth of information available. The more information a team is able to provide, the better a donor will understand their work on the ground.

3.4 LEVEL 4 (L4)

PURPOSE: Create and implement a prototype that results in 100 tonnes of CO_2e abatement every month.

TIME PERIOD: 6 months (600 tonnes CO_2e for the period)

PROCESS: Scrum

PRIMARY BENEFICIARIES: 1000

FOCUS AND REQUIREMENTS: The team must continue to intentionally develop their core stacks architecture, bringing in their own stacks as they see fit, and provide quarterly reports and Open Archive contributions. At this level, the team must also ensure it has representation horizontally and vertically across all three sectors, i.e. civil society, government, and business.

At this level, the team both requires — and should be able to facilitate — full-time commitment from some members of the core team. Additionally, this is also the first level where the team is also required to adopt a full Scrum process. Further explanation and links to resources for Scrum are in the Glossary of this document, but team coaches will also be able to explain it.

Level 4 teams will produce an annual abatement notable at the kilotonne (KT) scale, with two temporal cycles abating 1.2 KT of CO_2e.

The formal requirements at Level 4 are:

REQUIREMENT 4.1
Abate 100 tonnes of CO_2e every month for 6 months consecutively.

REQUIREMENT 4.2
1000 primary beneficiaries of the work.

REQUIREMENT 4.3
Organise team architecture around 3 core stacks and capacity-building, adding additional stacks as determined by the team.

REQUIREMENT 4.4
Horizontal and vertical representation across civil society, government, and business sectors, with part-time and full-time commitment from some team members.

REQUIREMENT 4.5
Quarterly reporting through the CROI Reporting Tool and Open Archive contributions.

3.5 LEVEL 5 (L5)

PURPOSE: Create and implement a prototype that results in 1000 tonnes of CO_2e abatement every month.

TIME PERIOD: 6 months (6000 tonnes CO_2e for entire period)

PROCESS: Scrum

PRIMARY BENEFICIARIES: 10,000

FOCUS AND REQUIREMENTS: Level 5 teams must continue to include members horizontally and vertically across all sectors, and will have full-time commitment from some in the core team. They will continue utilizing a scrum process and developing their core stacks, alongside providing quarterly reports and Open Archive contributions. A new requirement at this level is to undergo an assurance audit, a quality control process to ensure reporting reliability and accuracy.

Level 5 teams must produce an annual abatement notable at the kilotonne scale, with two temporal cycles abating 12 KT of CO_2e.

The formal requirements at Level 5 are:

REQUIREMENT 5.1
Abate 1000 tonnes of CO_2e every month for 6 months consecutively.

REQUIREMENT 5.2
10,000 primary beneficiaries.

REQUIREMENT 5.3
Organise team architecture around 3 core stacks and capacity-building, adding additional stacks as determined by the team.

REQUIREMENT 5.4
Horizontal and vertical representation across civil society, government, and business sectors with a mix of part-time and full-time commitment from team members.

REQUIREMENT 5.5
Quarterly reporting through the CROI Reporting Tool, Open Archive contributions, and an assurance audit.

3.6 LEVEL 6 (L6)

PURPOSE: Create and implement a prototype that results in 10,000 tonnes of CO_2e abatement every month.

TIME PERIOD: 6 months (60,000 tonnes of CO_2e for the period).

PROCESS: Scrum

PRIMARY BENEFICIARIES: 100,000

SECONDARY BENEFICIARIES: 100,000

FOCUS AND REQUIREMENTS: The team must continue to include members horizontally and vertically across all sectors, with full-time commitment from some in the core team, utilize a scrum process, and develop their core stacks, alongside providing quarterly reports, Open Archive contributions, and undergoing an assurance audit. Teams are also now required to track **secondary beneficiaries** as part of their Equity targets – people who benefit as a result of the primary beneficiaries being directly impacted (see section 4.3 for further details).

Level 6 teams will produce an annual abatement notable at the megatonne scale, with two temporal cycles abating 0.12 MT of CO_2e.

The formal requirements at Level 6 are:

REQUIREMENT 6.1

Abate 10,000 tonnes of CO_2e every month for 6 months consecutively.

REQUIREMENT 6.2
100,000 primary beneficiaries, 100,000 secondary beneficiaries.

REQUIREMENT 6.3
Organise team architecture around three core stacks and capacity-building, adding additional stacks as determined by the team.

REQUIREMENT 6.4
Horizontal and vertical representation across civil society, government, and business sectors with a mix of part-time and full-time commitment from team members.

REQUIREMENT 6.5
Quarterly reporting through CROI Reporting Tool, Open Archive contributions, and an assurance audit.

3.7 LEVEL 7 (L7)

PURPOSE: Create and implement a prototype that results in 100,000 tonnes of CO_2e abatement every month.

TIME PERIOD: 6 months (600,000 tonnes of CO_2e for the period).

