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HOW CAN WE PROMOTE THE WISE USE OF "NET ZERO EMISSION" COMMITMENTS?

Research Informing Policy Discussion Paper 1/24

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Share and cite this report:

Mackey B. and Becken S. (2024) How can we promote the wise use of "Net Zero Emission" commitments?, Research Informing Policy Discussion Paper 1/24

DOI

https://dx.doi.org/10.25904/67t8-8609

INTRODUCTION

While its origins can be found in Earth system science, the concept of "net zero emissions" (NZE) has been translocated into a governance context via instruments and related decisions negotiated under the United Nations Framework Convention on Climate Change (UNFCCC) which are now focused on implementation of the **Paris Agreement**. Mitigating greenhouse gas emissions, and in particular CO_2 emissions from burning fossil fuel for energy, but also from deforestation and degradation (and other sources including cement production and certain agricultural practices), is a whole-of-society challenge (which if we collectively fail, has dire consequences for the future and survival of all humanity and much of the greater community of life with whom we share Earth as home). The **UNFCCC efforts** have therefore been promoting the contributions of all sectors – public and private – and subnational jurisdictions. The response has been positive as evidenced by the 140 countries, 9000 companies, 1000 educational and over 600 financial institutions who have made NZE pledges and to varying extents are implementing **NZE plans** for their organizations.

While the voluntary uptake of NZE commitments is very much welcomed, one consequence has been that the term has taken on **social meanings** that are often disconnected from the scientific definition *stricto sensu*. This gap between the scientific understanding of NZE and its social interpretation and application has created considerable uncertainty as to what it actually means in practice to organisations in all sectors – governments at all levels, commercial businesses including SM&L enterprises and listed corporations. In some cases, misinterpretation could lead to unintended consequences and actually undermine decarbonization efforts.

SCIENTIFIC NZE

The scientific meaning of NZE is based on understanding of the **global carbon cycle** where carbon occurs in a number of interconnected reservoirs, flowing between them over different time periods. Carbon is found in the atmosphere in a gaseous form (carbon dioxide CO_2, methane CH_4); terrestrial ecosystems (biomass glucose $C_6H_{12}O_6$); and in the ocean (carbonic acid H_2CO_3) usually depicted as "shallow" and deep" ocean pools plus ocean floor surface sediment which includes the products of deep ocean circulation, weathering of limestone and silicate rock, and deposition of dead marine biomass. Carbon is naturally exchanged between the land and the atmosphere, the oceans and the atmosphere, and the land and the oceans. Carbon also naturally de-gases into the atmosphere from volcanic activity. Fossil fuel carbon (oil, coal, gas) is fossilized dead plant material which is now inert and does not naturally degas into the atmosphere.

While most of the carbon (~96% or so) that is removed by ecosystems on land is returned to the atmosphere annually, the percentage that is retained accumulates in ecosystem carbon stocks in the form of living and dead biomass (mainly big old trees) and the soil. The amount of carbon that is removed annually by terrestrial ecosystems, and mainly by natural forests, is **globally significant**: averaged over 10 years, the gross removals are around 15.6 Gt C per year (i.e., billion tonnes of carbon) but with only 7.2 Gt C retained due to the losses from deforestation and degradation of around 8.1 Gt C. Despite these losses, terrestrial ecosystems continue to provide a globally significant carbon stock that serves to buffer natural CO_2 fluxes such as from volcanic activity. About one third of the accumulated human-caused carbon in the atmosphere is from **prior land use change**. The current annual land CO_2 emissions however, are around **10% with 90% now being from fossil fuel sources**.

Similarly, most of the carbon that dissolves in the oceans is de-gassed annually, with only a small percentage annually working its way to the bottom. The weathering of rock on land by rain also delivers a steady trickle of carbon which ends up at the bottom of the ocean. However, despite being slow these processes are incredibly significant as these deep ocean reservoirs are the primary natural sink in the global carbon cycle (in geological timeframes).

So now we have all the information needed to understand the scientific meaning of net zero emissions:

- NZE is achieved when all anthropogenic (i.e., human caused) CO_2 emissions (as well as other greenhouse gases) are reduced to the rate at which they can be removed and permanently stored by the natural sinks, i.e., the world's ecosystems and oceans.
- If this is not possible in absolute terms, then any residual emissions will therefore need to be removed using artificial means, that is, technology that **does not exist at the scale required** nor will be in policy relevant timelines.

