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Taking stock of the implementation gap in climate policy

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A gap persists between the emissions reductions pledged by countries under the Paris Agreement and those resulting from their domestic policies. We argue that this gap in fact contains two parts: one in the policies that countries adopt, and the other in the outcomes that those policies achieve.

Under the Paris Agreement, countries set targets to reduce greenhouse gas (GHG) emissions and implement policies to achieve those targets. When a country first sets a target, an implementation gap — the gap between a country's future emissions under the target and those under its current policies — is expected, because countries typically set targets beyond what they are already on course to achieve. If such a gap lingers over time, however, both national and global climate goals will fail.

Together with an ambition gap — the difference between pledged emissions targets and emissions pathways in alignment with a given temperature goal, such as 1.5 °C — the implementation gap contributes to a large deficit between the emissions pathway that is consistent with limiting warming to agreed levels and the pathway that the world is currently on track to follow[1].

Understanding the implementation gap is critical in light of the first global stocktake under the Paris Agreement, which will conclude in 2023. Despite its relevance, however, the implementation gap has not been thoroughly conceptualized. We break the implementation gap into its component parts, quantify them at the national level and explore the reasons for their variation across countries, as a prerequisite to investigating why the gap persists in some cases and not in others.

The implementation gap has two parts: a policy adoption gap and a policy outcome gap (Fig. 1). The policy adoption gap exists between emissions pledges and projected emissions under policies as adopted. This is the component of the implementation gap that has been quantified to date in the literature[1–3]. The policy outcome gap exists between projected emissions under policies as adopted, assuming their implementation, and the emissions outcomes that adopted policies ultimately achieve. This component of the implementation gap can only be quantified post hoc and the international policy debate largely ignores it, assuming that adopted policies result directly in emissions reductions[2].

The policy adoption gap

The policy adoption gap varies widely across countries (Fig. 2). During the first round of nationally determined contributions (NDCs) — the emission reduction pledges that countries make under the Paris Agreement — the policy adoption gap ranged from −84% to 85% as a fraction of each country's 2019 emissions. Countries with a positive gap have projected emissions higher than their targets, meaning they will need stronger domestic policy to achieve their targets, all else held equal. Meanwhile, countries with a negative gap are already on track to exceed their targets under current domestic policies.

Cross-national variation in the policy adoption gap may be due to strategic pledging behaviour, domestic institutions, and interest group politics and public support (Fig. 1). Strategic pledging behaviour may underpin either negative or positive policy adoption gaps.

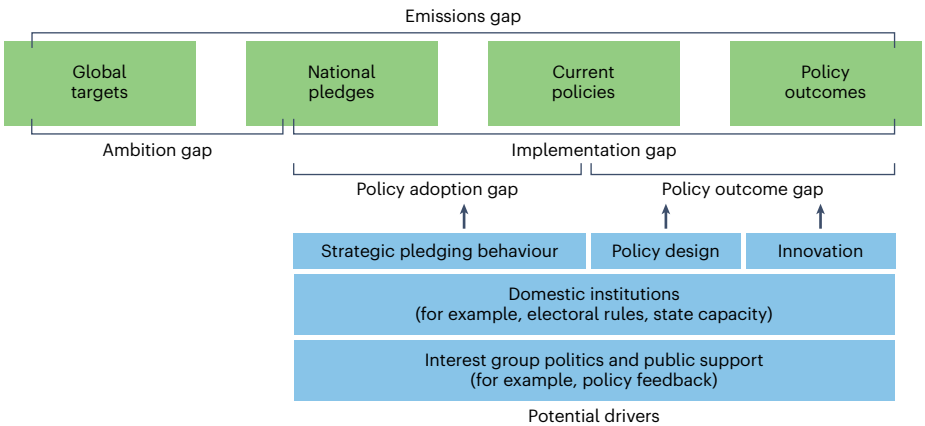

Fig. 1 | The implementation gap and its contributing factors. The implementation gap consists of a policy adoption gap and a policy outcome gap, driven by pledging behaviour, policy design, innovation, domestic institutions, and interest group politics and public support.

