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Perspective

A framework for assessing the impact of private climate governance

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ABSTRACT

The growing sense of urgency by the public for action to address climate change stands in stark contrast to the slow pace and limited accomplishments of national and international institutions to reduce greenhouse gas emissions. Political institutions face significant structural barriers to taking strong and rapid action to cut emissions, but private environmental governance has potential to avoid those barriers and achieve rapid emissions reductions. It appears unlikely that private governance alone can reduce emissions enough to stabilize the climate, but it does have the potential to reduce emissions sufficiently and quickly enough to buy time for enacting more comprehensive public governance measures. In this Perspective, we review what is known about private governance, present a framework for analyzing private governance initiatives, outline the prospects of the framework for understanding and guiding private governance, and identify future research priorities for applying this framework.

1. Introduction

Almost four years after the adoption of the Paris Agreement, progress on limiting global warming is discouraging. The Nationally Determined Contributions (NDCs) to reduce greenhouse gas emissions pledged by the signatories to the Paris accord are woefully inadequate to limit warming to 2.0 °C, much less 1.5 °C, and even with these lax commitments, only 16 countries have enacted laws or regulations sufficient to meet them [1]. In 2018 global greenhouse gas emissions grew at the highest rate since 2011, as consumption of both coal and natural gas increased considerably [2].

The disjunction between this poor performance toward meeting even inadequate goals on the one hand and the urgency to cut emissions sufficiently to keep warming below 1.5 °C emphasize the need to investigate additional emissions reduction mechanisms outside the traditional realm of international agreements among nations.

One such mechanism is the private governance of greenhouse gas emissions, which we investigated in *Beyond Politics* [3]. In contrast to the actions of nation-states in the years since Paris, developments in private governance since we wrote *Beyond Politics* present a hopeful picture. We remain more confident than ever that private governance can and should play an important role in addressing global warming, although we emphasize that it should be one part of a diverse set of actions, and that private governance on its own cannot provide an adequate response to climate change.

2. What is private governance?

Traditionally, public governance—whether through international treaties or national or sub-national governments—has been viewed as the exclusive institutional mechanism for managing environmental externalities such as greenhouse gas (GHG) emissions. However, over the past several decades each year has brought new attention to a large and growing gap between what public governance is achieving to mitigate global warming and widely shared goals, such as keeping global warming below 2.0 °C [4]. This gap highlights the importance of considering the potential for non-governmental actors—such as business firms; non-governmental, religious, or community organizations; or even individuals and households—to undertake activities generally associated with public governance by coercing or otherwise influencing the actions of large numbers of others.

The United States is a case in point: even before President Donald Trump announced his intention to withdraw from the Paris Agreement, the Nationally Determined Contribution (NDC) adopted by President Barack Obama was rated “insufficient” by the Carbon Action Tracker project, meaning that it was not consistent with keeping warming below 2 °C and that if all countries adopted similar policies global warming could reach as high as 3 °C by 2100 [5]. The current government's actions to withdraw from Paris and to revoke current energy efficiency and clean energy policies are likely to increase the gap between US policy and an emissions trajectory consistent with a 2.0 °C

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target. Nor is the U.S. alone; the United Nations Environment Programme finds that the U.S. and six other nations are unlikely to meet their 2030 unconditional NDCs under current policies [4]. And even those nations on track to meet their NDCs contribute to the gap between their ambitions and their actions: despite embracing in principle the need to rapidly reduce emissions, the EU adopted NDCs that fall far short of what would be necessary to meet a 2.0 °C target, and the *gilets jaunes* protests in France starkly illustrate the challenges public governance faces even when public officials strongly support reducing emissions.