PROCESS: Scrum

PRIMARY BENEFICIARIES: 100,000

SECONDARY BENEFICIARIES: 1,000,000

FOCUS AND REQUIREMENTS: The team must continue to include members horizontally and vertically across all sectors, with full-time commitment from some in the core team, utilize a scrum process, and develop their core stacks, alongside providing quarterly reports, Open Archive contributions, and undergoing an assurance audit.

Level 7 teams will produce an annual abatement notable at the Megatonne scale, with two temporal cycles abating 1.2 MT of CO_2e.

The formal requirements at Level 7 are:

REQUIREMENT 7.1
Abate 100,000 tonnes of CO_2e every month for 6 months consecutively.

REQUIREMENT 7.2
100,000 primary beneficiaries and 1,000,000 secondary beneficiaries.

REQUIREMENT 7.3
Organise team architecture around three core stacks and capacity building, adding additional stacks as required.

REQUIREMENT 7.4
Horizontal and vertical representation across civil society, government, and business sectors with a mix of part-time and full-time commitment from team members.

REQUIREMENT 7.5
Quarterly reporting through CROI Reporting Tool, Open Archive contributions, and an assurance audit.

4. PERFORMANCE METRICS

PERFORMANCE IS MEASURED across seven metrics, in which the required standard changes per level. Each metric is further detailed below.

4.1 TARGETS – ABATEMENT

THE ABATEMENT PERFORMANCE metric refers to the amount of CO_2e (measured in Tonnes of CO_2e) that each team must prevent from entering the atmosphere in order to meet each level within the protocol.

4.1.1 CARBON ACCOUNTING

THERE ARE THREE main considerations when accounting for CO_2e emissions:

1. **Local context matters.**
   • The team needs to understand what the current emissions levels are before they start action or intervention. This is called the *baseline*.
   • Baseline emissions are compared with the team's activity or intervention to abate CO_2e for calculating emissions.
   • The type of landfill also affects the calculation.

Example: If the team prevents food waste from going into landfill and composts it instead, then this will be considered CO_2e abatement done by the team. If food waste was already being composted before the team began its activity, then the team will not get credit for abatement. The basic idea is to understand what the intervention by the team has achieved.

2. Understanding the action or intervention's **scope of impact** and then calculating the emissions. i.e., emissions are to be calculated from the point in the life cycle of that item/process where an alternative is being introduced - e.g., if food waste is being composted instead of going to landfill, only the end-of-life emissions are being impacted. This means emissions should be calculated from the food waste stage to composting.

Since emissions from farming, storing, and transport from farm to market are not abated, they cannot be accounted for.

3. **Emissions** do not generally happen within the same year. However, owing to time factor and responsibility of abatement, we use the Mass Balance method (as per IPCC 1996 publication)[24] which calculates current year and future emissions, which is considered as abatement achieved by the teams. Teams are encouraged to use a further refined method/ tool which is more suitable with their prototype and context.

24. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook Volume 2. (1996). Intergovernmental Panel on Climate Change. Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/gl/invs5e.html

GIGATONNE WASTE COLLECTION TARGETS FOR ABATEMENT

Teams must determine the type of landfill where their waste is usually sent, in order to accurately calculate abatement; see below:

Sources: Wiego Tool
https://www.wiego.org/ghg

LANDFILL TYPE	DESCRIPTION
MANAGED	FOR LANDFILLS IN WHICH MAINTENANCE WORK IS PERFORMED REGULARLY.
UNMANAGED DEEP (>5M)	UNMANAGED LANDFILLS REFER TO INFORMAL WASTE DUMPS, WHERE NO MAINTENANCE WORK IS EVER PERFORMED. A DISTINCTION IS MADE BASED ON THE DEPTH/HEIGHT OF THE UNMANAGED LANDFILLS.
UNMANAGED SHALLOW (<=5M)	
UNSPECIFIED	OPTION THAT SHOULD BE SELECTED IF UNSURE ABOUT THE STATUS OF THE LANDFILL.
METHANE EXTRACTION	THESE ARE MANAGED LANDFILLS WHERE 100% METHANE EXTRACTION IS PERFORMED, AND IN WHICH THE METHANE PRODUCED THROUGH DECOMPOSITION IS CAPTURED.

FOOD WASTE

	WASTE COLLECTION TARGETS FOR EACH LEVEL			
LANDFILL TYPE	L1 (1t)	L2 (10t)	L3 (10t/m)	L4 (100t/m)
MANAGED	715 KG	7,150 KG	7,150 KG PER MONTH	71,500 KG PER MONTH
UNMANAGED DEEP (>5M)	893 KG	8,930 KG	8,930 KG PER MONTH	89,300 KG PER MONTH
UNMANAGED SHALLOW (<=5M)	1,786 KG	17,860 KG	17,860 KG PER MONTH	178,600 KG PER MONTH
UNSPECIFIED	1,191 KG	11,910 KG	11,910 KG PER MONTH	119,100 KG PER MONTH
METHANE EXTRACTION	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT

