



The Climate Club

How to Fix a Failing Global Effort

By William Nordhaus

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Climate change is the major environmental challenge facing nations today, and it is increasingly viewed as one of the central issues in international relations. Yet governments have used a flawed architecture in their attempts to forge treaties to counter it. The **key agreements** [<http://https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>], the 1997 Kyoto Protocol and the 2015 Paris climate accord, have relied on voluntary arrangements, which induce free-riding that undermines any agreement.

States need to reconceptualize climate agreements and replace the current flawed model with an alternative that has a different incentive structure—what I would call the “Climate Club.” Nations can overcome the syndrome of free-riding in international climate agreements if they adopt the club model and include penalties for nations that do not participate. Otherwise, the global effort to curb climate change is sure to fail.

In December 2019, the 25th **Conference of the Parties**

[<https://www.nytimes.com/2019/12/15/climate/cop25-un-climate-talks-madrid.html>](COP25) of the UN Framework Convention on Climate Change (UNFCCC) met in Madrid, Spain. As most independent observers concluded, there was a total disconnect between the need for sharp emission reductions and the outcomes of the deliberations. COP25 followed COP24, which followed COP23, which followed COP22, all the way back to COP1—a series of **multilateral negotiations** [[https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop?page=0%2C0%2C0%2C0%2C0%2C0%2C0%2C0%2C0%2C0](https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop?page=0%2C0%2C0%2C0%2C0%2C0%2C0%2C0%2C0%2C0%2C0)] that produced the failed Kyoto Protocol and the wobbly Paris accord. At the end of this long string of conferences, the world in 2020 is no further along than it was after COP1, in 1995: there is no binding international agreement on climate change.

When an athletic team loses 25 games in a row, it is time for a new coach. After a long string of failed climate meetings, similarly, the old design for climate agreements should be scrapped in favor of a new one that can fix its mistakes.

THE PRISONER'S DILEMMA OF CLIMATE CHANGE

Concepts from game theory elucidate different kinds of international conflicts and the potential for international agreements. A first and easy class of agreements are those that are universally beneficial and have strong incentives for parties to participate. Examples include coordination agreements, such as the 1912 accord to coordinate the world measurements of time and, more recently, the agreement to use “**aviation English** [http://http://www.berlitz-virtual-classroom.eu/en/news/aviation_march_2008.html]” for civil aviation, which coordinates communications to prevent collisions during air travel. A second class of agreements, of medium difficulty, rely on reciprocity, a central example being treaties on international trade.

A third class of international agreements confront hard problems—those involving global public goods. These are goods whose impacts are indivisibly spread around the entire globe. Public goods do not represent a new phenomenon. But they are becoming more critical in today’s world because of rapid technological change and the astounding decline in transportation and communication costs. The quick spread of COVID-19 is a grim reminder of how global forces respect no boundaries and of the perils of ignoring global problems until they threaten to overwhelm countries that refuse to prepare and cooperate.

A melting glacier in El Calafate, Argentina, July 2008

Andres Forza / Reuters

Agreements on global public goods are hard because individual countries have an incentive to defect, producing noncooperative, beggar-thy-neighbor outcomes. In doing so, they are pursuing their national interests rather than cooperating on plans that are globally beneficial—and beneficial to the individual countries that participate. Many of the thorniest global issues—interstate armed conflict, nuclear proliferation, the law of the sea, and, increasingly, cyberwarfare—have the structure of a prisoner’s dilemma. The prisoner’s dilemma occurs in a strategic situation in which the actors have incentives to make themselves better off at the expense of other parties. The result is that all parties are worse off. (The studies of Columbia’s **Scott Barrett** [<https://sipa.columbia.edu/faculty-research/faculty-directory/scott-barrett>] on international environmental agreements lay out the theory and history in an exemplary way.)