Aggressive government action could at least partially remedy these shortfalls, but such action is unlikely to occur soon in many high-emissions nations. However, even though national governments hold great power in principle to mitigate greenhouse gas emissions, legislative gridlock can delay or prevent action even when a large majority of the public supports it. Numerous surveys of public opinion in the United States have consistently found majority support for action on climate change [6–8], with two thirds to three quarters of Americans consistently supporting regulation of CO₂ as a pollutant for the last decade [6], but this public support has not translated into any significant legislation.

There is concern that growing partisan polarization is undermining democratic governance in the United States and many other nations [9]. The contribution of partisan polarization among elected officials to political dysfunction in the United States has been extensively studied [10,11]. Particularly relevant to climate governance is the growing partisan divide in the U.S. Congress on environmental legislation [12,13], which may have contributed to the fact that the United States enacted only one major pollution control law since 1990 [3]. This is exacerbated by two characteristics of the U.S. Senate: States comprising less than 20% of the U.S. population control more than half of the seats, so these Senators, many of whose states are significant fossil fuel-producers, can block climate legislation [14]. And even if a climate bill were to gain majority support in the Senate, the supermajority assent required for bringing a bill to a vote would allow even a large minority to block legislative action.

Despite the great potential for national governments to reduce greenhouse gas emissions, the combination of legislative gridlock and the urgent need to act quickly, requires us to consider other approaches to governance. Even if an alternate approach has less capacity to reduce emissions, if it can bypass political gridlock and be put into practice quickly it may be able to buy time to enable governments to adopt and implement more comprehensive measures [3]. Such alternate approaches can include public governance at the sub-national level as well as private governance. Table 1 describes types of actors in public and private governance with a partial list of the greatest strengths and limitations each type of actor faces and potential synergies between different types of actors.

One example of private governance that has received considerable attention is corporate buyers imposing conditions on the environmental impact of their suppliers. A 2006 study demonstrated that more than half of the firms in eight large global sectors include environmental elements in their supply chain contracting requirements [15]. In recent years, more than 115 large corporate buyers, representing over \$3.3 trillion in procurement spending have required their suppliers to disclose their environmental impacts [16]. Pressure from purchasers has led suppliers to cut their emissions by more than 640 million metric tons of CO₂ equivalent (MMT CO₂e) and more than one third of the suppliers are, in turn, imposing similar pressure on their upstream suppliers [16].

Another example of private governance occurs when actors use their influence to provide new options for their clients and customers to reduce their environmental impacts. Federal requirements encouraged the development of more energy-efficient lightbulbs, but the private sector played an important role in accelerating the uptake of those bulbs by consumers. For many years, the Walmart retail chain has taken

initiative on making energy-efficient lightbulbs more accessible and attractive to their customers [17]. When compact fluorescent light bulbs (CFLs) were first introduced, they were mostly sold through specialty retailers and this, combined with their cost, limited their popularity with the public. In 2005, before the federal government enacted efficiency standards for light bulbs, Walmart launched a campaign to stock CFLs prominently in their stores, to work with suppliers to reduce the price, and to market the advantages of CFL bulbs to consumers. Walmart set a goal of selling 100 million CFL bulbs in 2007 and exceeded that goal in the third quarter of the year [18]. Several years later, with federal efficiency standards in effect, Walmart introduced a similar program for LED bulbs, which are even more efficient than CFLs. Working with manufacturers, Walmart introduced new inexpensive LED bulbs in 2013 and promoted them heavily [19,20]. A recent analysis of residential electricity consumption in the United States found that starting around 2012 per-capita residential electricity consumption dropped after more than half a century of consistent growth [21] (Fig. 1). Sales of energy-efficient light bulbs accelerated dramatically during this time and the study credited those bulbs for the drop in consumption. Based on Davis's analysis, we estimate that this reduction in residential electricity consumption reduced U.S. annual emissions by around 127 MMT CO₂e in 2018 relative to a baseline that extrapolates the trend from 1990–2006.

