NET ZERO INITIATIVE

A FRAMEWORK FOR COLLECTIVE CARBON NEUTRALITY

carbone 4

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CARBONE 4 THANKS ITS PARTNER COMPANIES, ALL THE MEMBERS OF THE SCIENTIFIC COUNCIL, AS WELL AS THOSE WHO CONTRIBUTED DIRECTLY AND INDIRECTLY TO MAKE THE OBJECTIVE OF CARBON NEUTRALITY MORE CREDIBLE.

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APRIL 2020

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THE PRIVATE SECTOR'S "CARBON NEUTRAL" OR "NET ZERO" COMMITMENTS ARE MULTIPLYING; THESE ARE PRESENTED AS AN APPROPRIATE RESPONSE TO HALT GLOBAL WARMING AND ECOLOGICAL DEGRADATION, WHICH ARE BOTH ACCELERATING BEFORE OUR VERY EYES. YET, THERE IS NO SHARED DEFINITION OF WHAT CONSTITUTES A COMPANY'S NEUTRALITY, DESPITE THE FACT THAT THERE ARE STRONG STATEMENTS FROM THE NON-STATE SECTOR TO ACT CONSISTENTLY WITH SCIENCE. CARBONE 4, THROUGH THE NET ZERO INITIATIVE PROJECT, PROPOSES TO GIVE THIS CONCEPT A NORMATIVE DEFINITION, THAT COMBINES AMBITION, TRANSPARENCY AND EFFICIENCY.

UNDERSTANDING CARBON NEUTRALITY

GLOBAL CARBON NEUTRALITY IS THE ONLY ONE THAT IS RIGOROUSLY DEFINED BY SCIENCE

Science defines global carbon neutrality as a balance between anthropogenic CO_2 emissions and anthropogenic CO_2 removals. Removing as much CO_2 annually as the emissions that are produced is the only way to stop the build-up of CO_2 in the atmosphere, and thus stabilize the temperatures later on. In order to meet the 2°C or 1.5°C objectives, the realization of global carbon neutrality must be achieved by the middle of the century. In addition, to comply with the Paris Agreement, we must not only achieve this "net zero carbon" objective early on, but also reduce emissions of other greenhouse gases fast enough. In the IPCC's definition, "carbon neutrality" and "net zero" mean the same thing.

To achieve global carbon neutrality, human societies must act on two major fronts:

THE REDUCTION OF EMISSIONS

CO_2 emissions of fossil fuel origin and from deforestation [2]

THE INCREASE IN SINKS

Afforestation/reforestation, agricultural practices and technological solutions

In view of the effort required, both in terms of reducing emissions and increasing the removals, achieving global carbon neutrality will necessarily have to go hand in hand with profound and radical socio-technical transformations. Carbon neutrality is a breakthrough concept.

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[1] IPPC 1.5°C Special Report (2018) : « *Net zero carbon dioxide (CO_2) emissions are achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removals over a specified period. Net zero CO_2 emissions are also referred to as carbon neutrality.* »

[2] To be more precise, it is about reducing CO_2 fossil fuel emissions, from industrial activities, and coming from the land sector (land use, land use change, forestry). To be consistent with the 2°C/1,5°C targets, other GHG emissions will also need to decrease at a rapid pace.

"COMPANIES' CARBON NEUTRALITY": THE BIG BLUR

Today's demands for neutrality in the corporate world are essentially based on a process of three theoretical steps: **"Measure, Reduce and Offset"**. Within this framework, "carbon neutrality" can be achieved each year, by immediately "cancelling out" (or "offsetting") an organization's emissions through the purchase of "carbon credits".

But this reasoning suffers from many limitations, both theoretical and practical. First of all, the **scope** of the emissions taken into account may overlook the most significant emissions' sources in which the company's activities depend on. Secondly, the ambition of the targeted **reduction** is rarely compatible with the 3% to 7% per year reduction in global emissions required to comply with the Paris Agreement. Finally, the very idea of "**offsetting**" is based on physically questionable principles (for example, the equivalence postulate between a reduction at the source and the purchase of carbon credits; or between *certain* and *immediate* emissions, and *presumed* and – in some cases – *future* reductions/removals, etc.) and induces a psychological bias on the part of the credit buyers (the belief in the possibility of "cancelling out" the climate problem at a little cost, etc.). Finally, there is one sole label being used, "carbon neutral", which is used for private initiatives which have very different ambitions; this leads to counterproductive leveling-down.

In general, there are other limitations in defining carbon neutrality as a static and individual state at an organizational level, including:

- The possibility of achieving "zero net emissions" each year **makes the evolution of actual greenhouse gas emissions over time invisible**, which does not encourage the organization to implement effective actions to reduce emissions at source.
- Since anthropogenic emissions far exceed the amount of "offsets" available worldwide, **this concept is not universally applicable** and therefore cannot be considered a viable solution on a large scale.
- This implicitly conveys the message that the el**imination of "climate risk" depends only on a set of accounting entries** ("offsetting"), which actually anaesthetizes the contributors and slows down their creativity when faced with the problem that needs to be solved.

In short, the concept is not successful. The idea of "corporate neutrality" that can be achieved through offsetting is not capable of triggering concrete action which is up to the challenge. Thus, there is an urgent need to change this concept, in line with the effort to align corporate action with the imperatives of climate science initiated at the COP21; and to **offer organizations a reference framework for action on carbon neutrality that is proportionate with the global challenge**.

THE NECESSARY RECONNECTION OF "CORPORATE NEUTRALITY" WITH THE OBJECTIVE OF GLOBAL NEUTRALITY

To achieve this, two paradigm shifts are needed:

1. A COMPANY IS NOT CARBON-NEUTRAL: IT *CONTRIBUTES* TO NEUTRALITY

This means in practice that:

- **The process is no longer static, but dynamic.**

The company must shift its focus from achieving one-off and immediate neutrality to dynamically managing its climate performance to maximize its contribution to achieving global neutrality.

- **The objective is no longer individual, but collective.**

Giving up a quest for "neutrality in its own right" makes it possible to understand the inclusion of one's activity in the rest of the system. The company can then assess the compatibility of its activity to a carbon-neutral path within the world through several indicators, which are not interchangeable with each other, which better reflects this systemic but very real complexity.

2. YOU DON'T *OFFSET* ANYMORE, YOU *CONTRIBUTE*

Financing low-carbon projects outside of a company's value chain is useful practice for the collectivity, as it helps to finance mitigation and preservation or the development of sinks for projects that would not necessarily achieve this without external assistance. As mentioned above, the problem arises when this funding is used to "cancel out", "offset" or "neutralize" the company's own emissions, which incidentally contravenes conventional carbon reporting rules [1].

The standard proposes to no longer use the term offset, and to replace it with the term contribution, which does not implicitly convey the idea of "cancelling out" emissions through project financing. The concept of voluntary carbon financing is retained, which increases the financial flows necessary to comply with the Paris Agreement.

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[1] For example, according to the Science-based Targets Initiative : « *The use of offsets is not counted as reductions toward the progress of companies' science-based targets. The SBTi requires that companies set targets based on emission reductions through direct action within their own boundaries or their value chains. Offsets are only considered to be an option for companies wanting to contribute to finance additional emission reductions beyond their science-based target/net-zero* ».

THE NET ZERO INITIATIVE FRAMEWORK

MAIN PRINCIPLES

The Net Zero Initiative provides organizations with a way to describe and organize their climate action to maximize their contribution within achieving global carbon neutrality.

The framework is based on several key principles:

1. The word "carbon neutrality" (or "net zero") refers **only to the global goal of balancing the emissions and removals**. It does not apply to an organization.
2. Organizations can only **contribute** to the trajectory towards global carbon neutrality.
3. **Emission reductions** and **negative emissions** (also called "removals") are rigorously distinguished and counted separately.
4. The concept of "contribution to global neutrality" is broadened to include the **marketing of low-carbon products and services**. "Avoided emissions" are separated into two groups: those that correspond to a real absolute decrease in the level of emissions, and those that provide only a "smaller increase" compared to the initial situation.
5. Carbon finance can trigger avoided or negative emissions, but it cannot "cancel" the company's operational emissions; it has to have a separate account for this.

THE NET ZERO INITIATIVE DASHBOARD

The framework is based on the idea that an organization must, at its level, act in three complementary ways in order to contribute to global neutrality:

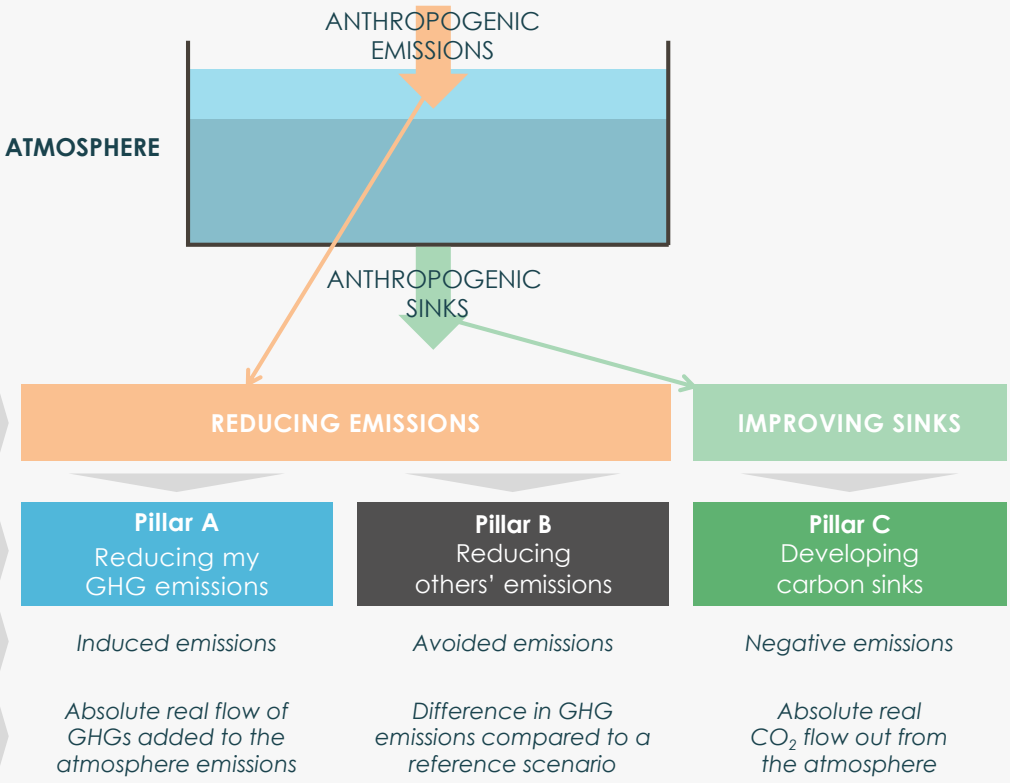
In order to contribute to the global reduction in emissions, it must:

1. **Reduce its direct and indirect emissions**
2. **Reduce the emissions of others:**
    - By marketing low-carbon solutions, under certain conditions
    - By financing low-carbon projects outside of its value chain

In order to contribute to the increase in global removals, it must:

3. **Improve carbon sinks:**
    - By **developing** carbon removals within its operations and in its value chain
    - By **financing** carbon sequestration projects outside its value chain

DECLINING GLOBAL ACTION AT A COMPANY LEVEL



THE NET ZERO INITIATIVE DASHBOARD

		Pillar A Reducing my GHG emissions	Pillar B Reducing others' emissions	Pillar C Developing carbon sinks
In my value chain	In my operations	Direct emissions (« scope 1 »)	-	Direct removals
	Upstream and downstream	Indirect emissions (« scope 2+3 »)	Emissions avoided by my products and services	Indirect removals
Outside of my value chain		-	Emissions avoided through the financing of reduction projects	Removals through the financing of absorption projects

Each company is then encouraged to:

1. **Measure** its performance on these three pillars;
2. **Set ambitious objectives** for each of them;
3. **Manage them dynamically** over time.

A. Pillar 1: Reducing my GHG emissions

Indicator: Induced Emissions
Physical Nature: Actual, absolute flow of GHG emissions into the atmosphere
Description: This pillar encourages the organization to assess and monitor the reduction of its absolute direct and indirect greenhouse gas emissions over time.
Method:

1. **Measure** (usually annually) the emissions, all scopes combined, using standard reporting frameworks: ISO 14064/14069, Carbon Footprint, GHG Protocol, etc.

2. **Set targets** :
   - Through scenario analyses carried out by themselves to understand their dependence on activities with emissions within their operations and from others;
   - Alternatively, by using frameworks for defining trajectories within the private sector (Science-based Targets).
   - Failing this, global (IPCC, IEA, etc.), national (National Low Carbon Strategies, NDCs, etc.) and local (local and regional climate plans, etc.) decarbonization scenarios can be adapted to the scale of the organization.

1. **Dynamically manage the performance** using dynamic assessment tools such as ACT (ADEME & CDP)

B. Pillar 2: Reducing others' emissions

Indicator: Avoided emissions.
Physical nature: Difference in the level of GHG emissions compared to a reference scenario, caused by an "intervention" by the organization within its environment.
Caution: It is necessary to determine whether or not this difference corresponds to a real decrease in emissions compared to the existing situation ("really reduced" emissions vs. "less increased" emissions)
Description: This pillar encourages the organization to assess and increase its contributions to decarbonization within third parties:

- Either as a result of its **products and services sold**, which replace a more carbon intensive use by the end users;
- Or as a result of **financing emission reduction projects outside its value chain** (purchases of certified emission reductions, direct participation in projects, low-carbon energy contracts under certain conditions, etc.).

Method:

1. **Measure** the organization's avoided emissions each year by using an array of robust methodologies and official reference scenarios (UNFCCC, domestic carbon certification labels, international standards, etc.).

2. **Set targets** for avoided emissions through its products and by financing projects outside the value chain; in order to contribute to the decarbonization of others "at the right level" expected by the organization, considering the collective effort required.

3. **Dynamically manage the performance** and evaluate it against the set trajectory.

C. Pillar 3: Developing carbon sinks

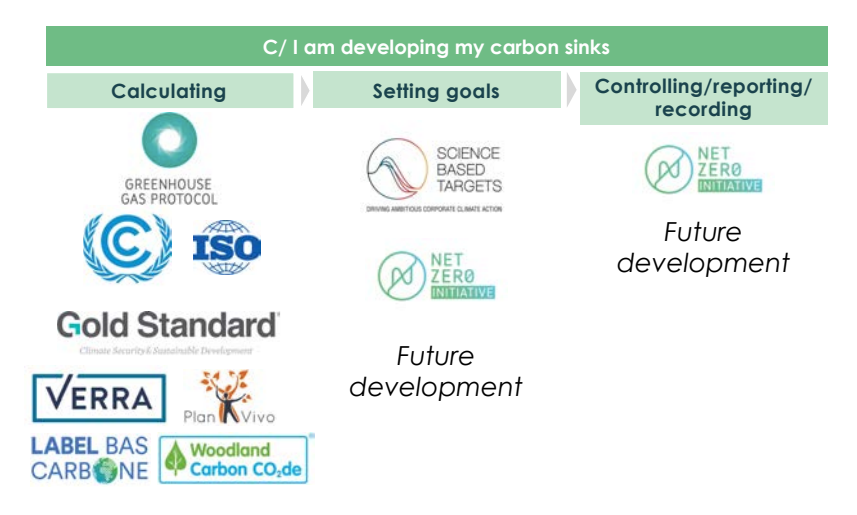
Indicator: Negative emissions (or "removals")
Physical nature: Real, absolute flow of CO_2 removed from the atmosphere
Description: This pillar encourages the organization to assess and increase its contribution to the enhancement of the world's natural and technological carbon sinks:
- Either in its value chain, by developing its own carbon sinks (direct removals) or those upstream (in the supply chain) and downstream (within its customers or end-users)
- Or outside of its value chain, due to its financing of sequestration projects (purchases of certified carbon sequestration, direct participation in projects, etc.).

Method:

1. **Measure** each year:
   - The negative emissions in the organization's value chain using existing standards (ISO 14064, GHG Protocol Guidance on Removals, etc.).
   - The negative emissions caused by project financing, due to robust methodologies (UNFCCC, domestic carbon certification labels, international standards, etc.).

2. **Set targets** for the carbon removal outside and inside its value chain, to help increase the sinks "at the right level", given the collective effort required.

3. **Dynamically manage the performance** and evaluate it in accordance to its set trajectory.



Next steps

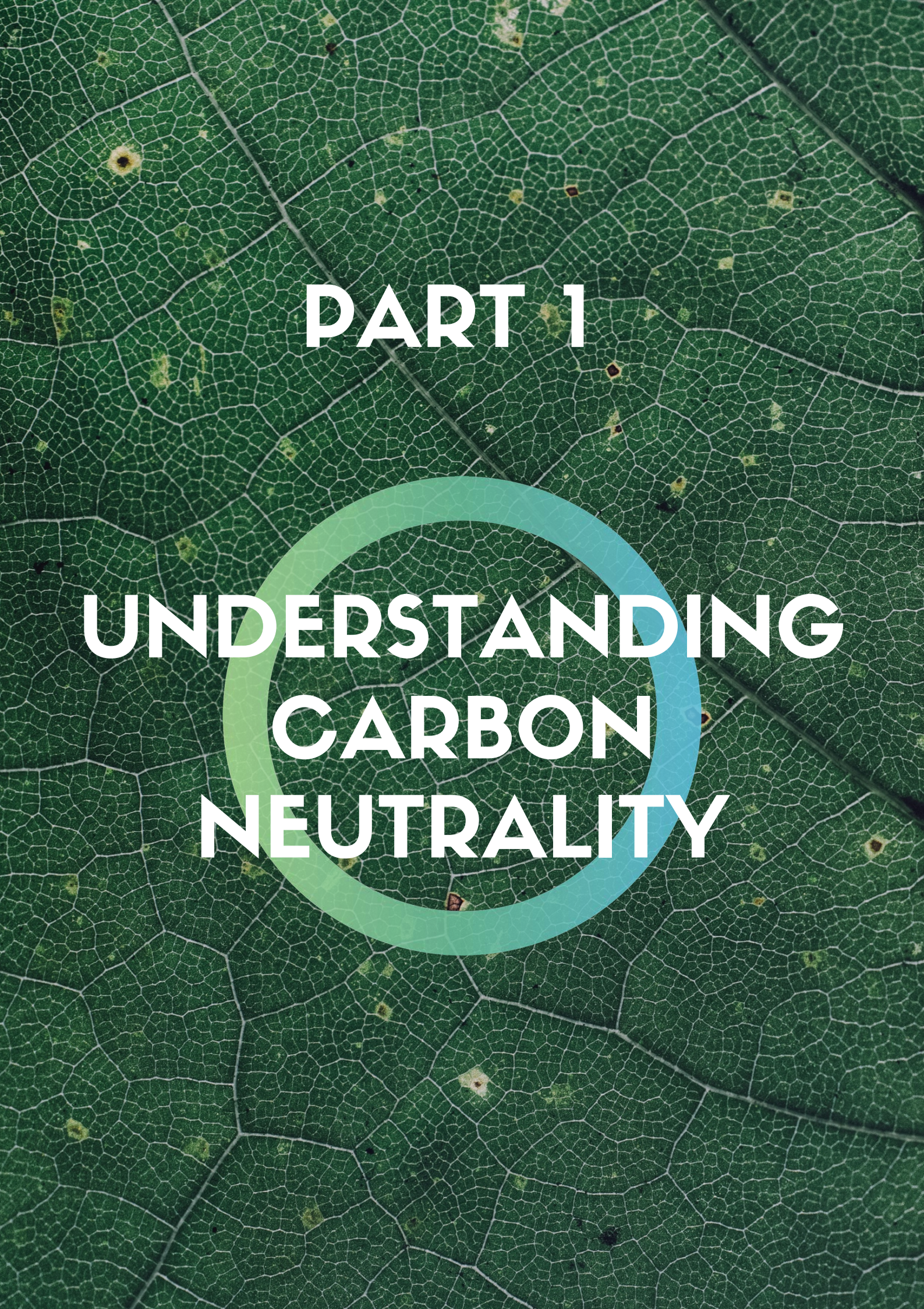
- **This framework is the first stone laid to generate a major paradigm shift:** the transition from an autonomous declaration of neutrality to action that is part of a collective movement.

- **This framework can now be used by organizations** and notably companies; the methods exist for taking an inventory of the emissions over the entire value chain, for accounting for avoided emissions compared to existing ones, and finally for accounting for the removals.

- In the light of the objective of global neutrality, these methods are sometimes incomplete, but they provide a basis on which to start working. **Carbone 4 therefore calls on all companies to take up this way of looking at things right now**, to trigger action in all areas of their activities (in the sales and marketing roles for its avoided emissions, in the production and organization roles for the induced emissions, in R&D, strategy and finance for all three pillars, etc.). Placing the organization's actions in a "path towards neutrality", is a project that involves all collaborators; unlike the short-term search of an individual neutrality state.

- **In particular, it is necessary to specify what could be the "right" trajectories for each of the pillars**. An essential step for a given company is to set concrete short-term objectives, as well as an assessment of the ambition of its own commitments, which will have to relate to the framework's three pillars.

- Ambitious climate action by the private sector will therefore involve experimentation from now on, and then gradual harmonization of the terms and concepts used. This is why **we invite all stakeholders, companies, project holders, consultancy firms, "offset" operators, and civil society actors to grasp the concepts described here in order to accelerate collective action towards global net zero**; to which Carbone 4 hopes to have contributed to through the reference framework proposed here.



PART 1

UNDERSTANDING CARBON NEUTRALITY

Part 1

UNDERSTANDING CARBON NEUTRALITY

A/ Global Carbon Neutrality: the Bathtub Metaphor

Adopted in December 2015 by 197 parties, the Paris Agreement aims to "strengthen the global response to the threat of climate change (...); in particular by **keeping the rise of the average global temperature well below 2°C compared to pre-industrial levels**, as well as continuing efforts to **limit the rise in temperature to 1.5°C compared to pre-industrial levels**" [1].

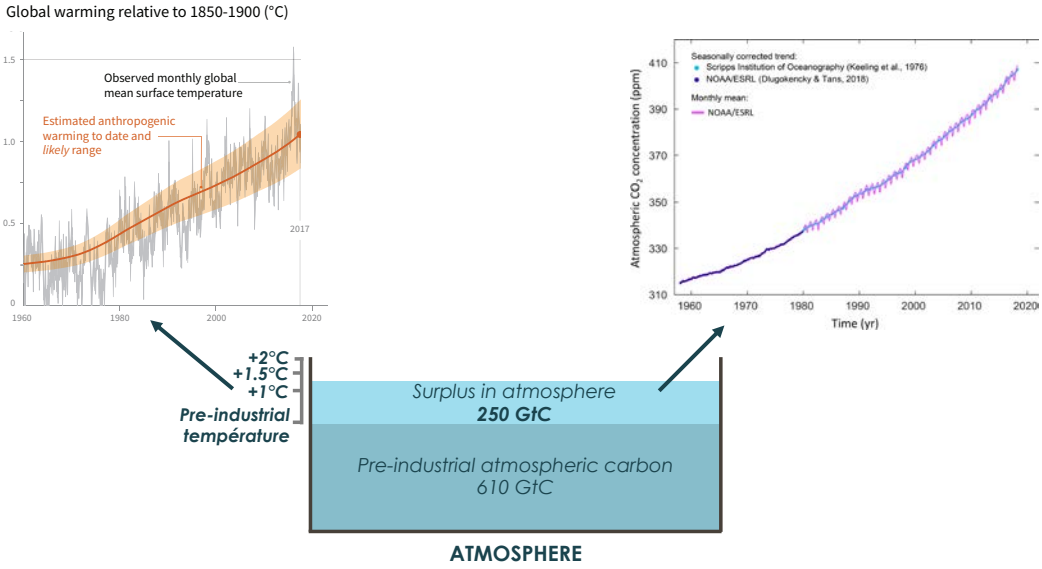
Furthermore, within Article 4 of the same Agreement it states that, "in view of achieving the long-term temperature objective set forth in Article 2, the Parties shall aim to (...) **achieve a balance between anthropogenic emissions by sources and anthropogenic removals by sinks of greenhouse gases in the second half of this century** (...)".

How do these two objectives, the temperature objective and the neutrality objective, relate to each other?

1. The temperature objective: the bathtub should not overflow

Cumulative CO_2 emissions in the atmosphere largely determine the average global surface warming expected by the end of the 21st century and beyond. Necessary emissions reductions can be quantified using "carbon budget" approaches, which relate cumulative CO_2 emissions to the increase in average global temperature (IPCC AR5). In pre-industrial times, the amount of carbon (C) in the atmosphere was relatively stable at 2240 $GtCO_2$ (Le Quéré et al., 2018). Over the past 150 years, human activities have added an additional 917 $GtCO_2$ to the atmosphere, due to the combined effect of fossil fuel combustion, industrial processes [2] and land-use changes. The atmosphere today contains about 3150 gigatons of CO_2 (Le Quéré et al., 2018), which corresponds to a CO_2 concentration of 405 ppm [3] (Dlugokencky and Tans, 2018) [4], compared to the concentration of only 277-288 ppm in pre-industrial times (Joos and Spahni, 2008; Le Quéré et al., 2018).

[1] Paris Agreement, article 2.
[2] Oxidation reactions mainly due to the production of steel and cement.
[3] There is a linear correlation between the carbon quantity in the atmosphere and the concentration in ppm: 1 ppm amounts to 2,13 GtC, that being 7,8 $GtCO_2$.
[4] At the time this report was drafting, the global mean CO_2 concentration in the atmosphere is 414 ppm.



The atmosphere can be compared to a giant bathtub whose water level represents the amount of carbon in the atmosphere. Before 1870, the level was stable, it was maintained at around 2240 gigatons of CO_2 (277 ppm). Within a century and a half, human activities have added about 917 gigatons of CO_2 to the atmosphere through the combustion of fossil fuels, industrial processes and deforestation, increasing the concentration to 414 ppm. This excess carbon is causing an increase in the average temperature at the Earth's surface. Meeting the 1.5°C or 2°C targets means ensuring that the bathtub "doesn't overflow". Left curve: evolution of the temperature anomaly since 1850 (IPCC SR15). Right curve: evolution of the average concentration of CO_2 in the atmosphere since 1960 (Le Quéré et al., 2018).

The temperature anomaly corresponding to the currently observed CO_2 concentration is theoretically between +1°C and +1.5°C with respect to pre-industrial levels (IPCC SR15) [1] . However, due to the inertia of the climate system, the actual warming currently measured in 2020 is only +1°C (IPCC SR15) [2]. Climate science estimates that to limit human-induced warming to 2°C with a 66% probability, cumulative CO_2 emissions from all anthropogenic sources would need to remain below about 3,430 $GtCO_2$ since the pre-industrial period [3]. Limiting it to 1.5°C with a 66% probability would require remaining below 2,620 $GtCO_2$ (IPCC SR15).

Human activities have already emitted 2,260 $GtCO_2$ (Le Quéré et al., 2018) from 1870 to 2017 [4], through fossil fuel combustion, industry and land-use changes. About 40% of this carbon is currently in the atmosphere. The remaining 60% has been absorbed by natural carbon sinks (on land and in the ocean).

In order to meet global temperature targets our remaining carbon budget is then very limited:

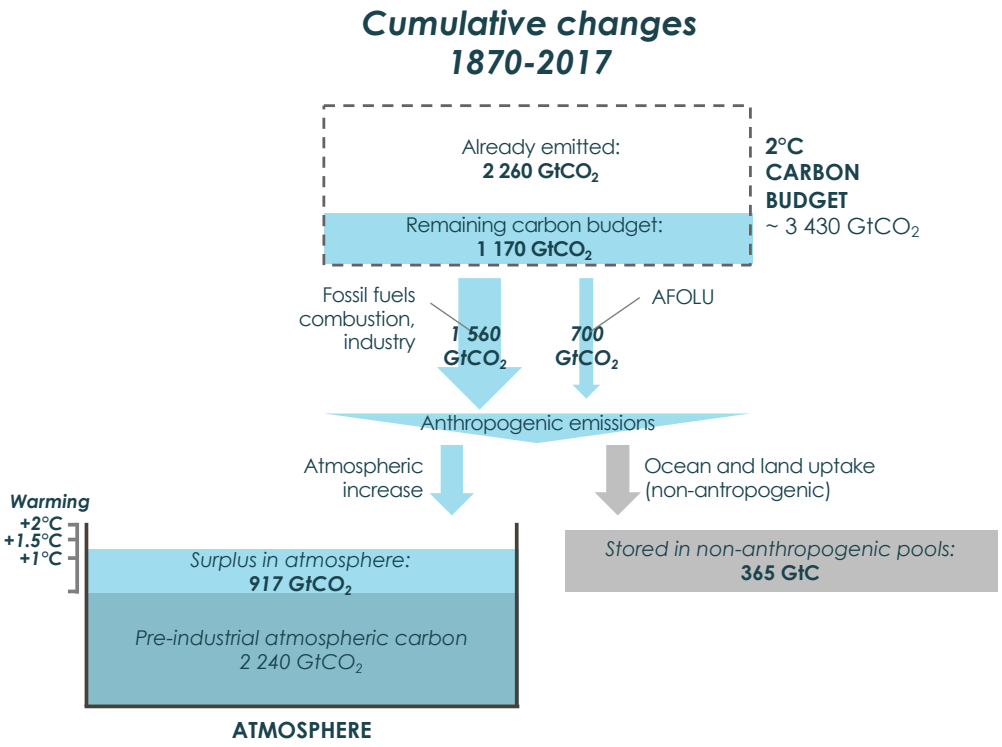
- approximately 1170 $GtCO_2$ for the 2°C target with 66% probability (IPCC SR15)
- approximately just 420 $GtCO_2$ for the 1.5°C target with 66% probability (IPCC SR15).

[1] IPPC 1.5°C Special Report (IPCC SR15) : "If all anthropogenic emissions (including aerosol-related) were reduced to zero immediately, any further warming beyond the 1°C already experienced would likely be less than 0.5°C over the next two to three decades (high confidence), and likely less than 0.5°C on a century time scale (medium confidence)".

