CLIMATE POLICY

Regulators, corporate 1.5°C targets, and neglect of future innovators

Corporate emission targets can distort competition against future innovators.

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Widely recognized as key partners for achieving international climate goals (*1*, *2*), businesses like to indicate that their targets and activities are 'Paris-aligned'. In response, research and initiatives have emerged to guide and assess if companies' targets represent an adequate mitigation effort to achieve the Paris Agreement. Here, we highlight conceptual limitations of effort-sharing approaches applied to companies and argue that the fundamental assumption of using emission-reduction targets as the central and often sole metric for setting or benchmarking individual corporations' climate action ambition is simply insufficient as future innovators are neglected. While emissions targets can help curb emissions, we detail the risks of relying on individual corporation's emissions targets to guide and track progress in aligning the economy with the Paris Agreement goals. Finally, we clarify the distinct roles of companies as agents of innovation, and of market regulators and supervisors as either definers or enforcers of market-wide objectives for sustainability.

At present, the primary authority offering standards and guidance for emissions allocations is the Science Based Targets initiative (SBTi), which publicly 'validates' over a thousand companies as "Paris-aligned" based on their emissions reduction targets. Such validated companies are likely to experience reputational benefits, attract investment from green investors and, in larger numbers, may soften upcoming standards and regulations, thereby potentially slowing down the necessary market transition. While SBTi has recently acquired charitable status, its funding is closely tied to corporate interests (additional references in the SI). In 2023, 48% of their budget consisted of fees paid by corporations for their emissions target validation services, with another 45% originating from the Bezos Earth Fund and the IKEA foundation.

So far, voluntary emissions pledges are found to correlate with increased climate action (*3*). Yet, the causal link between a company adopting a target and increased action is not clear as is the effectiveness of the actions themselves (*3*), and pledges remain collectively insufficient as global emissions continue to rise (*1*, *2*). The voluntary nature of companies' targets and their opacity are increasingly criticized, with calls from policymakers and scientists for greater scrutiny and enforceability (*2*–*4*). Here, we go beyond existing critical observations of SBTi methods and results to discuss the conceptual limitation of seeking to allocate the remaining emissions space across incumbent companies. We argue that individual companies cannot claim to be 1.5°C-aligned based on an emissions target alone, since their role needs to be contextualized in terms of innovation capacity. Aligning corporations' emissions with global or national objectives requires regulations that address technology innovation and production efficiency jointly.

"PARIS-ALIGNED" TARGETS AND INDIVIDUAL FIRMS

Conceptually, emissions targets are meaningful and commonly-used indicators for measuring the ambition of countries' efforts as fair contributions to achieve the Paris Agreement (*5*). Indeed, only by considering whether an emissions target represents a fair contribution to a global collective action problem can its adequacy be assessed (*6*). Governments on the national, regional, and city level as well as their fiscal budgets and sovereign wealth funds can direct the green transition, which businesses can enable through innovation and decarbonization (*3*).

The equity considerations of the Paris Agreement ultimately serve people, not companies (*7*). In competitive markets, firms appear, compete for market share, merge, liquidate, or bankrupt. Thus, the Paris Agreement's equity principles cannot directly translate into target-setting formulas for companies, as doing so would assume and promote their continued existence in the future. Despite this limitation, this is essentially what happens under effort-sharing approaches, such as SBTi.

Emissions reductions calculations for individual companies focus on current emissions and solidify the position of incumbents over that of growing or yet-to-be companies (*8*). SBTi presents two emissions allocation formulas to quantify emissions targets for companies that are then labelled as being in line with the Paris Agreement and for which firms can acquire validation (*3*, *8*). However, SBTi does not demonstrate how a universal adoption of these formulas would lead to sufficient collective emissions reductions (*3*). These formulas suggest that companies adopt emissions reduction targets equal to the decarbonization rate needed globally or sectorally, giving them a share of the remaining emissions space that is proportional to their current emissions. These top-down 'grandfathering' approaches (*8*, *9*) effectively allocate the emissions space across companies based on their current emissions, without any provisions for future developments.

These formulas assume, and thus favor, the continued presence and market dominance of existing companies until their specified target year, typically 2030 or around 2050 for net-zero targets (*8*). The allocation of the remaining emissions space exclusively amongst existing companies penalizes new and possibly more efficient companies that could have growing emissions in a decarbonizing market (Fig. 1). There would be no emissions space left for them, or, alternatively, their presence would lead to overshooting the climate goal. Consequently, such distribution of future emission allowances could distort competition and effectively shield well-established and high-polluting companies from market share losses to emerging or expanding competitors.