It follows that NZE is a collective endeavor on that part of all the people of the world that results in total anthropogenic greenhouse gas emissions being reduced on a permanent basis to the rate at which they can be absorbed and durably stored for thousands of years by the natural sinks. This means that NZE is not a measure that can be achieved by any one nation, sub-national jurisdiction or organization – but only collectively. However, all governments and organizations can contribute to the goal of NZE through implementing a decarbonization transition plan with the goal of contributing their feasible share of the mitigation burden.

SOCIAL INTERPRETATIONS OF NZE

NZE has acquired a **social interpretation** which on the one hand is helpful in that it has provided a clear focus and a clarion call around which governments at all levels and organizations, including universities, have rallied around to make real, concrete GHG emission reductions against targets and timetables documented in publicly available decarbonization plan, which in many cases involve significant investments.

In addition, organisations can benefit, and we would say legitimately so, from their NZE pledges including:

- by signalling political commitment that action is being taken in support of implementing the Paris Agreement;
- mobilising investment directed towards climate mitigation;
- through a branding exercise that enhances green and social and environmental responsibility (SER) reputation; and
- in a public statement that signals a fundamental shift in the mission, vision and strategic priorities.

However, in the absence of mandatory compliance standards, NZE can be used by an organisation to serve merely as an inconsequential vehicle for "virtue signalling" that they are socially and environmentally responsible, without any substantive climate action and perhaps even with the aim of securing a temporary marketing advantage.

NZE TRANSITION PLANNING

In response to the growing uptake of NZE in all sectors, the UN formed a High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities whose **report**, released in 2020, sets out ten practical recommendations to bring integrity, transparency and accountability to ensure that net-zero pledges are fully aligned with limiting global temperature rise to 1.5°C above pre-industrial levels, by establishing clear standards and criteria.

The 10 recommendations are: 1. Announcing a Net Zero Pledge; 2. Setting Net Zero Targets; 3. Using Voluntary Credits; 4. Creating a Transition Plan; 5. Phasing out of Fossil Fuels and Scaling Up Renewable Energy; 6. Aligning Lobbying and Advocacy; 7. People and Nature in the Just Transition; 8. Increasing Transparency and Accountability; 9. Investing in Just Transitions; and 10. Accelerating the Road to Regulation.

And, building on recommendation #4, creating a transition plan (which is really the key step for an organization), the Transition Plan Taskforce was launched at the 2022 UN Climate COP26 in Glasgow to establish the **gold standard in transition plans** for decarbonization and meeting NZE commitments.

A key step in a decarbonization transition plan is to calculate the organization's carbon footprint and identify sources of GHG emissions and ways in which these can be minimized. Significant *absolute reductions* in emissions are critical in contributing to global NZE goals. The guidance requires organizations to account for what are called **scope 1, 2 and 3 emissions**.

> **Scope 1 emissions:** These are "direct" emissions – those that a company causes by operating the things that it owns or controls. These can be a result of running machinery to make products, driving vehicles, or just heating buildings.
>
> **Scope 2 emissions:** These are "indirect" emissions created by the production of the energy that an organization purchases, mostly electricity. For example, installing solar panels or sourcing renewable energy rather than using electricity generated using fossil fuels would cut an organisation's Scope 2 emissions.

Scope 3 emissions: These are also indirect emissions – meaning those not produced by the company itself – but they differ from Scope 2 as they cover those produced by customers using the company's products or those produced by suppliers making products that the company uses, i.e., they are indirect emissions (not included in Scope 2) that occur in the value chain (the entire business model from suppliers to end users) of the reporting company, including both upstream and downstream emissions.

Scope 1 and 2 emissions are conceptually relatively straightforward for a large organisation to address given sufficient financial resources. For a university, key mitigation actions to mitigate Scope 1 and 2 emissions include investing in generating clean energy onsite, sourcing electricity from clean renewables sources, replacing old emissive equipment like large science refrigerators, setting stringent energy efficiency design standards for new buildings and retrofitting existing buildings. Indeed, Griffith University's NZE plan which is currently being implemented does in fact prioritize these mitigation actions and the implementation of this plan is being resourced through a significant budget allocation. We understand that the public version of Griffith NZE plan is to be released shortly, giving effect to the High-Level Expert Group's recommendation #8 on transparency and accountability.

