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A Politically Feasible Multi-Factor Approach for the US to Reach Carbon Neutrality by 2050

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Abstract

The Intergovernmental Panel on Climate Change (IPCC) recently reported a global temperature rise of 1.07℃ above pre-industrial levels, while also maintaining that a temperature in excess of 1.50℃ will bring catastrophic social, economic, and environmental damages. The United States, as a global financial leader and top carbon polluter since the 1850s, ought to lead global policy changes to mitigate the adverse effects of climate change. The paper presents politically feasible actions for the US including remedying political asymmetries, decarbonizing electricity, and implementing a carbon pricing system. Completion of these steps is essential if the US is to reach carbon neutrality by 2050 and do its part to keep mean global temperature increases below 1.50℃.

Keywords: global climate change, United States, political asymmetry, decarbonization, carbon market

Introduction

The Intergovernmental Panel on Climate Change (IPCC) Working Group 1 recently reported that the best estimate for anthropogenic global warming since pre-industrial levels is 1.07℃. While this number may seem insignificant, the planet is already experiencing the adverse effects of warming. Communities around the world are dealing with hotter hot days in the summer, wetter heavy storms, and increased droughts in arid regions of Africa and the Middle East (IPCC, 2018, 2021). These impacts pose threats to human health and global stability, as observed following droughts in 2006-2007 in Syria when ISIS rose to power in the region (Kelley et al., 2015). Scientific evidence demonstrates urgent change is needed to combat the climate crisis (IPCC, 2018, 2021), yet the global response to date has been slow and ineffective (Boston & Lempp, 2011). Immediate and rapid action is necessary to mitigate the threats of climate change.

This report will focus on the actions the United States (US) ought to take to mitigate climate change. Climate change is a principal agent problem, so wealthy countries, including the US, will pay more to mitigate climate change than they may benefit from such spending (Jenkins, 2014). Climate change is also a collective action problem because the decisions and actions of individual countries impact the globe. This leads to strong incentives for free riders because the atmosphere is a global public good (Boston & Lempp, 2011; Jenkins, 2014; Kaul et al., 1999). The potential for free riders may make the US hesitant to take climate action. However, the US is a free rider in its own right because of its theft of Indigenous land and use of African slave labor. Meanwhile, Indigenous nations and African countries are disproportionately impacted by climate change, and those countries have responded through policies for mitigation and adaptation practices (Rumble, 2019). The US must act, too, even if other free-riding countries benefit from US efforts.

Global warming must peak at 1.5 ℃ above pre-industrial levels to mitigate the adverse effects of climate change. The most politically feasible pathways to achieve this goal are (1) remedying political asymmetries, (2) decarbonizing electricity, and (3) implementing a carbon pricing system. Through these actions, the US will be on track to significantly reduce emissions by 2030 and reach net-zero emissions by 2050 (Falk et al., 2020; US Department of State, 2021). This plan of emissions reduction will help keep global mean temperatures from rising above 1.5 ℃ and better ensure the well-being of natural and human systems.

The effects of a 1.5 ℃ temperature rise

Natural and human systems are already experiencing adverse effects of climate change, but little action has been taken to reduce these threats. The literature overwhelmingly supports that warming must peak at 1.5 ℃ or natural and human systems will face more dire consequences (Falk et al., 2020; IPCC, 2018; Rockstöm et al., 2017). The IPCC (2021) further argues that overestimating how much warming the planet can tolerate is too risky. Based on the Paris Climate Agreement, world leaders from nearly 200 countries also support that climate action should be pursuant to keeping warming below 1.5 ℃ (UNFCCC, 2015). Climate scientists and world leaders agree on a goal of 1.5 ℃ of warming because scientific evidence supporting it is abundant and clear.

Anthropogenic climate change has already caused changes in the climate system. These changes include increased land and water temperatures, more frequent and longer heatwaves in terrestrial and aquatic regions, increased frequency and intensity of precipitation at a global scale, increased risk of drought in several regions, and more (IPCC, 2018, 2021). The IPCC

(2018) also reports the effects of 1.5 ℃ peak warming relative to 2 ℃ peak warming. The conditions climate scientists and models predict based on 2 ℃ warming have significantly more negative impacts compared to conditions based on 1.5 ℃ warming. Compared to 2 ℃ warming, a peak warming of 1.5 ℃ will likely result in (1) fewer occurrences of extreme temperatures, (2) lower risk of heavy precipitation events globally, (3) lower risk of extreme drought, (4) lower probability of a sea-ice-free Arctic ocean during the summer months, (5) lower mean global sea level rise, (6) lower risk of local species loss and extinction, (7) greater retention of ecosystem services, (8) lower risk of water scarcity, (9) less intense effect on crop yield and food availability in vulnerable regions, (10) less risk to urban areas, and (11) lower increase in global populations of impoverished and disadvantaged persons. But how much worse is 2 ℃ of warming compared to 1.5 ℃?