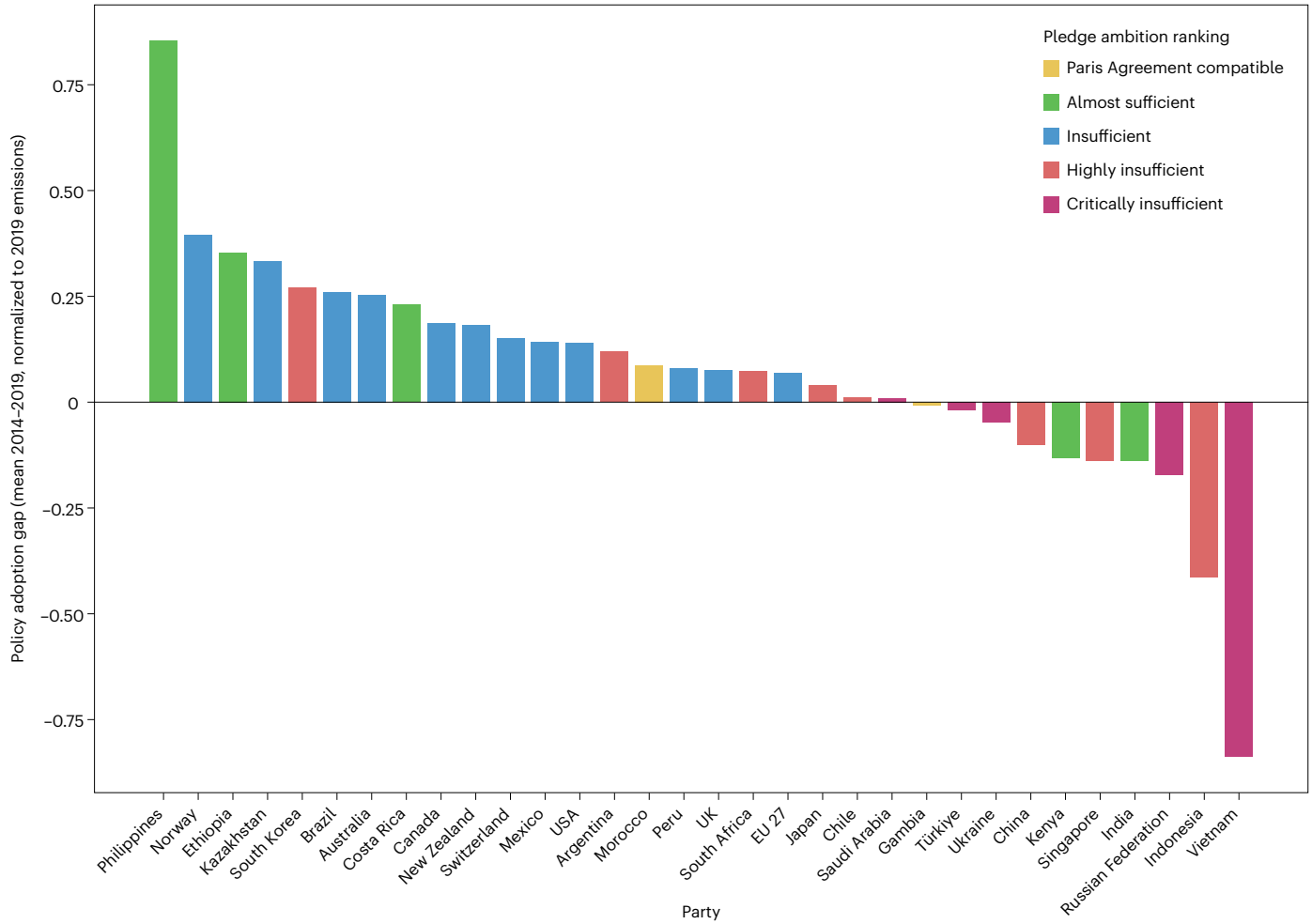

Fig. 2 | The policy adoption gap (2014–2019) and pledge ambition ranking for select parties to the Paris Agreement. The policy adoption gap is the mean difference between projected 2030 emissions under current policies and the maximum 2030 emissions value under national contributions (typically corresponding to unconditional NDCs), as calculated by the Climate Action Tracker over the years 2014–2019. Ambition rankings, from 'critically insufficient' to 'Paris Agreement compatible', are taken from the Climate Action Tracker's 2019 analysis[3].