International climate treaties, which attempt to address hard problems, fall into the third class, and they have largely failed to meet their objectives. There are many reasons for this failure. Since they are directed at a hard problem, international climate agreements start with an **incentive structure** [<https://www.vox.com/energy-and-environment/2019/11/5/20947289/paris-climate-agreement-2020s-breakdown-trump>] that has proved intrinsically difficult to make work. They have also been undermined by myopic or venal leaders who have no interest in long-term global issues and refuse to take the problem seriously. Further obstacles are the **scale, difficulty, and cost** [<https://www.forbes.com/sites/sergeiklebnikov/2019/10/24/stopping-global-warming-will-cost-50-trillion-morgan-stanley-report/#300f4ac951e2>] of slowing climate change.

But in addition to facing the intrinsic difficulty of solving the hard problem of climate change, international climate agreements have been based on a flawed model of how they should be structured. The central flaw has been to overlook the incentive structure. Because countries do not realistically appreciate that the challenge of global warming presents a prisoner's dilemma, they have negotiated agreements that are voluntary and promote free-riding—and are thus sure to fail.

MORE KNOWLEDGE, NO PROGRESS

The risks of climate change were recognized in the UNFCCC, which was ratified in 1994. The UNFCCC declared that the “ultimate objective” of climate policy is “to achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”

The first step in implementing the UNFCCC was taken in the **Kyoto Protocol** [https://unfccc.int/kyoto_protocol] in 1997. Kyoto's most important innovation was an international **cap-and-trade system** [<https://www.cfr.org/background/debate-over-greenhouse-gas-cap-and-trade>] for emissions. Each country's greenhouse gas emissions were limited under the protocol (the cap). But countries could buy or sell their emission rights to other countries depending on their circumstances (the trade). The idea was that the system would create a market in emissions, which would give countries, companies, and governments strong incentives to reduce their emissions at the lowest possible cost.

The Kyoto Protocol died a quiet death, mourned by few.

The Kyoto Protocol was an ambitious attempt to construct an international architecture to harmonize the policies of different countries. Because it was voluntary, however, the United States and Canada withdrew without consequences, and no new countries signed on. As a result, there was a sharp reduction in its coverage of emissions. It died a **quiet death** [<https://www.cnn.com/2013/07/26/world/kyoto-protocol-fast-facts/index.html>], mourned by few, on December 31, 2012—a club that no country cared to join.

The Kyoto Protocol was followed by the Paris accord of 2015. This agreement was aimed at “holding the increase in the global average temperature to well below 2°C above pre-industrial levels.” The Paris agreement requires all countries to make their best efforts through “nationally determined contributions.” For example, China announced that it would reduce its **carbon intensity** [<https://www.reuters.com/article/us-china-climatechange-carbon/china-meets-2020-carbon-target-ahead-of-schedule-xinhua-idUSKBN1H312U>] (that is, its carbon dioxide emissions per unit of GDP), and other countries announced **absolute reductions** [<http://https://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges>] in emissions. The United States, under the Trump administration, declared that it would withdraw from the agreement.

Even before the United States **withdrew** [<https://www.foreignaffairs.com/articles/world/2017-06-05/trumps-paris-agreement-withdrawal-context>], it was clear that the national targets in the Paris accord were **inconsistent** [<https://www.nationalgeographic.com/news/2017/10/paris-agreement-climate-change-usa-nicaragua-policy-environment/>] with the two-degree temperature target. The accord has two major structural defects: it is uncoordinated, and it is voluntary. It is uncoordinated in the sense that its policies, if undertaken, would not limit climate change to the target of two degrees. And it is voluntary because there are no penalties if countries withdraw or fail to meet their commitments.

Trump announcing the U.S. withdrawal from the Paris accord in Washington, D.C., June 2017

Kevin Lamarque / Reuters

Studies of past trends, as well as the likely ineffectiveness of the commitments in the Paris accord, point to a grim reality. Global emissions would need to decline by about three percent annually in the coming years for the world to limit warming to the two-degree target. Actual emissions have grown by about two percent annually over the last two decades. Modeling studies indicate that even if the Paris commitments are met, the global temperature will almost certainly **exceed the two-degree target** [<https://www.nationalgeographic.com/news/2017/10/paris-agreement-climate-change-usa-nicaragua-policy-environment/>] later in the twenty-first century.