Once-per-decade extreme heat events at a 1.5 ℃ temperature rise will likely occur 4.1 times every decade, but at a 2 ℃ rise that number rises to 5.6 times each decade, which is nearly every other year. Furthermore, the global mean sea level will rise by 2-3 m over the next millennia if warming is limited to 1.5 ℃, while it will rise by up to 6 m if warming is limited to 2 ℃ (IPCC, 2021). This translates to a 10% lower rise in sea level by the end of the century (IPCC, 2018). While several meters or fractions of meters may seem inconsequential, the inundation of coastal cities will displace hundreds of millions of people (McMichael et al., 2020). The IPCC also predicts warming at the lower threshold could reduce the size of populations vulnerable to poverty by 62 to 457 million people, which is nearly 6% of the global population at the high end (IPCC, 2018). Action must be taken as soon as possible to avoid more drastic changes to our planet.

Political barriers to climate action

There is a large disparity between known threats of climate change and climate change mitigation. Despite the scientific consensus that action is necessary, political commitments are lacking (den Elzen et al., 2019; Rockström et al., 2017). According to research, climate change mitigation practices (e.g., decarbonization) are technically and economically feasible, but political barriers make it difficult to implement these practices (Patterson et al., 2018). When considering how the US can realize stopping warming at 1.5 ℃, political feasibility is a critical factor. Political feasibility refers to the beliefs within a political system about the scale and speed of climate change mitigation that is favorable and possible within society (Patterson et al., 2018). For the US, political feasibility is challenged by political polarization in the two-party system and the separation of powers between Congress and the Executive branch (Fortier, 2015).

Political asymmetries

According to Boston & Lempp (2011), there are four political asymmetries (i.e., imbalances of political influence) that impede the political feasibility of climate action: (1) the voting asymmetry, (2) the cost-benefit asymmetry, (3) the interest group asymmetry, and (4) the accounting asymmetry. The voting asymmetry refers to how political power is held within the voting population. Because of this asymmetry, there are many voices (e.g., young people, felons, and people affected by voter suppression) that do not have a vote, and thus have less political power. Evidence also suggests that voters underestimate future benefits and overestimate current costs. Further, voters tend to care about short-term, local issues; as a result, policies aimed at longer-term goals are unlikely to succeed (Boston & Lempp, 2011; Jacobs, 2008; Lazarus, 2009). Climate action should be considered a short-term issue because action must be immediate and rapid; making climate action politically feasible in the US requires reframing the issue and emphasizing how it is indeed a present concern. Boston and Lempp (2011) affirm that doing this requires adjusting incentives within the democratic process in a way that fosters care about future generations.

The cost-benefit asymmetry describes how the costs and benefits of climate action vary temporally, spatially, tangibly, etc. Climate action implies immediate costs to the present generation; the debate is entrenched in social discount rates, i.e., the difference between the valuation of money in the present to that of money in the future. Political conflict ensues when determining the most acceptable social discount rate to use when evaluating the cost of climate change. The interest group asymmetry is similar to this, describing how the costs of climate action are concentrated on easily identifiable, powerful interest groups, while the beneficiaries of climate action are displaced spatially and temporally. Thus, the interest groups that bear the costs are more incentivized to take political action than those that reap the benefits. Additionally, weak campaign finance regulation makes it easy for those contributing to climate change the most to promote their interests through lobbying or illicit practices, and their interests gain political support (Boston & Lempp, 2011; Pellegrini & Gerlag, 2006). Finally, the accounting asymmetry describes how manufactured and financial capital are accounted for and valued, while ecological capital (i.e., ecosystem services) usually is not accounted for or valued. As a result, damages to ecosystem services caused by greenhouse gas (GHG) emissions are not considered in national accounts (Boston & Lempp, 2011).