Countries with negative policy adoption gaps are more likely to have a pledge that scores as 'critically insufficient' according to the Climate Action Tracker's assessment of each country's fair share of emissions reductions. Although the relationship between pledge ambition and credibility is contested[4], it stands to reason that if a country's pledge is very unambitious, it can achieve it with little or no effort — eliminating the potential for a policy adoption gap. Conversely, countries may make international pledges that they do not intend to implement domestically, creating a persistent policy adoption gap. They may do this to elevate their status as climate leaders, to improve their short-term reputation internationally with a view to extracting concessions from negotiating partners, and/or to tie the hands of their successors, even in absence of certainty that such pledges can be implemented[5]. For instance, most countries that set net-zero emissions targets in the context of diplomatic pressure surrounding the COP26 summit have not underpinned those targets with implementing legislation[6]. In one egregious example, former president of Brazil Jair Bolsonaro pledged net-zero emissions even as he rolled back the country's NDCs and dismantled forest protection policies, causing emissions to surge.

On the other hand, countries may make ambitious international pledges that are sincere but based on a miscalculation of their ability to turn those pledges into strong policies. Factors such as opposition from voters or interest groups[7], or domestic institutional factors such as electoral rules[8], may thwart a country's ambitions and allow the gap to persist. For example, during the 2009 climate negotiations in Copenhagen, former US president Barack Obama offered a GHG reduction target for 2020 that was designed with a view to what the cap-and-trade bill that he championed in Congress could deliver. That bill was subsequently killed with help from interest group opposition (including the coal lobby) and Senate filibuster rules[9], leaving the USA with a policy adoption gap.

The policy outcome gap

In the absence of a direct measurement of the policy outcome gap, we map the relationship between the perceived strength of adopted

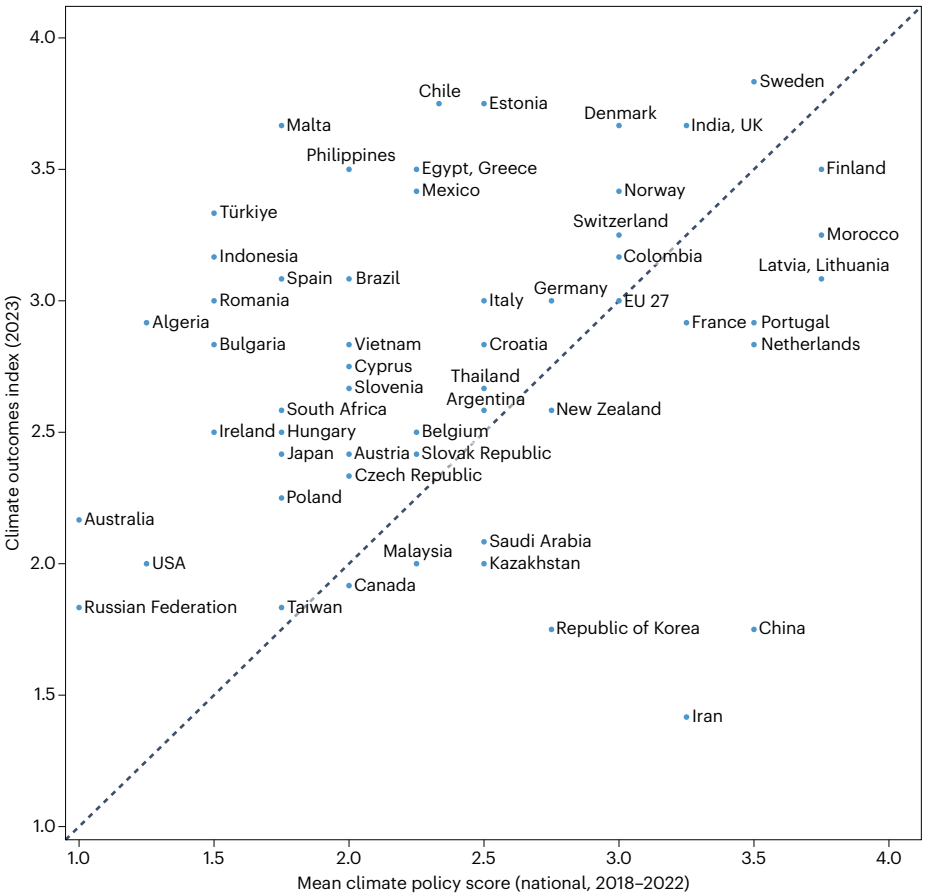

Fig. 3 | Strength of domestic climate policy (2018–2022) versus climate-related outcomes (2023). The climate policy score is the mean national score assigned by the Climate Change Performance Index, based on expert elicitation[17], over the years 2018–2022. The Climate Outcomes Index is derived from the Climate Change Performance Index scores for GHG emissions, renewable energy and energy use for 2023 (ref. 17).