The bottom line is that climate policy has not progressed over the last three decades. The dangers of global warming are much better understood, but nations have not adopted effective policies to slow the coming peril.

FREE RIDERS

Why are agreements on global public goods so elusive? After all, nations have succeeded in forging effective policies for national public goods, such as clean air, public health, and

water quality. Why have landmark agreements such as the Kyoto Protocol and the Paris accord failed to make a dent in emission trends?

The reason is free-riding, spurred by the tendency for countries to pursue their national interests. **Free-riding** [<http://econ.sciences-po.fr/sites/default/files/file/Climate%20Clubs%3A%20Overcoming%20Free-riding%20in%20International%20Climate%20Policy%20-%20aer.15000001.pdf>] occurs when a party receives the benefits of a public good without contributing to the costs. In the case of international climate change policy, countries have an incentive to rely on the emission reductions of others without making costly domestic reductions themselves.

Focusing on national welfare is appropriate when impacts do not spill over national borders. In such cases, countries are well governed if they put their citizens' well-being first rather than promoting narrow interests such as through protectionist tariffs or lax environmental regulations. However, when tackling global problems, nationalist or noncooperative policies that focus solely on the home country at the expense of other countries—beggar-thy-neighbor policies—are counterproductive.

Free-riding lies at the heart of the failure to deal with climate change.

Many global issues induce cooperation by their very nature. Like players on athletic teams, countries can accomplish more when acting together than when going their separate ways. The most prominent examples of **positive-sum cooperation** [<https://link.springer.com/article/10.1631%2Fjzus.2006.A1995>] are the treaties and alliances that have led to a sharp decline in battle deaths in recent years. Another important case is the emergence of **low-tariff regimes** [<https://www.pewresearch.org/fact-tank/2018/03/22/u-s-tariffs-are-among-the-lowest-in-the-world-and-in-the-nations-history/>] in most countries. By reducing barriers to trade, all nations have seen an improvement in their living standards.

However, alongside the successes lie a string of failures on the global stage. Nations have failed to stop nuclear proliferation, overfishing in the oceans, littering in space, and transnational cybercrime. Many of these failures reflect the syndrome of free-riding. When there are international efforts to resolve a global problem, some nations inevitably contribute very little. For example, NATO is committed to defending its members against attacks. The parties to the alliance agreed to share the costs. In practice, however, the burden sharing is not equal: the United States accounted for **70 percent** [<https://www.cnbc.com/2018/07/03/nato-spending-2017.html>] of the total defense spending by NATO members in 2018. Many other NATO members spend only a **tiny fraction** [<https://www.defensenews.com/global/europe/2018/03/15/results-are-in-heres-how-much-nato-allies-spent-on-defense-in-2017/>] of their GDPs on defense, Luxembourg being the extreme case, at just 0.5 percent. Countries that do not fully participate in a multiparty agreement on public goods get a free ride on the costly investments of other countries.

Free-riding is a major hurdle to addressing global externalities, and it lies at the heart of the failure to deal with climate change. Consider a voluntary agreement, such as the **Kyoto Protocol** [<https://www.foreignaffairs.com/articles/2004-07-01/beyond-kyoto>] or the Paris accord. No single country has an incentive to cut its emissions sharply. Suppose that when Country A spends \$100 on abatement, global damages decline by \$200 but Country A might get only \$20 worth of the benefits: its national cost-benefit analysis would lead it not to undertake the abatement. Hence, nations have a strong incentive not to participate in such agreements. If they do participate, there is a further incentive to understate their emissions or to miss ambitious objectives. The outcome is a noncooperative free-riding equilibrium, in which few countries undertake strong climate change policies—a situation that closely resembles the current international policy environment.

When it comes to climate change policies today, nations speak loudly but carry no stick at all.

MEMBERSHIP BENEFITS

In light of the failure of past agreements, it is easy to conclude that international cooperation on climate change is doomed to fail. This is the wrong conclusion. Past climate treaties have **failed** [<https://www.foreignaffairs.com/reviews/capsule-review/2001-05-01/collapse-kyoto-protocol-and-struggle-slow-global-warming>] because of poor architecture. The key to an effective climate treaty is to change the architecture, from a voluntary agreement to one with strong incentives to participate.