GARDEN WASTE

	WASTE COLLECTION TARGETS FOR EACH LEVEL			
LANDFILL TYPE	**L1 (1t)**	**L2 (10t)**	**L3 (10t/m)**	**L4 (100t/m)**
MANAGED	631 KG	6,310 KG	6,310 KG PER MONTH	63,100 KG PER MONTH
UNMANAGED DEEP (>5M)	788 KG	7,880 KG	7,880 KG PER MONTH	78,800 KG PER MONTH
UNMANAGED SHALLOW (<=5M)	1,576 KG	15,760 KG	15,760 KG PER MONTH	157,600 KG PER MONTH
UNSPECIFIED	1,051 KG	10,510 KG	10,510 KG PER MONTH	105,100 KG PER MONTH
METHANE EXTRACTION	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT

PAPER AND CARDBOARD WASTE (COMPOSTED)

	WASTE COLLECTION TARGETS FOR EACH LEVEL			
LANDFILL TYPE	**L1 (1t)**	**L2 (10t)**	**L3 (10t/m)**	**L4 (100t/m)**
MANAGED	268 KG	2,680 KG	2,680 KG PER MONTH	26,800 KG PER MONTH
UNMANAGED DEEP (>5M)	335 KG	3,350 KG	3,350 KG PER MONTH	33,500 KG PER MONTH
UNMANAGED SHALLOW (<=5M)	670 KG	6,700 KG	6,700 KG PER MONTH	67,000 KG PER MONTH
UNSPECIFIED	447 KG	4,470 KG	4,470 KG PER MONTH	44,700 KG PER MONTH
METHANE EXTRACTION	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT	NO ABATEMENT

4.2 TARGETS – TEMPORALITY

TEMPORALITY RELATES TO time limits. Temporal targets are therefore achieving the targeted end within a stipulated or given time. This is especially important for time-bound strategies or where we have limited time to achieve the result or end.

Temporal performance metrics refers to the timeframe within which the team must produce the relevant abatement in order to meet each level within the protocol.

The first two levels, which effectively function as introductory/ training levels, offer non-recurring timeframes. From Level 3 onwards, recurring abatement is necessary to progress.

In order to maintain the agreed time limit, teams can have a very short feedback loop and adaptation cycle. They can use simple coded questions like what they completed the previous day, what they aim to complete that day, and whether there are any impediments, challenges, or risks to progress. Detailed discussions and problem resolution may happen later.

4.3 TARGETS – EQUITY

THE EQUITY METRIC is measured by the **number of primary** (and later, **secondary**) **beneficiaries**.

Primary beneficiaries are those which the team directly assists.

Secondary beneficiaries are those which the **primary beneficiaries contribute to**.

Equity performance metrics come into play formally in Level 3 and continue in higher levels; this refers to achieving the abatement within a relevant timeframe, in a manner that proportionally benefits those most affected by the climate crisis and those in the team's locality (i.e. in a manner that is equitable).

From the beginning of Level 1, we want the prototypes we design to benefit the community around us. Our intent is to at least make the people around us aware of what we are doing and why — and to share the benefits with them. For example, if we are collecting food waste from neighbours for composting, we must tell them what we intend to do with the waste collected. We should let them know that we are doing this to abate CO_2e, which results in global warming if that food waste goes to the landfill, and we should offer to share the compost made with their food waste, if they want it. As a result, we are both making them aware of the larger problem of climate change, and giving them benefits. But at Level 1 and 2, formal measurements of these benefits are not required.

From Level 3 onward, formal measurement of **primary beneficiaries** is required. In the same vein, **secondary beneficiaries** may also be apparent with all levels of prototypes, ie. children gaining access to fresh vegetables because of local gardeners receiving compost

from food waste prototypes. However, formal measurement of secondary beneficiaries is only required for Level 6 and Level 7, the most advanced levels of Gigatonne.

The intention here is to first allow the teams to build competence and momentum in achieving abatement at scale and pace (Abatement and Temporality), then introduce the additional requirements around Equity once they have built a foundation.

4.4 TEAM

GIGATONNE TEAMS WILL be made of diverse people drawn from many different backgrounds, including people directly impacted by the challenge. The teams bring together people from local wisdom traditions, engineering schools, the financial sector, government agencies, and grassroots communities, both urban and rural.

Each team has a clear set of actions, team operating agreements, and a budget. They work over the period for each performance level, reporting and documenting their progress with an aim of iterating and improving their prototypes as they move forward.

The Team performance metric is split into two elements: one that recognises the need for diversity within any team in order to effectively respond to complex challenges; and the other that looks at the commitment level of team members.

4.5 PROCESS

THE GIGATONNE CHALLENGE is based on prototyping and structurally designed to avoid some of the features that might put it into the megaproject category. This removes some of the risks associated with projects of this size and cost. Key features include:

- **DISTRIBUTED TEAMS:** Teams will manage their own budgets. This means that they learn to operate within the given budget and timeframe, but are free from pressures that characterise more centralized projects.