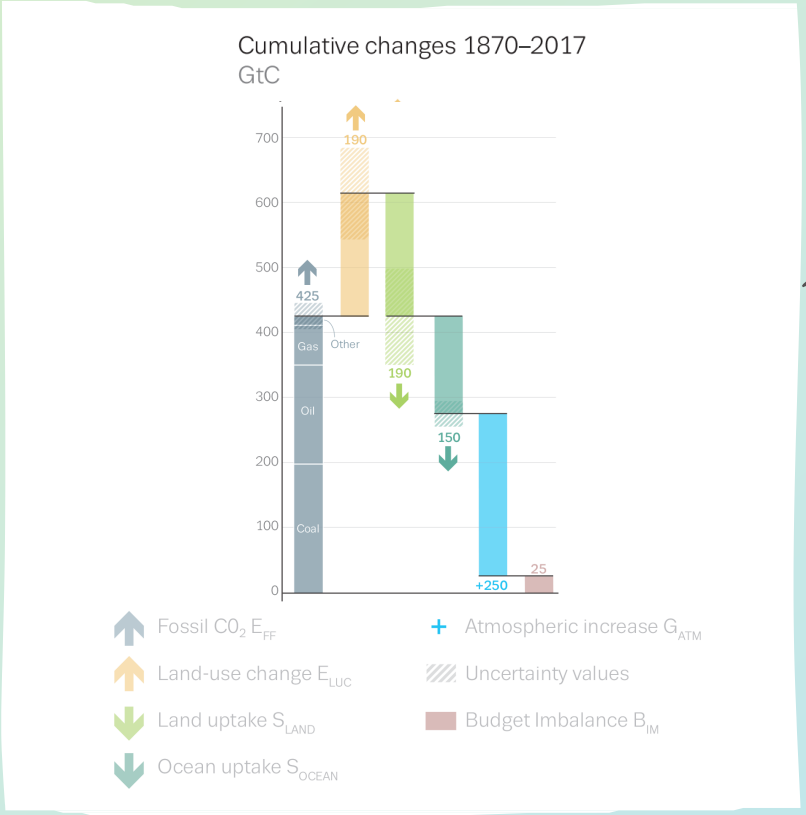
[2] IPCC SR15 : "Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels".

[3] The fifth IPCC evaluation report (AR5) published in 2014 gives an estimate of 3670 $GtCO_2$. The 2°C carbon budget figure of 3430 $GtCO_2$ used in our paper is calculated by adding the CO_2 quantity emitted since 1870 (2260 $GtCO_2$, according Le Quéré et al., 2018) and the 2°C carbon budget (66%) remaining according to the IPCC SR15 (1170 $GtCO_2$).

[4] The IPCC SR15 report gives an estimate of 2200 $GtCO_2$, probably because of the uncertainties due to the cumulated emissions in land use change (or due to a different time perimeter).



An illustration of the remaining 2°C carbon budget; 2,260 $GtCO_2$ have already been emitted since the pre-industrial period (including 1,560 $GtCO_2$ from fossil fuel combustion and industrial processes, and 700 $GtCO_2$ from the land sector). Of these 2260 $GtCO_2$, 917 $GtCO_2$ have been transferred to the atmosphere, resulting in a global warming of approximately +1°C since the pre-industrial period. The remaining 1343 $GtCO_2$ [1] have been absorbed by the ocean and continental biomass, transfers that are considered non-anthropogenic because they are not managed by humans.



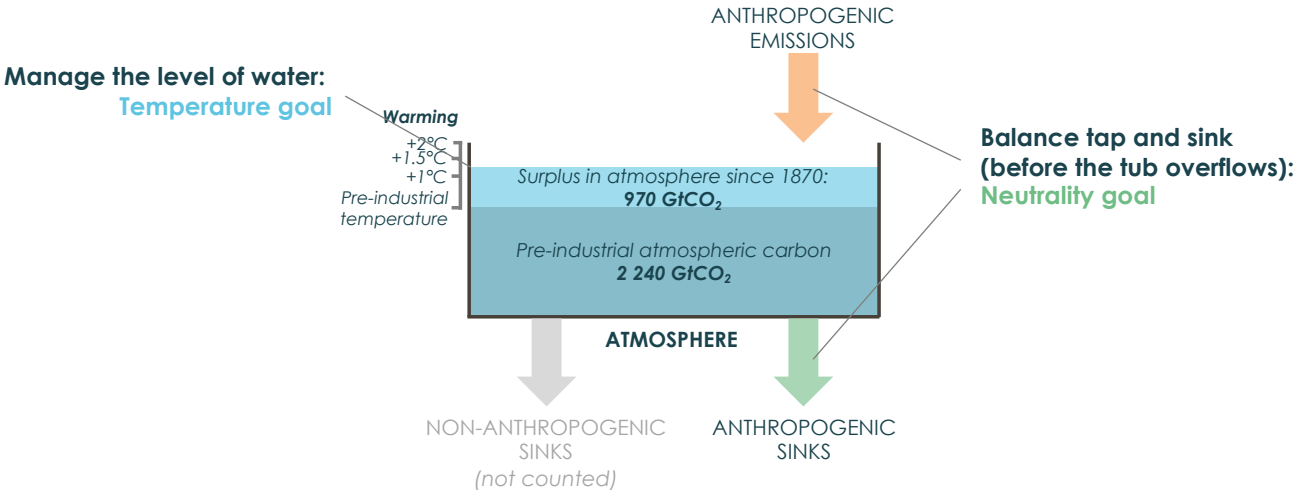
The preceding diagram is a stylization of the graph above, illustrating the cumulative changes of anthropogenic carbon fluxes since 1870; it is from the Global Carbon Budget 2018 (Le Quéré et al.). The quantities are expressed in gigatons of carbon (C) and not in $GtCO_2$. Simply multiply by 3.67 to go from one to the other.

[1] Due to several uncertainties, the Global Carbon Budget has to deal with a fiscal, cumulative imbalance of 90 $GtCO_2$ from 1870 to 2017; between the emissions emitted (fossil combustion, industry and land-use change) and the sinks (atmosphere, land and ocean). We have chosen to include this budget imbalance in the cumulative land and ocean absorption in order to perfectly match the emissions emitted and the sinks within the scheme. The cumulative carbon transferred to land and oceans since 1870 thus increases from 1250 (theoretical value given by Le Quéré et al., 2018) to 1343 $GtCO_2$.

You have to imagine the atmosphere as a sort of giant bathtub: the water level corresponds to the concentration of CO_2, which itself is proportional to an increase in the average global temperature. Respecting the 1.5°C or 2°C carbon budget means making sure that the water level does not exceed a certain height, at the risk of overflowing the bathtub.

Thus, respecting the global carbon budget resembles a set of communicating vessels; whose aim would be, in the long run to stop the water level in the bathtub from rising, a "plumbing problem". A necessary condition for stabilizing the water is to balance what goes into the bathtub annually with what comes out; in other words, a necessary condition for stabilizing the global temperature is to balance the anthropogenic CO_2 emissions with anthropogenic removals, i.e. to achieve "carbon neutrality".

The temperature target is a "stock" target that relates to the total amount of water in the bathtub. The carbon neutrality target is a "flow" target that looks at the inlet/outlet balance between the tap and the siphon. It is a necessary condition to reach the first one and to validate the second one quickly enough.



In order to stabilize the water level in the bathtub at a reasonable level and thus meet the temperature objectives of 2°C or 1.5°C, the incoming carbon flows must correspond to the annual outgoing flows. "Carbon neutrality" refers only to human-controlled flows and leaves aside non-anthropogenic sinks such as the ocean or unmanaged land.

The subject of Article 2 from the Paris Agreement (objective 2°C/1.5°C) is the stabilization of the concentration of CO_2 in the atmosphere (the level of the water in the bathtub) at acceptable levels. Article 4 (carbon neutrality) sets the objective of achieving a balance between what goes in (fossil emissions, industry and deforestation) and what goes out (anthropogenic carbon removals) before the bathtub overflows (before the middle of the 21st century). Natural carbon sinks (natural CO_2 removal by the oceans and unmanaged land [1]) are not included in the definition of neutrality.

Respecting the 1.5°C carbon budget with a 50% probability implies that CO_2 emissions will balance with global sinks in about 30 years (IPCC SR15).

[1] For a definition of "unmanaged land", see the section c. " Non anthropic flows" below.

2. Carbon Neutrality Objective: balancing the bath's tap and siphon

The subject of Article 2 of the Paris Agreement (objective 2°C/1.5°C) is the stabilization of the concentration of CO_2 in the atmosphere (from the level of the water in the bathtub) at acceptable levels. Article 4 (carbon neutrality) sets the objective of achieving a balance between what goes in (fossil emissions, industry and deforestation) and what goes out (anthropogenic carbon removals) before the bathtub overflows (before the middle of the 21st century). Natural carbon sinks (natural absorption of CO_2 by the oceans and unmanaged land [1]) are not included in the definition of neutrality.

Respecting the 1.5°C carbon budget with a 50% probability implies that CO_2 emissions will balance with global sinks in about 30 years (IPCC SR15).

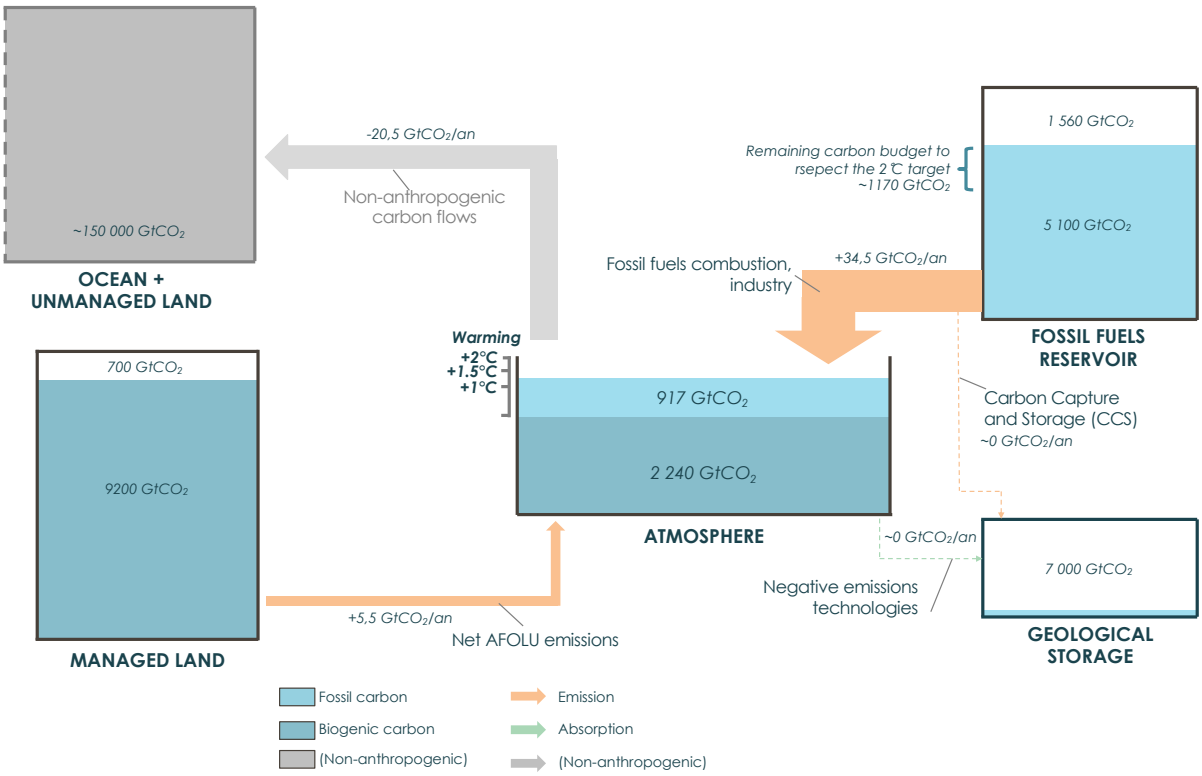
Carbon neutrality is defined as the balance between anthropogenic emissions and anthropogenic removals.

- **Anthropogenic emissions** are the total carbon fluxes that enter the atmosphere each year as a result of human activities:
    - The **emissions from fossil fuels and industry (FFI)** [2], which flow "out of the tap", which each year add to the atmosphere a quantity of carbon which was previously stored in distant geological fossil reservoirs, thus increasing the total amount of carbon in the total cycle.
    - The **emissions linked to agriculture, forestry and land-use change** (AFOLU [3]), which displace carbon previously stored outside of the atmosphere within a biomass reservoir;
- **Anthropogenic removals** are all of the carbon removals created by humans:
    - **Afforestation** [4]/**reforestation** [5] (A/R), both of which are negative AFOLU emissions;
    - **Technological removals of carbon dioxide** (CDR [6]), such as bioenergy combined with carbon capture and storage (BECCS [7]), direct carbon capture and storage in the air (DAC [8]) or enhanced weathering (EW) [9]).

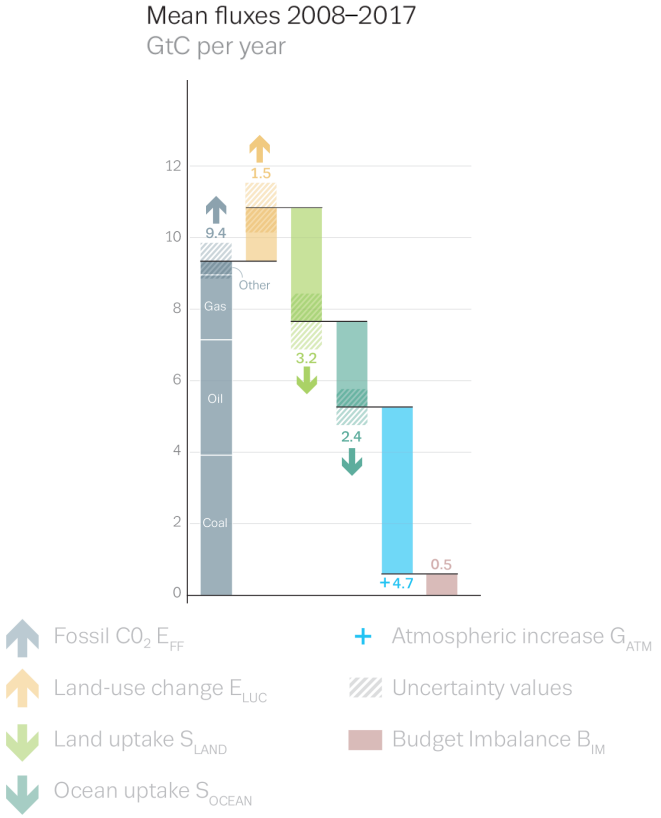
Carbon exchanges with natural reservoirs, such as the ocean or unmanaged terrestrial lands (e.g. Siberian, Canadian and tropical forests) are not included in the definition of "carbon neutrality" or "net zero". These flows will decrease in the future as the carbon cycle "stabilizes". In addition, these sinks are needed to offset some of the warming "embedded" due to the inertia of the climate system.

[1] For a definition of "unmanaged land", see the section c. " Non anthropic flows" below.
[2] FFI : Fossil Fuels and Industry.
[3] AFOLU : Agriculture, Forestry and Other Land Use.
[4] Afforestation is the establishment of a forest or stand of trees in an area where there was no previous tree cover.
[5] Reforestation is the natural or intentional restocking of existing forests and woodlands that have been depleted in the past due to various reasons.
[6] CDR : Carbon Dioxide Removal.
[7] BECCS : Bio-Energy Carbon Capture and Storage.
[8] DAC : Direct Air Capture.
[9] EW : Enhanced Weathering.

Current situation

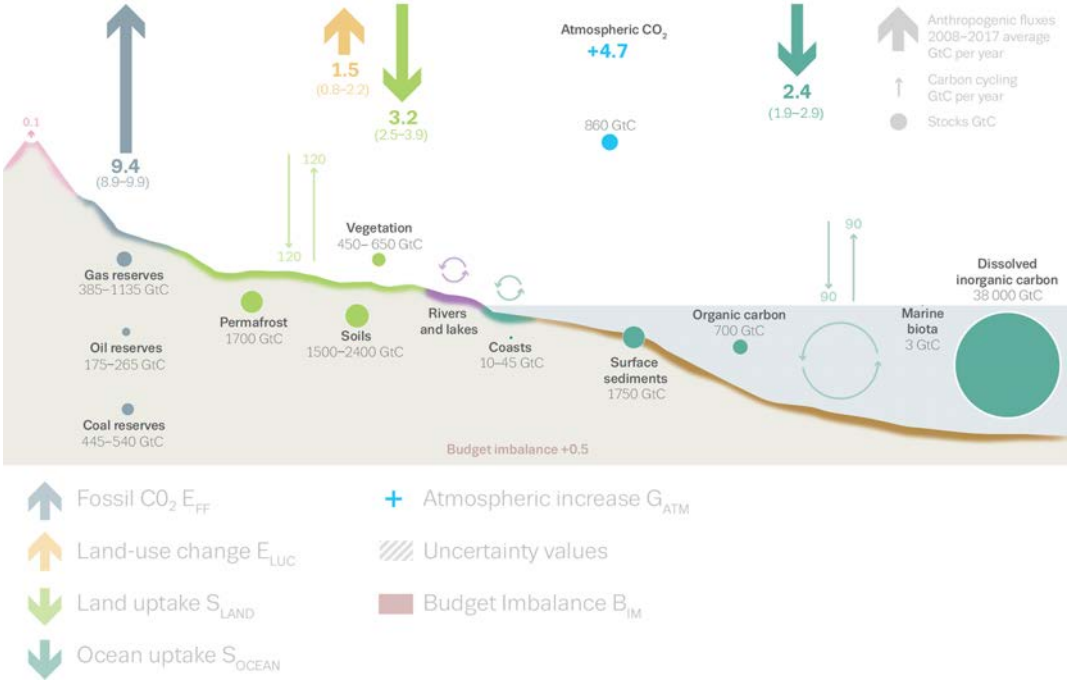


An illustrative diagram of carbon exchanges between the atmosphere and the various reservoirs. Carbon neutrality will be achieved when the emissions (orange arrows) are equal to the removals (green arrows). For the sake of simplicity, the different technological sinks are identically represented on this diagram (for more details, see part b.ii below).



The preceding diagram is a stylization of the above graph, it shows the annual carbon flows between the different reservoirs (averaged between 2008 and 2017), taken from the Global Carbon Budget 2018 (Le Quéré et al.). The quantities are expressed in gigatons of carbon (C) and not in $GtCO_2$. Anthropogenic emissions are in grey (fossil emissions) and orange (land use change). The increase of CO_2 in the atmosphere is shown in blue. Non-anthropogenic removals are in light green (unmanaged land) and dark green (oceans). Anthropogenic absorptions are absent from the diagram, as they do not exist at this stage.

The Global Carbon Cycle

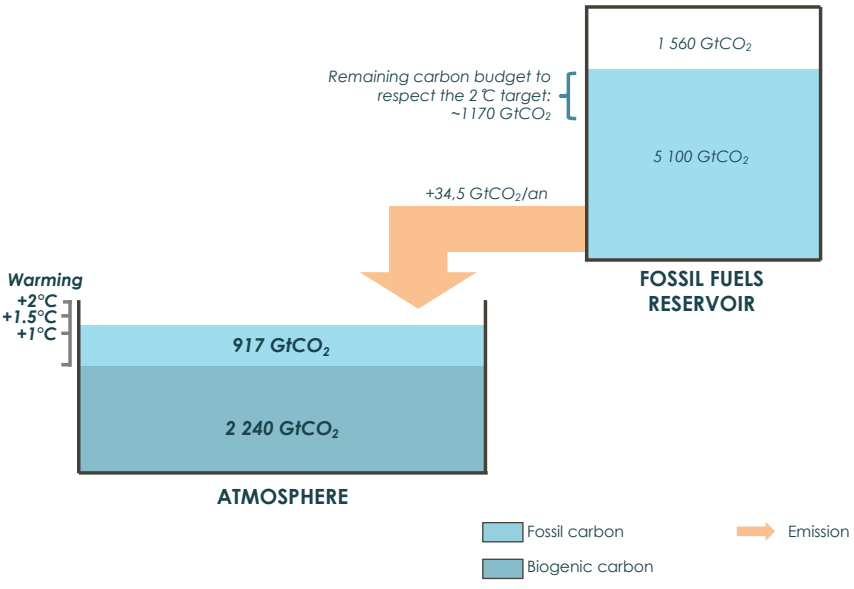


Stocks and flows. Carbon neutrality is a question of the arrows; the target temperature is a question of the circles (the atmospheric blue, in this case). The quantities are expressed in C and not in CO_2. Source: Global Carbon Budget 2018.

Let's look at each of the terms:

a. The "tap": ever-increasing fossil fuel emissions

With 34.5 $GtCO_2$ added to the atmosphere each year, emissions from fossil fuel combustion and industry represent the main source of annual anthropogenic carbon emissions (Le Quéré et al., 2018). This includes the combustion of oil, coal and gas, as well as industrial processes and cement production. Human activities have already emitted a total of 1560 $GtCO_2$ since the pre-industrial period (Le Quéré et al., 2018).



One important thing to understand is that these human-induced fossil fuel emissions add an amount of carbon that was not historically present in the cycle. Each year, an amount of carbon from a distinct reservoir is introduced, first into the atmosphere and then partially redistributed between land and ocean. A major difference in relation to the emissions linked to land-use is that the total amount of carbon in the atmosphere-earth-ocean system increases (Jones et al., 2016).

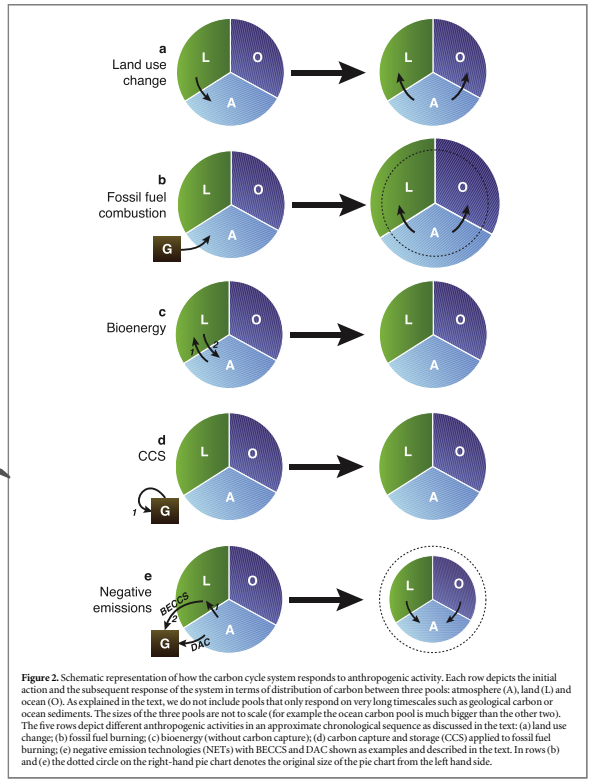
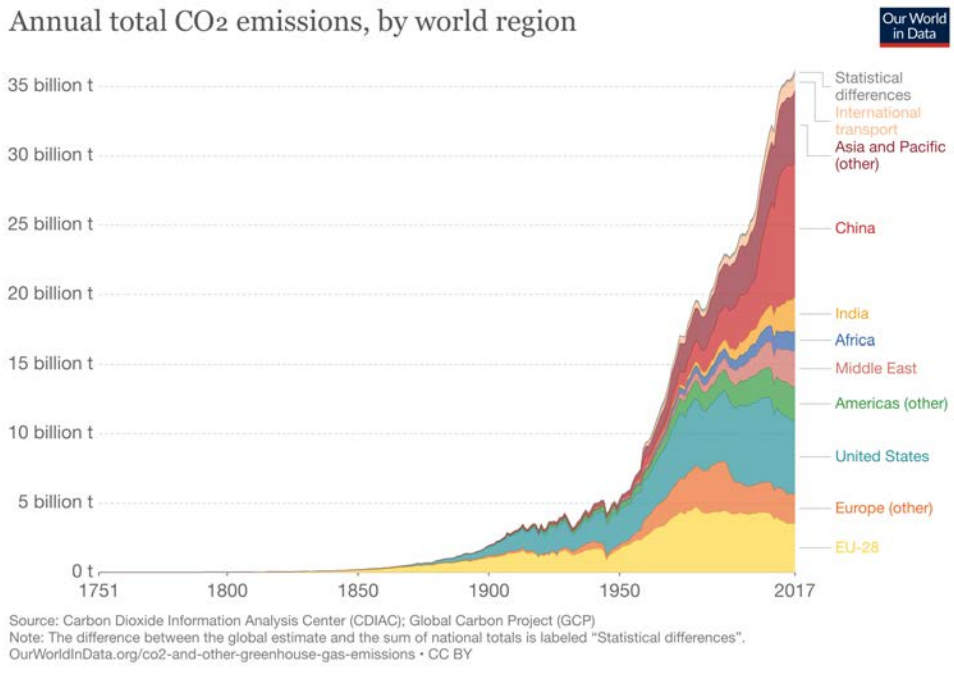


Figure 2. Schematic representation of how the carbon cycle system responds to anthropogenic activity. Each row depicts the initial action and the subsequent response of the system in terms of distribution of carbon between three pools: atmosphere (A), land (L) and ocean (O). As explained in the text, we do not include pools that only respond on very long timescales such as geological carbon or ocean sediments. The sizes of the three pools are not to scale (for example the ocean carbon pool is much bigger than the other two). The five rows depict different anthropogenic activities in an approximate chronological sequence as discussed in the text: (a) land use change; (b) fossil fuel burning; (c) bioenergy (without carbon capture); (d) carbon capture and storage (CCS) applied to fossil fuel burning; (e) negative emission technologies (NETs) with BECCS and DAC shown as examples and described in the text. In rows (b) and (e) the dotted circle on the right-hand pie chart denotes the original size of the pie chart from the left hand side.

Jones et al, 2016. Burning fossil fuels increases the total amount of carbon in the cycle. Only negative emissions such as BECCS or DAC can be considered as exact "mirrors" to fossil fuel emissions, as they alone allow for an overall decrease in the amount of carbon present in the Atmosphere-Earth-Ocean system.

Fossil fuel reserves are currently estimated at 5390 (3685-7110) $GtCO_2$ (Le Quéré et al., 2018; Ciais et al., 2013; GEA 2006); gas, oil and coal reserves are on average 2790, 810 and 1800 $GtCO_2$ respectively. This amount of carbon represents 3 to 6 times the amount of the remaining carbon budget for the 2°C scenario; and is 6 to 17 times the amount of the remaining carbon budget for 1.5°C scenario. In other words, there is enough coal, gas and oil under our feet to "make the bathtub overflow" several times.

Not only is the fossil fuel tap now wide open, but it keeps opening wider year after year. In 2017 alone, fossil fuel emissions growth was about +1.6%. Therefore, reducing atmospheric CO_2 to a level of 350 ppm would require a reduction rate of 6% per year (Hansen et al, 2013a).

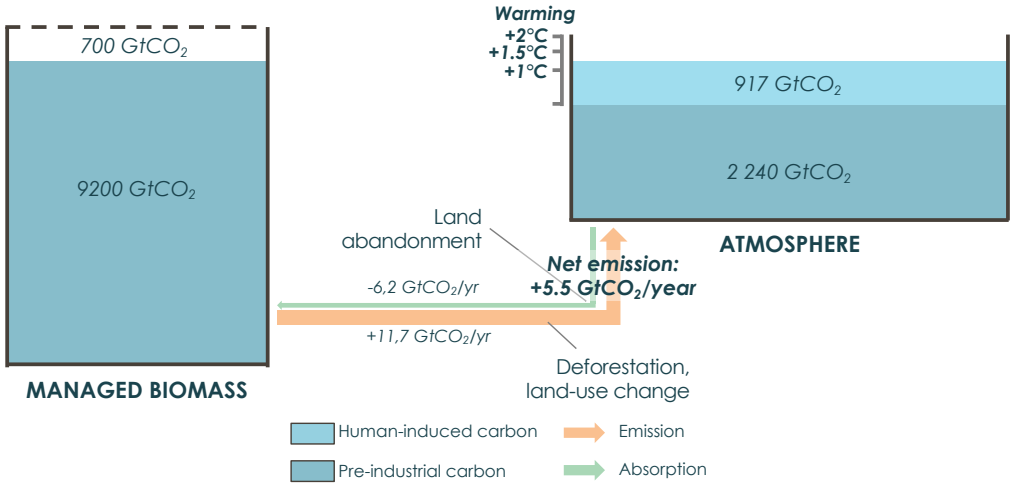


The evolution of CO_2 emissions by region between 1751 and 2017. Our fossil fuel emissions "tap" shows no signs of slowing down. Source: Global Carbon Project/ Our World in Data.

b. The “siphon”: a failing carbon sink

i. Our natural siphon used for “drainage” is broken

The biomass reservoir managed by man (forests and soils considered to be "man-made") is supposed to play the role of a carbon sink, i.e. to absorb atmospheric CO_2 each year through photosynthesis. Yet, it is currently a net emitter of about 5.5 $GtCO_2$/year (Le Quéré et al., 2018). This is the net sum of emissions and removals from all anthropogenic activities considered in the land use, land-use change and forestry (LULUCF) sector.



Absolute carbon emissions from the LULUCF sector are caused by deforestation, logging, forest degradation and land-use change (clearing and conversion to pasture or cropland). They amount to about +11.7 $GtCO_2$ per year. These absolute emissions are about twice as high as the absolute removals caused by carbon removal activities such as afforestation, reforestation or the natural regeneration of forests after land abandonment (-6.2 $GtCO_2$/year) (Hansis et al., 2015; Erb et al., 2013).

Human activities on the land have induced cumulative emissions of approximately 700 $GtCO_2$ since the pre-industrial period (Le Quéré et al., 2018).

The corresponding metaphor would be the following: instead of annually emptying the water from the bathtub into a dedicated tank, our siphon instead causes the water in the bathtub to back up annually due to poor management of the storage tank. This is a clear illustration of the essential nature of the *permanence* [1] of our terrestrial carbon reservoir (Matthews and Caldeira, 2008; NRC, 2015; Fuss et al., 2016; Jones et al., 2016).