The official guidance for non-state actors emphasizes that they must prioritize actions that achieve urgent and deep reduction of emissions across their value chain. These mitigation actions therefore should follow the mitigation hierarchy so that the emphasis on investments and action are on avoiding and reducing emissions in the most cost-effective ways.

It is the Scope 3 emissions however where the real "mitigation pain" lies for many organisations. **Examples** of Scope 3 emissions include extraction and production of purchased materials, transportation of purchased fuels, use of sold products and services, emissions from waste. For many enterprises, including universities, a core business activity involves international air travel and therefore Scope 3 long-haul aviation emissions are a significant proportion of their total emissions. For universities, this can easily be 15-20% of their total annual emissions (i.e., Scopes 1, 2 and 3). Furthermore, some Universities have estimated that the air travel emissions of their international students could amount to about half of the organisation's overall carbon footprint, if they were accounted for.

WHAT TO DO ABOUT SCOPE 3 EMISSIONS?

One way in which NZE has been socially interpreted is the idea that each organisation has to achieve net zero emissions in the book-keeping sense that if they have done everything they can feasibly do to avoid and reduce GHG emissions, then they must offset any residual emissions (i.e., the quantity of ongoing emissions that cannot eliminated) in the organisation's GHG inventory spreadsheet by purchasing an equivalent amount of carbon credits from a voluntary or compliance market. However, this social interpretation of the role of offsets in achieving NZE at an organisation level is actually at odds with the scientific definition.

A carbon offset is purchased from someone who has generated a carbon credit by (1) planting a tree or changing a land management practice that has removed an equivalent quantity of carbon from the atmosphere (i.e., a removal credit), (2) avoiding an equivalent amount of carbon from being emitted by someone, somewhere at some point of time in the future (an avoidance credit) or (3) a credit that constitutes a "SER offset", i.e., by invoking the "polluter pays" principles, purchasing this kind of offset puts a cost on emissions and provides funds for good environmental action elsewhere which may or may not be related to emissions reduction or removals. Under the **Australia ACCU system**, eligible projects that can earn credits by storing or avoiding emissions includes: new technology; upgrading equipment; changing business practices to improve productivity or energy use; and changing the way vegetation is managed.

While carbon offsets might sound like a good idea, they are a form of avoidance behaviour and their purchase further delays progress on our collective journey along the pathway to NZE. It is true an organisation can buy carbon offsets to achieve an annual "net zero" balance in their GHG inventory spreadsheet but this does not necessarily result in achieving the scientifically based global NZE outcome we need to cap global warming as close as possible to the Paris Agreement goal of 1.5°C above pre-industrial levels.

There are four reasons why buying carbon credits as offsets are particularly problematic.

The **first reason** is that avoidance emission credits by definition do not remove prior emissions. Avoided emission projects can involve new technology, upgrading equipment, changing business practices to improve productivity or energy use. This is all very good and well but does not neutralise the additional radiative forcing from the increase in atmospheric concentrations of greenhouse gases caused by prior fossil fuel emission. Rather, they serve to avoid or reduce future emissions.

A **second reason** is that purchasing a carbon credit to offset a fossil emission can essentially undo the good work in generating the credit in the first place (that is, the good work done by someone who actually managed to reduce emissions). At best, we are collectively "treading water" at a time when we need rapid, deep and sustained cuts in greenhouse gas emissions from all sources. In addition, increasing removals into the land sector by protecting and restoring natural ecosystems and implementing regenerative farming is urgently needed – without these then being sold on as a credit to legitimise new emissions elsewhere. The good work of increasing carbon sequestration and retention in the land sector needs to be undertaken in parallel with avoiding and decreasing emissions in the fossil fuel sector.

A **third reason** is that a system to define and ensure standards for both the integrity of the credits themselves and how non-state actors claim them is not yet in place. Furthermore, current voluntary carbon markets and compliance markets are not actually connected to formal Paris Agreement nationally determined contributions. In that sense, there is a likelihood of double counting where organisations may claim a credit from the voluntary market, whilst governments capture the same carbon reduction in their national accounts.