- **MULTI-SECTORAL TEAMS:** As participants are drawn from multiple sectors, the culture of a single organisation or sector does not dominate.
- **OPERATIONAL CYCLES:** Operating cycles are broken down into smaller timeframes. This means that there is flexibility. It is also easier to make changes and pivot depending on results.
- **AGILE PROJECT MANAGEMENT:** Agile project management allows teams to learn, unlearn, and relearn scope. It provides an opportunity to learn as you do. As the prototype is tested quickly, changes can be made earlier, saving time and resources.
- **MULTIPLE PROTOTYPES:** As teams begin operating and go through multiple cycles, testing multiple prototypes, a probability model will emerge based on real experience and real data. The wider Gigatonne community will be able to look across an entire portfolio of abatement efforts to know what failure rates to expect and how operations would need to change in order to increase the odds of success.

4.6 ARCHITECTURE

THE ARCHITECTURE PERFORMANCE metric refers to the **core stacks** which allow a Gigatonne team to function effectively. Within each stack are the **spaces**, **relationships**, **communication,** and **collaboration** structures upon which they are based, and from which the team and processes can function. There is a base requirement for at least **three core stacks**: **Governance**, **Information**, and **Innovation**. There is also a strong suggestion for a **fourth Capacity stack**. As the teams gain experience, they can conceptualise their own additional stacks as they see fit.

Each stack will develop and become more formalised as the team progresses. At the lower performance levels (L1 and L2), many of the functions of each stack will be performed by team coaches, so there is only an informal requirement for stacks. From Level 3 up, the team will take formal ownership of the stacks and develop them independently.

The core stacks are:

4.6.1 GOVERNANCE

The Governance Stack focuses on ensuring key decisions are conducted in an accountable way like dealing with participation, fiduciary issues, etc. While the specific features of governance will vary depending on context, teams will be given a clear set of accountabilities and will need to determine their own roles, responsibilities, and decision-making processes for how to manage them. Support will also be provided as needed.

4.6.2 INFORMATION

The purpose of the Information stack is to manage data flows including:

1. Communicating up and down (to shareholders "above" and "below");
2. Communicating "across" to other Gigatonne Teams; and
3. Ensuring that a quarterly CROI report is submitted.

In practical terms, this will involve creating and managing an archive from which various information products can be created.

4.6.3 INNOVATION

The Innovation Stack is designed to support the operational cycles that generate prototypes. This includes functions such as facilitation, conflict resolution, as well as practical issues such as logistics and administration.

The optional stack is:

4.6.4 CAPACITY

The Capacity stack is designed to ensure that teams have the right capacities to deliver the work. This will range from helping to convene Gigatonne teams, to recruitment of specific skills required by the team, and finally to actual training and capacity-building.

4.7 REPORTING

THE REPORTING PERFORMANCE metric recognises an increasing need for oversight and also sharing amongst the wider Gigatonne community and beyond, as a team grows in scale.

As with the Equity metric, reporting is informal for L1 and L2, although L2 teams are expected to take on more responsibility for their reporting from their coaches, as part of the transition to L3.

From Level 3 upwards, quarterly reports and Open Archive contributions are required and teams are in charge of their own reporting. The additional requirement for an assurance audit comes in from Level 5 onwards.

4.7.1 CROI

MULTIPLE CAPITALS

CROI stands for **Capital Return on Investment.** The Gigatonne Challenge utilizes reporting on *multiple capitals* to calculate the performance of teams (rather than only financial capital).

The six capitals are: **Human, Social, Natural, Intellectual, Physical,** and **Financial**. These capitals that will be reported in the CROI Reporting Tool are not just for performance measurement, but a way to capture the team's story and show how the team generates and maintains value for their community. It also indicates where a team might need help.

HUMAN CAPITAL

For the success of the Gigatonne Challenge, it is important that the participants belong to diverse and multiple levels of the system – both horizontally diverse and vertically diverse, ideally encompassing everyone from community members to politicians. Participants also must include those who are directly impacted by the situation.

SOCIAL CAPITAL

Social capital depends upon relationship, trust, and equity in the

system. One of the core outputs from this strategy are multiple teams with the capabilities to respond to the climate crisis. When teams grow, they bring awareness to the communities around them. This leads to more radical behavioural change initiatives. The result is more systemic responses to the climate crisis through practical work that engages multiple stakeholders in actual emission-reduction efforts.

NATURAL CAPITAL

Benefits or needs that come from nature such as trees or cleaner air, as well as ways we help bolster these systems (ie. planting more trees, cleaning water bodies, preventing clearing of forests and the cutting down of trees).

INTELLECTUAL CAPITAL

The Gigatonne Challenge as a whole will generate multiple streams of data. We anticipate data coming from multiple levels; this may include:

1. Biographical Data *(ie. applications from teams & individuals to Seed Funds)*;
2. Performance Data from Teams *(quarterly CROI submissions)*;
3. Archival Data from Teams *(e.g. about their process or learnings)*;
4. Performance Data from Prototypes;
5. Contextual Data *(e.g. regulatory developments or policy data)*;
6. Transaction Data from the Marketplace.