The terrestrial biomass reservoir currently contains about 9200 gigatons of CO_2, mainly stored in the vegetation (1650-2380 $GtCO_2$) and soils (5500-8800 $GtCO_2$) (Le Quéré et al., 2018) [2]. Even if the fossil fuel emissions were to cease today, the development of deforestation and land-use change activities at a sufficient pace would exceed the carbon budget of 2°C or 1.5°C several times. To carry the metaphor further, the large reservoir that collects water from the bathtub drain could make it overflow several times if it is not managed properly.

[1] The permanence of a carbon reservoir reflects its ability to store carbon sustainably over time.
[2] In reality, this total carbon stock is divided between natural, non-anthropogenic (unmanaged) and "managed land" reservoirs.

However, it is possible to transform the managed biomass reservoir into a net carbon sink. The afforestation and reforestation can amount to 4 to 12 $GtCO_2$ per year (Smith et al., 2016) depending on the assumptions made for different development parameters, such as land requirements, water supply and cost. Soil carbon sequestration has the potential to store 2.6 $GtCO_2$ per year (Smith et al., 2016). The use of biochar [1] to improve soil fertility could store up to 4.8 $GtCO_2$ per year of additional carbon (Woolf et al., 2010; Smith et al., 2016).

In most of the compatible trajectories with a +1.5°C warming, CO_2 emissions from the land sector (AFOLU) reach zero by mid-century or even earlier, and then become negative (IPCC SR15). Depending on the scenario chosen, negative AFOLU emissions are between 0 (scenarios " higher than 2°C ") and -16 $GtCO_2$ per year (scenarios "below 1.5°C").

The managed biomass reservoir is, of course, not infinitely expandable: the forests and soils cannot absorb an unlimited amount of carbon. As forests mature, their annual capacity to absorb atmospheric carbon decreases, and the negative flux will one day equal zero. Considering the typical sink saturation durations (50 years for tropical, temperate and boreal trees, 20-50 years for soils), Hansen et al (2013) conclude that 367 $GtCO_2$ is the order of magnitude of the total cumulative storage capacity achievable through relatively natural reforestation and afforestation; (Canadell and Raupach, 2008) as well as improved agricultural practices that increase soil carbon content (Smith et al, 2016).

In summary:

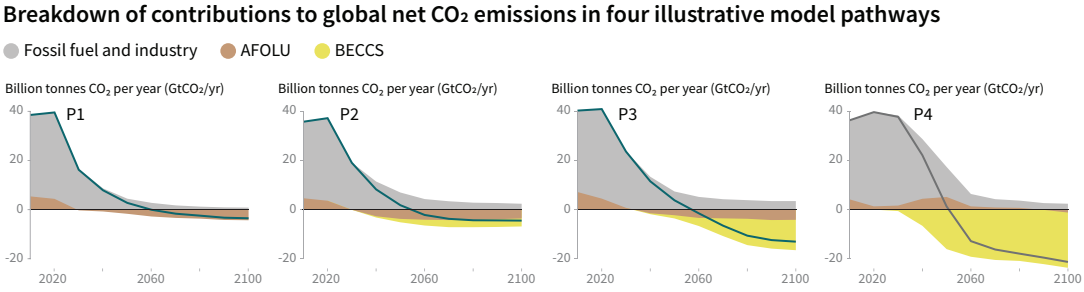
- Human-managed land and soils are now net emitters of carbon as a result of deforestation and land-use change. We are mismanaging our biomass reservoir.
- This reservoir can become a net sink if: deforestation ceases, afforestation and reforestation are expanded on a large scale, and the agricultural practices that increase carbon in the soil are adopted and improved.
- It is estimated that a cumulative maximum of 366 $GtCO_2$ can be stored in the biomass reservoir (vegetation and soils) during the 21st century. The saturation of sinks prevents this limit from being exceeded.
- Ensuring the permanence of the carbon stored in the terrestrial biomass (keeping water in the reservoir) is at least as important as creating the conditions to develop a net negative carbon flows (moving water from the atmospheric basin to the biomass reservoir).

[1] Biochar is a soil amendment resulting from the pyrolysis of biomass, it is used in agriculture to increase soil productivity. When it is produced from renewable biomass, biochar in its stable elemental form allows the storage of carbon from atmospheric CO_2 in the soils.

i. The "technological siphon", which does not exist today, will have to be developed

Alongside afforestation/reforestation (A/R) techniques, which affect the capacity of our terrestrial ecosystems to absorb carbon and store it in the biomass reservoir; climate scenarios compatible with a +1.5°C or +2°C warming rely heavily on another source of carbon dioxide removal (Carbon Dioxide Removal, or CDR): Negative Emissions Technologies, or NETs.

The most famous of these is Carbon Capture and Storage for Bioenergy (CCS). Other theoretically feasible negative emissions technologies include Direct Air Capture and Storage (DAC/DACCS) using solvents and chemical sorbents, and Enhanced Weathering (EW). Bioenergy with Carbon Capture and Storage (BECCS) removes carbon from the atmosphere via the land sector; Direct Air Capture removes it directly from the atmosphere (Jones et al., 2016). BECCS and DACCS also require permanent C storage after the capture phase.



Four "archetypal" scenarios of 1.5°C trajectories, from the IPCC SR15 report. The rate of reduction of fossil fuel emissions (grey) directly determines the quantity of natural (brown) and technological (yellow) negative emissions that will have to be developed to hope to meet the 1.5°C carbon budget.

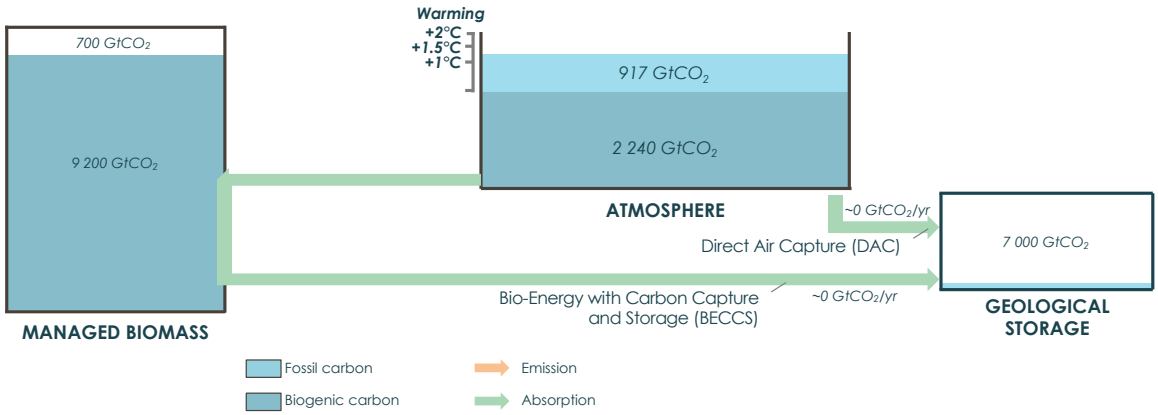
The potential for the deployment of other negative emissions technologies such as DAC and EW has been analyzed in literature (Lenton, 2014; Smith et al., 2016). However, they have not been taken into account in depth in the climate models (IAM) considered in the IPCC 1.5°C Special Report, due to the high economic costs and high energy requirements for DAC, and the high uncertainties and various risks associated to EW (IPCC SR15).

The BECCS

This negative emission technology consists in capturing biogenic CO_2 from biomass combustion and storing it in geological reservoirs. This technology is expected to ensure a permanent removal of carbon from the atmosphere, with a theoretical storage time of around 100,000 years.

The amount of BECCS that needs to be developed is highly dependent on the rate of emission reductions. A quick review of the four archetypal IPCC SR15 scenarios (see below) reveals that the longer we delay reducing emissions, the more negative emissions technologies will be required to achieve carbon neutrality by 2050. It will also be necessary to maintain a situation of net negative emissions in order to offset for a possible one-off temperature increase over the century. [1]. In 2050, the need for CCS is estimated between 2.9 $GtCO_2$ per year (scenarios "Higher 2°C) and 7 $GtCO_2$ per year ("1.5°C with high overshoot" scenarios). The cumulative deployment of BECCS on trajectories at 1.5°C with zero or limited overshoot covers a range of about 480 (0 to 990) $GtCO_2$ over the 21st century (IPCC SR15).

[1] This is known as the "overshoot": several 1.5°C compatible scenarios include a one-off excess of the CO_2 concentration limit in the atmosphere, but are betting on our ability to reduce this concentration by the end of the century through massive use of negative emission technologies. To use the metaphor, this is equivalent to occasionally overflowing the bathtub, only to "mop the floor " in the hours that follow...



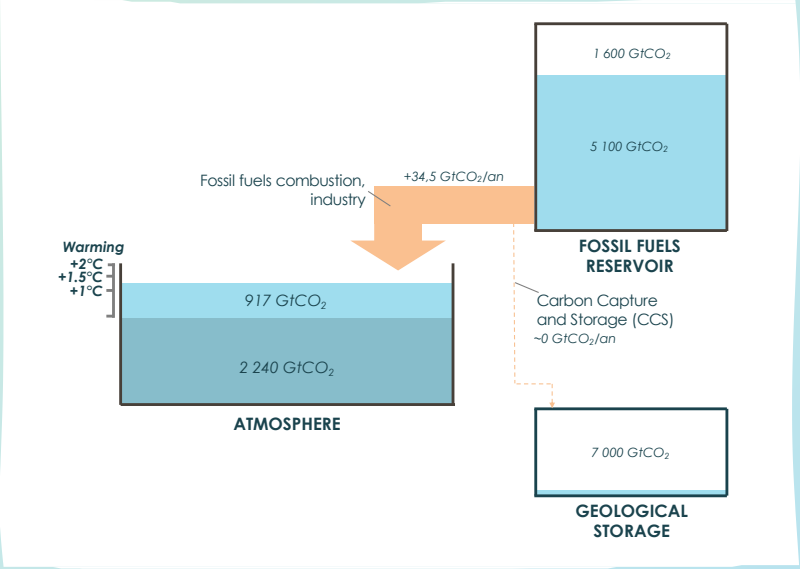
Geological storage capacity is not infinite. However, unlike the biomass reservoir, which has obvious physical limitations, the amount of geological storage available does not appear to be a limiting parameter in itself. Dooley et al (2012) assume that there is a maximum storage capacity of approximately 7,000 $GtCO_2$ worldwide. However, it is important to bear in mind that some geological storage may not be readily available or not available in the right geographies (e.g. those close to carbon capture facilities).

What is the difference between CCS and BECCS?

Carbon Capture and Storage (CCS) applied to fossil fuel emissions is a way to "turn off the tap", i.e. reduce/avoid fossil fuel emissions. It is not considered a true "negative emissions technology" because it does not actively remove CO_2 from the atmosphere (to use the metaphor: it does not lower the water level in the bathtub, it only diverts the water from the tap and stores it in a separate tank).

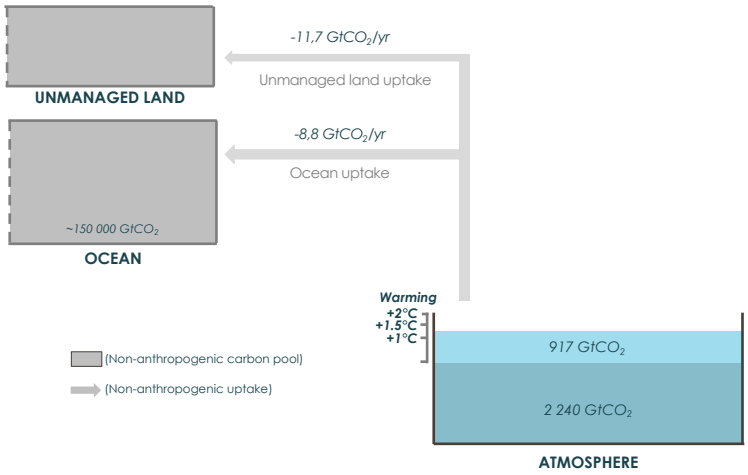
The BECCS is a CCS system installed on a bioenergy plant. It corresponds to an elimination of atmospheric carbon dioxide, since the CO_2 captured is biogenic and not from a fossil fuel origin.

Various 1.5°C scenarios analyzed in the IPCC SR15 rely on CCS as a means of reducing emissions, in particular by applying them to certain coal-fired power plants. The deployment needs of CCS globally vary considerably depending on the 1.5°C scenario being considered. According to the 1.5°C scenarios with zero or limited overshoot, the carbon captured from fossil fuel sources and then stored by CCS will need to be about - 4.1 $GtCO_2$ per year by the middle of the century. Today, this flow is at or near zero.



c. Non-anthropic flows

The atmosphere has always been in constant interaction with two carbon reservoirs that are considered as "non-anthropogenic": the ocean (including the coasts and territorial seas) and the terrestrial non-managed carbon reservoir (including boreal and tropical forests, inland waters and estuaries).



This "continental carbon pool" includes all the land that is not managed by human activities. It generates an annual removal of non-anthropogenic CO_2. It is composed of the combined effects of fertilization due to the increase in atmospheric CO_2, as well as the effects of climate change such as the lengthening of the growing season in temperate and northern boreal zones (Le Quéré et al., 2018). It does not include fluxes resulting directly from land use and land-use change (e.g. vegetation regrowth), as these are counted in the AFOLU emissions and removals sector (see parts a. and b.i. above). However, the definition of system boundaries makes it difficult to accurately allocate CO_2 fluxes between "managed" and "unmanaged" terrestrial biomass reservoirs (Erb et al., 2013).

Each year, 11.7 $GtCO_2$ are absorbed by the growth of this unmanaged biomass reservoir. With approximately 150,000 $GtCO_2$ of stored carbon, the oceans are by far the largest carbon reservoir in the entire terrestrial carbon cycle. They absorb 8.8 $GtCO_2$ each year. They are not considered "anthropogenic" carbon reservoirs.

3. Carbon neutrality, a prerequisite for meeting the 2°C/1.5°C temperature target

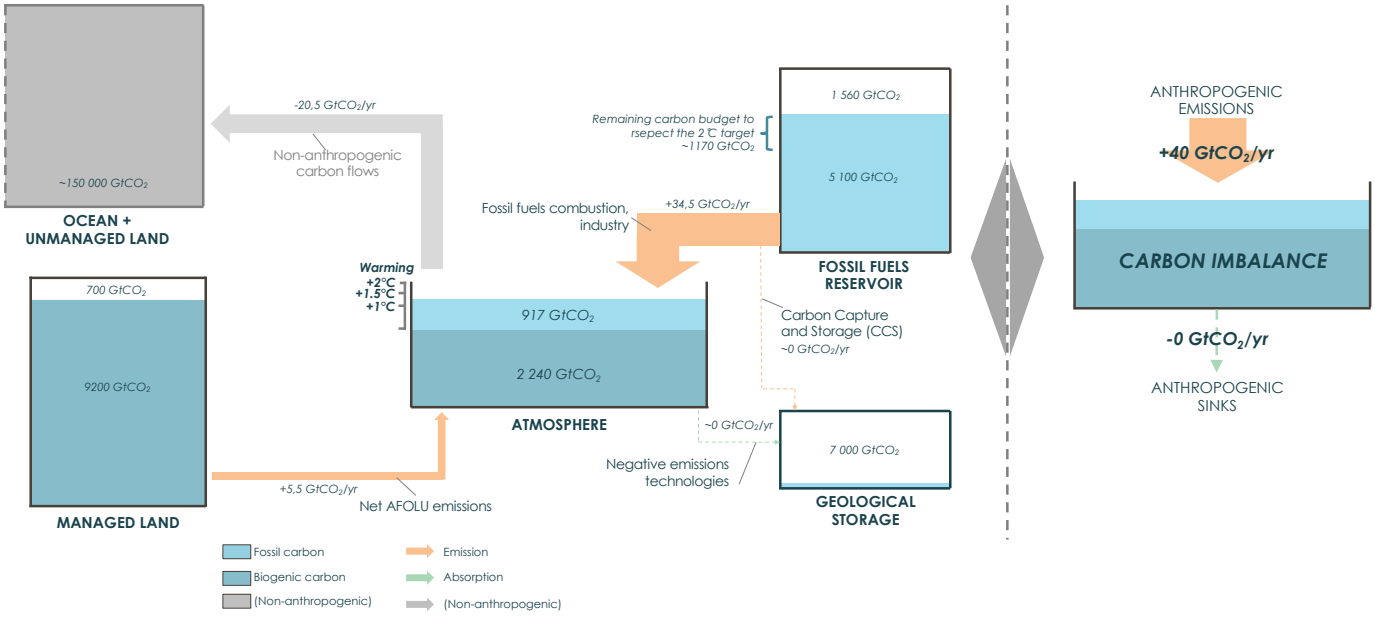
In most 1.5°C or 2°C scenarios, carbon neutrality is only a transition point towards a net negative emissions situation; it is not a goal in itself.

In order to achieve carbon neutrality, it is necessary to both:

- reduce fossil fuel carbon emissions quickly and radically (turn off the tap), as well as those from the land sector (properly manage the drainage reservoir)
- and rapidly and intelligently develop natural (increase the size of the siphon going towards the biomass storage tank) and technological (create a second siphon going towards the geological storage tanks) negative emissions.

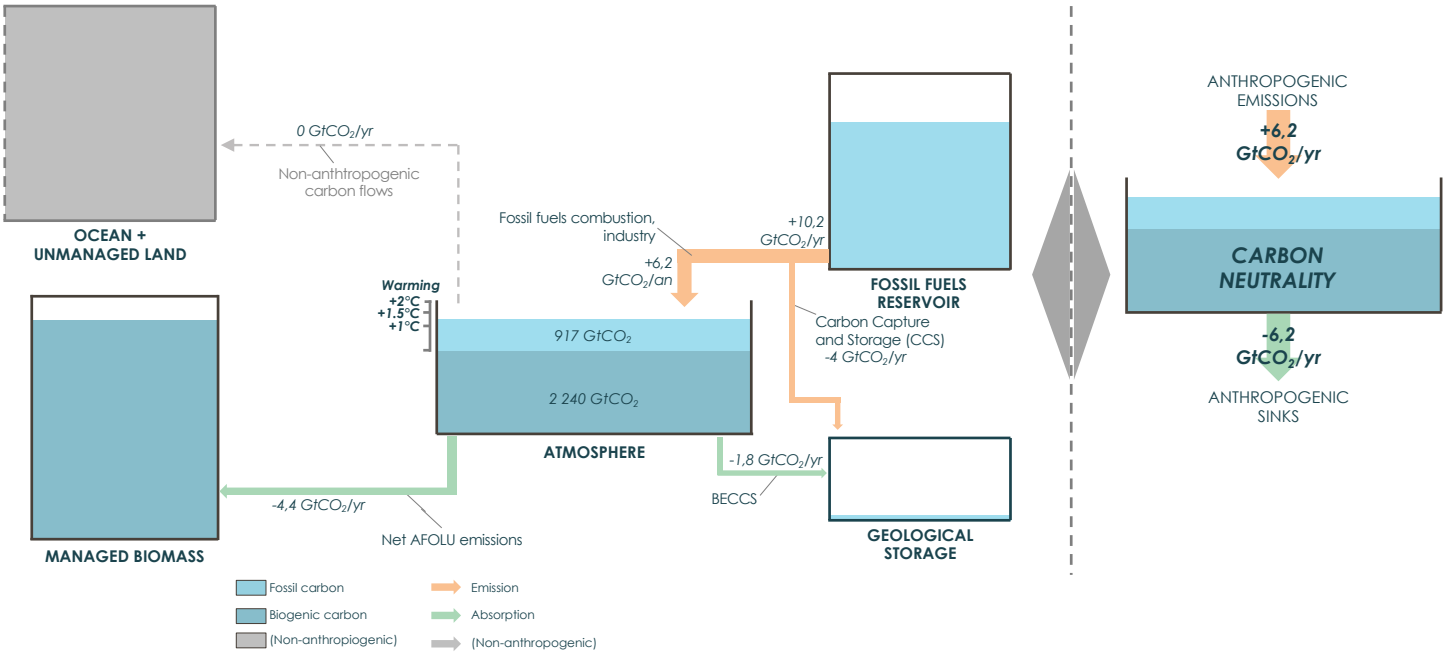
Given the structural limitation of carbon sinks, conventional mitigation (i.e. the reduction of fossil fuel emissions) must remain a substantial part of any climate policy aimed at achieving the 2°C objective" (Gasser et al., 2015).

Current situation



Current status of the global carbon cycle. There is a strong imbalance between anthropogenic inflows (fossil fuels, industry, and deforestation) and outflows (which hardly exist today).

« Carbon Neutrality » in a 1.5°C* scenario (mid-21st century)



The situation in a S1 (or P2) scenario from the IPCC Special Report for the year 2054. Carbon neutrality is achieved. A significant part of the emissions related to energy and industry is captured and stored via CCS. The biomass reservoir has become a net sink. Negative emissions technologies absorb the surplus. Natural sinks (oceans, unmanaged land) have nothing left to absorb because anthropogenic emissions and sinks are in balance. After this year, and until the end of the century, the earth system will become a "net carbon remover". NB: this scenario is only one of the very many 1.5°C (or 2°C) scenarios compatible with reaching neutrality by around 2050 (or 2070). It is given here for illustrative purposes only.*

B/ Companies' Carbon Neutrality: the big blur

1. Inadequacies of the current definition of carbon neutrality for companies: *Measure, Reduce, Offset*

Until today, a "neutral" company follows more or less the same operating method: Measure, Reduce and Offset. That is to say: it measures its emissions, then reduces them "as far as possible", and finally "offsets" the balance, whatever the emissions volume or their dynamics over time (rising, falling). While this triptych may seem logical at first glance, in reality it suffers from several structural pitfalls, which make it difficult to construct a robust and credible definition of corporate carbon neutrality on this basis.

a. Deficiencies in each of the definition's three terms

Measure?

Today's "carbon neutral enterprise" concept is based on the notion of "emissions offsetting". The first step for a company is therefore to define on what volume of emissions it wishes to be considered as neutral. **But companies never define their neutrality within the same perimeter**. Some choose to commit to offsetting their entire value chain, others only include their direct emissions... and yet all claim to have reached the same "zero".

Existing "corporate neutrality" standards and protocols leave a significant margin of freedom in the choice of scope [1], and also allow for not necessarily the most significant emissions in the value chain to be included (e.g. banking investment emissions, vehicle emissions which are sold by a car manufacturer, etc.), as long as the company can prove "the technical or economic impossibility of measuring emissions from all sources" [2].

In short, the "zero" is now considered to have the same value regardless of the perimeter on which it is defined.

Reduce?

The company is supposed to reduce its emissions "as much as possible" before offsetting them. But the announced emissions reductions are always self-declared, estimated on the basis of unambitious incremental actions, and which are not required to be linked to climate scenarios compatible with limiting warming to +2°C or +1.5°C [3] (which call for global emissions to be reduced by 3% to 7% per year from now until 2050 [4]).

Emission reductions are thus unlikely to be truly transformative for the company; targets are usually set "backwards", the first constraint being to prevent the company from fundamentally questioning themselves.

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[1] See: The Carbon Neutral Protocol, Natural Capital Partners, 2018 : "The Protocol requires the inclusion of certain Scope 3 emissions (waste generated in operations, business travel, etc) for certain certifications. The inclusion of any other Scope 3 emissions is at the discretion of the client."
[2] See: PAS 2060 White Paper, Carbon Clear, 2011 : « It should be noted that while the standard requires a robust footprint measurement process, it does provide flexibility by recognizing that it might not be technically feasible or economically viable to establish accurate emissions from all sources. In such cases, these sources can be excluded from the scope of the footprint as long as the removal is justified, well documented and reported ».
[3] A Framework for Alignment with the Paris Agreement: Why, What and How for Financial Institutions? I4CE, sept. 2019.
[4] Höhne et al. (2020) : « Had serious climate action begun in 2010, the cuts required to meet the emissions levels for 2 °C would have been around 2% per year, on average, up to 2030. Instead, emissions increased. Consequently, the required cuts from 2020 are now more than 7% per year on average for 1.5 °C (close to 3% for 2 °C) ». https://media.nature.com/original/magazine-assets/d41586-020-00571-x/d41586-020-00571-x.pdf

Furthermore, the "neutral" status for a company may be achieved after a "reduction period", which may potentially be as short as possible; which is not consistent with the global imperative to maintain sustained emission reductions until the middle of the 21st century and even beyond. The PAS 2060 standard, developed by the British Standards Institute BSI, even allows organizations to claim 100% neutrality based on offsetting, without first reducing [1][2] .

As a result, some companies claiming to be "carbon neutral" see their emissions increase from one year to the next; this incompatibility with the requirement to reduce its overall emissions is not seen as a limit to the claim (by the general public, rating agencies or the financial sphere, for example). As long as the company buys a volume of carbon credits each year equivalent to the volume of emissions calculated on the perimeter of its choice, this increase remains invisible because of the subtraction that leads to the final zero, which is the only figure actually communicated.

The concept of "incompressible" emissions, in other words, those that are considered unavoidable for the company, is itself fragile, at what point can we declare that a GHG emission cannot be reduced. When in practice is it only a question of accepting the counterparts (social, economic, or even environmental on some other criteria), which is essentially a matter of our will and not of inviolable physical laws? At a time when the 2°C or 1.5°C compatible climate scenarios are based on an almost complete decarbonization of uses by 2050, the notion of the "incompressibility" of emissions is proving to be flawed.

A contradiction can therefore be noted between the relative weakness of the emission reduction criteria set within the framework of the existing neutrality labels (PAS 2060, Carbon Neutral Protocol) and the much stronger ambition that the concept of carbon neutrality requires for the community as a whole, on a global scale.

Offset?

“Carbon offsetting", which responds to a logic of subtraction between emissions and carbon credits, has long been called into question [3]; it appears to be non-contributory to the overall neutrality when used without rules [4]. It has been the subject of numerous analyses and criticisms [5][6][7][8][9], of which we can recall the main points below, without claiming to be exhaustive.

Grievances against offsetting can be classified in two categories: criticism against the reasoning biases that it induces **on the part of credit buyers**, and criticism of the **project and carbon markets** defaults.

[1] See: PAS 2060 – White Paper Carbon Zero, co_2balance UK Ltd, 2011 : « This [Route 3 to Carbon neutrality] enables entities to use offsetting to account for all of the GHG emissions associated with the defined subject at the end of the first application period. Entities are therefore able to make a Declaration of Achievement of carbon neutrality at the end of the first application period based solely on offsetting. »
[2] See: White Paper PAS 2060, Carbon Clear, 2011 : « This [Route 3] allows organisations with no historical carbon emissions to declare carbon neutrality in year 1 through 100% offsetting. The requirement to demonstrate carbon reductions applies from Year 2 onwards ».
[3] See for example: Gold Standard Policy Brief: A new paradigm for voluntary climate action (2017)
[4] United Nations Environment Programme, Carbon offsets are not our get-out-of-jail free card (2019)
[5] Kevin Anderson, The inconvenient truth of carbon offsets, Nature (2012)
[6] The inconvenient truth about the carbon offset industry, The Guardian (2007)
[7] Sharon Beder, Carbon offsets can do more environmental harm than good, The Conversation (2014)
[8] Can you really negate your carbon emissions? Carbon offsets, explained. Vox (2020)
[9] Comment des entreprises polluantes se donnent bonne conscience se donne bonne conscience en plantant des arbres, Le Monde (2020)

On the side of credit buyers: the cognitive bias of offsetting

The power of the carbon offsetting concept, which allows the West to distance itself psychologically from its own impact on the climate, has been widely commented on over the last fifteen years [1][2][3]. The words "carbon credits", "neutrality", "neutralization", "cancellation" and "offsetting" operates a semantic bias that suggests that **offsetting allows for perfect reversibility of emissions**, and that a carbon credit would be directly substitutable for emission reductions at the source [4].

However, these credits have never had the official status of a real emissions reduction in corporate carbon accounting. The Science-based Targets Initiative refuses to take them into account in the construction of organizations' reduction trajectories [5], and GHG emissions reporting frameworks, such as the Carbon Inventory , which founded the ISO 14064 standard and the "supply chain" part of the GHG Protocol, do not mention them. The "zero carbon" currently claimed by companies does not seem to be consistent with the rest of the private sector's climate benchmarks, nor with the imperatives of climate science [6].

Classic offsetting is a **zero-sum game**. Any carbon credit trade involves one ton avoided on one side and one ton emitted on the other. From this point of view, the very logic of the system is incompatible with a reduction in overall emissions [7].

It is easy to understand why it is so tempting to consider carbon credits as the equivalent of reductions at home: **the cost of abatement of a ton of CO_2 offset is generally much lower than the implementation of a reduction action plan "at source"**. Offsetting is therefore an efficient and cheap way to soften, or even "neutralize", the cognitive dissonance caused by climate issues [8].

In the same vein, as soon as a company speaks of "neutrality" even though it has only marginally changed its processes, its customers, its products or its spatial organization; i**t implicitly accredits the idea that the neutrality of our economy will be achieved with marginal changes** and that there are a few people responsible for looking "elsewhere" for the solution to a problem, for which there is no internal solution [9]. 9] Global neutrality does not mean an additional incremental step, but it does mean qu**estioning the very socio-economic underpinnings of the way our societies function** [10]. 10] For example by offsetting claiming to equate incremental changes, as well as socio-technical transformations, inexpensive "homeostasis" [11], and ambitious "ruptures"; it creates a counter-productive confusion around the nature of the changes to be implemented by industrialized countries [12].