A **fourth reason**, and this is the most important one, is that removal offsets are not "like for like", i.e., they do not result in carbon being stored with an equivalent level of **permanence and stability** as (1) the original natural fossil fuel oil, coal and gas reservoirs or (2) the deep ocean reservoir which is the principle active natural sink in the global carbon cycle. Perhaps the most difficult scientific aspect of the scientific meaning of NZE to grasp is that it takes a very long time for the carbon from a pulse of fossil fuel CO_2 emissions to work its way to the bottom of ocean where it is permanently locked away and can no longer de-gas back into the atmosphere. In fact, it takes about 300 years for the first 75% of a fossil fuel emission to be removed into the natural sinks but some **30,000 thousand years for the remaining 25%**. This is the main reason why fossil fuel emissions cannot be offset by short-term removals. Currently removal emissions are all short-term relative to the natural sinks and are not permanent.

Given all these problems, does this mean that buying carbon credits to offsets an organization's residual emissions is a bad idea? And if not, what role can they play and how should they be used?

RECOMMENDATIONS FOR DECARBONIZATION PLANNING WITH INTEGRITY

Drawing upon the above, including the recommendations from the High-Level Expert Group, provides guidance that if followed will help ensure that an organization's decarbonization transition plan has integrity, contributes to global NZE, and avoids greenwashing or false claims.

On the issue of offsets, the **High-Level Guidance report** makes three important observations:

- "Non-state actors must prioritise urgent and deep reduction of emissions across their value chain. High integrity carbon credits in voluntary markets should be used for beyond value chain mitigation but cannot be counted toward a non-state actor's interim emissions reductions required by its net zero pathway."
- Non-state actors cannot buy cheap credits that often lack integrity instead of immediately cutting their own emissions across their value chain;
- As guidelines emerge for a high-integrity voluntary credit market, credits can be used above and beyond efforts to achieve 1.5°C aligned interim targets to increase financial flows into underinvested areas, including to help decarbonize developing countries;
- The important work of incentivising, recognising and rewarding high-integrity companies who if they purchase carbon credits from a compliance market beyond efforts to achieve interim targets, then retire these carbon credits from the market, to go further and faster in their climate action.

The last point is important and suggests a way of using high integrity offsets as part of a societal approach to decarbonization, namely, purchasing a removal or avoidance credit and "retiring" it so that it can never be on-sold.

The question remains however, about what organisations such as universities should do about their Scope 3 long haul aviation emissions. The advice remains the same as for Scopes 1 and 2 emissions: follow the mitigation hierarchy and make the actions being taken transparent in your publicly available transition plan. **Mitigation actions** that can help avoid and reduce aviation emissions include:

- Policies that enable staff to take a smaller number of higher value international trips by staying longer and doing more once there;
- Policies that give equal prestige value for academic performance reviews and promotion to virtual and in-person attendance at international events;
- Investing in technology that enables more effective virtual interactions, meetings, research and teaching;
- Proving staff with regularly updated information on their aviation emissions aggregated at different organisational levels (individual, school, faculty, group); and
- Introducing an internal "cap and trade scheme" with a price on emissions and a cap that decreases over time.

Aviation emissions will not be the only Scope 3 residual emissions an organisation has to manage and there will also be Scope 1 and 2 residuals from hard-to-abate sources either because of a lack of clean alternative technology or financial resources. The key to integrity, we suggest, is to transparently report these residual emissions, document the mitigation actions being taken to reduce them, and report on annual progress.

Many organizations are now claiming that they will achieve NZE through purchasing carbon credits to offset their residual emissions and especially Scope 3 emissions. However, this is only NZE in the social meaning that the emissions have been arithmetically netted out with purchased credits recorded in their organization's greenhouse gas inventory spreadsheet. As highlighted above, this "netting out" is at best treading water and not advancing us collectively toward global NZE. In other words, there is no prize for being a net zero organization on paper, in a world that fails its global climate goal.

The key point to keep in mind - and really this is our main take home message - is that an NZE commitment means that your organization is committed to following the mitigation hierarchy in avoiding and reducing emissions and that you will develop and implement a decarbonization transition plan that has targets and timetables aligned with the Paris Agreement's long-term temperature goal and to increase ambition in light of what the science tells us is needed to. Best practice guidelines for integrity also require that you transparently and honestly report on progress in meeting those targets. On the important question of Scope 3 emissions, and any other residual emissions, we support the proposition that if carbon credits are purchased to offset residual emissions they must be of high integrity, be used for beyond value chain mitigation, are not counted toward interim emissions reductions targets, and serve to impose a cost that provides incentives for continuing efforts to avoid and reduce them.