We see this data as "warm data" because in a complex system, this data only makes real sense inside of a context. This contextual background provides a sharp contrast to "cold" data – that is, data that is generally viewed as being unrelated to context. We imagine that these data flows will feed multiple information "products" that will assist teams across the Gigatonne network with their prototyping to become more efficient, innovative, and successful.

PHYSICAL CAPITAL

Physical capital includes new products, services, or infrastructure.

FINANCIAL CAPITAL

The first source of funding for teams will be *Seed Funds* – funding that is designed to create cohorts (groups) of Gigatonne teams.

Potential teams, either formal or informal, apply to each fund. Seed funds will focus geographically (ie. eligible teams are required to be based in any Indian city with a population of 1M+ people). There is also a potential for seed funds to be sector-focused.

The other major source of financial capital for Gigatonne teams will be the Gigatonne Marketplace, described below.

4.7.2 THE GIGATONNE MARKETPLACE

ONCE A TEAM enters L3, their profile goes live on the **Gigatonne Marketplace**, a place where possible donors/investors can select teams to fund. Currently, the funding process is still offline.

The capitals described above have been assigned a qualitative score that provides the 'health' status of different capitals for the team, calculated based on the data they've submitted. For each type of capital, red (or alpha) indicates a team at the most basic form of action for that capital, yellow (or beta) is the middle level, and green (or gamma) indicates a team excelling in that area of capital. This will allow potential donors and investors to easily determine how teams are performing across all six capitals being measured.

For each level of the Challenge, there are a set of actions that can be used to determine the health of each of the team's six capitals. Actions will differ based on the domain of the prototype (food waste, transport, etc.) Example of such actions taken from the food waste domain are:

- **ALPHA ACTION (RED):** collection and transportation of waste *(physical capital)*
- **BETA ACTION (YELLOW):** adding a new team member *(human capital)*
- **GAMMA ACTION (GREEN):** using zero-emission transport *(natural capital)*

4.7.3 THE REPORTING TOOL

TO CALCULATE RETURNS on multiple capitals for teams that have reached L3 and beyond, a CROI Reporting Tool has been developed where teams update a variety of metrics, information, and proofs to further corroborate the story of their prototypes and sprints, as they go through the levels.

The reporting requirements increase based on performance levels. Please check the reporting requirements under each level for further information.

The CROI Reporting Tool is intended to be a practical way to measure and evaluate performance standards, while collecting and generating real-time, shared data, so that investors can have confidence that teams are delivering a return on investment.

The reporting tool works on the following methodology:

STEP 1: ESTABLISH A BASELINE OF CROI EXPECTATIONS – At the start of each operational cycle, teams will be required to make a subjective assessment of their capability to generate impact in each of the six areas. The baseline will be captured via an online platform, where teams can track and compare their assessments.

STEP 2: QUARTERLY ASSESSMENT OF CROI – Teams do a quick review of their assessments and update their performance per quarter, based on the actual impact achieved since the baseline workshop. There will be a series of metrics relevant to each type of capital to record objective performance. A key aspect of the framework is ensuring a focus on usability for the teams — providing them with a straightforward way to capture data against each of their metrics. This will be done via an online dashboard or mobile application.

STEP 3: GENERATING A "CONFIDENCE SCORE" – The deviation between subjective and objective assessments will be used to create a 'Confidence Score', which will enable teams to be ranked relative to each other.

CROI EVALUATION: Once a CROI Baseline Evaluation has been run, an Evaluation Report can be generated. Quarterly evaluations will

generate a picture of how the team is performing.

CROI RANKING: Once CROI evaluations are run for multiple teams, a scorecard could be generated – for example, ranking teams by Gold, Silver, or Bronze ratings.

CROI TRACKING: Teams will eventually establish a performance track record, allowing donors and investors to see how effective teams have been over time.

4.8 TEAM ASSESSMENT

THE PRIME PURPOSE of the Gigatonne Challenge is to support, train and fund teams across the world. We believe "the team is the innovation " – in that developing teams that are empowered to effectively address their local problems is the most important part to finding innovative solutions to complex challenges. The heart of 'assessment' is therefore not a compliance check or an activity audit, but a comprehensive evaluation of teams and their ability to ultimately reach Level 7 of the Challenge, as well as how Complexity University can support and train teams through the levels.

This guide should be followed to decide how the teams should be assessed. If a team performed well in the qualitative aspect, but fell short of the technical aspect, they may be asked to repeat the current level. However, a lack in the qualitative areas will require decisions on how best to support the team to learn the process.

Below are the aspects to be considered for the first three levels of the Challenge, when teams are in the earlier training and learning stages. The process by which this information is collected may be varied – for example, qualitative assessments by coaches are one of the most important parts of assessing teams and where they might need help.