If we broaden the debate to the issue of energy, buying credits does not recreate oil. This practice of crediting that "cancels out" emissions therefore mask the economy's dependence on an otherwise exhaustible resource, and consequently all the issues of risk management and resilience control that underlie

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[1] Augustin Fragnière, Carbon offsetting, illusion or solution? (2009)
[2] Carbon Trade Watch, The Carbon Neutral Myth offset Indulgences for your Climate Sins (February 2007)
[3] Elisabeth Rosenthal, Paying More for Flights Eases Guilt, Not Emissions, The New York Times (17 November 2009)
[4] See: Gold Standard, Defining a corporate climate finance commitment (2018) and Sarah Leugers, Offsetting: Success in projects, failure of communication (2016)
[5] See: Science-based Targets Initiative : « The use of offsets is not counted as reductions toward the progress of companies' science-based targets. The SBTi requires that companies set targets based on emission reductions through direct action within their own boundaries or their value chains. Offsets are only considered to be an option for companies wanting to contribute to finance additional emission reductions beyond their science-based target/net-zero ». https://sciencebasedtargets.org/faq/
[6] The Corner House, cité par Augustin Fragnière dans La compensation carbone, illusion ou solution ?, Chapitre 2, page 53, §2, 2009 : "The claim of equivalence [between emissions and offsets] is rooted in the technical requirements of the market rather than science"
[7] This argument is valid for avoided emissions projects, but not for absorption/sequestration projects: argument
The Commission is also calling for a clear distinction to be made between the two types of projects.
[8] Refer to the theory of cognitive dissonance developed by the American psychologist Léon Festinger in 1957, quoted by Augustin Fragnière, La compensation carbone : illlusion ou solution ? (2009)
[9] Jean-Marc Jancovici, Carbon "neutrality", a funny good idea or a nice scam? (2008)
[10] See Part 1.A "Global Carbon Neutrality".
[11] The concept of homeostasis reflects the idea of dynamic equilibrium that allows a system to maintain its structure and function. It refers here to the results of the "incremental" changes allowed by the voluntary compensation projects implemented in the countries of the South, which do not lead to any significant questioning of behaviour.
[12] Paul Watzlawick, John Weakland and Richard Fisch, Change. Principles of Problem Formation and Problem Resolution (1974), used by Augustin Fragnière in the book cited above.

Offset projects and the voluntary market: methodological aporia and opacity

Surprisingly enough, **no distinction is made between carbon credits from emission reduction projects, and credits from carbon sequestration projects**. Yet, these two entities have nothing physically to do with each other: as one is a virtual difference in emissions flows, whereas, the other is a real flow of carbon removal from the atmosphere. The idea here is not to give a value judgment on the priority to be given to one or the other, but to stress that it is logically appropriate to separate these two levers, which call for very different roles, effects, levers, prospectives and costs (see part 1).

Another argument concerns the problems raised by the **temporal aspects of carbon sequestration in the land sector**. To emit one ton of fossil CO_2 is to instantly release into the atmosphere a quantity of carbon that has been stored for millions of years in a remote fossil geological reservoir [1]. In comparison, planting a tree allows a non-immediate removal, as it is **spread over the entire growth phase of the tree**. And once the tree has reached maturity, **the permanence of the carbon storage is only guaranteed for a few decades** (there are risks of carbon release through deforestation, fire, disease, drought, etc.). A "future" elimination of carbon cannot therefore benefit from the same level of certainty as present or past emissions; carbon sequestration cannot be considered as a strict "negative equivalent" of carbon emissions.

The issue of the **additionality** [2] of offset projects is still hotly debated [3][4][5][6]. Moreover, a debate must be opened on the issue of carbon prices; more specifically on **the margins practiced by offsetting intermediaries**; and on the redistribution of the value of carbon revenues on the ground [7]. Finally, the notion of offsetting is built on other implicit biases - and perfectly debatable - at the project level. For example:

- that it would be appropriate to **equate real tangible emissions with "avoided emissions"** via uncertain construction, because they require the use of a counterfactual "reference case" [8][9];

- in the case of ex-ante certification [10], that it would be appropriate to equate immediate emissions with avoidance, reduction or sequestration, **this has not taken place yet**;

- Incidentally, that the methods for calculating avoided or negative emissions are consistent with each other (which is rarely the case, even where it is possible to define what such "methodological consistency" should consist of).

Nevertheless, when used in the context of a relevant approach, **voluntary carbon markets remain interesting tools for accelerating the fight against climate change**. They offer a robust outlet for funding for organizations that are willing to act on climate change beyond their value chain. The challenge is to restore full credibility to this tool for financing low-carbon development and transition by placing it in a framework where legitimacy is no longer in question, which will necessarily require a more restrictive interpretation of its benefits for the entity purchasing the credits.

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[1] See: Part 1.A "Global Carbon Neutrality".
[2] A carbon project is considered "additional" if it would not have existed in the absence of the sale of the carbon credits. See Appendix "Methodological Basis", entry "Carbon Credits".
[3] See Gilles Dufrasne, *Carbon Markets 101, The ultimate guide to global offsetting mechanisms, 2019.*
[4] Dr. Martin Cames, *How additional is the Clean Development Mechanism?* Öko Institute, 2016
[5] Pauline Lacour, *La Chine, principale bénéficiaire du mécanisme pour un développement propre (MDP)*, Mondes en développement 2018/1 (n° 181), pp. 165-180.
[6] *Carbon offsetting, false good idea?* Pour la solidarité, 2018
[7] See Part 2.C/ Open questions.
[8] A counterfactual scenario is a scenario that would have occurred in the absence of the project whose gain is being assessed. By definition, it never takes place and is therefore impossible to verify.
[9] Dan Welch (Ethical Consumer magazine) : « Offsets are an imaginary commodity created by deducting what you hope happens from what you guess would have happened ».
[10] Ex-ante certification, as opposed to ex-post certification, allows carbon credits to be issued in advance, before the avoidance or sequestration has actually taken place. This type of calculation is generally applied to long-term projects, such as forestry projects.

b. "Measure, Reduce, Offset": the structural shortcomings of the definition

It could be argued that the problem lies not in the definition itself, but in the degree of ambition in applying each of the three terms of "Measure, Reduce, Offset". Let's look at the case of a company that would apply these three steps to the letter, and with a maximum degree of rigor: taking into account 100% of direct and indirect emissions in the value chain [1], adopting an emissions reduction trajectory compatible with 1.5°C, and purchasing the best carbon credits at a fair price. Is this enough to make its announcement of "carbon neutrality" irreproachable? Is it enough to make this concept live up to the global ambition of carbon neutrality (see section 1.A/)? We will see below that it is not.

Temporal inhomogeneity

The "Measure, Reduce, Offset" terms that underlie the current claims of "corporate neutrality" are heterogeneous in their terms: "Measure" and "Offset" are one-off actions, while "Reduce" is an ongoing process.

This contradiction in terms can be resolved in two ways:

- **Either the term "Reduce" should be understood as "the result of the reduction process"**,

i.e. the specific point in time when the company can no longer reduce its emissions. A company should then only "offset" when this "incompressible" emissions threshold has been reached. But how can emissions be considered "incompressible" in a global context where climate science requires us to reduce our emissions by 3-7% per year [2]?
In reality, none of the "carbon neutral companies" can justify in practice that the emissions they "offset" are incompressible. The examples of companies that give up their "carbon neutral" status if their emissions increase from one year to the next (in this case, they simply buy more carbon credits) are rare (or even non-existent, but this remains to be proven). Finally, it is simply not desirable to "wait" until the middle of the century before massively mobilizing the carbon finance instruments at our disposal to fight climate change.

- **Either the term "Reduce" should be understood as the process of reduction itself**.

Therefore, "carbon neutrality" cannot logically be a static state if one of the terms in its definition is a dynamic process. **The only way to solve this problem is to consider neutrality not as a state, but as a process that must be managed dynamically over time**.

2. A general critique of the business' concept of being "carbon neutral"

As we have seen, the current definition of carbon neutrality for organizations therefore suffers from a notable conceptual vagueness. The elements of the language invoked suggest that an organization is capable of achieving individual "climate virginity", within a unilaterally defined perimeter; without any analysis of the compatibility of the company's activity itself within a carbon-neutral world; nor of the ambition of the declared emissions reductions; nor of the significant aspect of the emissions perimeter within which it is defined [3].

Beyond the technical arguments opposed to the current definition of the concept (Measure/ Reduce/ Offset, see previous section), it may seem legitimate to question the relevance of **the very concept of a carbon-neutral company, whatever its form**.

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[1] In GHG reporting frameworks, "emissions scopes" correspond to different categories of greenhouse gas sources. See GHG Protocol or ISO 14064.
[2] Höhne et al., Emissions: world has four times the work or one-third of the time (2020).
[3] See Gold Standard, Defining a corporate climate finance commitment (2018), « Broad one-size-fits-all »

Arithmetic argument: no longer able to see the forest for the trees

A first argument that can be made against the general concept of neutrality applied to companies is the principle of subtraction itself.

The much sought-after "zero carbon" is the result of subtracting two terms: company emissions on the one hand, and the purchase of "offsets" on the other. Structurally, this zero makes each of the two terms in the equation invisible. In particular, it hides the first and most important of the two, namely the actual volume of emissions and their evolution over time. The question of whether the emissions trend is sustainable, or whether the company is reducing emissions fast enough, is avoided "by design" through convenient subtraction. Current announcements of corporate neutrality are therefore structurally opaque.

Specifically, a company that issues 100, with a downward trend, and "offsets" 100, is as "neutral" as a company that issues 10,000, with an upward trend, and "offsets" 10,000; even if, for the latter, climate science and collective societal orientations concluded that the "right" level of emissions would rather be 1,000.

Physical and ethical argument: the impossible universalization of the concept of “carbon neutral company”

Carbon offsetting, the "sister concept" of neutrality, is based on the notion of the universality of the climate problem: one ton of GHG emitted will have the same warming effect everywhere in the world, regardless of where it is emitted. In a mirror image, an emission avoided "at home" can therefore theoretically be replaced by an emission avoided "anywhere", and preferably where the abatement cost is lower. Carbon offsetting is now mainly used by organizations located in industrialized countries, which set up cheap emission avoidance (or carbon sequestration) projects in developing countries.

However, there are two problems with regards to the available "deposit". On the one hand, the emissions of the countries in the South are currently lower than those of the industrialized countries; even if the emission reductions of these countries could all be monetized in the form of carbon credits, they would not represent a sufficient stock to "offset" all the emissions of the countries of the North [1]. On the other hand, as we have seen above, the quantity of carbon sinks that can be developed on the surface of the planet is economically, technically and societally limited [2].

Offsetting therefore appears to be a "first come, first served" system that **does not allow the virtuous behavior of the first actors to be generalized to the whole system** [3]. From an ethical point of view, such a non-generalizable system cannot be considered as a valid solution for the climate [4]. To be "carbon neutral" can only remain an "unfair claim" because it is made possible "on the sole condition that others are not" [5].

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[1] Carbon Offsetting: a false good idea? Pour la solidarité, 2018: "Offsetting all the emissions of the industrialized countries would mean totally eliminating the emissions of the rest of the world, with developing and emerging countries (China, India, Brazil) increasing their emissions as they develop economically. This scenario is very unrealistic. The industrialised countries must therefore reduce their emissions in any case. »

[2] See Part 1.A/ Global Carbon Neutrality.

[3] In the Kyoto Protocol, States were subject to a "supplementarity clause" which obliged them to use the offset mechanisms only to a reasonable extent and in addition to domestic emission reduction actions. Voluntary carbon offsetting, on the other hand, has no theoretical limit.

[4] Augustin Fragnière, Carbon Offsetting - Illusion or Solution? Chapter 4, pages 138-139 (2009). It is not a concept universalizable because it does not subscribe to the absolute Kantian moral criterion of the categorical imperative: "Act only according to the maxim by which you can want it to become a universal law at the same time".

[5] *Ibid.*

Semantic argument: the term is already taken

It is not acceptable that the concept of corporate neutrality can be called by the same name as the concept of global neutrality.

The first one can be reached by any entity, as long as it pays the price. The idea is to "cancel" its emissions by buying carbon credits. Since the use of the voluntary carbon market is theoretically unlimited[1], its achievement is in no way conditioned by a transformation of the company's processes, nor even by a criterion of a minimum reduction of its own emissions. There is no scientific consensus on this issue.

The second one is rigorously defined by science as a balance between emissions and removals in a given territory. It can only be achieved at the cost of a very sharp reduction in fossil emissions, under the effect of profound socio-technical transformations.

The ambiguity is fueled by a number of players who are trying to create a distinction between the definition of "net zero" (emission-absorption balance on a global scale) and "carbon neutrality" (offsetting emissions by buying credits). This is a counterproductive attempt, which tries to make people forget that science considers these two concepts to be perfect synonyms [2]. **There is an urgent need to clarify the misunderstanding and to restrict the term neutrality to its scientific definition**.

Effectiveness argument: the concept does not bear fruit

Any definition of carbon neutrality as a state that can be achieved at any time by appropriate subtraction cannot trigger sufficient climate action by companies.

It is not certain that each company's individual pursuit of its own "carbon neutrality" will effectively lead to a global climate-neutral system. On the contrary, the search for individual neutrality runs the risk of leading companies to neglect the importance of the reduction process and instead focus on offsetting their emissions in the short term. The fact that conventional offsetting is a zero-sum game, incompatible with an overall reduction in the system's emissions (see "Offsetting?" section above), raises questions about the very effectiveness of this system on a large-scale.

To put it another way, **attempting to define carbon neutrality at the company level may not be the most effective way to motivate the private sector to act towards the collective "net zero" objective**.

Managerial argument: the staff are under general anesthesia

Announcing internally that "the company is already neutral" can potentially have a negative effect on the climate commitment of employees. As long as carbon neutrality is defined as a target that is achieved immediately through offsetting, carbon neutrality will be perceived as something outside of the company's day-to-day operations. It does not allow employees to take a long-term view, as it suggests that the work has already been done, *a fortiori* by others. **In this sense, it will inevitably lack the "transformative" power needed to act at the right level of ambition**.

Marketing argument: claiming carbon neutrality, is it a potential image risk in the medium term?

Businesses are powerful vectors of transformation that induce significant impacts in their value chains and beyond. It is doubtful that such companies (and what they imply in terms of production, wealth creation, employment, social and economic impacts) can ever pretend to be climate-neutral without being systematically questioned by the general public.

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[1] See note [3] on the previous page on the supplementarity clause.
[2] IPCC 1.5° Special Report (2018) : « Net zero carbon dioxide (CO_2) emissions are achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removals over a specified period. Net zero CO_2 emissions are also referred to as carbon neutrality."

The argument is then almost (de)ontological: **can any organization, commercial or not, ever be climate neutral?** Wouldn't recognizing such a status mean at the same time recognizing that the organization's entire corporate strategy, investments and production method is, then, climate-neutral?

While a priority objective should be to raise awareness among employees and the public, corporate neutrality and the lexical field associated with it ("credit", "offsetting", "zero carbon", and even "carbon positive") carry a counterproductive vision; which implies a lack of impact and the possibility of an immediate and effortless solution to the climate problem. This kind of communication is strongly discouraged by many NGOs [1] and agencies [2].

As long as offsetting is used as a means of cancelling out its emissions, the public will see this as a way of transferring responsibility to others, which is not far from a form of green-washing. Corporate liability could potentially be incurred in the long term.

To summarize these few points, the notion of a "carbon neutral business" does not maximize corporate climate action towards the collective achievement of global carbon neutrality [3].

[1] World Wildlife Fund, WWF position and guidance on voluntary purchases of carbon credits (2020) : "WWF cautions businesses on claiming "carbon/climate neutrality" for either the business or its products, because it could signal that a company's work on climate is done when a company or its product's entire footprint hasn't actually been eliminated."

[2] ADEME, Voluntary Carbon Offsetting: 5 rules of good practice recommended by ADEME (2019): "Rule n°5: Communicate in a responsible manner. "100% offset", "zero carbon impact", "low carbon product" ... these are all examples of inappropriate communication since (1) they do not allow a full understanding of the quantified issues, the references taken, the scope retained ... (2) they lead the public to think that there would be products or activities with no impact and therefore that they could be consumed without moderation ... (...)....) The essential objective of responsible communication on compensation is to avoid any confusion on the part of the public about the reality of the impacts and their reduction: in particular, any element of communication suggesting a lack of impact is to be prohibited. »

[3] See César Dugast and Renaud Bettin in Le Monde, Neutralité carbone : il faut une transformation radicale des modèles économiques des entreprises (29 November 2019)

C/ The necessary reconnection of “corporate neutrality” with the objective of global neutrality

In the light of the above, there seems to be an urgent need to rethink the concept of corporate carbon neutrality.

The only thing that is rigorously defined by science is the definition of global neutrality in 2050 (see Part 1.A). Given the conceptual weaknesses and shortcomings of the concept of "corporate neutrality" (see Part 1.B), it may be worthwhile to rebuild a new understanding of what *neutrality should mean* for a company, starting from the strongest possible basis: the goal of global neutrality.

To achieve this, Net Zero Initiative proposes to proceed with two paradigm shifts:

1/ MOVE FROM “I AM CARBON NEUTRAL” TO “I CONTRIBUTE TO GLOBAL CARBON NEUTRALITY”

This change has two consequences:

From static to dynamic

Moving from a static state of neutrality (I am neutral on date X) to a dynamic management of the company's climate performance in the light of global neutrality makes it possible to put the notion of reduction trajectories back at the heart of the matter.

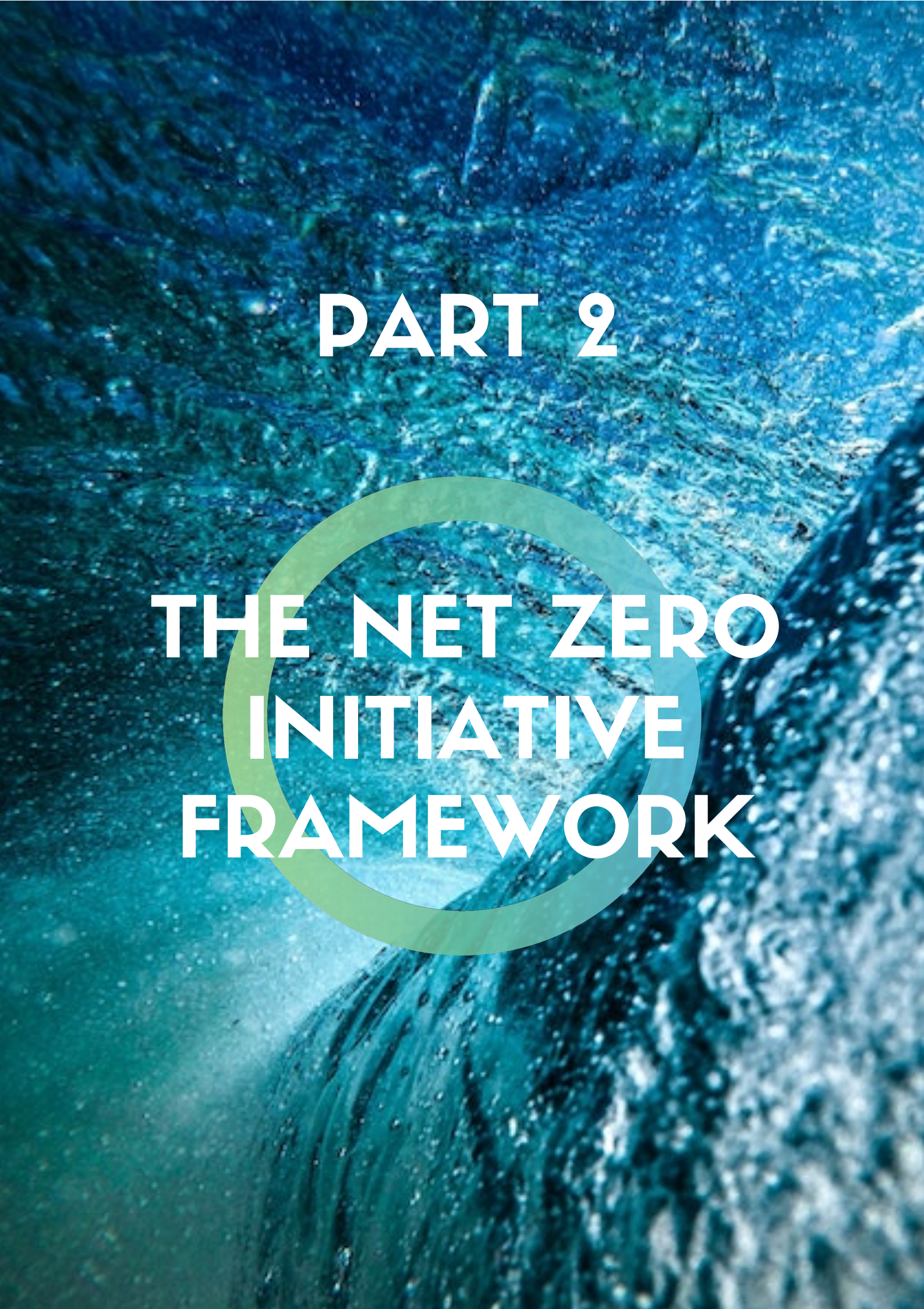
From individual to collective

Giving up the self-centered quest for "one's own neutrality" allows one to escape from a "silo vision" and consider one's activity in relation to the rest of the system. The ultimate goal of neutrality is a collective and global objective; it can be applied in an equally ambitious way on the scale of a territory or a State [1]. Firms can consider themselves to be at the disposal of this collective objective. It is no longer necessary to subtract carbon credits from the volume of emissions, since individual zero is no longer applicable. The only valid neutrality is that which is achieved collectively.

2/ MOVE FROM “OFFSETTING” TO “CONTRIBUTING”

Financing low carbon projects outside a company's value chain (in the form of purchasing carbon credits or not) is a practice to be encouraged. However, claiming ownership of the reductions achieved by these projects and subtracting them from one's own carbon footprint is counterproductive, contrary to conventional reporting rules and it is subject to public mistrust [3]. Carbon credits" should be considered as simple certificates of "good climate finance". Thus, no company should use carbon credits to "replace" an effort that has not been made at home [4].

[1] The French energy-climate law (2019) plans to achieve carbon neutrality on the national territory by 2050. This ambitious objective consists of dividing GHG emissions by six compared to 1990 levels, and at the same time doubling the territory's carbon sinks.
[2] Renaud Bettin and César Dugast, Pour une neutralité carbone au service de la neutralité des territoires, Carbone 4 (2019)
[3] See: A dangerous distraction. Why offsetting is failing the climate and people : the evidence, Friends of the Earth (2009)
[4] Renaud Bettin and César Dugast, From Offset to Contribution, Carbon 4 (2019)



PART 2

THE NET ZERO INITIATIVE FRAMEWORK

Part 2

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A/ Main principles

The main objective of the Net Zero Initiative framework is to provide organizations with a vision of the things that will enable them to optimize (and make visible) their climate action in view of the emergence of global carbon neutrality, through a coherent and balanced harmonization of the different climate action instruments.

The framework is based on a few main principles:

1. Consider organizations as participants in the collective action towards global net zero, rather than as individually "carbon neutral" entities

The Net Zero Initiative believes that it is much more powerful and effective to view organizations as agents that can contribute to the emergence of global and territorial carbon neutrality, rather than as independent entities that can themselves become carbon neutral [1].

Therefore, we argue that the "neutral" performance of an organization cannot be effectively captured by a binary criterion such as "being neutral/not neutral". Rather, it must be described as a **level of alignment** over time with the necessary imperatives for the emergence of a net zero world; [2] according to the criteria we describe below. The way in which companies can effectively contribute to this global goal is to act, right now, on three distinct levers: reducing their own emissions in line with global targets, contributing to the reduction of emissions from other actors inside and outside their value chain, and contributing to the development of carbon sinks, inside and outside their value chain as well.

2. Rehabilitating the right level of ambition behind the word "neutrality"

The expression "carbon neutrality" is powerful, and easily "marketable". For this reason, in order to avoid *green washing*, it must carry the same degree of ambition as that which prevails to designate the neutrality of the global system, which requires radical socio-technical ruptures [3].
For the Net Zero Initiative, "carbon neutrality" cannot suitably be an attainable condition by an organization (let alone overnight). On the contrary, it is a dynamic process, an ambitious path that will continuously require time, money and energy. It must be understood as one of the most ambitious permanent transformations that a business leader may encounter in the course of his or her career.

3. Strictly distinguishing between emission reductions and negative emissions

As explained in section 1.A/, climate science calls for rapid action on two distinct and complementary policy levers at a global level: the reduction of GHG emissions and the development of carbon sinks.

These two levers represent physically different realities, they do not have the same development potential and should not be ranked equally (since the rate at which the reductions are implemented directly determines the quantity of sinks that will be developed).

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[1] IDDRI, in its report Neutralité carbone, défis d'une ambition planétaire (2018), writes in particular: "Carbon neutrality can provide a common language and time horizon for the various players involved in the fight against climate change. Each actor can define its place in a carbon-neutral world, according to its constraints, endowments and potential, and not only (or necessarily) aim for neutrality in its own activities or territory. »

[2] In the spirit, for example, of the benchmark proposed by I4CE to quantify the "alignment" of economic players with the objectives of the Paris Agreement. See Ian Cochran, Alice Pauthier, A Framework for Alignment with the Paris Agreement: Why, What and How for Financial Institutions? I4CE (2019)

[3] See: Part 1.A/ Global Carbon Neutrality. IDDRI, in Neutralité carbone, défis d'une ambition planétaire (2018), paints this picture: "The trajectories studied by the IPCC assume at the global level of : 1. Develop a zero-emission global energy system by the middle of the century; 2. halt deforestation, soil artificialisation and sources linked to land use changes (before moving to a global GHG capture regime); 3. reduce emissions from agricultural and urban waste, methane leaks and fire-related emissions to a level close to zero. »

However, emission reductions and carbon removals are often mixed up and considered as equivalent and interchangeable mitigation instruments [1]. This confusion may already have hampered climate action by creating overconfidence in negative-emission technologies, thus undermining measures to reduce emissions at the source [2]. The Net Zero Initiative proposes to clearly separate the different physical realities from each other: inflows ("emissions"), outflows ("removals"), chronological difference in inflows ("emissions reduction"), or the difference between an actual flow and an alternative scenario ("avoided emissions").

4. To clarify the concept of "avoided emissions"/ to broaden the concept of one's "contribution to global neutrality"

Another subject deserving clarification is the concept of "avoided emissions", defined as the difference between the emissions generated by a project and the emissions from a counterfactual scenario that would have occurred in the absence of the project. Carbon credits, for example, are based on this definition. Some companies also claim to "avoid" certain emissions through the marketing of their products. However, it is not clear whether these "avoided emissions" always lead to a real decrease in global emissions, or simply to a "smaller increase compared to a baseline scenario".
For the Net Zero Initiative, it is crucial to shed light on the differences between the different natures of avoided emissions.

5. Sealing "inside" and "outside" of the value chain. Re-examining the status of carbon offsetting.

The net Zero Initiative establishes a strict separation between what is achieved inside and outside of an organization's value chain. We affirm that no addition, subtraction or any arithmetic operation whatsoever should be made between an organization's GHG emissions reporting (scopes 1+2+3) and its financing of low-carbon projects outside of its value chain (whether through the purchase of carbon credits or any other instrument).

For the Net Zero Initiative, the purchase and withdrawal [3] of carbon credits should not be used to "neutralize" or "offset" an organization's carbon footprint. Instead of claiming the "ownership" of the reduction (usage claim [4]), the organizations can claim the mere financing (finance claim), thus proving their positive and tangible contribution towards the Paris Agreement's net zero target, which should be counted in a separate category.

This strict separation between the "inside" and the "outside" of a company's value chain has two advantages:

- **It is a good way to avoid the misuse of offsetting**. If the credit buyer can no longer claim ownership of the reduction, but only its financing, the credits can no longer be used to "neutralize" the internal GHG emissions within the organization's value chain.
- **It is consistent with the avenues currently being explored for the restructuring of the post-2020 voluntary carbon market** [5].

[1] In particular, carbon credits do not clearly identify whether it comes from an emissions avoidance project (energy efficiency, renewables, etc.) or a carbon absorption project (afforestation, reforestation, etc.).
[2] McLaren et al., Beyond "Net-Zero": A Case for Separate Targets for Emissions Reduction and Negative Emissions, 2019
[3] Retirement is the last stage in the life of a carbon credit. After this stage, it is withdrawn from the market.
[4] The Gold Standard Foundation, Envisioning the Voluntary Carbon Market Post-2020 (2019)
[5] The Kyoto Protocol and the Paris Agreement contain structural differences that must necessarily lead to a clear redefinition of the role of voluntary carbon markets.

B/ The Net Zero Initiative Matrix

Linking the global net zero achievement with organizational climate action

In the first part, we have shown that global net zero should be reached by the middle of the century thanks to the joint activation of two action levers:

- **The reduction in anthropogenic emissions**, whether they are:
  - of **fossil fuel** origin (combustion of coal, oil or fossil gas and oxidation via industrial processes)
  - of "**biogenic**" origin (deforestation or carbon-inducing land-use change)

- **The increase in anthropogenic sinks**, whether they are:
  - "**natural**" (reforestation, afforestation and carbon sequestering agricultural techniques)
  - "**technological**" (biogenic carbon capture and storage, direct capture of CO_2 in the air and others)

From the point of view of the global planetary system, these two levers do not suffer from ambiguity: they are real, absolute, direct carbon flows between the atmosphere and the other carbon reservoirs. From the point of view of an organization, on the other hand, things are less clear:

- An organization is only one part of the overall system, thus, the notion of "indirect" emissions must be taken into consideration. In many cases, the most important climate impact of an organization lies precisely in its indirect emissions (the combustion of products sold by Oil and Gas companies, the use of vehicles sold by car manufacturers and emissions from assets financed by banks, etc.);
- An organization can act beyond its value chain, for example by providing additional financing for low-carbon projects;
- With some exceptions (forestry or agricultural companies), an organization has few or no carbon sinks within its own legal perimeter;
- Etc.

For all these reasons, the translation of achieving global net zero (i.e. a balance between direct emissions and removal flows) at the scale of a company is not immediate.

It seems more relevant and credible to ask **how an organization can best contribute to the activation of these two systemic levers**: a decrease in global emissions on the one hand, and an increase in sinks on the other.

In order to contribute to the reduction of global emissions, an organization has the capacity to act on several levers:

- If one takes a viewpoint focused on the organization and its value chain, which aims to produce an annual **carbon inventory**[1] :
  - It can reduce its direct emissions (Scope 1)
  - It can reduce its indirect emissions, either upstream or downstream of its value chain (scope 2+3).

- If one takes a "decentralized" point of view, which aims to evaluate the impacts of the company's **interventions** in a given year[1] :
  - It can **contribute to the reduction of its customers' footprint**, something that is not fully captured by the scope 3 downstream indicator
  - It can **contribute to the reduction of emissions from actors outside of its value chain** through project financing.

[1] This distinction between "Inventory Accounting" and "Intervention Accounting" is proposed by the WRI and the GHG Protocol in some of their documents (Project Protocol, Policy and Action Standard). It makes it possible to clearly distinguish between emission reductions (absolute decrease in emissions between two points in time) and emission avoidance (difference in the level of emissions between an actual project and a situation that would have occurred in the absence of the project). Intervention" accounting only makes sense when applied to specific projects, whereas "inventory" accounting can be applied in a steady state to any emissions process.