A third aspect of private governance occurs when private actors influence public regulators to remove obstacles to environmentally beneficial actions. In the Southeastern United States, where the electricity supply is heavily dependent on coal-powered generation and state regulations have made it difficult to add renewables to the grid, large information-technology companies, such as Amazon, Facebook, and Google, have applied pressure on utility companies and state regulators by offering to build expensive data processing facilities in Southeastern states, but only if utility regulations allow them to construct new large-scale renewable energy sources to power the facilities. New data centers built by Amazon in North Carolina and by Amazon and Facebook in Virginia led to arrangements with Duke Power and Dominion Power, respectively, to power them by building new solar and wind generation facilities totaling more than 750 megawatts capacity [22–26]. Assuming that these plants have a 14% capacity factor, as is typical for wind and solar generation in Virginia and North Carolina, and that they substitute for new gas-turbine generation facilities that would have been built otherwise, they will reduce emissions by around 390,000 t CO₂e per year.

A fourth example is the growing effort by large institutional investors and insurers, often working in coalitions organized by non-governmental organizations, to use divestment, investment selection screens, and application of shareholder pressure to encourage fossil-fuel heavy firms to reduce emissions. For instance, organizations such as CDP and ClimateAction 100+ include participation from institutional investors with more than \$100 trillion in assets under management and are pressing firms to disclose and reduce emissions [27,28]. In some cases these efforts target specific sectors, such as a recent effort by the Institutional Investors Group on Climate Change that pressed for emissions reductions from major European cement producers [29]. New research on the universal owner concept in law, economics, and finance is exploring one of the potential motivations for this recent effort by institutional investors: Whether large institutional investors may own such a wide share of all stocks that they have incentives to reduce the negative externalities of any one firm or sector if those externalities will adversely affect the value of another firm or sector [30].

3. A research agenda for private environmental governance

A challenge for research on private environmental governance is to move beyond anecdotes, however impressive, of successful private governance initiatives to develop both a systematic methodology for assessing the potential economy-wide impacts of private governance

Table 1

Actors in public and private governance with a partial list of opportunities and obstacles for governance by different actors and possible synergetic interactions between different kinds of actors.

Level of Governance	Actor	Opportunities	Obstacles	Interactions and Synergies
National Public	National Government	<ul style="list-style-type: none"> • Greatest coercive power • Uniform standards 	<ul style="list-style-type: none"> • Many legal & political impediments to enacting policy 	<ul style="list-style-type: none"> • Coordination across levels of public governance
Subnational Public	State/Provincial Government	<ul style="list-style-type: none"> • Intermediate coercive power 	<ul style="list-style-type: none"> • Power subordinate to higher levels of government 	<ul style="list-style-type: none"> • Public-private partnerships
	City/Town/ County Government	<ul style="list-style-type: none"> • Fewer obstacles to policymaking than national governments 	<ul style="list-style-type: none"> • Limited scope of influence 	<ul style="list-style-type: none"> • Stimulation of private-sector innovation
Private	Business Sector	<ul style="list-style-type: none"> • Few obstacles to rapid action • Great flexibility • Large buyers have coercive power over supply chain • Investor and lender power 	<ul style="list-style-type: none"> • Limited coercive power • Challenges to credibility • Cognitive and behavioral obstacles to action • Conflicts of interest between profit and environment 	<ul style="list-style-type: none"> • Public-private partnerships • Innovation in response to public governance • Influence upon public governance
	Nongovernmental, Civic, Religious Organizations	<ul style="list-style-type: none"> • Few obstacles to rapid action • Great flexibility • Moral suasion & signaling • Credibility 	<ul style="list-style-type: none"> • Limited coercive power • Limited influence • Cognitive and behavioral limitations to action 	<ul style="list-style-type: none"> • Certify business operations • Provide credible information to public
	Individual/ Household	<ul style="list-style-type: none"> • Few obstacles to rapid action • Moral suasion • Influence over social & community norms 	<ul style="list-style-type: none"> • Very limited coercive power • Obstacles to collective action • Cognitive and behavioral obstacles to action 	<ul style="list-style-type: none"> • Consumer influence on businesses • Voter engagement with public governance