As an analogy, the initial grandfathering method to allocate emissions to companies under the EU's emissions trading system was found to reduce innovation incentives, while effectively subsidizing polluters without mitigation impact (*9*). Designing a method to derive emissions targets for all companies without distorting market competition would require perfect foresight of future market composition, and provision of emissions space for future new companies. The less reliable the

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assumptions regarding the projected market composition, the greater the extent of market distortion resulting from company-level emissions targets. However, the reliability of these assumptions can fluctuate considerably between sectors and clearly diminishes when looking further into the future.

An alternative approach, also applied by SBTi, is based on firms' emissions intensity (or efficiency) per unit of economic or physical output. As benchmarks, intensity approaches do not contradict market competitiveness and are key to reveal best-practices and inform environmental regulations. However, as bottom-up emissions objectives, they do not cap the total amount of a company's emissions and therefore cannot guarantee collective alignment with absolute emissions reductions objectives.

The inadequacy of individual company-level emissions targets as indicators of their overall ambition in mitigating emissions also explains the recognized irrelevance of offsets when benchmarking a company's decarbonization plan. At best, firms' attempts to offset their emissions by paying for carbon sequestration projects can be seen as voluntary contributions to funding global decarbonization, not as part of a company's own reductions (*10*). At worst, they rely on projects that do not guarantee additional emissions reductions, substituting and undermine efforts to reach global net-zero emissions (*10*).

To summarize, we find ourselves caught between a rock and a hard place. Top-down approaches allocating the remaining emissions space to incumbents risk distorting future competition, while bottom-up metrics do not guarantee collective emissions reductions goals (Fig. 1). Additionally, allowing self-interested, commercially incentivized actors to choose amongst several methods proposed by an entity funded substantially by these actors facilitates gaming of numbers that reduces collective ambition. Leaving it up to companies to choose between rules can create a situation of over-allocation of emission space (*3*). Emissions targets may be a useful tool for companies to plan their emissions reductions. For observers and regulators, however, relying on individual companies' emissions targets to assess the transition of the economic sector risks both falsely perceiving these targets to be sufficient and missing out on the innovation potential of growing and yet-to-be businesses. By claiming that their emissions targets are validated by SBTi to be aligned with the 1.5°C or net-zero objectives, companies might convey to their clients and to the regulators that the problem is taken care of without additional regulations and supervision of the enforcement of such regulation (*3*). Indeed, research suggests that corporate actors are already exerting increasing negative political influence to water down the stringency of green regulations (*11*), including by pointing to voluntary targets as a justification for non-regulation (*12*) despite their credibility being questioned (*3*, *8*, *10*).

REGULATING THE MARKET

Consequently, widespread adoption of corporate net-zero targets should not be seen as sufficient to enable, let alone guarantee, rapid global decarbonization and should not substitute for needed regulations (*1*, *3*). Indeed, in the absence of clear incentives, regulations and supervision enforcing these laws, it would be economically unfavorable in the short term for some companies, particularly in business-to-business sectors that experience less end-consumer pressure, to take ambitious climate objectives that penalize their narrowly-defined competitiveness. Even if innovating companies with voluntary targets are already encouraging their counterparts (e.g. a bank to its borrowers, a company to its suppliers) and regulators to utilize new decarbonization possibilities, these can hardly go beyond corporate self-interest in the absence of regulation and supervision. Companies do require a level playing field. Worryingly, voluntary environmental programs and especially collective initiatives have been found to occasionally water down governmental regulations beyond lobbying and reduce independent observer's support for strong regulations (*3*, *12*).

Governments or intergovernmental organizations should provide the legal and regulatory frameworks for companies to compete economically while contributing to sustainable innovation and emission reductions. For instance, the EU's Corporate Sustainability Due Diligence Directive requires business transition plans to align with 1.5°C, and will require discussions on assessment criteria with regulators, supervisors and possibly courts. Recognizing the deficiencies in corporate objectives within the context of legal frameworks, courts of law have already issued judgments on the climate strategies of companies, affecting carbon-majors' valuation (*13*). The Dutch case against oil company Shell imposed an emissions reduction target that matches the emissions reduction needed at the global level. This ruling matches one of the SBTi methods and its current appeal highlights the complexities in setting targets for companies. This piece argues that imposing such SBTi style emission reductions is not sufficient to ensure a company's 1.5°C-alignment. For example, a photovoltaics company could see its emissions grow, while other, new companies need to appear to develop competitive mitigation options that are needed at a globally relevant scale (Fig. 1).