An organization can contribute to the increase in global carbon sinks:

- by adopting a "carbon inventory" viewpoint which focuses on the organization :
    - it can **increase its direct carbon sinks**
    - it can **increase its indirect carbon sinks**, upstream or downstream of its value chain

- by adopting an " intervention impact " perspective:
    - it can contribute to the **increase of carbon sinks amongst its customers** (which, on the other hand, could be merged with the increase of downstream removals in the value chain, refer to Pillar C)
    - it can **contribute to the development of carbon sinks outside its value chain** through project financing

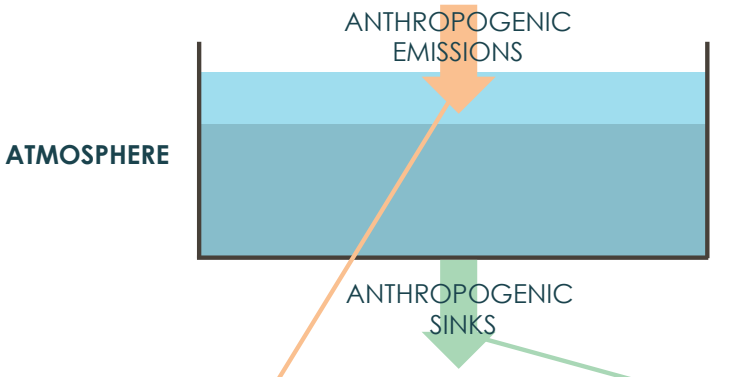
Another way of breaking down the problem is to clearly identify the physical quantities which are conventionally manipulated in carbon accounting, and sometimes wrongly confused with each other:

- **CO_2e emissions**, correspond to an immediate, absolute, physical flow of GHGs added to the atmosphere.
- **Emissions reductions**, which correspond (in our vocabulary) to an actual, physical, chronological, decrease in absolute emissions between two time intervals of an equal duration.
- **Avoided emissions,** which correspond (in our vocabulary) to a "ton of CO_2e that is not emitted". "This means an emissions differential between an actual project and a counterfactual scenario that would have taken place in the absence of the project. These avoided emissions, expressed in tons of CO_2e, are through "virtual" constructions because they are defined by the difference between reality and an imaginary scenario. They are not are not always synonymous with real emission reductions. In literature avoided emissions are often referred to as "emissions reductions" for convenience (which may create some confusion)
- **CO_2 removals**, which correspond to a physical, absolute, immediate flow of CO_2 out of the atmosphere through the action of anthropogenic carbon sinks.

For more information on the definition of terms used, the reader may refer to the Appendix "Methodological Foundations".

THE NET ZERO INITIATIVE MATRIX

A classification of these levers is proposed in the "dashboard" below.



Levers at a global scale	REDUCING EMISSIONS		IMPROVING SINKS
Levers at an organisational scale	**Pillar A** Reducing my GHG emissions	**Pillar B** Reducing others' emissions	**Pillar C** Developing carbon sinks
Indicator to be monitored	*Induced emissions*	*Avoided emissions*	*Negative emissions*
Physical nature	*Absolute real flow of GHGs added to the atmosphere emissions*	*Difference in GHG emissions compared to a reference scenario*	*Absolute real CO_2 flow out from the atmosphere*
In my value chain – In my operations	Direct emissions *(« scope 1 »)*	-	Direct removals
In my value chain – Upstream and downstream	Indirect emissions *(« scope 2+3 »)*	Emissions avoided by my products and services	Indirect removals
Outside of my value chain	-	Emissions avoided through the financing of reduction projects	Removals through the financing of absorption projects

Each organization is invited to:

1. **Measure** its performance on each of the three pillars
2. **Set targets** « at the right level of ambition » on each
3. **Manage them dynamically** over time, in parallel

1. Pillar A: Reducing my GHG emissions

Presentation

The first - and perhaps the most fundamental - lever an organization can use, is its ability to reduce its direct and indirect GHG emissions. We refer to these as "induced emissions" or "generated emissions". This involves reporting annually the amount of greenhouse gases emitted in an organization's value chain, expressed in tons of CO_2 equivalent (non-CO_2 gases are converted into CO_2 using an equivalency metric, such as GWP100).

Which equivalence metric amongst the different greenhouse gas emissions is the standard in terms of carbon neutrality ?

The definition of "net zero" at the global level only concerns CO_2, as it is a question of achieving a balance on the carbon cycle in a given year.

To meet the 1.5°C target, the IPCC SR15 report calls both for achieving net zero carbon by 2050 and for reducing emissions of short-lived climate forcers (SLCFs), such as methane, quickly enough (Allen et al., 2018; Collins et al., 2019). For convenience, greenhouse gas emissions are often expressed in CO_2 equivalent, most often using the GWP100 equivalence metric [1].

There is a debate on the relevance of using this metric for carbon neutrality objectives (Perrier-Guivarch,-Boucher, 2018), since these objectives express an immediate relationship between the flows entering and leaving the atmosphere in a given year and not an integrated radiative forcing balance over several years. The GWP* metric seems to be more appropriate in this case (Cain et al, 2019). Nevertheless, it is not uncommon to find carbon neutrality targets expressed in CO_2 equivalent via GWP100. This is for example the case of the French National Low Carbon Strategy (SNBC) [2]. Another solution would be to use a “double-bucket approach” and manage CO_2 and non-CO_2 gases separately.

[1] Global Warming Potential is a comparative index associated with a greenhouse gas (GHG) that quantifies its marginal contribution to global warming compared to that of carbon dioxide, over a selected time period. The GWP100 metric considers a time period of one hundred years.
[2] https://www.ecologique-solidaire.gouv.fr/strategie-nationale-bas-carbone-snbc

How to calculate this?

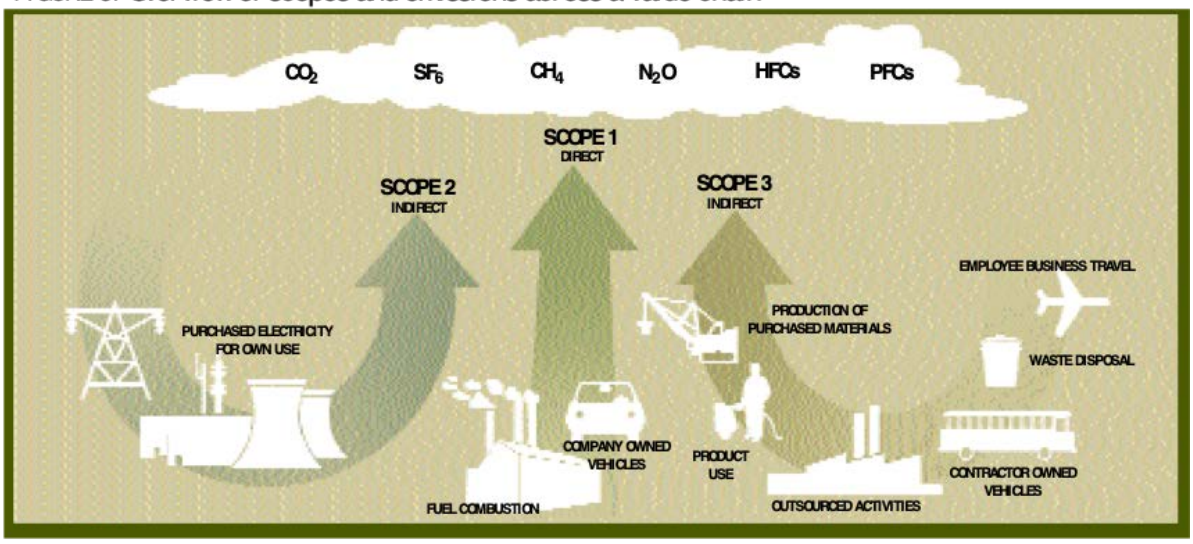
1. In the value chain

This first "pillar", the control of an organization's induced emissions, has been the keystone of private sector's climate action for decades. Today, the methods used to report an organization's greenhouse gas emissions are robust and recognized. In France, the "carbon inventory" which was created in 2007 by Jean-Marc Jancovici and disseminated by ADEME, is now supported by the 'Association Bilan Carbone' (ABC); it has given rise to an international standard, ISO 14064. At the same time, the Greenhouse Gas Protocol (GHG Protocol) initiative led by the WRI and the WBCSD proposes methodological rules derived from ISO and the French carbon inventory.

The accounting methods are very precisely indicated in the source documents for each methodology. Let us at least outline the main principles.

Emissions are divided into three groups according to their proximity to the core business: Scope 1 (direct emissions), Scope 2 (indirect energy-related emissions) and Scope 3 (other indirect emissions).

FIGURE 3. Overview of scopes and emissions across a value chain



Extract from the GHG Protocol: Overview of the scopes and emissions within the value chain

2. Outside the value chain

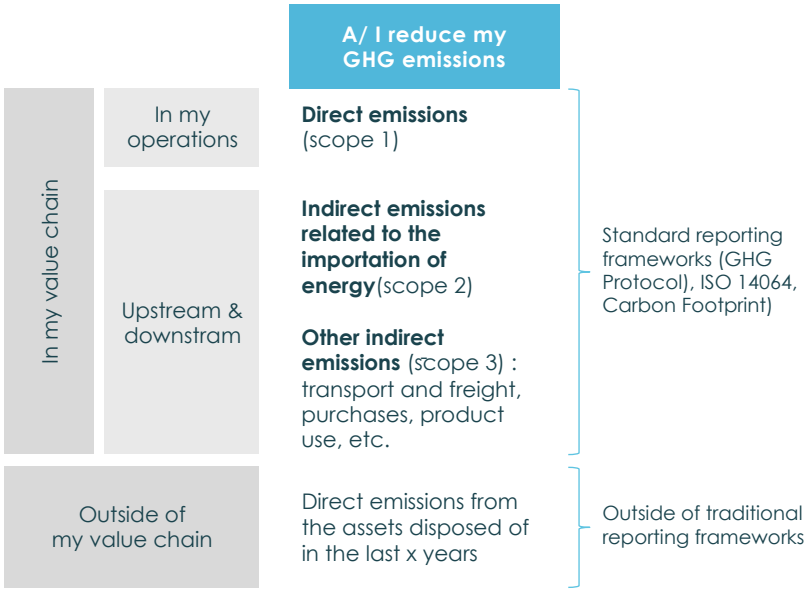
Current reporting frameworks stop at the boundaries of an organization's value chain.

To go even further

Given that the NZI matrix proposes a category, "Beyond Value Chain", which was initially reserved for financial contributions from companies outside of the value chain (see Pillars B and C below); we might consider whether it would be appropriate to consider creating a new category: reporting on direct emissions from assets recently disposed of by the organization. The sale of a high-carbon asset, such as a coal-fired power plant, for example, immediately disappears from the company's traditional reporting framework, but the asset does not cease to exist and emit.

Creating a category "Direct emissions from assets sold in the last x years" would make it possible to better account for emissions at a systemic level, as well as differentiating between companies with a real policy of transforming/closing assets and those that simply sell these assets to third parties. This question remains open.

Pillar A Reporting matrix



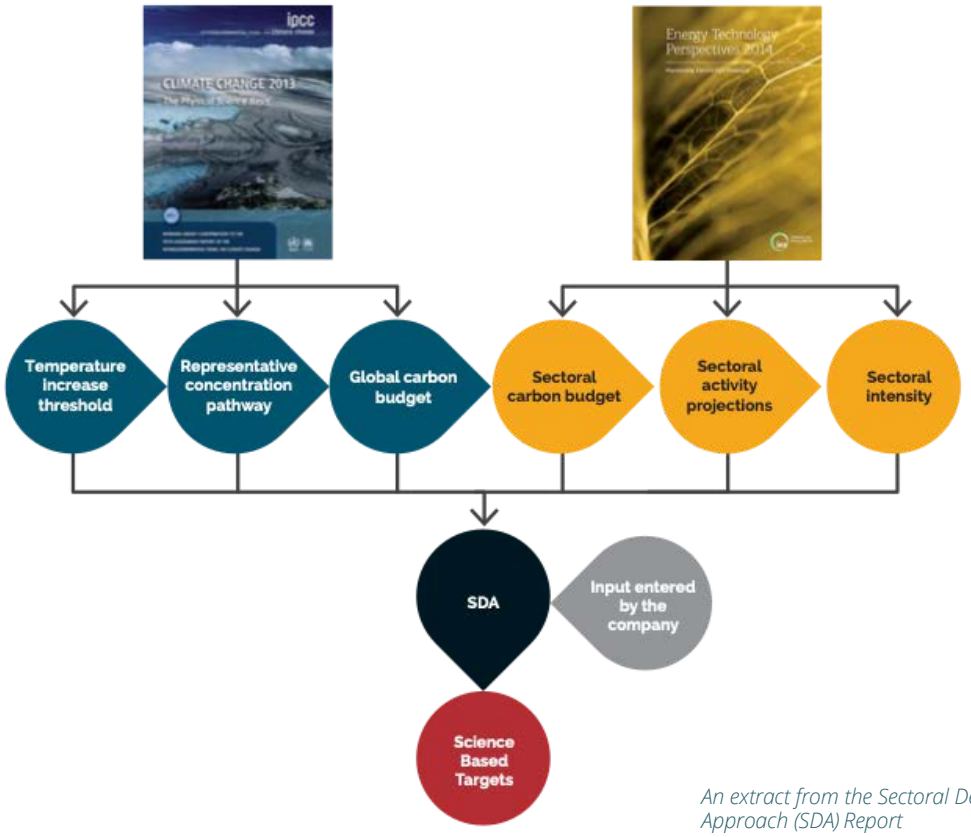
How to set these objectives?

Once again, many frameworks for defining GHG emission reduction trajectories for organizations exst.

Science-based Targets Initiative (SBTI)

The most famous one of these is the Science-based Targets Initiative (SBTI) launched by the WWF, the WRI, the UN Global Compact and the CDP in 2016. The SBTI encourages organizations to set emission reduction targets consistent with climate science. By the end of March 2020, 841 companies worldwide have submitted a reduction target compatible with the 2°C scenario; either well below 2°C or 1.5°C scenarios for their sector, or have committed to setting one within two years.

Figure 6. Development of the SDA method



An extract from the Sectoral Decarbonization Approach (SDA) Report

These precise criteria are explained in the various SBTi resource documents (Science-based Targets Setting Manual, SBTi Criteria and Recommendations). Among them are the following:

- The need to set a target which covers at least 95% of its scopes 1+2
- The need to set a target which covers at least two thirds of its scope 3 if it represents at least 40% of the total of the scopes 1+2+3
- The choice between an absolute target (tCO_2e), physical intensity (tCO_2e/physical unit) or economic intensity (tCO_2e/monetary unit).

How to manage this?

Once measured annually by a reporting framework and then constrained by a reduction target over time, emission reductions must be effectively managed over time. These initiatives do exist.

Assessing Low-Carbon Transition (ACT) Project

The ACT initiative, led by ADEME and CDP, aims to propose sector-based benchmarks that enable companies to measure the alignment of their low-carbon strategy with the overall ambition of decarbonization embodied in the Paris Accord. In this sense, the developed methodologies go well beyond setting ambitious climate objectives, thus attaching great importance to investment choices, the carbon performance of the products sold, the place of the climate issue in the company's management, the relationship with customers, suppliers, public authorities and the adoption of new business models.

It is therefore a tool to help companies adopt best practices for the implementation of a decarbonization strategy that matches up to the stakes.

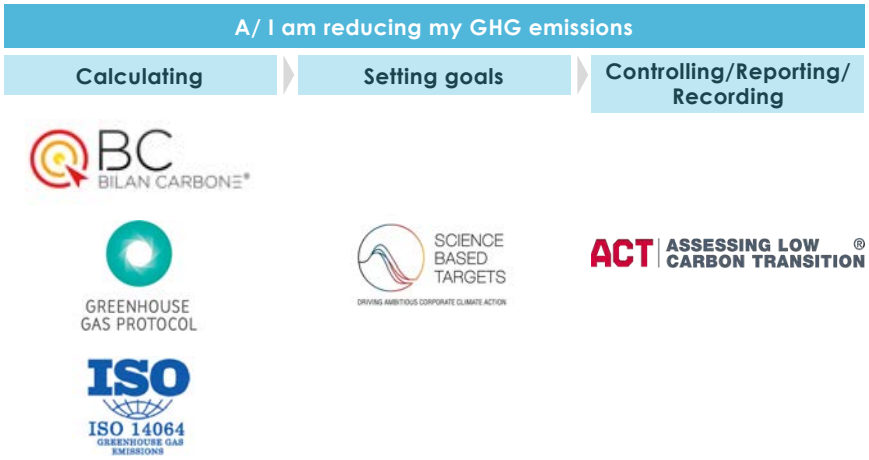
An extract from the ACT Pilot Executive Summary Report

Each company receives a triple rating:

- A "**Performance Rating**", ranging from 0 to 20, which reflects the company's performance in relation to the criteria set out in each sector's methodology.
- An "**Assessment Rating**" ranging from A to E, which reflects the consistency of the information communicated publicly by companies and shows evidence of adequately considering the low-carbon transition
- A "**Trend Rating**" represented by a "+", "=" or "-", reflecting the upward or downward trend of the company's low-carbon performance, taking into account the implementation of its strategy

Summary

Pillar A "Reducing the organization's GHG emissions" is based on a variety of existing benchmarks for measuring and setting targets, as well as monitoring its performance over time.



Note: companies, especially SMEs , can follow a rigorous approach to reducing their footprint outside of the above-mentioned frameworks.

2. Pillar B : Reducing other's emissions

Presentation

Not all of the actions that an organization can take to reduce global emissions are necessarily captured by the traditional carbon reporting described in Pillar A (see above).

For example, certain actions may result in emissions reductions that take place outside of the value chain: this is the case for financing low-carbon projects, whether in the form of "carbon credit" purchases from the voluntary market or direct financial participation in these projects.

Other actions can induce emission reductions within their value chain, without necessarily being "visible" through conventional carbon reporting. For example, a growing company marketing low-carbon vehicles that replace higher-emitting vehicles that are taken off the road will cause its customers to reduce emissions more and more (since a substitution of a carbon asset with a lower-carbon asset takes place at each sale).

Nevertheless, this gain in emissions for the customer's does not result in a decrease in the company's downstream Scope 3. On the contrary, as the company is growing, this Scope 3 will increase in proportion to sales (since the carbon impact of a growing number of products sold will have to be transferred to the downstream Scope 3, without taking into account the fact that they replace a more carbonaceous asset).

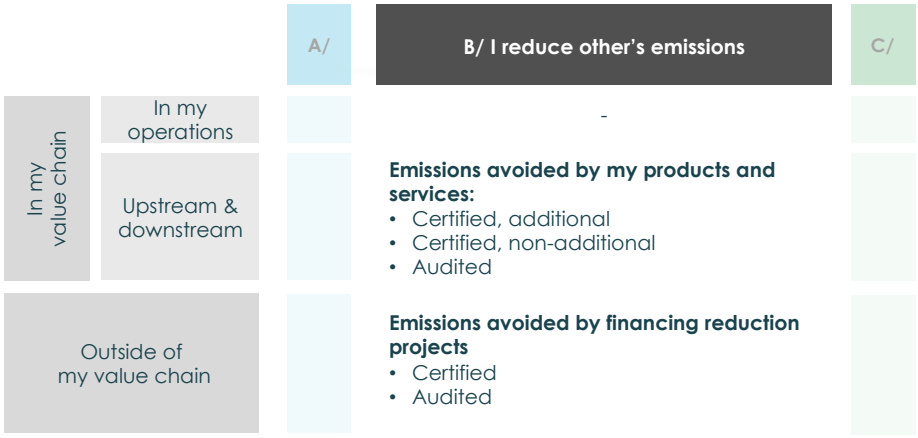
In line with the Net Zero Initiative framework, all corporate contributions towards achieving global net zero must be identified and quantified. Rigorously quantifying these positive contributions is the first step towards making them "exist" in the eyes of companies, and then managing them dynamically and effectively.

Actions taken to reduce emissions from third parties can be either through the **marketing** of low-carbon products and services, which can be guaranteed to replace more carbon-intensive uses by end customers, or through **financing** (purchase of carbon credits from emission reduction projects, direct financial support for projects, etc.). The aim is to obtain a reduction in emissions from all of the customers using these types of products, and not a smaller increase; since, at the global level, neutrality requires a reduction in absolute emissions, not a lesser increase.

This quantification of emissions reductions triggered "in others" has a two-fold advantage :

- It is a way of **"seeing" gains for the collective that are invisible in individual reports**, such as emissions avoided by some of the products and services sold as a substitute for more emitting products;
- It is a way of adding **value to the financing of emission reduction projects located outside the value chain**, without falling into the "subtraction" trap inherent in the concept of "carbon offsetting". In the NZI framework, a carbon credit is nothing more than proof of the financing of a reduction that has taken place at a third party. It does not under any circumstances "offset" the company's own emissions, as these do not cease to exist, nor do they, nor the associated risks.

What should we calculate?



1. In the value chain: emissions avoided by my products and services

In the Annex "Methodological Basis - Expanding the notion of organizations' 'climate contribution'", we proposed that the avoided emissions from the products and services sold by the organization be recognized as positive contributions to the achievement of global net zero. An organization whose core business leads to a reduction in its clients' GHG emissions, whether the services offered are financially additional or not, is an organization that is not only resilient to the risks of transition, but is also driving this transition.

The first case: certified additional avoided emissions

The most reliable case is when the avoided emissions which come from the company's commercialized solution have been subject to carbon certification by a recognized national or international standard. The avoided emissions have thus been recognized as real, additional, verifiable and permanent; then labeled, sold and possibly purchased by a third party.

Example
Alpha repairs end-of-life household appliances and sells 10,000 of them every year. The company can prove that this activity avoids emissions compared to buying a new appliance. Since the activity is profitable, these avoided emissions are not eligible for credit sale (as the certification would not be considered "additional" from a financial perspective). Nevertheless, Alpha was able to prove that additional financing would allow it to expand its business by up to +2,000 aircraft per year. The complementary criterion was validated in this case, the DGEC authorized the "Low Carbon" label for the avoided emissions from these 2,000 products and allowed Alpha to sell the credits issued in this respect to Beta, a company wishing to support the low-carbon transition in France.

Thus:
- Alpha records the avoided tons for the 2,000 products as "additional certified" avoided emissions.
- Beta records these avoided tons as "financing emission reductions outside of the value chain" (see next section).

Thus, Alpha and Beta will use the same avoided emissions, but these emissions will not appear in the same compartments of the Net Zero Initiative dashboard. **Then it does not cause a problem with double counting**. As with a monetary transaction, this also results in the registration of the sum concerned both at the customer's and at the supplier's premises:
- the credit was only bought once (no ***double use***)
- each avoided emission is credited only once (no ***double counting***)
- avoided emissions cannot be subtracted from induced emissions
- no consolidation of any kind is supposed to be made between the avoided emissions by the products of Alpha and the carbon financing by Beta: we don't sum up one with the other, just as we never sum up the scopes 1+2+3 of two carbon balance sheets from two different companies.

Case 2: certified non-additional avoided emissions

In this case, the marketed solutions are recognized by a label or standard as actually avoiding emissions, but cannot be the subject of a "carbon credit" emission (and therefore monetized) because their sale is profitable in itself. There is no financial additionality associated with labeling.

There are at least two possible scenarios:

- Either part of these avoided emissions is additional and has been duly certified (see first case); plus the other avoided emissions are calculated using the same method, even if they come from the profitable fraction of the activity.

Example : the company Alpha has already labeled the emissions of its 2,000 refurbished household appliances as "low carbon", valuing their additionality value (they can only be produced thanks to financing from the sale of credits). As the avoided emissions by the other 10,000 products sold in business-as-usual follow the same calculation method (less financial additionality), they can be accounted for as "certified non-additional avoided emissions."

- Or the label provides special certification, which recognizes the existence of the real avoided emissions, but which do not need the proceeds from the credit sales to be profitable.

Example : a national carbon certification label (e.g. The French Label Bas Carbone, 'low carbon label') could develop a full-fledged certification recognizing the "low carbon" nature of certain activities that are already profitable.

Contrary to the first case, the company cannot monetize and sell these avoided emissions to another company because the financial additionality criterion (financing is said to be additional if it allows the economic profitability of the operation, and therefore its existence) is not met.

Case 3: verified avoided emissions

This latter case concerns the avoided emissions by products and services sold that have not been certified, but whose reality has been "verified" by a third party organization.

This third party body (consultancy firm, audit firm, etc.) will have to use a robust and transparent methodology for calculating the avoided emissions [1].

There are two scenarios:

- Either the verification body relies on an official methodology from a reference body: UNFCCC CDM methodologies, international voluntary offset label (Gold Standard, VCS, Verra, etc.), national voluntary offset label (Label Bas Carbone in France, Woodland Carbon Code in Great Britain, Fondo de Carbono - FES-CO_2 in Spain, etc.), or others [2].

- Or no official methodology exists. In this case, the third body may develop its own calculation methodology, provided that :
    - That it is transparent and well argued
    - The reference scenario should be very explicit, so that the distinction between "emissions actually reduced" and "emissions with a smaller decrease" is made and explicitly stated.

Example 1 : The Company Gamma specializes in improving the energy efficiency of boilers in heating networks. The third-party organization responsible for calculating avoided emissions notes that a methodology for calculating the carbon gains of boilers has been developed as part of the Clean Development Mechanism. It therefore relies on the AM0044 method of the CDM Booklet to justify the robustness of its calculation of avoided emissions.

Example 2 : Company Alpha markets reconditioned refrigerators. It is not able to label its avoided emissions because no national or international carbon standard corresponds to this project. Its activity is profitable, so it cannot justify the additionality of external financing. It is therefore developing an ad hoc methodology with a research department in which it makes a clear distinction between "really reduced" emissions thanks to the sale of its products (purchase by customers replacing a refrigerator that has been taken out of service) and "less increased" emissions (purchase by customers buying a new refrigerator that does not replace a refrigerator that has been taken out of service). The calculated avoided emissions are reported in the "Validated avoided emissions" category.

	Case 1	Case 2
Certified avoided emissions, additional	Carbon-certified avoided emissions	
Certified avoided emissions, not additional	Avoided emissions that would have been subject to carbon certification if there had been financial additionality	Avoided emissions certified by a special label that does not require additionality (and therefore is not monetizable)
Validated avoided emissions	Avoided emissions calculated by a third party using a formal methodology	Avoided emissions calculated by a third party using a transparent methodology that differentiates between an "actual reduction" and a "lesser increase".

Note: The update of ISO 14069 includes a definition of avoided emissions by products and services sold. A specific working group for avoided emissions also exists within ISO.

[1] ADEME, avoided Emissions, what are we talking about? (2020)
[2] For a more complete list of European carbon labels, see Gabriella Cevallos, Julia Grimault, Valentin Bellassen, Domestic carbon standards in Europe. Overview and perspectives, I4CE (2019)

Is there a risk of double counting between Scope 3 Pillar A's "GHG emissions" and the avoided emissions from products in Pillar B's "Reducing other's emissions"?

Pillar A and Pillar B do not quantify as the same thing. Pillar A seeks to track an organization's absolute emissions on an annual basis; whilst Pillar B seeks to track all avoided emissions triggered by the company; whether it is the marketing of a product or service, or financing. A company can nevertheless be a double winner in some cases.

For example:
- If it can be shown that the solution can replace a more carbon intensive use at the customer's site, then the customer's footprint reduction is recorded in Account B;
- If this marketing replaces the sale of more carbon intensive products in the organization's product portfolio, then its "Scope 3 - emissions from products sold" in Account A will also be reduced to constant sales in physical units.

A company can therefore benefit from a double positive effect. Although the same phenomenon is viewed positively in two different ways, it is nevertheless not a double counting as it involves two different magnitudes (Scope 3 emissions on the one hand and avoided emissions from products on the other).

Example: Car manufacturer Alpha sells 100 Internal Combustion Engine Vehicles (ICEVs) and no Electric Vehicles (EVs) in year N.
If in year N+1 :

- Alpha still sells the same number of ICEVs, as well as 10 EVs.
    - Its account A **is increasing** because of the electricity generated (2/3 of which is coal and gas on Earth) to power the 10 EVs, and the emissions from battery production, which are adding to the 100 ICEVs footprint.
    - Its B account (reduction contribution):
        - **increases** if the 10 EVs replace customers' more carbon-intensive mobility use choices (highly dependent on the carbon content of the electricity in the country where the EV is used)
        - **values zero** if the 10 EVs replace an equally or less carbon-intensive use (such as walking, public transport, smaller EVs, etc.) or are added to the thermal fleet in circulation (then there is no replacement effect).

- Alpha goes from 100 to 90 ICEVs and sells 10 EVs in France:
    - Its A account **is smaller** because the LCA footprint of an EV in France is smaller than that of a ICEVs with the same capacity and power ;
    - Its B account (reduction contribution):
        - **increases** if the 10 EVs replace a more carbon-intensive mobility use.
        - **values zero** if the 10 EVs are added to the existing fleet, or replace an identical or smaller EV.

2. Outside of the value chain

The organization can contribute to the objectives of the Paris Agreement by funding additional projects outside of its value chain

First case: financing carbon certified projects

The first case is the most classic: an organization wishing to support the net zero carbon transition beyond its value chain chooses to finance an emissions reduction project by purchasing "carbon credits" on the voluntary market (VCM) and withdrawing them. These carbon credits are tangible proof of the robustness of the carbon project and the reality of the financial contribution to the objectives of the Paris Accord. As mentioned above, they do not allow the organization to claim "ownership" of the reduction, but only its financing.

Certifications can come from international voluntary labels (Gold Standard [1], Verra [2], Plan Vivo [3], etc.) or national labels (Low Carbon Label [4], FES-CO_2 [5], Woodland Carbon Code [6], etc.). The use of Kyoto credits (CERs) from the Clean Development Mechanism [7] to provide financial contributions from private actors for the net zero carbon transition is currently at the heart of negotiations on the implementation rules of Article 6 from the Paris Agreement [8], and it is considered by some observers as potentially counterproductive [9][10], particularly due to the non-additional nature of the projects financed by this means [11].