LEVEL 1

L1 assessment after sprint:

1. Technical assessment
   a. Abated 1t of CO_2e in 14 days
   b. Informal Reporting (as per L1 reporting guidelines)
      i. Reporting in the format shared by coaches
      ii. Quality and number of photos shared
2. Qualitative assessment
   a. 'Getting their hands dirty'
      i. Members actively got on the ground and performed necessary actions to complete the targets
   b. Prototype (as per the prototyping guidelines)
   c. Participation and commitment of members

LEVEL 2

L2 baseline assessment:

1. Initial prototype should have the ability to achieve Level 2 targets of abatement
2. Time commitment of team members

L2 assessment:

1. Technical aspect
   a. Abated 10t of CO_2e in 2-4 weeks
   b. Informal Reporting (as per L2 reporting guidelines)
      i. Frequency of reporting
      ii. Quality and number of photos shared
2. Qualitative aspect
   a. Team dynamics
      i. Resolving conflicts, communication, honouring team agreements, proactiveness
      ii. Number of active team members
   b. Prototype (as per the prototyping guidelines)

LEVEL 3

L3 baseline assessment:

1. Team's understanding and definition of equity in their prototype
2. Initial prototype should have the ability to achieve Level 3 targets of equity and abatement
3. Time commitment of team members

L3 assessment:

1. Technical aspect
   a. In 3 months
      i. Abated 30t of CO_2e
      ii. Benefitted (financial or in-kind) 100 distinct, 'local' and most vulnerable individuals
   b. Formal CROI reporting
      i. Frequency of reporting
      ii. Quality and number of photos shared
      iii. Performance in six capitals
2. Qualitative aspect
   a. Team dynamics
      i. Resolving conflicts, communication, commitment to increasing diversity, honouring agreements, onboarding new members, work allocations, task management, proactiveness
      ii. number of active team members becomes critical
   b. Prototype (as per the prototyping guidelines)
      i. Including whether and how the team was able to make their prototype efficient to achieve L3 targets

5. SUPPORT

BASED UPON THE performance metrics and standards, once a team has achieved a certain performance level, it becomes eligible to apply for support in line with that performance level.

Initially, for internal Gigatonne Challenge Teams, the support will take a more structured, prescriptive approach. This approach is based on previous experience with effective responses to complex challenges, as well as initial work on the Gigatonne Challenge. It has been practically demonstrated what sort of support teams at different levels need to be successful. As teams progress up the levels, their needs will become clearer and teams themselves will be able to define and state what support they need. This will also coincide with an increase in a team's budget, which the team will be able to employ in order to commission increased support (although a base level of support will always remain).

Support will be facilitated by or through Complexity University, in the form of plenaries or discussions, provision of coaches, arranging connections with external agencies or experts, or arrangements as established with individual teams.

5.1 SUPPORT AREAS

THE GIGATONNE PROTOCOL defines four areas in which support is available.

5.1.1 PEER

PEER SUPPORT COMES in multiple forms: peer team feedback and the Open Archive.

From within the Gigatonne Challenge, peer team feedback from teams on the same level is woven into the structure of the Challenge. For independent teams, peer team feedback from other teams can be arranged. In both scenarios, it offers reciprocal, mutually beneficial opportunities to see into other teams' prototypes and methods, and offer feedback to them, as well as

receive feedback on your own prototypes and activities.

Additionally, membership of the Gigatonne Community provides access to the Open Archive, effectively facilitating indirect peer support, through insight into other prototypes and their outcomes, with contact details available for direct support if desired and with consent from other teams.

5.1.2 PROCESS

PROCESS SUPPORT IS used here as a 'catch-all' phrase to encompass all elements of running a successful Gigatonne team. The form this support takes will depend on the level a team has reached, and the specific requirements of that team. For instance, teams at Level 1 will be learning the foundations of working on complex challenges and how to operate effectively in that environment; within the Gigatonne Challenge, this is facilitated through plenaries that introduce new material and concepts, and coaches who facilitate the team in starting their practice. In comparison, Level 3 teams, which have a grounded understanding of the foundations of operating within complexity, will need to further foster their understanding of the core elements of action as they develop their teams' diversity, begin shifting to a scrum process, and take ownership of their core stacks and architecture.

5.1.3 TECHNICAL

THIS REFERS TO support with the technical elements of team prototypes across the spectrum of scale, scope, and equity. This can either be derived from the body of knowledge and experience that exists within Complexity University and the Gigatonne Community already, or by connecting with external sources, if required, for a particular prototype.

5.1.4 CAPITAL – FINANCIAL

FINANCIAL SUPPORT IS considered within two streams: the scale of the support, and the mechanism by which it is made available.

5.2 SUPPORT AVAILABLE

THE TABLE BELOW provides an overview of the support available at each performance level.