Solutions to barriers and feasibility in the US

Sufficient climate action requires addressing each asymmetry, which may be realized through (1) institutional solutions, (2) containing solutions, or (3) rebalancing solutions (Boston & Lempp, 2011). Each of these solutions could be feasible in the US. Institutional solutions aim to shift decision rights on climate policies to independent bodies that are not directly held accountable by voters. This solution could be promising because independent bodies would face less influence through lobbying and would ideally seek to meet the well-being of everyone, not just those with voting power. Constraining solutions aim to constrain the decision rights of the nation-state on climate policies to give more weight to environmental issues and future generations (Boston & Lempp, 2011). Generally, politicians respond to what the people want; with growing social concerns about climate change, it is feasible to implement more policies focused on climate action. Rebalancing solutions seek to incentivize climate action (Boston & Lempp, 2011; Lazarus, 2009). The US is already implementing incentives for renewable energy, so it is likely that other incentives would be politically well-received.

Specific climate action the US must take

The following section presents tangible actions the US should pursue based on the solutions presented by Boston & Lempp (2011). Passing a carbon pricing policy in the US would be an example of an institutional solution because businesses would make their own decisions to lower the amount they would need to pay for their emissions. The US's new nationally determined contribution (NDC) goal of carbon neutrality by 2050 is an example of a constraining solution. As carbon neutrality will not be reached without large-scale decarbonization of electricity (IPCC, 2018), the US ought to continue to incentivize renewable energy as a rebalancing solution.

The Paris Climate Agreement urges that developed nations take the lead in climate action (UNFCCC, 2015). Because the US is historically and presently among the greatest emitters of CO_2 and other GHGs (Our World in Data, 2021), it thus has a responsibility to lead in emissions reductions globally (Rockström et al., 2017). As such, the US must lead climate change mitigation efforts and make greater strides in the rapid reduction of emissions.

The recent "Long-term Strategy" (NDC) published by the US Department of State brings a brighter vision for the future of climate change mitigation in the US. The report lists two main goals for the country: first, the US will aim for a 50-52% reduction in GHG emissions based on 2005 levels by 2030, and second the US will be net-zero by 2050 (US Department of State, 2021; USA, 2021). These goals are supported by literature (e.g., Falk et al., 2020) and put the US on pace with other countries' contributions (UNFCCC, 2021; USA, 2021). However, goals set forth by NDCs around the globe have not been met (den Elzen et al., 2019), and the UNFCCC reports that if trends continue, emissions will be higher in 2030 than in 2010 (UNFCCC, 2021). The US must take the lead in actually achieving its ambitious goals if they are to result in successful changes globally.

Decarbonizing Electricity

The US's main method to reach its carbon goals is through the decarbonization of electricity. Importantly, the long-term strategy claims the US will reach 100% clean electricity by 2035 (US Department of State, 2021). The US assumes a variety of solutions will be used to reach this target. Expansion of renewable energy driven by reduced costs will be the predominant means, but the expansion of nuclear energy and the use of carbon capture and sequestration (CCS) on lasting fossil fuel plants will also be used. As end-uses for electricity rise (e.g., through the expansion of electric vehicles), total capacity will also need to rise; the US envisions the use of CCS on existing fossil fuel plants to allow this expansion to occur.

To keep warming aligned with Paris Agreement goals, electricity must be decarbonized (IPCC, 2018; Kainuma et al., 2017; Luderer et al., 2019). The IPCC said that up to 80% of emissions reductions by 2050 must come from electricity decarbonization (IPCC, 2018). Electricity is the most important sector of emissions as electricity generation results in about

40% of total global emissions (IPCC, 2018). Co-benefits including health benefits from reduced air pollution and ecological benefits from reduced land use for fossil fuel extraction will also be seen from this transition, particularly if it occurs predominantly from the expansion of renewable energy (Luderer et al. 2019). Global governments agree, as most Nationally Determined Contributions from the Paris Agreement do contain changes to electricity generation (UNFCCC, 2021).