Example : Alpha, a real estate company, decides to contribute to the French carbon neutrality objective by purchasing credits labeled "Low Carbon" (LBC) from thermal renovation projects for buildings. It includes this contribution in the category "Financing carbon certified projects".

Case 2 : financing carbon validated projects

In this case, the organization chooses to financially support low-carbon projects that have not specifically been officially labeled by an existing standard, but whose robustness has been checked by a third party organization according to a recognized methodology.

Several cases may arise:

1. **"Emission reduction units" purchases** from a project not certified by a standard but calculated and validated by a third party according to an existing recognized methodology.

Example: An improved fireplace project is recognized by a third party auditor as emissions avoidant, after following a rigorous and formal methodology. Thus, non-labeled emission reduction units are issued, purchased by Alpha, and then withdrawn.

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[1] https://www.goldstandard.org/
[2] https://verra.org/
[3] https://www.planvivo.org/
[4] https://www.ecologique-solidaire.gouv.fr/label-bas-carbone
[5] https://www.miteco.gob.es/es/cambio-climatico/temas/fondo-carbono/
[6] https://www.woodlandcarboncode.org.uk/
[7] https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism
[8] See the analysis notes of the French think tank I4CE (Institute for Climate Economics): https://www.i4ce.org/go_project/cooperation-internationale-laccord-de- paris-examen-de-larticle-6/
[9] See the analysis of the German NGO, Carbon Market Watch, Carbon Markets 101. The ultimate guide to global offsetting Mechanisms (2019) https://carbonmarketwatch.org/publications/carbon-markets-101-the-ultimate-guide-to-global-offsetting-mechanisms/
[10] See the Öko Institute analysis: How additional is the Clean Development Mechanism? (2016) https://ec.europa.eu/clima/sites/clima/files/ets/docs/clean_dev_mechanism_en.pdf
[11] Pauline Lacour, "China, the main beneficiary of the Clean Development Mechanism (CDM)", Developing Worlds 2018/1 (No. 181), pp. 165-180

2. **Direct financing of carbon projects** whose reductions have been calculated and validated by a third party according to an already recognized methodology. An allocation of avoided emissions will have to be made (see the "How to calculate this?" section below). Moreover, the link between the "project financing world" (direct financing) and the "carbon finance world" (financing in the form of emissions credits) is not immediate and must be discussed in more detail (see Part C. Open-ended questions - Topic 3: The status of direct financing on emission reduction projects).

Example: the company Alpha invests directly in an emission reduction project validated by an external auditor according to an official methodology. It claims annually a part of the total avoided emissions according to an allocation key to be defined, for example pro rata to its financing.

3. **Subscription to energy contracts (electricity, biogas, heat, etc.) that are less carbon-intensive than the country mix**; which, although they cannot be valued directly in the scope 2 of location-based companies [1], they lead to a quantifiable decarbonization of the territory's electricity mix, provided that the financing is additional.

Example: the company Alpha decides to source low-carbon electricity. It takes out a contract "virtual Power Purchase Agreements" (PPA) with an electricity supplier, which triggers the construction of additional low-carbon capacity in the country of operation. As there is no physical link between the production site and Alpha's site, electricity cannot be counted as zero in Scope 2 on a location-based basis; Alpha therefore reports its Scope 2 emissions according to the country's mix. On the other hand, Alpha can claim to have contributed to the overall decarbonation of the country's mix through the construction of this plant. It uses an external auditor to calculate (following an official methodology) the emissions avoided by this new capacity at the country level.

4. **Purchases of green bonds**, provided that it is possible to accurately quantify the reduced emissions for each euro of bond thanks to a transparent and recognized methodology.

Example: Company Alpha buys green bonds issued by a railway group, which has first had the avoided ton of CO_2 for each euro of bond evaluated by an independent third party, following an official and recognized methodology.

5. **Purchases of Energy Saving Certificates (ESC)**, provided that these savings go beyond the regulations and that the conversion of kWh Cumac into tCO_2e is done through a transparent and recognized methodology.

Example: The company Alpha buys ESCs from boiler optimization projects and has them translated by an external auditor into avoided tCO_2.

Financing avoided emissions outside of the value chain		Case 1	Case 2	Case 3	Case 4	Case 5
	Certified Avoided Emissions	Purchases of labeled "Emission Reduction Units".				
	Validated avoided emissions	Purchases of non-labeled "Emission Reduction Units".	Direct financing of low-carbon projects	Subscription to low-carbon electricity contracts	The purchase of green bonds	ESC Purchase

[1] NZI advises that Scope 2 (Pillar A, see above) should be shifted to a "location-based" rule (where the emission factor of the electricity used is the average of the grid in the area where the company is located), which prohibits the purchase of low-carbon energy from being counted as zero in Scope 2 emissions. Nevertheless, the purchase of low-carbon energy (in the form of a Corporate Power Purchase Agreement or Guarantees of Origin) can, under certain conditions (in practice, whether the money obtained is differentiated from the decision of building a new facility that will replace an existing more carbon-intensive facility, which is rarely the case), trigger a reduction in emissions from the national power system or in a neighboring country. This funding can therefore be seen as avoided emissions outside of the value chain. If, however, the company wishes to shift its Scope 2 to "Market-based" (where the emission factor of the electricity used is that of the contractual supplier) in Pillar A, it will not be able to both subtract low-carbon electricity from its Scope 2 and claim avoided emissions in Pillar B. For definitions of location based and market based, refer to the GHG Protocol.

The special case of financed projects within the value chain (“interventions”)

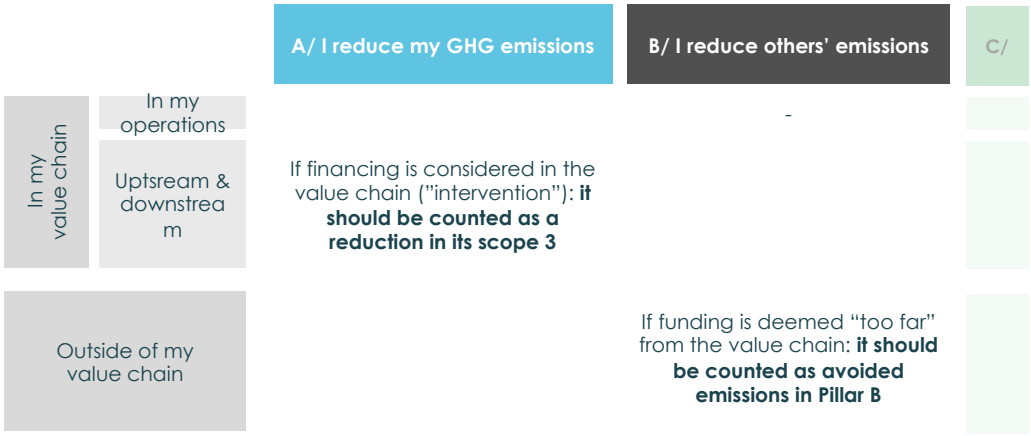
If reduction financing takes place "away from the organization", then the reduction should be accounted for in Account B "emissions avoided outside of the value chain". However, if the company directly intervenes within the value chain in order to finance an emissions reduction project, then the result is not immediate.

→ **If the reduction project is located at an organization's supplier** (or at least in the same supply-shed[1]) as the supplier), then the emission reduction allowed by that project **may be directly deducted from the upstream Scope 3 of the organization’s carbon balance sheet, which is within Pillar A**. Specific guidance from the Gold Standard, in partnership with Climate KIC, CDP, Danone, Mars, Livelihoods Fund, WWF and WRI, has been developed and establishes specific reporting rules[2]. It has been submitted for consultation in June 2018.

Example: The cosmetics company Alpha is financing improved homes at its supplier of shea butter in Burkina Faso. The reduced emissions calculated have the direct effect of reducing the part of scope 3 that concerns the "Purchasing" in pillar A.

→ **If the project is located at a player "too far" in the value chain, the reduction should be counted in Account B**.

Example: The Company Alpha, which is positioned in the coffee pod market, is financing an emission reduction project at a coffee producer who is not one of its suppliers and is considered too far from the supply market. It then counts the carbon gain from its financing as an avoided emission financed outside its value chain.



[1] See the publication "Value chain (scope 3) interventions - GHG Accounting & Reporting Guidance" (2018). « Supply-shed: The concept of supply-shed is introduced to cater for situations where a company may not be able to directly trace sourcing to a specific supplier but it is known that sourcing comes from the group of suppliers »
[2] *Ibid*. https://www.goldstandard.org/sites/default/files/documents/2018_06_scope_3_guidance_consultation.pdf

How do you count them?

Once all the avoided emissions categories can claim the status of "contribution to emissions reduction" (products and services sold, financing outside the value chain, as well as the various nuances between "Certified" and "validated"), there are two issues which remain to be addressed:

Should there be an avoided emissions allocation along the value chain for certain categories?
Should a hierarchy be established between the different categories, and if so, which one?

The allocation of avoided emissions

In the case of certified avoided emissions (marketing of certified low carbon products, purchase of certified emission reductions), the methodology used must already include allocation criteria.

Example: the financing by a company of an emission reduction unit labeled "Low Carbon" corresponds to exactly one ton of CO_2 avoided according to the calculation methodologies of the label. Through its purchase, the company can therefore immediately claim a contribution of 1 tCO_2 avoided via its financing.

In other cases, it is necessary to make an allocation "manually".

- In the case of **direct financing** of low-carbon projects, the organization must be able to claim a quantity of avoided emissions up to the amount of its financial contribution to the total cost of the project.

Example: a company takes a 10% financial stake in a carbon project that avoids 100 tCO_2 per year. What contribution can it claim?

- In the case of a **low-carbon marketing solution**, it is reasonable to go through an allocation formula in order to allocate only part of the gain, in the same way as the emissions calculation on certain categories of the carbon inventory's Scope 3.

Example: A company markets seats for electric vehicles. Can it claim a share of the avoided emissions that the vehicle will trigger during its use phase?

The possible rules are as follows:

- For direct, **pro rata financing**, or any other response consistent with resolving the issue of dialogue between the project finance and carbon finance worlds (see Part C. Open questions - Topic 3: Status of direct financing of emission reduction projects)
- In the case of product marketing:
    - **100%** if it is the primary producer of the product.
    - **On a pro-rata basis of its "share" in the product design**, with a distribution formula that depends on the situation. We can use:
        - the **added value** (in which case the avoided emissions correspond to the added value of the organization in the whole value added of the product manufacturing chain);
        - **mass** (in which case the avoided emissions correspond to the weight of the component manufactured by the organization in the total mass of the product, which may for example be relevant for a car);
        - **surface area**;
        - or **any other relevant indicator as the case may be**.

Allocation methods may be based on the guidance in Scope 3 of the GHG Protocol [1] or ISO 14064/14069.

[1] http://ghgprotocol.org/standards/scope-3-standard

Hierarchy between categories

Some categories of avoided emissions are more robust and reliable than others. If the final idea is to maximize the avoided emissions outside of and within the value chain, then consideration should be given to a weighting between the different "qualities" of avoided emissions, in order to encourage organizations to systematically aim for the highest level of robustness. Thus, this would avoid that avoided emissions which are calculated in a moderately robust way (third party verification without certification) have the same influence as more reliable avoided emissions (carbon certification).

The table below proposes a hierarchy which is carried out in this way:

Category	Type of avoided emission (E_x)	Calculation robustness	Discounts to be applied (Rx)	Consolidated total
$EE_{products}$: Avoided Emissions by products and services sold	EE_1: Certified, Additional Avoided Emissions	Optimal	No discount	$EE_{products} = EE1 + EE_2*R2 + EE_3*R_3$
	EE_2: Certified, Non-Additional Avoided Emissions	Strong	Yes (R_2). Low discount	
	EE_3: Validated avoided emissions	Medium to low	Yes (R_3). Medium to high discount	
EE_{fin}: Avoided Emissions outside of the value chain	EE_4: Certified Avoided Emissions	Optimal	No discount	$EE_{fin} = EE4 + EE5*R5$
	EE_5: Validated avoided emissions	Medium to low	Yes (R_5). Low to high discount	

Example : the company Alpha markets a product that avoids emissions for its customers. A third party organization calculated this amount to be 1 000 tCO_2 per year according to a recognized methodology. In addition, Alpha buys 100 carbon credits each year.

In the NZI standard, Alpha therefore applies to the 1,000 tCO_2 per year of avoided emissions to its products (category EE3: validated avoided emissions), with an R3 discount to be determined (say -80% in this example) as the reliability of the calculation is deemed low. It does not apply any discount to the tons purchased in the form of credits, as the label guarantees maximum quality.

In total, Alpha reports 200 tCO_2 per year of avoided emissions in the category “avoided emissions in the value chain" (1000 tCO_2 of avoided emissions * (1 - 80% discount)), and 100 tCO_2 per year of avoided emissions in "emissions avoided outside of the value chain (100 tCO_2 of credits* (1 - 0% discount)).

How to set goals?

In the same way as a company sets a decarbonation target over time compatible with a 1.5°C trajectory (see Pillar A), the Net Zero Initiative invites organizations to set trajectories for increasing their contributions to avoided emissions, both outside and within the value chain.

But what is the right level of "decarbonation contributions" for an organization, that is consistent with the overall net zero goal?

To answer this question, we can consider several avenues, which are developed below:

- Be inspired by the definition of the existing "neutrality" labels and protocols, although they define the "carbon neutrality" of organizations on a completely different paradigm (static state attainable through offsetting, no link with the claimed global net zero, etc.) ;
- Be inspired by the definition of "corporate net zero" being developed by the Science-based Targets Initiative ;
- Explore other radically different ways of looking at the issue.

The ***PAS 2060 standard*** and ***The Carbon Neutral Protocol***

These two standards, respectively from the British Standard Institution (BSI) and the private American group Natural Capital Partners, are based on the idea that an organization can achieve its "carbon neutrality" by "offsetting" its emissions within a perimeter arbitrarily defined by the company, after having reduced its emissions to a self-declared level over an arbitrary period of time [1].

These protocols do not address the issue of avoided emissions by products and services.
Furthermore, they do not distinguish between emission reduction credits and carbon sequestration credits.

Put another way, using our vocabulary, these protocols:

- **Contributions to avoided emissions in the value chain**: they do not say anything about the annual level of avoided emissions by low-carbon solutions to be achieved.
- **Contributions to avoided emissions outside of the value chain**: they only set a level of contribution to the financing of "certified" reductions equal to the amount of Pillar A emissions (or, more generally, an arbitrarily small perimeter of Pillar A emissions). This sizing is "self-centered" and does not reflect the level of an organization's fair contribution to the global transition.

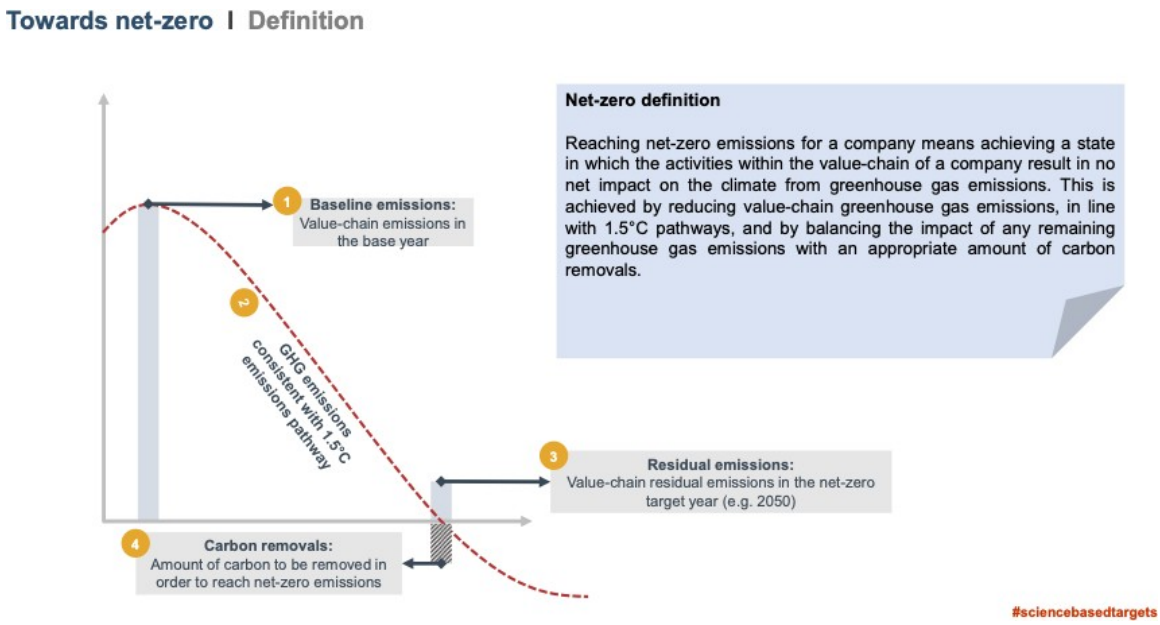
It is difficult for the Net Zero Initiative to use these protocols as a basis for defining the "right" levels of contribution for companies' avoided emissions.

Science-based Targets Initiative : ***Towards a science-based approach to net-zero in the corporate sector***

In November 2019, the Science-based Targets Initiative submitted for public consultation a proposed definition of corporate "net zero" [2]. After a description of the different instruments used by companies to claim neutrality (the decarbonation of activities, purchase of sequestration credits, development of sinks in the value chain, avoided emissions from the products and services sold, and the purchase of emission reduction credits) and the robustness of each of them, the SBTI proposes a definition of carbon neutrality:

"For a company, achieving net zero emissions means achieving a state where its activities within a company's value chain have no net impact on the climate. This state is achieved by reducing GHG emissions from the value chain at the rate required by the 1.5°C trajectory, as well as balancing the impact of its remaining emissions with an appropriate amount of carbon sinks."

[1] https://www.carbonneutral.com/the-carbonneutral-protocol et https://www.bsigroup.com/fr-FR/PAS-2060-Neutralite-carbone/
[2] Science-based Targets Initiative, *Towards a science-based approach to climate neutrality in the corporate sector* (2019)



The SBTi therefore seems to be moving towards the possibility of making a "net zero emissions" claim at the scale of the company only if:

- The company proves it's on a 1.5°C trajectory.
- The company "balances" its emissions in the value chain with its removals in the value chain. Whether or not to take into account the removals financing outside of the value chain (purchases of carbon credits) is still not decided.

At this stage, it is not clear whether the firm must wait until 2050 before it can claim its "net zero" state, or whether it can claim it before 2050 (and if so, it is also not clear how a firm can claim a static **state** of neutrality when the prerequisite is to be on a dynamic **trajectory** of reduction).

In any case, the SBTi seems to exclude from this definition of corporate net zero any "contribution to the decarbonation of others" (Pillar B), be it emissions avoided by the solutions sold, or by financing reduction projects outside the value chain.

The science-based approach of SBTi cannot be used as an inspiration for setting Pillar B targets.

Tracks proposed by Net Zero Initiative

This part is a reproduction of Topic 1 – The definition of trajectories within account B, and is based on Topic 3 - The status of direct financing on emission reduction projects, within Part C. "Open-ended questions".

What is, for one organization, the "right level" of contribution to others' reducing emissions?

The Net Zero Initiative proposes to discuss the following options, which at this stage are not all the recommendations **but some of the possibilities to be eliminated as future work proceeds**. This list is therefore **non-exhaustive**.

Net Zero Initiative proposes to consider the following options.

For the amount of avoided emissions from the products:

Option 1: No objective. Set a quantity as large as possible, and compare it with other players in the sector, in order to create "virtuous competition".
Option 2: Set a level of avoided emissions equal to x times the emissions of scopes 1+2+3 in the value chain
Option 3: Set a growth target for this quantity

The amount of emissions avoided as a result of financing outside the value chain:

Option 1: No objective. Set as large a quantity as possible, and compare with other players in the sector in order to create "virtuous competition".
Option 2: Set a level of avoided emissions equal to x times the emissions of scopes 1+2+3 in the value chain, where x is equal to or greater than 1
Option 3: Set a level of avoided emissions equal to the emissions from scopes 1+2+3 in the value chain that exceeds the projected remaining emissions level in 2050 according to the trajectory set out in pillar A
Option 4: Set a level of avoided emissions consistent with a normative trajectory, whether local, national or global. Each company would then be assigned, according to its sector and according to allocation rules to be defined [1], a quantity of avoided emissions to be financed annually in order to be consistent with the quantity of avoided emissions that is necessary to achieve the 2°C/1.5°C compatible scenarios.
Option 5: Set a financing amount equal to the emissions of scopes 1+2+3 translated into Euros, via a price per ton of CO_2 increasing over time.
Option 6: Fix an amount of financing according to the finance gap [2] to be filled in year N: the company is allocated a share of the financial effort in proportion to the weight of its turnover in world GDP, via an allocation key, yet to be defined.

	PAS 2060, Carbon Neutral Protocol	SBTi: Corporate Net Zero	Net Zero Initiative Proposals
Avoided Emissions target for products and services	None	None	**Option 1**: No target: as large as possible **Option 2**: Equal to x times the emissions scope 1+2+3 **Option 3**: Set a growth target for this amount
Avoided Emissions target by financing outside of the value chain	Equivalent to the volume of emissions within the definition of the "neutrality", all or part of the scopes 1, 2 and 3. Only through the purchase of carbon credits (without distinction between avoided and negative emissions).	None (only carbon sinks are considered)	**Option 1**: No target: as large as possible **Option 2**: Equals x times the emissions scope 1+2+3 **Option 3**: Equal to Scope 1+2+3 emissions exceeding the value of residual emissions in 2050 **Option 4**: Pro rata to a normative trajectory of avoided emissions to be developed in a given territory **Option 5**: Amount of financing equal to the translation into Euros of the emissions scope 1+2+3, via a price per ton of CO_2 increasing over time. **Option 6**: The amount of financing according to the *finance gap* to be filled in year N, on a pro-rata basis to the weight of the organization's turnover in world GDP

[1] Ditto.
[2] Finance gap: financial capital required to meet and exceed national commitments.

How do you manage it?

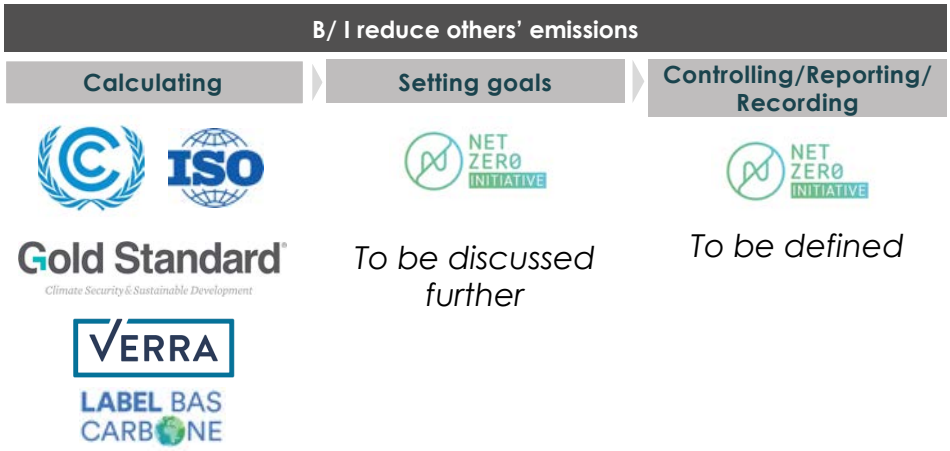
No body currently exists at this stage to steer the performance of organisations with regard to their contributions to avoided emissions inside and outside of their value chain (Pillar B).

However, the equivalent does exist for Pillar A (see the section "How to set objectives?") from the chapter "Pillar A" further above). A company that sets a decarbonation target compatible with a 1.5°C trajectory (which, it should be remembered, means having an activity compatible with a global reduction in emissions of 3% to 7% per year worldwide) then seeks to implement a strategy consistent with this objective on the one hand, and to effectively manage its performance over time to check that it is achieving the objectives that it has set itself on the other hand. This is to some extent the reason for the ACT initiative led by CDP and ADEME.

Net Zero Initiative proposes to examine the question of creating a body to control organizations' performance on their Pillar B.

Summary

Pillar B "Reducing others' emissions" is based on a variety of existing measurement benchmarks; it calls for the creation of new bodies for goal setting and dynamic performance management.



3. Pillar C: Increasing carbon sinks

Presentation

Climate scenarios leading to carbon neutrality by the middle of the century require a relatively large expansion of global carbon sinks, an effort to be initiated as soon as possible (see Part 1). In these scenarios, the development of sinks at the sufficient levels is a necessary condition for success in achieving carbon neutrality, and should be considered **in addition to, and not as a substitute for**, the efforts to reduce emissions. For this reason, establishing separate accounting for negative emissions (both at a global level and organizational level) seems to be a necessary prerequisite for the proper monitoring of the climate ambitions of States and organizations (McLaren et al., 2019).

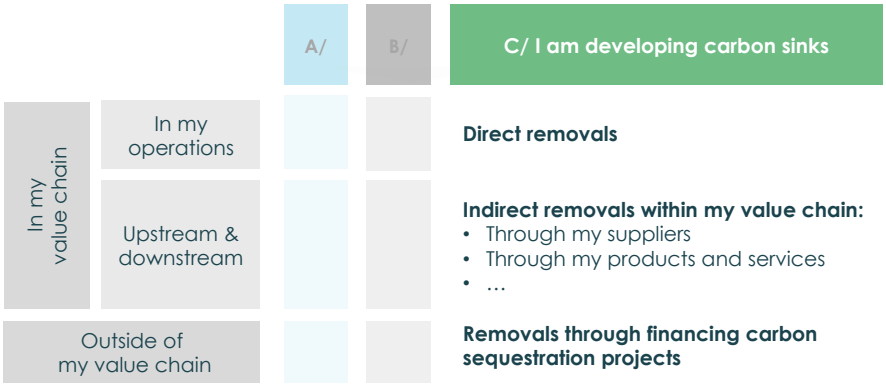
These "negative emissions" represent a real, absolute flow of carbon removed from the atmosphere.

In line with the Net Zero Initiative standard, all the companies' contributions towards the development of carbon sinks, whatever their sector of activity must be identified and quantified.

These efforts can be of several types:

- **The development of "direct" carbon sinks**, i.e. net carbon sequestration assets owned directly by the organization
- **The development of carbon sinks in the value chain**, including its suppliers or through products sold by the organization
- **The financing of carbon sinks outside of the value chain**

What should be calculated?



1. In the value chain

Properly and comprehensively accounting for the carbon removals taking place in a company's value chain is crucial in order to effectively control an organization's contribution to the goal of global carbon neutrality.

It is a matter of calculating the negative carbon flows annually:

- Direct, meaning the carbon sinks are directly owned by the company. This is the "negative" equivalent of Pillar A's scope 1 of (see above).

Examples:
- Carbon absorbed annually by the trees of a forestry company
- Carbon absorbed annually by a farmer's soil conservation techniques
- Carbon absorbed annually by the biomass power plant equipped with CCS (BECCS) from an energy company

- **Indirect**, meaning in the organization's value chain
  - **Within the suppliers**

    Example: carbon sinks in the farmers who supply an agri-food company
  - **Through the products and services sold**

    Example: the removals caused by the use of a BECCS solution sold by an energy company.
  - **In the organizations' assets**

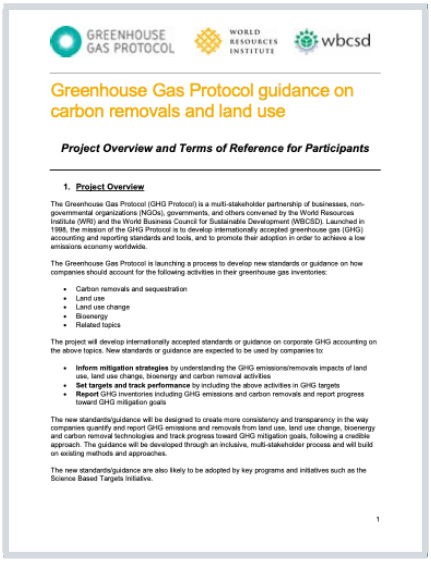
    Example: carbon stored in the organizations' wood products and buildings (stock to be converted into "annual flow" according to rules to be defined)

While the accounting of GHG emissions is now very well defined through standards (ISO 14064, Carbon Inventories and the GHG Protocol; see section on Pillar A), the robust reporting framework for carbon sinks has yet to be built. ISO 14064 already speaks of direct and indirect removals [1]. In early 2020, the GHG Protocol launched a project aimed at defining ***guidance*** on the quantification of carbon sinks within organizations' value chains [2].

[1] https://www.iso.org/fr/standard/66453.html
[2] See the Project Overview and Terms of Reference of Greenhouse Gas Protocol guidance on carbon removals and land use (2019).

In particular, methodological clarifications need to be made on the following topics:

- The distinction between **flows** (annual removals) and **stocks** (carbon reservoirs, wood products, etc.).
- The distinction between **natural** sinks (afforestation/reforestation, farming techniques, etc.) and **technological** (BECCS, DACCS, EW)
- Counting methods
    - Flows
    - stocks, as well as the possible conversion of temporary carbon storage into the carbon "flow equivalent" [1] in order to recognize the absence of CO_2 molecule's radiative forcing for a given period of time.
- The scope of the flows taken into account and the emissions associated with the implementation of the project which are deducted
- Allocation rules within the value chain
- End-of-life status of carbon sequestering products



GREENHOUSE GAS PROTOCOL · WORLD RESOURCES INSTITUTE · wbcsd

Greenhouse Gas Protocol guidance on carbon removals and land use

Project Overview and Terms of Reference for Participants

1. **Project Overview**

The Greenhouse Gas Protocol (GHG Protocol) is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). Launched in 1998, the mission of the GHG Protocol is to develop internationally accepted greenhouse gas (GHG) accounting and reporting standards and tools, and to promote their adoption in order to achieve a low emissions economy worldwide.