national climate policy and lagged climate policy outcomes (Fig. 3), measured by the Climate Change Performance Index. For countries falling along the diagonal line, the strength of adopted climate policy is positively correlated with climate policy outcomes. This is the relationship that many policy analysts assume. Yet a substantial number of countries do not exhibit this correlation. Falling to the lower right of the line would indicate strong policies but weak outcomes, suggesting the potential for a policy outcome gap. Likewise, falling to the upper left of the diagonal suggests the possibility for policies to over-deliver relative to projections — in other words, a negative policy outcome gap.

A set of factors explain variation in the policy outcome gap across countries, including policy feedback, state capacity, innovation and policy design (Fig. 1). Positive policy feedback occurs when a policy empowers interests that benefit from it, facilitating stronger implementation — for example, through more robust implementation of regulations or greater resources[10]. On the other hand, opposing interest groups may mobilize a backlash against adopted policies in a case of negative policy feedback[11]. For example, business opposition played an important role in the retrenchment of renewable energy policy in US states[11]. Policy feedback can occur through elite or mass channels[11] and can cause policies to either over- or under-deliver relative to earlier projections, resulting in a negative or a positive policy outcome gap.

Enforcing policies against opposition from lobby groups requires state capacity and the existence of government agencies that are both sufficiently capable and autonomous from political groups to implement policy[12]. Bureaucratic capacity includes the ability to monitor, report, verify and enforce, which tends to be weak in many developing countries. It entails financial and human resources, as well as a high degree of professionalization. In South Africa, for example, limited state capacity combined with interest group opposition has served to limit carbon tax implementation[13]. Moreover, lack of access to climate finance may play an important role in hampering outcomes from NDCs that are conditional on international support[14]. Industrialized economies, on the other hand, often have sufficient bureaucratic capacity, including staff and technical expertise. But their government agencies may lack bureaucratic autonomy, resulting in regulatory capture by polluting interests. In successful cases, such as the California Air Resources Board, policymakers have leveraged relatively autonomous agencies to advance climate policy and insulate themselves from backlash.

Additionally, policy-induced innovation can narrow the policy outcome gap. For instance, deployment policies have fostered innovation in the solar photovoltaic industry, catalysing not only incremental technological evolution but also breakthroughs that depart from existing

technological trajectories[15]. The effect of breakthrough innovation is unpredictable by nature, and is not typically factored into projected emissions under current policies.

Finally, policy design can strongly influence the impact of a given policy on a wide range of outcomes[16]. For instance, designing renewable energy auctions to ensure due diligence by banks on project viability can help avoid construction delays and project downsizing, with important implications for the climate outcomes that the auctions ultimately achieve[16].

Policy implications

The global stocktake underscores the persistence of a major implementation gap. To date, the international process has largely understood the implementation gap as the policy adoption gap. It thus misestimates the overall implementation gap, given the existence of the policy outcome gap.

Moreover, as we show here, whether countries face a policy adoption or outcome gap does not fall along conventional fault lines, such as industrialized versus developing countries or climate leaders versus climate followers. This points to the need for better measurement of both components of the implementation gap, particularly when it comes to the policy outcome gap, and for analysis of the causes across countries. This will help to identify where in the policy process challenges lie for the different countries, when formulating or enforcing policy, and ultimately help to devise effective strategies to close the gap.

Serious engagement with the political factors that facilitate and undermine the implementation of the Paris Agreement will be necessary to bring climate policies on course to limit warming to 1.5 °C. The global stocktake presents a critical opportunity to shine a light on these factors.

Data availability

Data for Figs. 2 and 3 are available in the Supplementary Data.

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Author contributions

Conceptualization: J.M. and T.F.; formal analysis: T.F.; visualization: T.F. and A.S.; writing (original draft): T.F., J.M. and A.S.; writing (reviewing and editing): T.F., J.M., A.S., T.S., F.E., N.S. and C.B.

Competing interests

The authors declare no competing interests.

Additional information

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