Many decarbonization options are yet to be invented. A company's climate ambition should be assessed contextually and dynamically, based on a range of indicators beyond its emissions, in relation to best-practices in the sector and what is required globally to achieve the Paris goals. The relative ambition of a company's objectives will depend on the market context, and the ratcheting-up of their targets can reflect external technological and regulatory advances. More stringent legal requirements on transparency could improve the relevance of independent third-party (e.g., national supervisors) assessments of companies' plans, not financed by the companies themselves, which are crucial to inform the industry and regulatory bodies (*2*, *4*), beyond emissions targets (*2*). Useful indicators can include emissions, emissions intensity, energy intensity, influence on the supply chain, legal compliance, lobbying influence (*2*), the alignment of the service, products, and investments with Paris-compatible climate transition needs, and more. Companies can provide plans detailing their potential activities in a decarbonizing economy, leaning on scientific literature and possibly national long-term strategies. Such plans can inform companies' partners and regulators on the evolution of their products and services, but also reflect their investors and consumer's concerns towards their supply chain (*14*).

In turn, legal frameworks should encourage best-practices while limiting the total market emissions (Fig. 1) using carbon pricing, sectoral objectives, demand-side constraints (*8*), subsidies under a green taxonomy, environmental goals, and standards dynamically informed by best-practices (*1*, *2*). Consequential emissions accounting, which emphasizes assessing the shift in global emissions resulting from a particular decision or intervention, considering both the direct and potential indirect systemic effects, rather than merely the internal emissions, can also be introduced into legal frameworks to reflect the possible system-wide impacts of corporate decisions, beyond attributional accounting of Scopes 1-to-3 and life cycle analyses (*15*).

Global cap-and-trade measures can theoretically align companies with a collective goal, national or global, but require international agreements to connect national markets. As no single effort-sharing formula or regulation can ensure the alignment of businesses with the climate goal, regulations need to dynamically adapt to the nature of businesses' activities. For instance, investors can establish emissions objectives for decarbonizing their portfolios,

which spread across borders and most economic activities, to fund future innovators without affecting market competition (e.g., EU Climate Transition Benchmarks supervised by member states). In addition to economic tools, measures are required to deliver on just transition and other equity considerations (*2*, *10*). Businesses in developing countries can also inform how the support from developed countries could enable their additional contribution towards a local just transition.

This paper clarifies that regulations and their supervision are needed to encourage best practices for companies, whereas defining objectives purely at the company-level is insufficient and can affect competition and the innovation needed to achieve the global Paris goals. Voluntary targets, even if claiming to be science-based, cannot ensure collective alignment with the climate objectives and may delay necessary regulations. We urgently need additional domestic and international regulations for companies to innovate in pursuit of the Paris Agreement's goals, not simply rest on emissions targets that are made without adequate consideration of the competitive nature of markets, in particular of future innovators.

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Fig. 1. Schematic figure of possible company-level emissions trajectories as part of a decarbonizing market. Iterative regulations informed by market-wide emissions trends and companies' best-practices can: 1) constrain whole market emissions (via supply, demand, cap-and-trade etc.) and 2) incentivize innovative activities and reduce emissions intensity (via emissions standards, carbon price, subsidies etc.). Emissions profiles of companies (grey) during the market decarbonization can strongly differ across companies (examples a, b, c, d). Companies' emissions trajectories depend on their innovation capacity given dynamic climate regulations and the use for their product in a decarbonizing world. Negative emissions may be funded externally by governments, rather than by companies individually to compensate for their residual emissions.

Paris-aligned whole market emissions

Possible companies' emissions in a Paris-aligned market, including:

(a) Disappearing polluting companies

(b) Decarbonizing companies

(c) Solution providing companies (e.g. solar panel)

(d) Transient companies (come and go)

Policies supporting innovation and best practices

Feedback on best practices and technological progress

Market emissions

Regulations to constrain whole-market emissions

Other organizations' emissions

a

b

c

d

Market residual emissions

Time

Decarbonization informed by companies' best practices and emissions intensities