The Greenhouse Gas Protocol is launching a process to develop new standards or guidance on how companies should account for the following activities in their greenhouse gas inventories:

- Carbon removals and sequestration
- Land use
- Land use change
- Bioenergy
- Related topics

The project will develop internationally accepted standards or guidance on corporate GHG accounting on the above topics. New standards or guidance are expected to be used by companies to:

- **Inform mitigation strategies** by understanding the GHG emissions/removals impacts of land use, land use change, bioenergy and carbon removal activities
- **Set targets and track performance** by including the above activities in GHG targets
- **Report** GHG inventories including GHG emissions and carbon removals and report progress toward GHG mitigation goals

The new standards/guidance will be designed to create more consistency and transparency in the way companies quantify and report GHG emissions and removals from land use, land use change, bioenergy and carbon removal technologies and track progress toward GHG mitigation goals, following a credible approach. The guidance will be developed through an inclusive, multi-stakeholder process and will build on existing methods and approaches.

The new standards/guidance are also likely to be adopted by key programs and initiatives such as the Science Based Targets Initiative.

1

The coverage of the presentation which shows the methodology development project to account for carbon removals, under the GHG Protocol (2019).

2. Outside of the value chain

The organization can contribute to the objectives of the Paris Agreement by financing additional carbon sequestration projects outside of its value chain.

Casa 1 : financing certified carbon projects

The first case is the most classic: an organization wishing to support the net zero carbon transition beyond its value chain chooses to finance a sequestration project by purchasing "carbon credits" on the voluntary market (VCM) and withdrawing them. These carbon credits are tangible proof of the robustness of the carbon project and the effectiveness of the financial contribution to the objectives of the Paris Agreement. As mentioned above, they do not allow the organization to claim "ownership" of the absorption (nor any "compensation"), but only its financing.

[1] On this subject, see Fearnside et al, 2000; Guest et al, 2012; Moura Costa et al, 2009 as well as the report of the expert group GE3 "Temporary Carbon Storage" from the Ministry of Ecological and Solidarity Transition (2019).

Certifications can come from international voluntary labels (Gold Standard [1], Verra [2], Plan Vivo [3], etc.) or national labels (Low Carbon Label [4], FES-CO_2 [5], Woodland Carbon Code [6], etc.). The use of Kyoto credits, "Certified Emission Reductions" (CERs), from the Clean Development Mechanism [7] to provide financial contributions from private actors for the net zero carbon transition, is currently at the heart of negotiations on the implementation rules of Article 6 from the Paris Agreement [8], and it is considered by some observers as potentially counterproductive [9][10].

Example: Alpha, a property company, decides to contribute to the French carbon neutrality objective by buying credits labeled as "Low Carbon" (LC) from the French forestry projects. It includes this contribution in the "Financing certified carbon projects" category.

Case 2 : financing validated carbon projects

In this case, the organization chooses to financially support sequestration projects that have not specifically been officially labeled by an existing standard, but whose robustness has been checked by a third-party organization according to a recognized methodology.

Several cases may arise (the categories are the same as for the account B outside of the value chain, *mutatis mutandis*).

1. **Purchase of "carbon removal units"** from a project that is not certified by a standard, but has been calculated and validated by a third party according to an existing recognized methodology.

Example: a reforestation project is recognized by a third-party auditor as carbon remover each year, following a rigorous and official methodology. Non-labeled Units are issued, purchased by the company Alpha, and withdrawn.

2. **Direct financing of carbon projects** whose removals have been calculated and validated by a third party according to a recognized existing methodology. An allocation of sequestered tons will have to be made (see the "How to count" section below). Furthermore, the link between the "project finance world" (direct financing) and the "carbon finance world" (financing in the form of emissions credits) is not immediate and needs to be discussed in more detail, in the same way as for Pillar B described above (see Topic 3 - The status of direct financing on emission reduction projects, in the "Open-ended questions" section).

Example: the company Alpha invests directly in a carbon removal project validated by an external auditor according to an official methodology. It claims negative emissions annually on a pro-rata basis to its participation in the overall cost of implementing the sink.

3. **The purchases of green bonds**, provided that it is possible to accurately quantify the emissions removed by each euro of bond through a transparent and recognized methodology (if climate bonds financing of carbon sequestration exist at all).

Example: the company Alpha buys green bonds issued by a railway group wishing to develop hedges on its tracks; which evaluated beforehand the ton of CO_2 removed by each euro of bond by an external consultancy firm, following an official and recognized methodology.

Financing avoided emissions outside the value chain		Case 1	Case 2	Case 3
	Certified Avoided Emissions	Purchases of labeled "removal units".		
	Validated avoided emissions	Purchases of non-labeled "removal units".	Direct financing of low-carbon projects	Purchase of green bonds

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] See notes for the equivalent section "How to calculate this? - Outside of the value chain" in Pillar B

How do you count it?

Once all the categories of negative emissions that qualify for the "sink enhancement contribution" status are identified, two issues remain to be addressed:

- Should there be an allocation of emissions along the value chain for certain categories of emission removals?
- Should a hierarchy be established between the different categories, and if so, which one?

Allocation of negative emissions

An organization can claim negative emissions:

- In the case of financing: pro rata of the financial share in the total cost of the project;
- In the case of product marketing:
    - 100% if it is the main producer of the product (example: a CO_2 capture and storage solution applied to a biomass plant).
    - Pro-rata of its "share" in the product design with a distribution key that depends on the situation. We can use the added value (in which case the removals correspond to the added value of the organization in the whole added value of the product's manufacturing chain), the mass (in which case the negative emissions correspond to the weight of the component manufactured by the organization, within the total mass of the product), the surface area, or any other relevant indicator depending on the case.

Allocation methods will be a topic addressed in the forthcoming GHG Protocol guidance specific to sinks [1].

Hierarchy between categories (outside of the value chain)

In the case of removals "caused" outside of the value chain by the organization's financing, there are some categories of negative emissions which are more robust and reliable than others. If the final idea is to maximize the tons of negative CO_2 outside of the value chain, a weighting between the different "qualities" of negative emissions should be considered; in order to encourage the organizations to systematically aim for the highest level of robustness. Thus, this would avoid that negative emissions calculated in a moderately robust way (third party verification without certification) have the same weight as more reliable negative emissions (carbon certification).

The table below proposes a hierarchy in this way.

Category	Type of negative emissions (Nx)	Calculation robustness	Discounts to be applied (Rx)	Consolidated total
N_{fin}: Negative emissions outside of the value chain	N_1: Certified Negative Emissions	Optimal	No discount	$N_{fin} = N_1 + N_2 * R_2$
	N_2: Validated negative emissions	Strong to weak	Yes (R_2). Low to high discount	

[1] See the: Project Overview and Terms of Reference du Greenhouse Gas Protocol guidance on carbon removals and land use (2019).

Example : Company Alpha buys 100 carbon credits from sequestration projects. It also invests directly in a non-labeled sequestration project, verified by a trusted third party, which estimates Alpha's share of sequestration at 1000 tCO_2/year.
In the NZI standard, Alpha therefore applies to the 1,000 tCO_2/year of negative emissions an R2 discount which is to be determined (let's say 50% in this example), as the reliability of the calculation is considered average. It does not apply any discount to the tons purchased in the form of credits, as the label guarantees maximum quality. In total, Alpha reports 600 tCO_2 per year of negative emissions in the category "negative emissions outside of the value chain": (1,000 tCO_2 from sequestration * (1 - 50% discount)) + (100 tCO_2 of credits * (1 - 0% discount)).

How can we set the objectives?

The Net Zero Initiative calls for a decarbonation rate over time within the induced emissions (Pillar A), that is compatible with a global trajectory of 1.5°C/2°C. On Pillar C, Net Zero Initiative calls on organizations to set trajectories for increasing their sinks, both outside and within the value chain.

But what is the right level of "contributions to wells" for an organization, which is consistent with the overall net zero goal?

To answer this question, we can go down several avenues, which are developed below:

- To be inspired by the definition of existing "neutrality" labels and protocols, although they define the organizations' "carbon neutrality" on a completely different paradigm (static state attainable through offsetting, no link with the claimed global net zero, etc.);
- To be inspired by the "corporate net zero" definition being developed by the Science-based Targets Initiative;
- Explore other radically different ways of looking at the issue.

The ***PAS 2060 standard*** and ***The Carbon Neutral Protocol***

These two standards, respectively from the British Standard Institution (BSI) and the private American group Natural Capital Partners, are based on the idea that an organization can achieve its "carbon neutrality" by "offsetting" its emissions within a perimeter randomly defined by the company, after having reduced its emissions to a level it has set for itself, over a random period of time.

These protocols do not address the issue of removals in the value chain (direct and indirect).
Furthermore, they do not distinguish between emission reduction credits and carbon sequestration credits.

Put another way, using our vocabulary for these protocols:

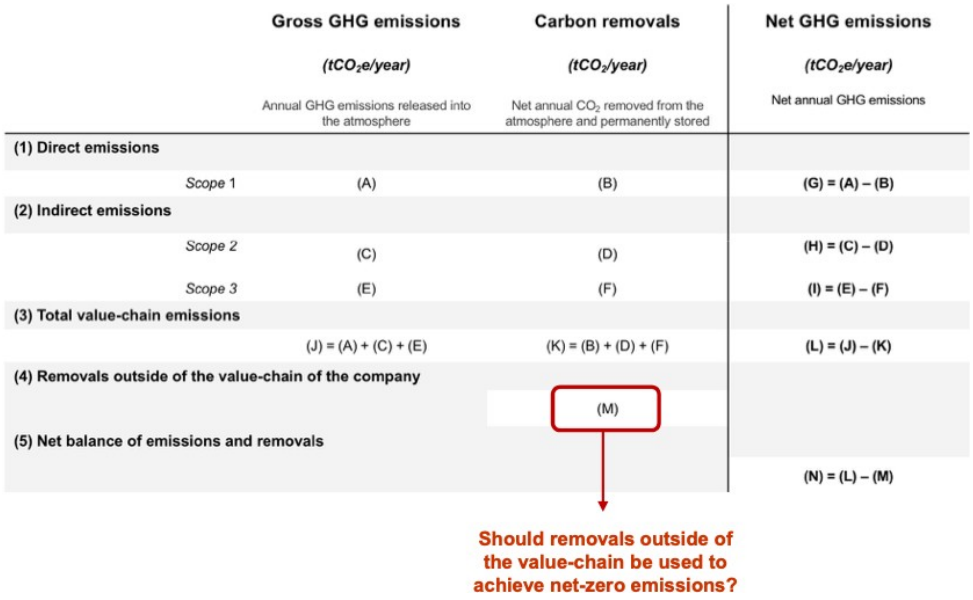
- **Sinks in the value chain**: They do not say anything about the annual level of sinks that will be developed in the value chain.
- **Sinks outside of the value chain**: They set only a financing contribution level of "certified" reductions equal to the amount of Pillar A's emissions (or, more generally, an arbitrarily small perimeter of Pillar A's emissions). This scaling is "self-centered" and does not reflect the level of an organization's fair contribution to the overall transition.

It is difficult for the Net Zero Initiative to use these protocols as a basis for defining the "right" levels of contribution to negative emissions for companies.

Science-based Targets Initiative : ***Towards a science-based approach to net-zero in the corporate sector***

In November 2019, the Science-based Targets Initiative submitted for public consultation a proposed definition of corporate "net zero" [1]. Refer to Part B/ Pillar 2: Reducing others' emissions.

The SBTI proposal is as follows: "For a company, achieving zero net emissions means achieving a state where activities within a company's value chain have no net impact on the climate. This state is achieved by aligning GHG emissions in the value chain on a 1.5°C trajectory, and balancing the impact of the remaining emissions with an appropriate amount of carbon sinks".



Extract from the webinar Science-based Targets - Towards a science-based approach to net zero in the corporate sector. SBTi seems to be moving in the direction of a possible subtraction between "Gross GHG emissions" (term "J") and "Carbon removals" (term "K" for the sinks in the value chain and "M" for the sinks outside of the value chain). It is not yet clear whether "K" can be counted in their definition of "net zero".

The SBTi therefore considers at this stage that an organization's "net zero carbon" claim is measured by a subtraction between emissions and removals, with removals being made up of :

- real carbon sinks in its value chain;
- potentially, the purchases of carbon credits from the removal projects (this point is under discussion).

The SBTi also questions the claims of neutrality that companies have the right to make or not to make depending on whether or not they comply with the 1.5°C reduction trajectory.

However, it is surprising from the SBTi to make the choice of defining a corporate sink development target that is self-centered on the company and based on its own emissions at a certain point in time. A more "science-based" approach would have been to deduce the target from global carbon absorption development scenarios and ratios.

The SBTi approach could serve as an inspiration for setting targets on Pillar C, but as it stands, it fails to make the link with the level of sink development required at the global scale (unlike the SBT methodologies developed on Pillar A, which are indeed a declination of the global emission reduction scenarios).

[1] Science-based Targets Initiative, ***Towards a science-based approach to climate neutrality in the corporate sector*** (2019)

In summary:

	PAS 2060 and the Carbon Neutral Protocol	SBT Initiative - Corporate Net Zero
Target for negative emissions within the value chain	None	As large as the emissions within all the scopes 1+2+3. Difficulties with the temporality (what should be done with the 1.5°C trajectory?)
Target for negative emissions outside of the value chain	Equivalent to the volume of emissions within the scope of the organization (all or part of scopes 1, 2 and 3). Only through the purchase of carbon credits (without distinction between avoided and negative emissions)	Inclusion of financing for sinks outside of the value chain not confirmed

The tracks proposed by the Net Zero Initiative

This part is a reproduction of Topic 2 – The definition of trajectories in Account C and is based on Topic 3 – The status of direct financing on emission reduction projects, in Part C. "Open-ended Questions".
What is, for an organization, the "right level" of contribution to increasing carbon sinks over time? The Net Zero Initiative proposes to discuss the following options, which at this stage are not all recommendations **but some of the possibilities to be eliminated as future work progresses**. This list is also no**n-exhaustive**.

For sinks in the value chain:

- **Option 1**: No objective. Set as large a quantity as possible, and compare with other players in the sector so as to create "virtuous competition".
- **Option 2**: Set a level of negative emissions equal to x times the scope 1+2+3 emissions within the value chain (Pillar A), where x is equal to or greater than 1. The SBTi proposal on "corporate net zero" claims (see above) sets x=1.
- **Option 3**: Set a constant level of negative emissions over time, equal to the level of the remaining emissions in 2050 from the trajectory set in pillar A.
- **Option 4**: Set a level of negative emissions consistent with a normative sink development trajectory, whether local, national, or global. Each company would then be assigned, depending on its sector and according to the allocation rules which need to be defined [1], a quantity of sinks that will be developed annually; in order to be consistent with the quantity of sinks that needs to be developed according to the 2°C/1.5°C compatible scenarios.

For sinks outside the value chain:

- **Option 1**: Consider that the quantity of wells outside of the value chain is fungible with the sinks in the value chain; and therefore that the sinks outside of the value chain can be seen as "complements" to achieve the objectives defined above.
- **Option 2**: No objective. To set as large a quantity as possible, then compare with other players in the sector so as to create "virtuous competition".
- **Option 3**: Set an amount of sink financing equal to the translation into Euros of Scope 1+2+3 emissions, via a price per ton of CO_2 that increases over time.
- **Option 4**: Set a level of negative emissions consistent with a normative trajectory of sink development, whether local, national, or global. Each company would then be assigned a quantity of sinks to be developed annually, according to its sector and according to the allocation rules that need to be defined [2]; in order to be consistent with the quantity of sinks that needs to be developed according to 2°C/1.5°C compatible scenarios.
- **Option 5**: To fix an amount of financing according to the finance gap to be filled in year N: the company is allocated a share of the financial effort in proportion to the weight of its turnover in world GDP.

[1] [2] Example : pro rata to its share of the territory's emissions ("the company is responsible for x% of the territory's emissions, it is therefore assigned x% of the sink development effort"), pro rata to its income ("the company represents x% of the national GDP, it is therefore assigned x% of the development effort for sinks"), etc.

In summary:

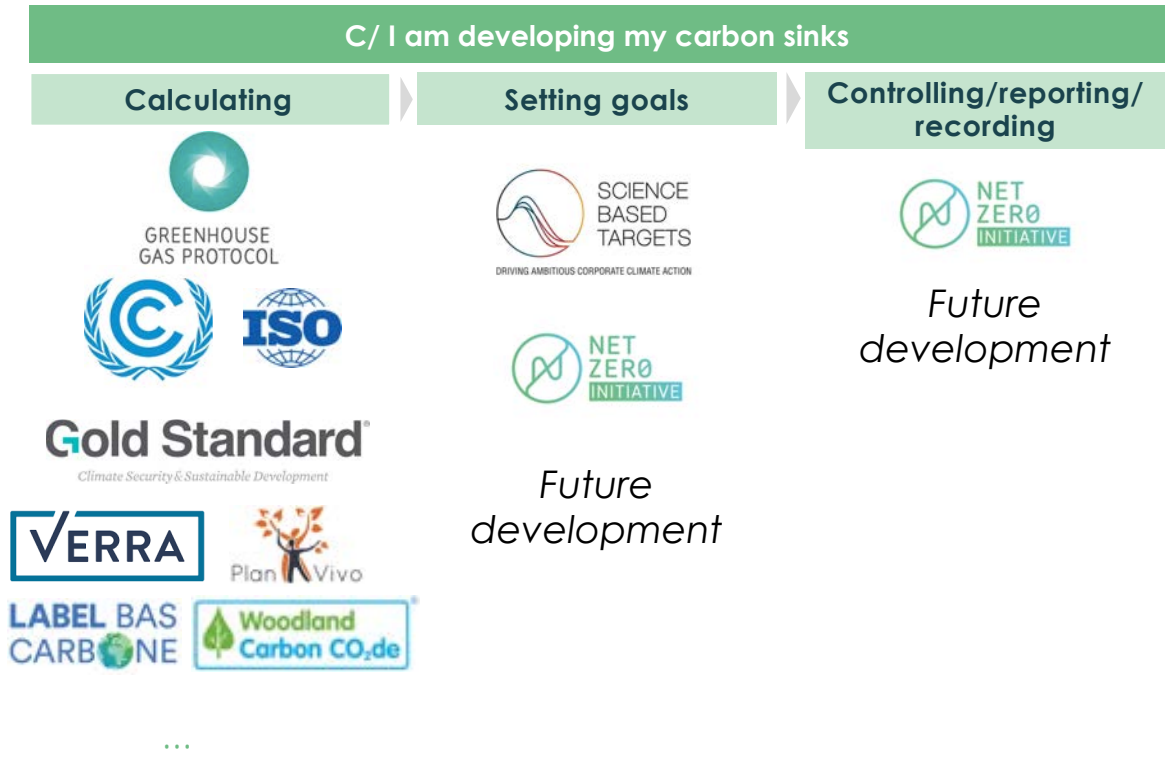
	PAS 2060, Carbon Neutral Protocol	SBTi Corporate Net Zero	Net Zero Initiative Proposals
Target for negative emissions within the value chain	None	As large as the emissions in all the scopes 1+2+3. Difficulties with temporality (what should be done with the 1.5°C trajectory?)	**Option 1**: No objective. Set as large a quantity as possible **Option 2**: Set a level of negative emissions equal to x times Pillar A's scope 1+2+3 emissions **Option 3**: Set a constant level of negative emissions over time, equal to the level of the remaining emissions in 2050 from the trajectory set in pillar A **Option 4**: Setting a level of negative emissions consistent with a normative sink development trajectory
Target for negative emissions outside of the value chain	Equivalent to the volume of emissions within the scope of the definition of "neutrality" (all or part of scopes 1, 2 and 3). Only through the purchase of carbon credits (without distinction between avoided and negative emissions)	Inclusion of financing for sinks outside of the value chain not confirmed	**Option 1**: See these sinks outside of the value chain as "complements" to achieving the objectives defined in the value chain. **Option 2:** No objective. Set as large a quantity as possible, as well as comparing with other players in the sector so as to create "virtuous competition". **Option 3**: Set an amount for financing sinks equal to the translation into Euros of the emissions scopes 1+2+3, via a price per ton of CO_2 that increases over time. **Option 4**: Set a level of negative emissions consistent with a sink development normative trajectory **Option 5**: Set a financing amount based on the *finance gap* to be filled in for the year N

How can we manage it?

A company that sets itself a sink development objective, then on the one hand seeks to implement a strategy consistent with this objective, as well as effectively managing its performance over time to ensure that the objectives it has set itself are met on the other.

There is no body to manage, monitor or rate the performance of organisations in relation to their sink development (Pillar C) at this stage.

Overview


C/ I am developing my carbon sinks
Calculating
Setting goals
Controlling/reporting/ recording
GREENHOUSE GAS PROTOCOL
ISO
Gold Standard
Climate Security & Sustainable Development
VERRA
Plan Vivo
LABEL BAS CARBONE
Woodland Carbon CO2de
...
SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION
NET ZERO INITIATIVE
Future development
NET ZERO INITIATIVE
Future development

C/ Summary

Accounting

CALCULATE		A/ I am minimizing my GHG emissions	B/ I am reducing others' emissions	C/ I am developing my carbon sinks
In my value chain	In my operations	BC BILAN CARBONE®, GREENHOUSE GAS PROTOCOL, ISO 14064	ISO, NET ZERO INITIATIVE *To be developed*	GREENHOUSE GAS PROTOCOL, ISO, ISO 14064 *To be developed*
	Upstream & downstream			
Outside of my value chain		-	Gold Standard, Woodland Carbon CO2.de, VERRA, LABEL BAS CARBONE, NET ZERO INITIATIVE *To be developed*	Gold Standard, ISO, Woodland Carbon CO2.de, VERRA, LABEL BAS CARBONE, Plan Vivo, NET ZERO INITIATIVE *To be developed*

Setting goals

SET GOALS		A/ I am minimizing my GHG emissions	B/ I am reducing others' emissions	C/ I am developing my carbon sinks
In my value chain	In my operations	SCIENCE BASED TARGETS	NET ZERO INITIATIVE *To be developed*	SCIENCE BASED TARGETS, NET ZERO INITIATIVE *To be developed*
	Upstream & downstream			
Outside of my value chain		-		

Managing /reporting/recording

MANAGE/REPORT/ RECORD		A/ I am minimizing my GHG emissions	B/ I am reducing others' emissions	C/ I am developing my carbon sinks
In my value chain	In my operations	CDP	NET ZERO INITIATIVE *To be developed*	NET ZERO INITIATIVE *To be developed*
	Upstream & downstream	ACT ASSESSING LOW CARBON TRANSITION		
Outside of my value chain		-		

Interpretation of the matrix in regard to existing definitions of neutrality

Reminder of the considered categories: NZI matrix

Levers at an organizational scale		A/ I reduce my emissions	B/ I reduce others' emissions	C/ I develop my carbon sinks
Indicator to be monitored		*Induced emissions*	*Avoided emissions*	*Negative emissions*
Physical nature		*Absolute real flow of GHGs added to the atmosphere*	*Difference in GHG emissions compared to a reference scenario*	*Absolute real CO_2 flow out of the atmosphere*
In my value chain	In my operations	A_1 (direct emissions– scope 1)	-	C_1 (direct sinks)
In my value chain	Upstream & downstream	A_2 (indirect emissions – scope 2+3)	B_2 (emissions avoided by products)	C_2 (certified)
Outside of my value chain		A_3 (assets recently disposed of)	$B_{3,1}$ (certified) $B_{3,2}$ (audited)	$C_{3,1}$ (certified) $C_{3,2}$ (audited)

Translation of the various definitions of corporate neutrality with regard to the NZI matrix

Definition	Condition to be respected
Total decarbonation of the company's direct activities	$A_1 = 0$
Direct application of the global "net zero" definition at the organizational-wide level	$A_1.C_1 = 0$
PAS 2060 and *Carbon Neutral Protocol* Definitions	(A_1+A_2) (on a partial scope) - $(B_{3.1} + C_{3.1)} = 0$
Proposed definition of "Corporate Net Zero" from the SBTi	• (A_1+A_2) must be aligned with a 1.5°C trajectory. *and* • $(A_1+A_2) - (C_1 + C_2) = 0$ or $(A_1+A_2) - (C_1 + C_2 + C_{3.1)} = 0$
Net Zero Initiative Proposal	No "carbon neutrality" status Dynamic control of several parameters over time: • $A_1 + A_2 + A_3$ must be aligned with a trajectory 1.5°C/2°C • B_3 must be aligned with a trajectory to be defined • B_3 must be aligned with a trajectory to be defined • $C_1 + C_2$ must be aligned with a trajectory to be defined. • C_3 must be aligned with a trajectory to be defined Potentially, the creation of a system of grades for evaluating the company's degree of alignment on these different trajectories.

D/ Open-ended questions

Topic 1: The definition of trajectories within account B

What is the "right level" for an organization's contribution to reducing the others' emissions over time?

The Net Zero Initiative proposes to discuss the following options, which at this stage are not all of the recommendations but **some of the possibilities that will be eliminated as future work proceeds**. This list is also **non-exhaustive**.

For the amount of avoided emissions from the products:

- **Option 1**: No objective. Set a quantity as large as possible and then compare with other players in the sector so as to create "virtuous competition".
- **Option 2**: Set a level of avoided emissions equal to x times the emissions of scopes 1+2+3 in the value chain, where x may be greater or less than 1
- **Option 3**: Set a target for the growth of this quantity / Set a substitution trajectory for less or even non-emitting products to replace the emitting products

For the amount of emissions avoided by financing outside of the value chain:

- **Option 1**: No objective. Set a quantity as large as possible and compare it with other players in the sector so as to create "virtuous competition".
- **Option 2**: Set a level of avoided emissions equal to x times the emissions of scopes 1+2+3 in the value chain, where x may be greater or less than 1
- **Option 3**: Set a level of avoided emissions equal to the emissions of scopes 1+2+3 in the value chain exceeding the projected remaining emissions level in 2050 according to the trajectory set in pillar A
- **Option 4**: Set a level of avoided emissions consistent with a normative trajectory, whether local, national, or global. Each company would then be assigned, depending on its sector and according to allocation rules, a quantity of avoided emissions to be financed annually which is consistent with the quantity of avoided emissions that needs to be developed according to the 2°C/1.5°C compatible scenarios.
- **Option 5**: Set a financing amount equal to the translation into Euros of the emission scopes 1+2+3, via a price per ton of CO_2 increasing over time.
- **Option 6**: Set a funding amount based on the finance gap to be filled in year N: the company is allocated a share of the financial effort in proportion to the weight of its turnover in world GDP, via an allocation key that is to be defined.

In summary :

	Net Zero Initiative Proposals
Avoided Emissions target for products and services	**Option 1**: No target: as large as possible **Option 2**: Equal to x times the emissions scope 1+2+3 **Option 3**: Set a growth target for this amount
Avoided Emissions target by financing outside of the value chain	**Option 1**: No target: as large as possible **Option 2**: Equal to x times the emissions scope 1+2+3 **Option 3**: Equal to Scope 1+2+3 emissions exceeding the value of the remaining emissions in 2050 **Option 4**: On a pro-rata basis to an avoided emissions normative trajectory to be developed in a given territory **Option 5**: The amount of financing equal to the translation into Euros of the emissions scope 1+2+3, via a price per ton of $_{CO2}$ increasing over time. **Option 6**: The amount of financing according to the *finance gap* to be filled in for the year N, on a pro-rata basis to the weight of the organization's turnover in world GDP

[1] Ditto.
[2] Finance gap: financial capital required to meet and exceed national climate commitments.

Topic 2: Defining trajectories within account C

What is, for an organization, the "right level" of contribution for increasing carbon sinks over time?

The Net Zero Initiative proposes to discuss the following options, which at this stage are not all the recommendations but some of the possibilities that will be eliminated as future work proceeds. This list is also non-exhaustive.

For sinks within the value chain:

- **Option 1**: No objective. Set a quantity as large as possible and compare it with other players in the sector, so as to create "virtuous competition".
- **Option 2**: Set a level of negative emissions equal to x times the emissions scope 1+2+3 within the value chain (A pillar), where x is less than or greater than 1. The SBTi proposal on the "corporate net zero" claims (see above) fixed x=1.
- **Option 3**: Set a constant level of negative emissions over time, at no more than the level of remaining emissions in the 2050 trajectory set out in pillar A.
- **Option 4**: Set a level of negative emissions consistent with a sink development normative trajectory, whether local, national or global. Each company would then be assigned, according to its sector and according to allocation rules, a quantity of sinks that will be developed annually, in order to be consistent with the quantity of sinks that need to be developed under the 2°C/1.5°C compatible scenarios.

For sinks outside of the value chain:

- **Option 1**: Consider that the quantity of sinks outside of the value chain is fungible with the sinks in the value chain; and therefore that the sinks outside of the value chain can be seen as "complements" in order to achieve the objectives set out above.
- **Option 2**: No objective. Set a quantity as large as possible and compare it with other players in the sector so as to create "virtuous competition".
- **Option 3**: Set an amount of sink financing equal to the translation into Euros of the Scope 1+2+3 emissions, via a price per ton of CO_2 that increases over time.
- **Option 4**: Set a level of negative emissions consistent with a sink development normative trajectory, whether local, national or global. Each company would then be assigned, according to its sector and according to allocation rules, a quantity of sinks that will be developed annually, in order to be consistent with the quantity of sinks that need to be developed under the 2°C/1.5°C compatible scenarios.
- **Option 5**: Set a financing amount based on the finance gap to be filled in year N: the company is allocated a share of the financial effort in proportion to the weight of its turnover in world GDP.

[1] Example: pro rata to its share of the territory's emissions ("the company is responsible for x% of the territory's emissions, it is therefore assigned x% of the effort to develop sinks"), pro rata to revenues ("the company represents x% of the national GDP, it is therefore assigned x% of the effort to develop sinks"), etc.