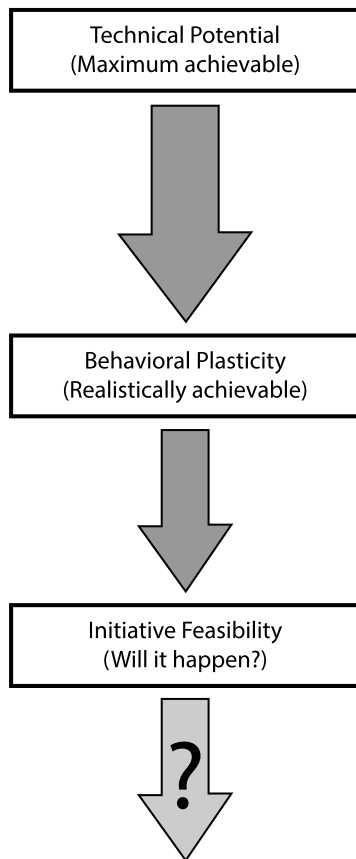


Fig. 1. The three-part analysis framework: Technical potential describes the maximum emissions reduction if all applicable actors take the action in question. Behavioral plasticity accounts for the fact that not all actors will choose to take the action. Initiative feasibility considers the ease and speed with which the proponents of the initiative can overcome opposition, enact it, and implement it in practice.

and for identifying best practices in private governance. To address these needs, we have developed a three-part theoretical framework for assessing both private and public governance initiatives in order to compare them and identify the most promising opportunities on both

Per Capita Electricity Consumption

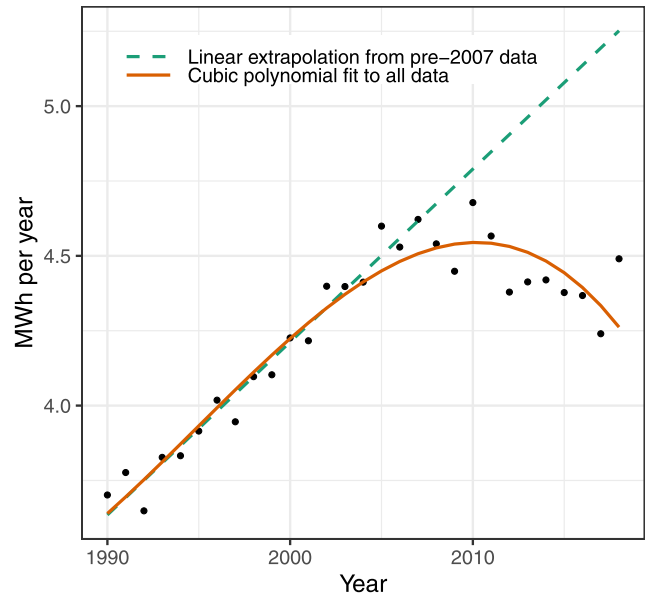


Fig. 2. Per-capita residential electricity consumption in the United States. After 2007, consumption began dropping for the first time since the 1930s. Davis ascribes this largely to the adoption of energy-efficient light bulbs by consumers [21]. The lines illustrate the magnitude of the reduction relative to the pre-2007 trend. The year 2007 is significant because in that year Walmart launched an aggressive campaign to sell 100 million compact-fluorescent light bulbs in a single year.

the public and private fronts.