	PEER	PROCESS	TECHNICAL	FINANCIAL – SCALE	FINANCIAL – MECHANISM
LEVEL 1	YES	YES	NO	CASE SPECIFIC	FEE PAID
LEVEL 2	YES	YES	NO	CASE SPECIFIC	FEE PAID
LEVEL 3	YES	YES	YES	$2K/MONTH	SERVICE CONTRACT/PARTNERSHIP
LEVEL 4	YES	YES	YES	$10K / MONTH	SERVICE CONTRACT/PARTNERSHIP
LEVEL 5	YES	YES	YES	$100K/MONTH	SERVICE CONTRACT/PARTNERSHIP
LEVEL 6	YES	YES	YES	CASE SPECIFIC	SERVICE CONTRACT/PARTNERSHIP
LEVEL 7	YES	YES	YES	CASE SPECIFIC	SERVICE CONTRACT/PARTNERSHIP

GLOSSARY

ABATEMENT: to reduce in value or amount.[1]

AGILE METHODOLOGIES: Agile is an iterative or repetitive and incremental process that works well for managing projects in situations of complexity where you don't know what the final outcome will look like.[2] It is well-suited to Gigatonne teams for this reason. Agile encourages a process of continuous improvement, both to the process and to the 'product' – which in Gigatonne is the prototypes – through short bursts of activities (sprints) with plenty of time built in to review and reflect. This approach has its roots in software development.[3] There are a few 'agile' methodologies, but the one utilized by the Gigatonne Challenge is called scrum (see below in Glossary).

AGILE PROJECT MANAGEMENT: borrowing from complex software development, agile project management is a flexible methodology suited to operating in situations of complexity and emergence. This methodology is iterative and allows for emergent tasks — ensuring that teams are able to meet the shifting nature of the challenge they are working on. One of the intended benefits of an agile approach is to empower the team to make choices, as they are closest to the problem. Additionally, they should make choices as close to implementation as possible, to use more timely information in the decision.[4]

CROI: Capital Return on Investment. Please see section 4.7 for a complete explanation.

DASHBOARD: a page that shows the analysis of the application's data, trends, summaries etc; a visual display of all of your data. While it can be used in all kinds of different ways, its primary intention is to provide information at-a-glance, such as Key Performance Indicators (KPIs, see below).

GREENHOUSE EFFECT: the process of heating of the surface of Earth till the troposphere. It happens because of higher concentration of carbon dioxide, water vapour, methane and other gases. Sunlight heats up Earth's surface, and subsequently, the energy is reflected back to space in the form of infrared radiation. In

1. Retrieved from: https://www.merriam-webster.com/dictionary/abate

2. See https://www.atlassian.com/agile for more on Agile.

3. Retrieved from: https://social-labs.org/managing-complexity/

4. Retrieved from: https://www.roller.sg/services/lab-cycles

the greenhouse effect, the concentrated gases absorb the energy, thereby increasing the global temperature. Hence, greenhouse effect and global warming are correlated.

ITERATION: Iterations, or sprints, are short time frames (timeboxes) in scrum processes during which a specific amount of work is completed.[5] Iterations typically last from one to four weeks and are usually repeated or done again and again to improve. In software development, each iteration involves a cross-functional team[6] working in all functions: planning,[7] analysis,[8] design,[9] coding,[10] unit testing,[11] and acceptance testing[12]. At the end of the iteration a working 'product' is demonstrated to stakeholders. This minimizes overall risk and allows the product to adapt to changes quickly.[13]

KEY PERFORMANCE INDICATOR: a measurable value that demonstrates how effectively a company is achieving key objectives. Organisations use KPIs to evaluate success at reaching targets. High-level KPIs may focus on the overall performance of the business, while low-level KPIs may focus on processes across departments like sales, marketing, HR, or support.[14]

MASS BALANCE: also called a material balance, an application of conservation of mass to the analysis of physical systems. By accounting for material entering and leaving a system, mass flows can be identified which might have been unknown, or difficult to measure without this technique. The exact conservation law used in the analysis of the system depends on the context of the problem, but all revolve around mass conservation, i.e., that matter cannot disappear or be created spontaneously. Therefore, mass balances are used widely in engineering and environmental analyses.[15]

OPEN ARCHIVES: Open access repositories where the electronic versions of publications and, in some cases, data obtained from scientific research, can be deposited. Most open archive servers are based on the self-archiving principle: the scholarly articles are deposited in these repositories by the researchers themselves before or after publication, to be archived and, if all goes well, disseminated. The content of these archives is described in compliance with a protocol that provides for the harvesting by

5. See:https://en.wikipedia.org/wiki/Timeboxing

6. See: https://en.wikipedia.org/wiki/Cross-functional_team

7. See: https://en.wikipedia.org/wiki/Project_planning

8. See: https://en.wikipedia.org/wiki/Requirements_analysis

9. See: https://en.wikipedia.org/wiki/Software_design

10. See: https://en.wikipedia.org/wiki/Computer_programming

11. See: https://en.wikipedia.org/wiki/Unit_testing

12. See: https://en.wikipedia.org/wiki/Acceptance_testing

13. Retrieved from: https://thinktribe.com/faqs/what-is-agile-development/

14. Retrieved from: https://www.klipfolio.com/resources/articles/what-is-a-key-performance-indicator

15. Retrieved from: https://en.wikipedia.org/wiki/Mass_balance

16. Retrieved from: https://formadoct.doctorat-bretagneloire.fr/open_archives

other servers and facilitates indexing in search engines. This protocol is the OAI-PMH protocol (Open Archive Initiative - Protocol for Metadata Harvesting). Open archives can be used to identify, find, disseminate, highlight, promote and monitor the scientific output of researchers. Since they are open, they make the work of researchers more easily available to the national and international community. They also speed up scientific cooperation and strengthen the impact of the deposited article.[16]