Successful international agreements function as a kind of club of nations. Although most people belong to clubs, they seldom consider their structure. A club is a voluntary group deriving mutual benefits from sharing the costs of producing a shared good or service. The **gains** [<https://environment-review.yale.edu/can-climate-club-help-solve-global-warming-crisis-0>] from a successful club are sufficiently large that members will pay dues and adhere to club rules to get the benefits of membership.

The principal conditions for a successful club include that there is a public-good-type resource that can be shared (whether the benefits from a military alliance or the enjoyment of low-cost goods from around the world); that the cooperative arrangement, including the costs or dues, is beneficial for each of the members; that nonmembers can be excluded or penalized at relatively low cost to members; and that the membership is stable in the sense that no one wants to leave.

Successful international agreements function as a kind of club of nations.

Nations can overcome the syndrome of free-riding in international climate agreements if they adopt the club model rather than the Kyoto-Paris model. How could the **Climate**

Club [\[https://www.nybooks.com/articles/2015/06/04/new-solution-climate-club/\]](https://www.nybooks.com/articles/2015/06/04/new-solution-climate-club/) work? There are two key features of the Climate Club that would distinguish it from previous efforts. The first is that participating countries would agree to undertake harmonized emission reductions designed to meet a climate objective (such as a two-degree temperature limit). The second and critical difference is that nations that do not participate or do not meet their obligations would incur penalties.

Start with the rules for membership. Early climate treaties involved **quantitative restrictions** [\[https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap\]](https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap), such as emission limits. A more fruitful rule, in line with modern environmental thinking, would focus on a carbon price, a price attached to emissions of carbon dioxide and other greenhouse gases. More precisely, countries would agree on an international target **carbon price** [\[https://www.worldbank.org/en/programs/pricing-carbon\]](https://www.worldbank.org/en/programs/pricing-carbon), which would be the focal provision of the agreement. For example, countries might agree that each will implement policies that produce a minimum domestic carbon price of \$50 per metric ton of carbon dioxide. That target price might apply to 2020 and rise over time at, say, three percent per year in real terms. (The World Bank estimates that the global average carbon price today is about **\$2 per ton of carbon dioxide** [\[https://www.cnbc.com/2019/10/10/carbon-tax-most-powerful-way-to-combat-climate-change-imf.html\]](https://www.cnbc.com/2019/10/10/carbon-tax-most-powerful-way-to-combat-climate-change-imf.html).)

Why would carbon prices be a better coordinating device than the quantity of emissions? One important reason is that an efficient path for limiting warming would involve equating the incremental (marginal) costs of reductions in all countries and all sectors. This would be accomplished by having equal carbon prices everywhere. A second and equally powerful reason involves bargaining strategy, a point emphasized in the writings of the economist **Martin Weitzman** [\[https://www.foreignaffairs.com/articles/2015-04-27/climate-shock\]](https://www.foreignaffairs.com/articles/2015-04-27/climate-shock). When countries bargain about the target price, this simplifies the negotiations, making them about a single number: dollars per ton. When the bargaining is about each country's emission limit, this is a hopeless matter, because countries want low limits for others and high limits for themselves. A bargain about emission limits is likely to end up with no limits at all.

A treaty focusing on an international target carbon price would not mandate a particular national policy. Countries could use carbon taxes (which would easily solve the problem of setting the price) or a **cap-and-trade** [\[https://www.foreignaffairs.com/articles/world/2018-06-14/why-carbon-pricing-isnt-working\]](https://www.foreignaffairs.com/articles/world/2018-06-14/why-carbon-pricing-isnt-working) mechanism (such as is used by the European Union). Either can achieve the minimum price, but different countries might find one or the other approach more suited to its institutions.

Smog in New Delhi, India, October 2018

Anushree Fadnavis / Reuters

The second and critical feature of the Climate Club would be a penalty for nonparticipants. This is what gives the club mechanism its structure of incentives and what distinguishes it from all current approaches to countering climate change: nonparticipants are penalized. Some form of sanction on nonparticipants is required to induce countries to participate in and abide by agreements with local costs but diffuse benefits. Without penalties, the agreement will dissolve into **ineffectiveness** [<https://www.vox.com/energy-and-environment/2019/11/5/20947289/paris-climate-agreement-2020s-breakdown-trump>], as have the Kyoto and Paris schemes.