Our framework (Fig. 2) considers the likely impact of a new policy in terms of three factors: *technical potential* (TP), *behavioral plasticity* (BP), and *initiative feasibility* (IF) [31,32]. *Technical potential* assesses the impacts that would occur if the actions promoted by the initiative were pursued by all relevant actors (e.g., if every household installed high-efficiency heating and cooling equipment). *Behavioral plasticity* draws on social and behavioral science to assess what fraction of relevant actors would actually take the actions if the initiative were implemented (e.g., if an initiative offered tax credits for installing energy-efficient equipment, how many households would do so?). *Initiative feasibility* refers to the difficulty of enacting and implementing an

initiative. Emissions taxes are widely believed to have very large technical potential and behavioral plasticity, but face enormous political barriers that have thwarted attempts to enact them, and it seems unlikely that these obstacles will be overcome in the near future [33,3] (Fig. 1).

The technical potential and behavioral plasticity for private governance measures appear significantly smaller than for public governance, but are large enough, nonetheless, to make meaningful contributions to mitigating global greenhouse gas emissions. Most importantly, the initiative feasibility for many private governance measures seems far more favorable than for public governance. This raises the possibility that private governance can move quickly, so that modest, but rapid reductions in emissions from a business-as-usual trajectory can buy time for public governance to enact more sweeping and powerful measures.

Dietz et al. assessed the technical potential and behavioral plasticity for households in the United States to reduce their energy-related carbon dioxide (CO₂) emissions through straightforward actions using technology that was widely available and that would not require significant changes in lifestyle [31]. The technical potential of these actions was estimated at more than 850 MMT CO₂, or 38 percent of household emissions. When behavioral plasticity was factored in, the reasonably achievable emissions reduction amounted to 450 MMT CO₂, which amounted to 20% of household emissions and 7.4% of national energy-related CO₂ emissions.

These actions are amenable to public or private governance alike. Public measures, such as the Energy Independence and Security Act of 2007—which raised energy-efficiency standards for vehicles, appliances, and light bulbs—contributed. However, political opposition limited the impact of these public-governance measures: Congress defunded enforcement of the light-bulb standards in 2011 [34] and the Department of Transportation announced in 2018 that it would freeze fuel efficiency mandates at 2020 levels and revoke standards that would have required a 30% reduction in fuel consumption by 2025 [35,36]. However, far from cheering the weakening of these regulations, light bulb manufacturers announced that they would continue to improve the efficiency of light bulbs and Walmart introduced new initiatives to promote efficient bulbs to consumers [37]. Similarly, several major auto manufacturers announced an agreement with the state of California to continue to improve fuel efficiency nationwide, albeit less aggressively than previous standards would have required [38,39].

The examples of light bulbs and fuel efficiency illustrate that private governance and public governance are not opposed, but can act either in concert or separately to reduce emissions with public governance leading in some issues and at some times, while private governance can step up to fill gaps where public governance falls short (see Table 1).

However, assessing the full potential of private governance and identifying best practices for private governance initiatives will require a great deal of new research. Assessing technical potential for household actions to reduce greenhouse gas emissions is possible because there is extensive and detailed publicly available data on household energy consumption [40], but there is no comparable comprehensive data on energy consumption by the business sector and this hinders attempts to assess the technical potential for private governance of business operations. Many individual case studies suggest that there is considerable technical potential in the business sector, but it will be important to develop better methods and collect better data in order to systematically assess technical potential and identify the highest-impact opportunities to reduce emissions.

Assessing behavioral plasticity in the business sector is also challenging. Dietz et al. [31] assessed behavioral plasticity in the household sector by drawing upon data from empirical assessments of past energy-efficiency programs that targeted household actions. Measuring the behavioral responses of business firms to opportunities, incentives, and public opinion is much more difficult and more poorly understood. Nonetheless, as discussed above, assessments of corporate actions

conducted by CDP (formerly the Carbon Disclosure Project) find large and growing numbers of institutional investors that are using their capital to promote action on climate change and that large and growing numbers of large corporate purchasers are applying pressure on their supply chains to reduce greenhouse gas emissions [16]. Several major automobile manufacturers have committed to rapidly shifting their production toward fully electric or plug-in hybrid cars [41–44].