Carbon pricing system

In addition to decarbonizing electricity, the US's long-term plan details four additional actions that the US must take to reach carbon neutrality by 2050: (1) electrifying end uses (e.g., vehicles), (2) cutting energy waste, (3) reducing non-CO_2 emissions, and (4) scaling up CO_2 removal (US Department of State, 2021). The best way to realize these goals is to set a price on emissions. Economists especially support this idea (e.g., Kainuma et al., 2017; Halim et al., 2019). Carbon pricing schemes, such as a Pigouvian carbon tax or a cap-and-trade system (C&T, also known as emissions trading schemes or ETS), will force carbon producers to internalize the social costs of their emissions at a low societal cost (Baranzini et al., 2017). ETSs are already in place in China, the EU, and parts of the US including California and the Northeastern and Mid-Atlantic (See the Regional Greenhouse Gas Initiative). Future US policy could introduce more C&T systems in other regions or introduce a larger unified system, though it must be national to avoid the issue of industries moving to areas where they would not have to pay (Baranzini et al., 2017). There is precedent for carbon pricing systems to be functional, and the US ought to take this crucial step now so there is the maximum amount of time to fine-tune the system in advance of the net-zero goal in 2050.

The regressivity of carbon pricing systems is one political barrier. Carbon taxes are regressive in nature because costs are usually diffused to the working class. To combat this, Bubna-Litic & Chalifour (2012) suggest the funds collected through auctioning a portion of C&T permits be used to offset the regressivity of the tax; the remaining funds would be used to mitigate climate change further. For example, the people of British Columbia, Canada, receive an income-based tax credit to offset the consumer costs of their carbon tax (Canada Revenue Division, 2021). Bubna-Litic & Chalifour then recommend additional revenue be used to fund programs that target specific communities, such as tribal communities, that are more heavily impacted by additional taxes. Finally, the US should invest in climate change mitigation because those communities that presently lack resources are often the same as those impacted most by climate change. Businesses still have incentives to reduce their emissions to not have to deal with the additional costs on their end, however, which would lead to changes, including reduced energy waste and scaled-up CCS, as these are methods for a one-time expenditure overpaying the tax annually (Baranzini et al., 2017). Regressivity is not the only issue that the US must address, however.

It may prove difficult to pass a carbon pricing scheme through Congress because voters and corporations generally do not favor paying additional taxes. Past efforts, such as the Waxman-Markey bill (American Clean Energy and Security Act) of 2009 were impeded by extensive lobbying efforts from the petroleum industry and agricultural groups, among others (Jenkins, 2014). Models demonstrate that higher taxes on carbon would cause higher prices to account for lost revenue in the petrochemical industry (Halim et al., 2019). However, some surveys show that almost half of business executives now support pricing policies, often because lobbying can bring more flexible policies (Baranzini et al., 2017). Another study found that about 66% of the 1600 individuals surveyed support a carbon tax, but that there is a division between types of people; about 80% of communitarian individuals strongly supported carbon pricing schemes while less than 50% of individualistic consumers did (Cherry et al., 2021). Jenkins (2014) also notes how consumer willingness to pay for carbon at $2-$8 per metric ton in 2014 was much lower than the social cost of carbon, which at the time was anywhere from $12-$42+ depending on discount rates and other factors. It was also noted that communication was essential, as net costs that would include tax credits for consumers are not as easily grasped by the public. For a carbon pricing system to pass, communication and collaboration will be key.

Congress must keep in mind that carbon pricing systems are not a one-size-fits-all solution because the social benefits are hard for taxpayers to visualize. Because of this, the public tends to support subsidizing climate-positive actions instead of penalizing climate-negative ones (Marlon et al., 2020). Policies that reduce CO_2 emissions without imposing additional social costs are needed (Jenkins, 2014), and it is possible the threat of taxation or otherwise paying for carbon would inspire businesses to improve efficiency and reduce waste enough that the policies end up costing little over time (Baranzini et al., 2017). Further, it may be worthwhile to investigate different rates for several types of emissions, which may foster more support (Halim et al., 2019). The road to the ratification of a carbon pricing bill would be tumultuous, but its passage would greatly aid in reaching carbon neutrality by 2050.

Conclusion

The threats of climate change are clear. It is vital to act now to stop warming from reaching more than 1.5 ℃ above pre-industrial levels. Achieving sufficient climate legislation is difficult due to political asymmetries. However, rectifying these asymmetries is possible by passing a combination of targeted and broad climate policies. Alongside work to rectify these asymmetries, the US must work to decarbonize its electrical grid which will help reach carbon neutrality by 2050 and protect natural and human systems. Additionally, the US should put a price on carbon to realize decarbonization in end-uses, drive reductions in waste, improve CO_2 reductions, and inspire innovation. The implementation of these policies has economic and social support from industry and the public, and it is up to these groups to hold the government accountable. Existing goals can bring a positive future if, and only if, action is taken now to reduce emissions.

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