Topic 2: Defining trajectories within account C (continued)

In summary (non-exhaustive options):

	Net Zero Initiative Proposals
Target for negative emissions within the value chain	**Option 1**: No objective. Set as large a quantity as possible **Option 2**: Set a level of negative emissions equal to x times Pillar A's scope 1+2+3 emissions **Option 3**: Set a constant level of negative emissions over time, equal to the level of the remaining emissions in 2050 from the trajectory set in pillar A **Option 4**: Set a level of negative emissions consistent with a normative sink development trajectory
Target for negative emissions outside of the value chain	**Option 1**: See these sinks outside of the value chain as "complements" to achieving the objectives defined in the value chain. **Option 2**: No objective. Set as large a quantity as possible, as well as comparing with other players in the sector so as to create "virtuous competition". **Option 3**: Set an amount for financing sinks equal to the translation into Euros of the emissions scopes 1+2+3, via a price per ton of CO_2 that increases over time. **Option 4**: Set a level of negative emissions consistent with a sink development normative trajectory **Option 5**: Set a financing amount based on the *finance gap* to be filled in for the year N

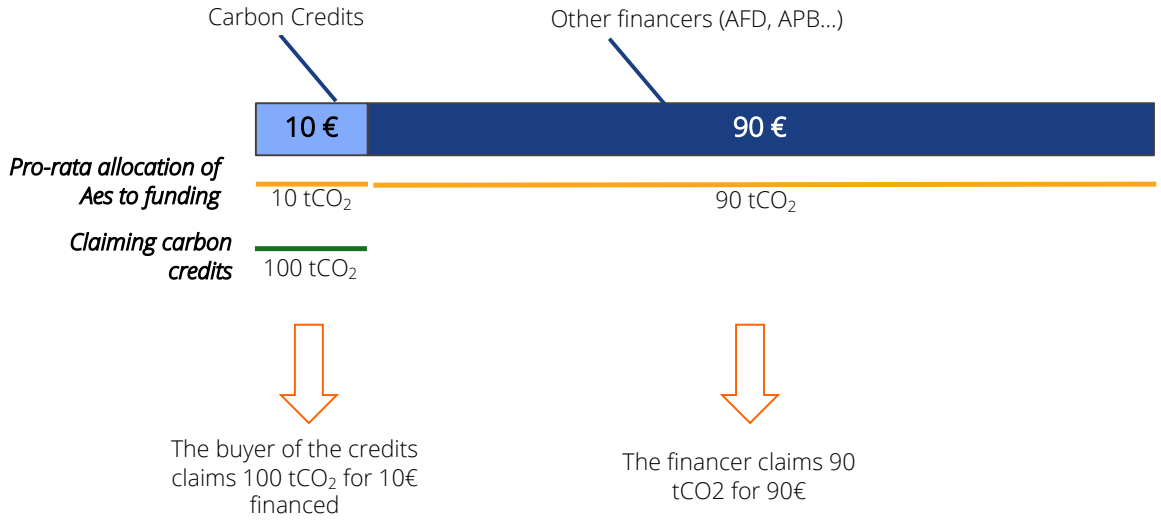
Topic 3: The status of direct financing on emission reduction projects

A growing number of organisations are seeking to invest directly in low carbon projects, outside of the traditional carbon certification frameworks. This raises the question of how many avoided emissions the organization is able to claim through its financing.
An intuitive position would be to consider that the organization can claim annually its avoided emissions on a pro-rata basis depending on the amount of project participation.
However, if the project derives part of its financing from the sale of carbon credits, a difficulty arises: **the part financed by carbon credits is allocated to 100% of the project's avoided emissions, not just the pro-rata share of the financing**.

For example, if a project avoids 100 tCO_2 and it costs 100 €, but it is only financed by 10€ of carbon credits, it is nevertheless accepted that 100 tCO_2 credits are emitted on the basis of the 10€ alone. This is in contradiction with the fact that the other financiers could also claim a contribution of avoided emissions.
In the preceding example, we would have:

- Credit buyers who finance 10€ and claim 100 tons of avoided CO_2 (carbon credits);
- Investors who finance 90 € and claim 90 tons of avoided CO_2 (pro rata to their financing).

The risk is that by summing up all the claims of all the players, we could end up with a total claim of 190 tCO_2 avoided on the whole.



Option 1: Should we start issuing carbon credits only on a pro-rata basis to what has actually been financed by the credits (i.e. 10 tCO_2 here)?
Option 2: Should other financers be prohibited from claiming a contribution?
Option 3: Should the sum of the claims be 190 tCO_2?

This question shows that the "world of the voluntary carbon market" and the "world of project finance" will need to communicate more. This issue will need to be further explored in future work.

Topic 4: Defining a common language between territories and companies

If organizations must first and foremost be seen as entities serving the emergence of a territorial net zero carbon (cities [1], regions, countries and the planet), the question arises as to how:

- **Organizations** can effectively track and quantify their contribution to a territory's zero-carbon transition, including:
    - The impact of the emissions reduction on their scopes 1+2+3 on a given territorial footprint
    - The impact of the avoided emissions with their customers and outside of the value chain on a given territorial footprint
    - The impact of negative emissions within and outside of the value chain, on the carbon sinks of a given territory
- **Territories** can trace and value the contributions of all stakeholders, whether they are individuals, businesses or public authorities.

Topic 5: Calculating in terms of financing rather than tons of avoided CO_2

An alternative to the quantification of "tons of carbon reduced" is to think in terms of the amount of financing. Thus, instead of quantifying the contributions in tons of avoided CO_2, the company could instead highlight the total amount invested:

- **Within its operations**: in the research and development of its low carbon products and services;
- **Within its value chain**: in M€ from emission reduction projects financing within its suppliers;
- **Outside of its value chain**:
    - in M€ of credits purchased, labeled or not
    - in M€ invested directly in low-carbon projects
    - in M€ purchased in low-carbon electricity, green bonds and ESC

Similarly, a discount system could be developed in order to weight the "quality" of the financing between them.

This way of thinking has the disadvantage of:
- manipulating the financial, non-physical quantities
- removing the incentive of financing projects with the lowest abatement costs (lower economic efficiency)
- making non-financial contributions invisible, such as the marketing of low-carbon products

On the other hand, it has the advantage of:
- making important actions visible that do not immediately yield results, such as investment in R&D;
- cutting short the temptation to compare and subtract the “avoided tons” (pillar B) from the Company-induced emissions (Pillar A);
- highlighting the importance of the additional financing needed to fill the financing gap of the Paris Agreement.

This vision within financing is compatible with the "Reduce Within, Finance Beyond" vision of the Gold Standard [2].

[1] See, for example, the Issues Brief currently being drafted by the WBCSD on the articulation between urban and corporate climate action.
[2] Gold Standard, Corporate Climate Stewardship. Guidelines for best practice climate action in the Paris Agreement era (2018)

Topic 6: The case of the neutrality of events, products, individuals and other entities

The Net Zero Initiative approach currently applies only to organizations. The question of other entities' neutrality (one-off events, products, personal carbon footprints, services, etc.) may be addressed at a later stage (only if it proves relevant to go down this path).

APPENDICES

A/ Methodological foundations

1. Avoided emissions

A project avoids emissions if there is a positive gain between the emissions from the project on the one hand, and the baseline emissions that would have occurred in the absence of the project on the other.
An avoided emission is therefore the difference between a physical greenhouse gas flow that actually takes place (that of the project) and an imaginary greenhouse gas flow that, by definition, has not taken place (that of the counterfactual scenario).

Another way of referring to avoided emissions is a "non-emission of CO_2e compared to a reference scenario" or "the persistence of a lower level of emissions over time compared to a reference scenario".

It is clear that the choice of the reference scenario is the keystone of the concept.
The avoided emissions, although expressed in tons of CO_2e, are therefore not immediately comparable to absolute GHG reductions. They are theoretically only "virtual" differences of emissions levels. However, they may "contain" a share of absolute reductions.

Does an avoided emission from a project perspective necessarily imply a reduction in emissions from a global perspective?

This nuance is important because the global net zero target calls for an absolute decrease in global emissions (see Part 1). The instruments manipulated at the level of organizations, including the concept of avoided emissions, should reflect this subtlety as much as possible.

In the following, we will associate these terms with the following definitions:
- An emissions reduction is a real decrease in GHG emissions between two dates on a given perimeter.
- An avoided emission is the difference in the level of emissions induced by a solution compared to a reference scenario that would have occurred in the absence of the solution.

We can see that the concept of reduced emissions corresponds to an absolute decrease in emissions. The concept of avoided emissions is the difference between two situations, one real, the other hypothetical (counterfactual).

The two concepts are not mutually exclusive. An avoided emission can mean a pure emission reduction, if the reference scenario used for the calculation is the former situation of the system:

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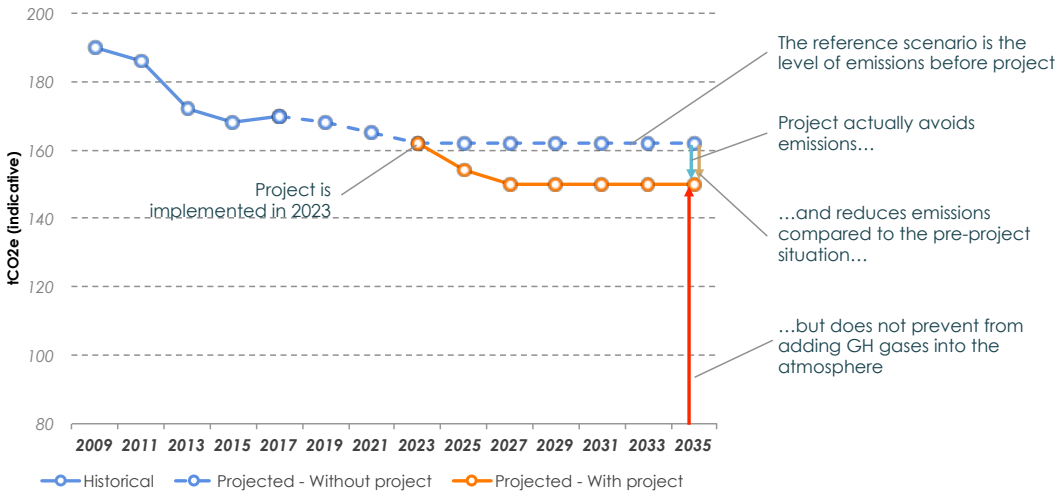
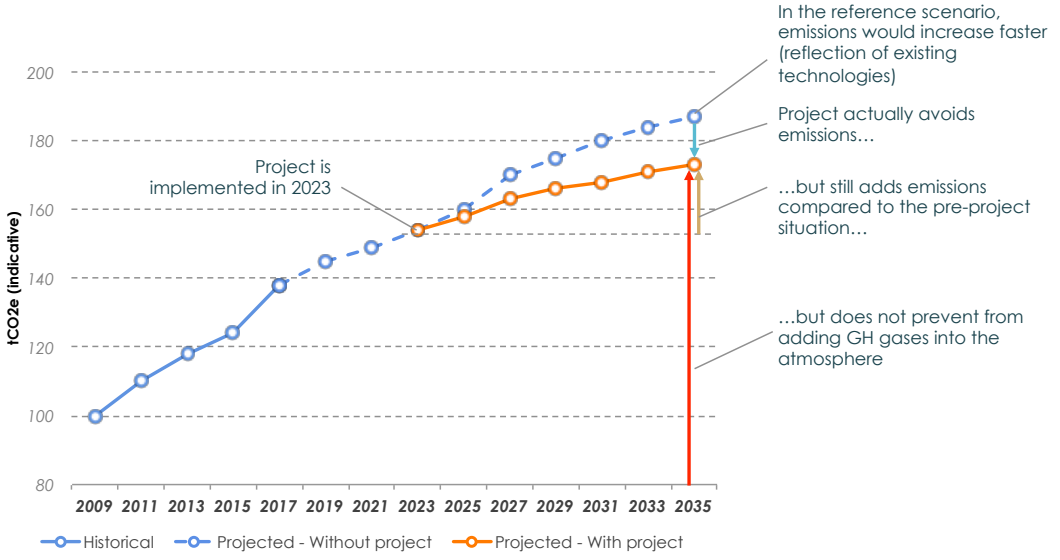


On the other hand, if the baseline scenario leads to an increase in emissions compared to the initial situation, there may be "avoided emissions" while the overall level of emissions from the project increases. The project simply does "less bad" than the counterfactual scenario in terms of increased emissions. These avoided emissions are compared to a growing baseline scenario, it is also known as a suppressed demand [1].



An avoided emission can therefore be of two different natures:

- Either it is an absolute decrease in emissions compared to the previous situation, if for example the reference scenario is taken as a constant and equal to the initial situation. Example: the thermal renovation of a building.
- Or it is a smaller increase in emissions compared to a developing baseline scenario (but, an absolute increase in emissions compared to the previous situation). Example: construction of a new high-performance building.

In the Net Zero Initiative vision, avoided emissions consisting of "less emissions increase" is not satisfactory. They cannot be counted in the case of the marketing of products and services, since it is stipulated in Pillar B that these must (in the case of "validated" emissions in any case, see page 53) trigger absolute reductions in customer emissions. However, as the carbon standards themselves do not distinguish between "smaller increases" and "real reductions", it is difficult to apply special treatment to them now. Eventually, however, these "smaller increases" will not be subject to the same tolerance, depending on criteria that will be determined (geographical area, etc.).

[1] The UNFCCC's CDM Methodology Booklet defines it as follows: "A scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party".

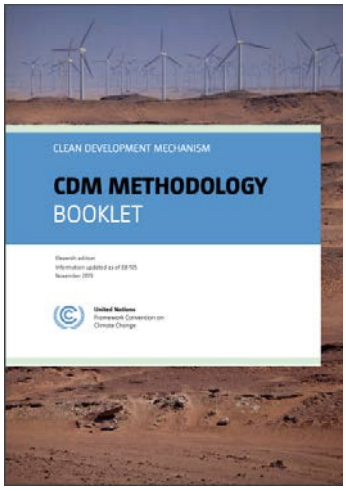
2. Carbon credits

A carbon credit is the monetization of an avoided emission (or a ton of sequestered carbon, we will discuss this in the section dedicated to Pillar C, below) recognized as real, additional [1], verifiable and permanent. Carbon certification also guarantees the absence of double issuance [2] and double use [3].

The purchase of a carbon credit by a company can therefore be seen as a robust and tangible proof of the existence of a financial contribution to the Paris Agreement objectives, in the form of a real, additional, verifiable and permanent avoided emission [4].

Emission reduction calculations for carbon credit projects follow the logic of "avoided emissions" because they involve a baseline scenario [5]. This is often the initial state of the system, but sometimes also of the growing scenarios. In both cases, the standard carbon certification benchmarks consider them indifferently as "tons of CO_2 not emitted".

- **Example of labeled projects leading to an absolute reduction in emissions**: a project for improved homes by replacing existing equipment
- **Example of labeled projects that do not induce an increase or a reduction of emissions**: REDD+ projects that avoid deforestation (the level of emissions from the project remains stable over time and it is compared to a counterfactual situation in which the forest stock is degraded).
- **Example of carbon credits inducing an increase in emissions**: energy efficiency projects in a new building (the project induces new emissions compared to the pre-project situation, but it is compared to a counterfactual situation in which the new building would have emitted more).



The cover of the UNFCCC CDM Methodology Booklet.

NB: This observation argues that not all carbon credits should be considered as a "negative reflection" of companies' own emissions, since in some cases these "carbon credits" do not imply an absolute reduction in emissions.

This distinction having been made, we cannot claim here to conduct a "clean-up" of the nature of carbon credits according to their "absolute decrease" or "lesser increase" nature. Nevertheless, we consider that this differentiation of this work must be made in the future, at the level of labels and carbon certification bodies.

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[1] A carbon project is considered "additional" if it would not have existed in the absence of the sale of the carbon credits. This is a crucial criterion, but also particularly difficult to demonstrate. Studies have shown, for example, that 85% of CER credits from the UN Clean Development Mechanism are not additional. See "How additional is the Clean Development Mechanism", Öko Institute, 2016.
[2] Double counting occurs when the same avoided emission is converted twice into a carbon credit.
[3] Double use occurs when two organizations purchase the same carbon credit.
[4] See: « Envisioning the Voluntary Carbon Market Post-2020 » statement convened by The Gold Standard (2019).
[5] See for example the CDM Methodology Booklet from the UNFCCC : "Definition of Baseline Scenario: For a CDM project activity (non- A/R) or CPA (non-A/R), the scenario for a CDM project activity or CPA that reasonably represents the anthropogenic emissions by sources of GHG that would occur in the absence of the proposed CDM project activity or CPA."

3. Emissions avoided by products and services

Most of the methods for calculating the avoided emissions by the marketed solutions by companies are not standardized.

First, there is no standardization of the reference scenarios used. It may therefore be difficult to prove the reality and the environmental additionality of these avoided emissions.

Example: a company marketing electric cars wants to calculate the emissions avoided by its products. It can choose its reference situation based on its customers' previous mobility usage. In this way, it would assess how the sale of its cars will change the mobility emissions of its customers. To do so, it will have to distinguish between the sales replacing a more carbon-intensive use (combustion vehicle) and sales replacing a less carbon-intensive use (walking, public transport, etc.) in order to differentiate between sales that will reduce or increase its customers' emissions. However, in the absence of a standardized calculation for avoided emissions, the car manufacturer could just as easily choose its reference situation by claiming that all of its customers would have bought a highly emissive combustion vehicle instead of its electric vehicle. The calculated avoided emissions would then be much higher.

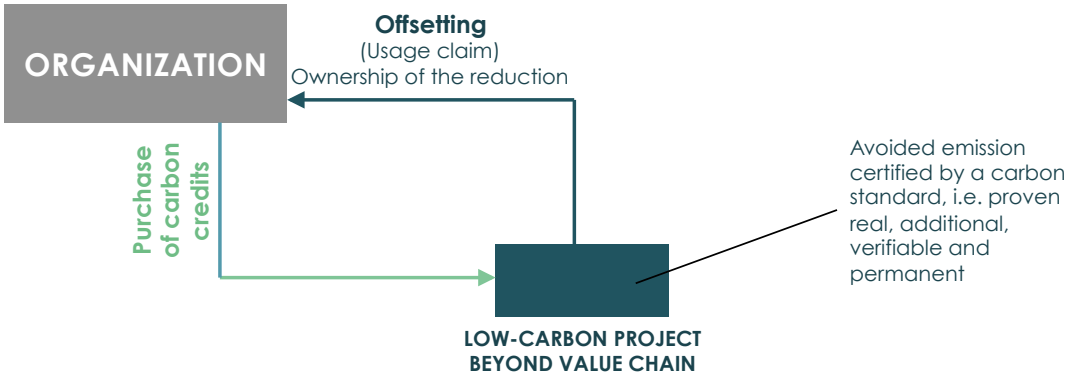
Second, the avoided emissions from products and services are generally summed over the entire life of the solution, and are brought back to the year in which the solution was sold. There is therefore an inhomogeneity between the avoided emissions as defined by carbon projects (the difference between the project and the baseline scenario in a given year) and the avoided emissions as defined by the products and services sold by companies (the difference between the solution and the baseline scenario over the entire lifespan of the solution).

Nevertheless, the same criticism can be made of the Scope 3 emissions category, the "Use of products sold" in the carbon accounting standards. By definition, it is calculated by integrating all the emissions generated during the life of the product and bringing it back to the year of sale. This emissions category therefore contains future emissions, unlike the other emissions categories, which only reflect annual emissions flows in the reporting year.

The question of applying a "negative" discount rate to future emissions could then be raised in order to give them more weight in reporting. This would penalize any shift of the climate burden "to the future" and provide an incentive to act now to reduce emissions.

B/ Broadening the notion of organizations' "climate contribution"

In the era of the Kyoto Protocol the voluntary carbon market provided an opportunity for organizations to "offset their emissions": by buying a "carbon credit" they could claim possession of an emission reduction made by a third party outside their value chain. This was made possible by the fact that under the Kyoto Protocol, only 37 countries were concerned by emission reduction commitments, and that the level of ambition was much lower (18% reduction of the parties' emissions compared to 1990). The voluntary market then operated as a way of obtaining emission reductions from a reservoir outside of the framework of international agreements, beyond the countries' commitments.

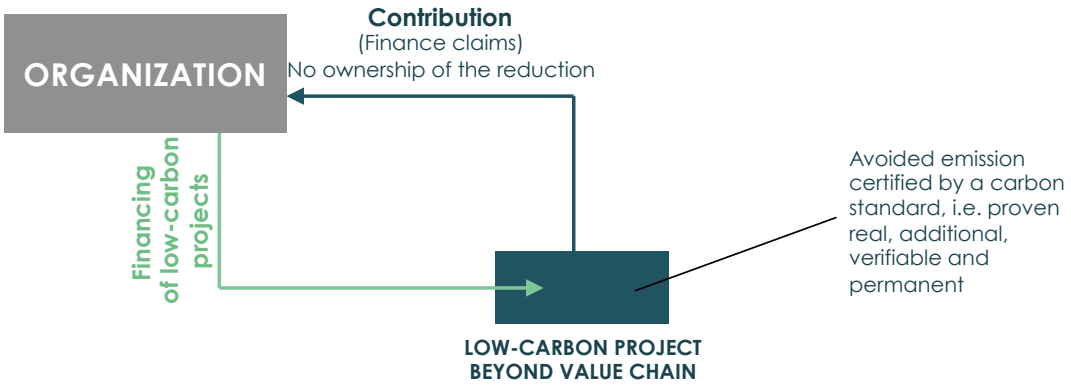


The Paris Agreement, on the other hand, commits almost all of the countries in the world to set reduction targets compatible with achieving global net zero by the middle of the century (see Part 1). The imperatives of reducing emissions and increasing carbon sinks are also much more ambitious than under the Kyoto Protocol. The status of carbon credits will therefore have to be reviewed, since the emission reductions generated by the projects will be recorded in the host countries' inventories, and it is imperative to avoid double counting [1][2].

The fate of the voluntary carbon market could therefore become to be "an instrument for accelerating the global transition towards zero net emissions, helping to close the emissions gap [3], the finance gap [4] and the time gap" [5].

One way of giving substance to this ambition is to consider carbon credits not as certificates of the possession of reductions, but of their financing. The reductions themselves would remain in the hands of the host countries; the credits would simply be proof of a tangible financial contribution to the achievement of global net zero emissions.

[1] See the: Carbon Markets 101. The Ultimate Guide to global offsetting mechanisms, Carbon Markets Watch, 2019
[2] See the: Features and implications of NDCs for carbon markets, Climate Focus, 2017
[3] Emissions gap: gap between the sum of the national contributions (NDCs) formulated by the signatory countries and the reductions required to stay below the warming target.
[4] Finance gap: financial capital required to meet and exceed national commitments.
[5] Time gap: preference for emission reduction initiatives taking place now rather than later.
[6] Envisioning the Voluntary Carbon Market Post-2020, Gold Standard, 2019



Is this, however, the only "contribution" possible from a company's point of view?

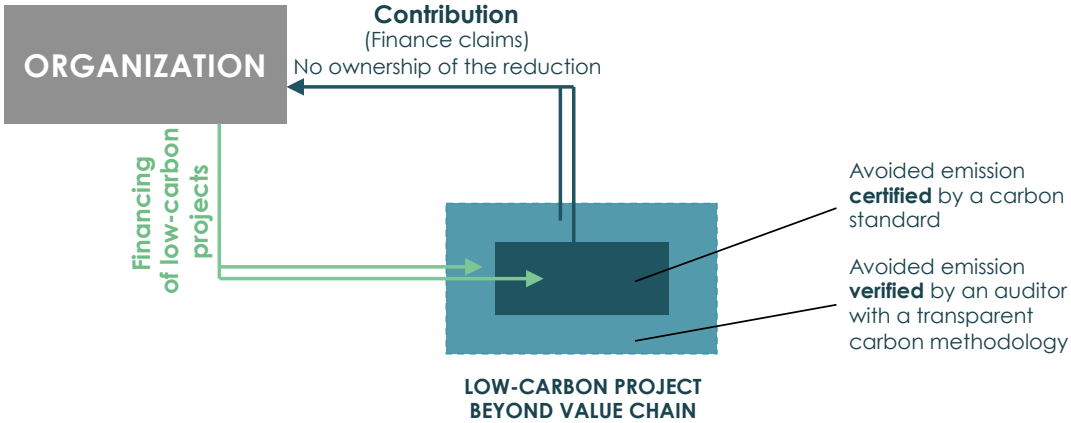
While the purchase of carbon credits constitutes as a robust instrument for contributing to the global net zero target, is it the only one?
NZI proposes that the notion of "climate contribution" could refer more broadly to all actions, financial or otherwise, that trigger avoided emissions (provided that sufficient effort is made in terms of measuring and verifying the reality of these avoided emissions).

1st expansion: financing of other projects outside of the value chain

The company can finance low carbon projects outside of its value chain that do not necessarily deliver carbon credits per se, but whose reality is "verified" by a third party according to a solid and transparent methodology.
The hierarchy is as follows:

1. Certified projects: the organization finances low-carbon projects outside its value chain through the purchase of emission reductions certified by a label. The emissions avoided have been certified as real, additional, permanent and verifiable by an official carbon standard.
2. Validated projects: the organization finances low carbon projects outside its value chain. The avoided emissions from the project have not been certified by an official carbon standard, but verified by a third party according to a robust and transparent methodology.

Given the difference in robustness between the two categories, an incentive hierarchy must be clearly identified, for example through the application of a discount within the second category.



One way of "contributing financially" to the reduction of third-party emissions is to finance the avoided emissions that are not certified, but verified by an independent auditor following a rigorous official methodology.

The 2nd expansion: the sale of low-carbon solutions

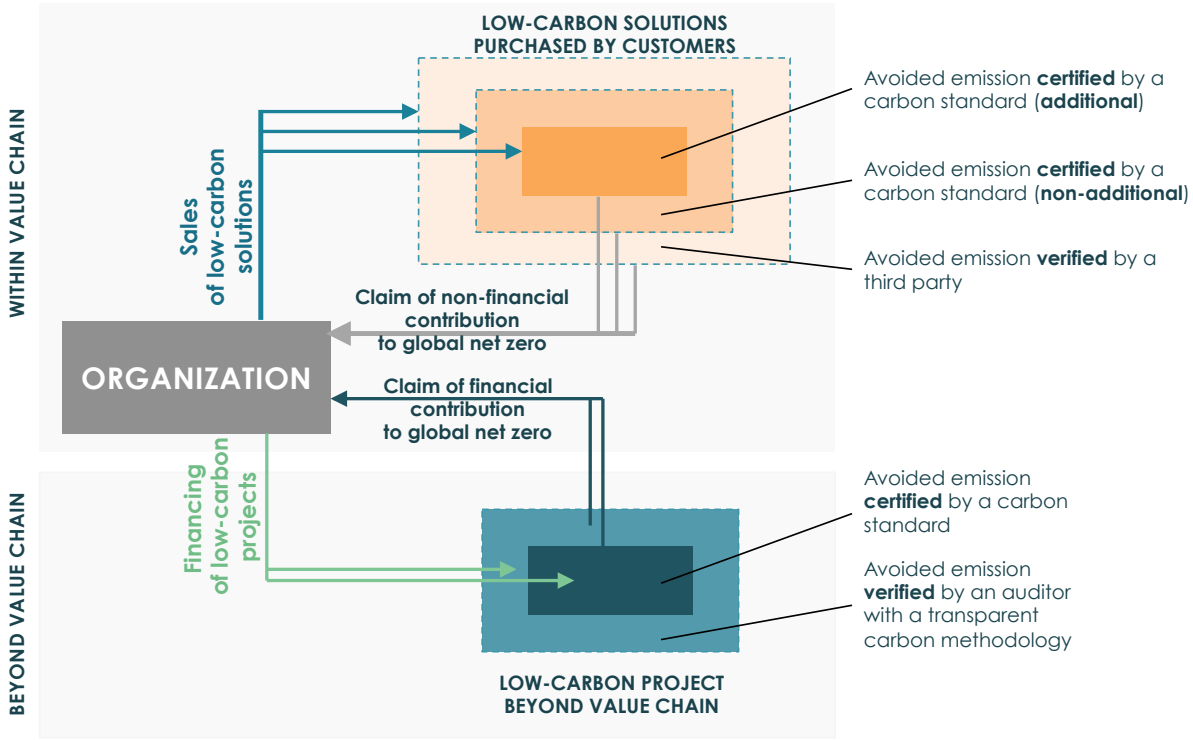
The Net Zero Initiative considers that the notion of the climate contribution to the goal of global neutrality can even be extended beyond mere financing actions. A company that sells low-carbon products and reduces the carbon footprint of its customers compared to a previous situation, is a company that contributes in its own way to the global net zero goal through its own products.

The lack of financial additionality is not an issue (the product may well be profitable in itself) as long as the company does not monetize these gains in the form of credits. The existence of avoided emissions from the products and services sold can moreover be seen as an encouraging sign, proof that climate opportunities have been properly integrated into the heart of the company's business model.

A hierarchy can be applied to avoided emissions by the sale of products and services:

1. Certified avoided emissions:
    - with additionality: the avoided emissions from the solutions sold by the company have been certified as real, additional, permanent and verifiable by an official carbon standard.
    - without additionality: the avoided emissions from the solutions sold by the company have been certified as real, permanent and verifiable by an official carbon standard but are not financially additional (the marketing of the solution is profitable in itself).
2. Validated avoided emissions: the emissions from the products sold by the company have not been certified, but their reality has been verified by a third party according to a robust and transparent methodology.

Given the robustness gap between the three categories, an incentive hierarchy should be clearly identified, for example through the application of a discount within the second and third categories.



The notion of "contribution" can also be broadened to outside of the financing scope and outside of the value chain: for example, a company that markets climate-friendly solutions contributes in its own way, by reducing others' emissions (i.e. its customers).

GLOSSARY

ACT : Assessing Low-Carbon Transition (ACT)

AE : Avoided Emission

AFOLU : Agriculture, Forestry and Other Land Use

A/R : Afforestation/Reforestation

BECCS : Bio-Energy Carbon Capture and Storage

BSI : British Standards Institution

CCS : Carbon Capture and Storage

CDP : Carbon Disclosure Project

CDR : Carbon Dioxide Removal

CER : Certified Emission Reduction

DAC : Direct Air Capture

DACCS : Direct Air Carbon Capture and Storage

ESC: Energy Saving Certificates

EW : Enhanced Weathering

FFI : Fossil Fuels and Industry

GHG : Greenhouse Gas

GHG Protocol : Greenhouse Gas Protocol

IPCC : International Panel on Climate Change

ITMOs : Internationally Transferred Mitigation Outcomes

LC: Low Carbon

NETs : Negative Emissions Technologies

NZI : Net Zero Initiative

SBTi : Science-based Targets Initiative

SDA : Sectoral Decarbonization Approach

SLCF : Short-Lived Climate Forcer

SNBC : Stratégie Nationale Bas Carbone

VCM : Voluntary Carbon Market

WRI : World Resources Institute

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