On initiative feasibility, there has been considerable analysis of the growing partisan political polarization over environmental issues and the consequent legislative gridlock that has stymied progress in public governance of greenhouse gas emissions, but there is no established methodology for assessing initiative feasibility for private governance. As with technical potential and behavioral plasticity, a number of case studies provide anecdotal evidence that private governance initiatives enjoy far greater initiative feasibility than public governance but there is a pressing need to develop methods and data for systematically assessing initiative feasibility. Hsu et al. [45] provide a promising start in this direction by recommending a standard for consistently reporting assessments of initiative feasibility for public and private sub-national initiatives.

4. Prospects for private governance

Despite the gaps in research on private governance, we argue that there are good reasons for optimism about the potential for private governance to make a meaningful contribution to mitigating greenhouse gas emissions. In *Beyond Politics*, we estimated conservatively that private governance could rapidly reduce greenhouse gas emissions over the next ten years by an average of at least one billion tons per year below business as usual, with half of the reductions coming from the household sector and half from the business sector. Subsequent research suggests that the potential may be considerably higher.

In our original assessment of the potential of private governance to reduce household energy consumption, we did not anticipate that the widespread adoption of LED light bulbs, driven in large part by private initiatives by large retailers, would reduce per-capita residential electricity consumption in the US. In the business sector, reports by CDP show that supply-chain contracting alone has already produced considerably greater annual emissions reductions than we anticipated for the entire business sector [27].

Growing concern over climate change within the financial sector is leading large institutional investors to become increasingly active, both with their choice of where to invest and also in voting their shares on climate-related shareholder resolutions [28]. Many shareholder initiatives on climate fail, but even when a resolution fails, if the resolution had the support of a large minority of shareholders, management often implements many of the actions in the resolution [46].

Private-sector governance has moved beyond focusing on energy alone and a small but growing number of businesses are launching initiatives to reduce meat consumption. This has potential to have significant impact since livestock is estimated to contribute almost 20% of global greenhouse gas emissions [47]. In 2018 WeWork took the drastic step of forbidding meat at corporate events and reimbursed business meals [48]. Taking a different approach, Google is using its corporate cafeterias to conduct a data-driven investigation into what incentives and menu choices will persuade its employees to voluntarily reduce their meat consumption [49]. WeWork and Google represent relatively small numbers of workers, and their actions are unlikely to have a large impact on total greenhouse gas emissions, but if their initiatives catch on and spread throughout the business sector the total impact could be substantial. In the past year several large fast-food chains have added plant-based burgers to their menus and a market analysis by Barclays estimated that the market for plant-based meat-substitutes could capture 10% of the world market for meat, or about \$140 billion per year, in the next decade [50]. Eker et al. [51] find that for every 10% of the global population that shifts from a typical meat-intensive Western diet

to a vegetarian one, annual agricultural greenhouse gas emissions drop by around 750 MMT CO₂e, so the combined TP and BP of these initiatives could be substantial.

Despite these hopeful signs, there are also significant challenges. It would be a mistake to see corporate action on climate as purely constructive or destructive. Corporate action is complex and often contradictory as some parts of a firm pursue pro-environmental actions while other parts engage in destructive actions. After years of promoting itself as a leader in applying its financial and technological leadership to reducing its climate impact, Amazon has come under scrutiny and criticism for actions considered inconsistent with those goals, such as the environmental impact of its shipping operations, curtailing its commitment to completely power its data centers with renewable energy, and aggressive marketing of its cloud computing services to oil and gas companies [52–55]. These developments complicate the analysis of Amazon's net impact on climate and require detailed consideration of the beneficial and harmful aspects of corporate behavior.