PROTOTYPING: in Agile development methodologies, refers to "an early sample, model, or release of a product built to test a concept or process or to act as a thing to be replicated or learned from."[17] In the context of the Gigatonne Challenge, this means a series of activities undertaken to abate CO_2e that can be quickly tested through trial and error in a local context and that is allowed to fail. Prototypes can then be repeated, adjusted, and scrapped, or new prototypes can be attempted until a design succeeds at abating the level of CO_2e (and at higher levels, achieving equity targets) necessary to progress to more advanced levels of the Challenge.

17. See: https://www.atlassian.com/blog/agile/agile-design-prototype

STAND-UP: in Agile processes, a daily progress meeting, traditionally held within a development area. The term "stand-up" is derived from the way it is run as all attendees must remain standing to keep it short and the team engaged.[18]

18. Retrieved from: https://www.techtarget.com/searchsoftwarequality/definition/stand-up

SCRUM: a lightweight framework that helps people, teams and organizations generate value through adaptive solutions for complex problems.[19] Originally designed for software development but increasingly used to intervene effectively in other complex systems, Scrum utilizes teams with members who have specific roles (such as ScrumMaster), as well as sprints, iterations, and prototyping processes in order to develop solutions to complex challenges. For more detail on Scrum as a process, see Scrum Guides.[20]

19. Retrieved from: https://www.scrum.org/resources/what-is-scrum

20. See: https://scrumguides.org/

SCRUM MASTER: the leader and coach of a scrum team, who is responsible for ensuring that the team abides by the values and practices of the Scrum process, as well as the process owner, who assists the team in ensuring they are performing at their highest level, such as facilitating meetings and helping team members work through barriers.[21]

21. See: https://www.mountaingoatsoftware.com/agile/scrum/roles/scrummaster

SPRINT: a set period of time during which specific tasks must be completed.

STORIES: similar to use case[22] descriptions, stories (in the context of Agile development processes) are typically used to define requirements and convey a message. Teams must deal with new information, which may produce additional tasks for a story. If the new information prevents the story from being completed during the iteration, then it should be carried over to a subsequent iteration. However, it should be prioritised against all remaining stories, as the new information may have changed the story's original priority.[23]

STRATEGY: A plan of action designed to achieve a long-term or overall aim. While strategy is the action plan that takes you where you want to go, tactics are the individual steps and actions that will get you there.[24]

TACTIC: the specific actions taken to enact a strategy; actions carefully planned to gain a specific end, showing adroit planning and aiming at an end beyond the immediate action.[25]

TEMPORAL: Of or relating to time. A temporal target will mean achieving the targeted end within a stipulated time. This is especially important for time-bound strategies or where we have limited time to achieve the result or end.

THEORY U: Developed by Otto Scharmer and "building upon two decades of action research at MIT, the process shows how individuals, teams, organizations and large systems can build the essential leadership capacities needed to address the root causes of today's social, environmental, and spiritual challenges."[26] It suggests that society should get to "ecosystem awareness"-driven forms of cooperation, and Scharmer refers to this process as the "journey of the U". The U-Process is based on a belief that there are multiple ways of coping with highly complex problems, some more successful than others. On that journey at the bottom (visualized as a U) lies an inner gate that requires us to drop everything that isn't essential. This process of letting-go (unlearning) and letting-come (learning) establishes a subtle connection to a deeper source of knowing, allowing for effective

22. Retrieved from: https://en.wikipedia.org/wiki/Use_case

23. Retrieved from: https://www.wikiwand.com/en/Agile_software_development

24. Retrieved from: https://asana.com/resources/strategy-vs-tactics

25. Retrieved from: https://www.rampfesthudson.com/what-is-the-definition-tactic/

26. Retrieved from: https://www.presencing.org/aboutus/theory-u

27. For more, see Scharmer, C.O.(2016). *Theory U: Learning from the future as it emerges.* Oakland, CA: Berrett-Koehler Publishers

leadership on social challenges.[27]

WARM DATA: information about relationships and connections that integrate elements of complex systems; includes qualitative dynamics and contextual aspects that create a different dimension of understanding of systems as compared to more conventional quantitative "cold" data which is often disconnected from context. Such data (for instance, when only utilizing statistical analyses) that does not consider interrelationality often misses important aspects of complex systems, which can lead to system interventions that are uninformed or misinformed, potentially damaging systems. As a result, utilizing warm data leads to more effective responses to complex systems. [28]

28. Adapted from: https://batesoninstitute.org/warm-data/