Amazon employees have been outspoken in their frustration with the inconsistency they see between their employer's public statements about concern for the environment and climate change versus its lack of progress in reducing its carbon footprint and its courting of the fossil fuel industry, and have expressed this frustration in open letters and a threatened walkout [54,55]. In our analysis of the motives for private governance actions on climate by corporations, we found that many firms emphasized the importance of maintaining environmental bona fides with their employees. In competitive markets for skilled engineers, data scientists, and other technological specialists, many firms report that perceptions that an employer is environmentally responsible are important to recruiting and retaining top talent [3]. Thus, employee action is emerging as a new form of private environmental governance.

BlackRock, the largest asset manager in the world, has emphasized the importance of climate change in its public statements, but it has faced criticism both from environmental activists and from investment professionals for failing to support shareholder resolutions on climate and for continuing to invest heavily in the fossil-fuel sector even as many analysts find that sector underperforming the market and posing a great risk to investors as assets become stranded [56,57].

Inconsistent behavior by firms engaged in private environmental governance is no more a reason to dismiss private governance than inefficiency and inconsistency in public governance would be a reason to dismiss public governance. The challenge is to carefully analyze the strengths and weaknesses of any governance regime, to understand the characteristics of that regime, and to pursue actions that are likely to produce substantially more good than bad. At worst, private governance can be an exercise in futility or greenwashing, but at best it has great potential to complement public governance and to produce meaningful reductions in greenhouse gas emissions in the near term, while public governance struggles with gridlock.

A great deal of research is necessary to better understand private governance, to develop robust methods for assessing the technical potential, behavioral plasticity, and initiative feasibility of private governance initiatives, to apply those methods to identifying best practices in private governance, and to understand the interactions between private and public governance that could allow the two to be used synergistically complementing and reinforcing each other. Table 1 presents an overview of opportunities and obstacles that different levels of private and public governance face, as well potential areas of synergy across different levels of governance.

Several recent studies have made promising starts at this type of analysis [45,58,59]. These studies reiterate the difficulty of obtaining relevant data on private governance actions, of converting such data into consistent formats that allow comparisons and aggregation, and of assessing initiative feasibility.

Despite the limitations in available data, these studies identified promising directions for assessing private and subnational public

governance. Hsu et al. [45] identified and recommended best practices for collecting and reporting data relevant to technical potential and initiative feasibility. Kuramochi et al. [59] estimate that almost 1500 companies around the world—not only in highly-developed nations, but also in rapidly developing nations, such as Brazil and India—have made quantifiable commitments to reduce their greenhouse gas emissions, and they estimated that these commitments could potentially reduce annual emissions by more than 500 MMT CO₂e, mostly through enhanced energy efficiency. However, the lack of transparency and consistency in reporting private-sector initiatives remains the most significant challenge to assessing the scope of existing initiatives and the prospect for expanding such initiatives across the global economy [45].

5. Conclusions

Frustration with the slow and limited progress of national and international political institutions in addressing climate change is fueling a growing sense of urgency among political activists for putting pressure on public officials to aggressively regulate greenhouse gas emissions. This pressure may ultimately produce results, but many public governance institutions face structural obstacles that have effectively impeded progress for several decades and are likely to continue doing so in the near future. Private environmental governance has great potential to avoid many of those structural obstacles and thus to achieve rapid emissions reductions. Public and private governance can be complementary: Public governance can eventually achieve greater emissions reductions than private governance, but the urgency of climate change creates an important role for private governance, whose rapid emissions reductions could buy time for public governance institutions to enact more comprehensive measures.

We have developed a framework for analyzing the potential of private-governance initiatives. Individual case studies support the framework and point to the potential for private governance to achieve meaningful emissions reductions. Considerable activity is underway in the research community to better understand the potential of private governance and the practical efforts necessary to implement it. Extant research has demonstrated that private-governance initiatives can make important and rapid contributions to reducing global greenhouse gas emissions. Clearer and more consistent reporting that adheres to the guidelines laid out by Hsu et al. [45] can both improve our ability to assess private governance initiatives and our understanding of the factors that contribute to success or failure.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.5281/zenodo.3581420.

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