Although many different penalties might be considered, the simplest and most effective would be tariffs on imports from nonparticipants into club member states. With penalty tariffs on nonparticipants, the Climate Club would create a situation in which countries acting in their self-interest would choose to enter the club and undertake ambitious emission reductions because of the structure of the payoffs.

One brand of penalty could be a countervailing duty on the carbon content of imports. However, this approach would be both complicated and ineffective as an incentive to join a club. The main problem is that much carbon dioxide is emitted in the production of nontraded goods, such as **electricity** [<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>]. Additionally, calculating accurately the indirect carbon content of imports is exceedingly complicated.

A second and more promising approach would be a uniform tariff on all imports from nonclub countries into the club. Take as an example a penalty tariff of five percent. If nonparticipant Country A exported \$100 billion worth of goods into the club countries, it would be penalized with \$5 billion of tariffs. The advantage of uniform tariffs over countervailing duties is simply simplicity. The point is not to fine-tune the tariffs to a nonparticipant country's production structure but to provide powerful **incentives** [<https://www.forbes.com/sites/howardgleckman/2018/10/10/bill-nordhaus-the-nobel-prize-climate-change-and-carbon-taxes/#4fb3f9076a03>] for countries to be part of the Climate Club.

SANCTIONING THE NONPARTICIPANTS

There is a small academic literature analyzing the effectiveness of clubs and comparing them to agreements without sanctions. The results suggest that a well-designed climate club requiring strong carbon abatement and imposing trade sanctions on nonparticipants would provide well-aligned incentives for countries to join.

I will illustrate the point using the results of a study I presented in my 2015 **Presidential Address** [<http://https://www.aeaweb.org/webcasts/2015/climate>] to the American Economic

Association and summarized in my **Nobel Prize lecture**

[<https://www.nobelprize.org/uploads/2018/10/nordhaus-slides.pdf>]. (The former provided a full explanation of the model, the results, the qualifications, and the sensitivity analyses; the latter was a nontechnical discussion of just the key results.) The study divided the world into 15 major regions. Each region has its own abatement costs and damages from climate change. Because of the global nature of climate change, however, the abatement costs are local, whereas virtually all the benefits of a region's emission reductions spill over to other regions. Even for the largest players (the United States and China), at least 85 percent of the benefits of their emission reductions accrue abroad.

Voluntary international climate agreements will accomplish little.

The modeling of the study tested alternative uniform tariff rates, from zero to ten percent, and different international target **carbon prices**

[<https://www.nytimes.com/2018/10/13/climate/nordhaus-carbon-tax-interview.html>], from \$12.50 per ton to \$100 per ton. It then asked if there were stable coalitions of countries that wanted to join and remain in the club. One case is a regime with a carbon price of \$25 per ton and a penalty tariff of three percent. With this regime, it is in the national interest of every region to participate, and it is in the interest of no region to defect and free-ride. The coalition of all regions is stable because the losses from the tariff (for nonparticipants) are larger than the costs of abatement (for participants).

The Kyoto Protocol and the Paris accord can be thought of as regimes with **zero penalty tariffs** [<https://www.theglobeandmail.com/report-on-business/economy/economy-lab/the-nuts-and-bolts-of-kyoto-withdrawal/article619868/>]. Both history and modeling have shown that these induce minimal abatement. Put differently, the analysis predicts—alas, in a way that history has confirmed—that voluntary international climate agreements will accomplish little; they will definitely not meet the ambitious objectives of the Paris accord.

Such detailed modeling results should not be taken literally. Modeling offers insights rather than single-digit accuracy. The basic lesson is that current approaches are based on a flawed concept of how to manage the global commons. The voluntary approach needs to be replaced by a club structure in which there are penalties for nonparticipation—in effect, environmental taxes on those who are violating the global commons.

TOWARD EFFECTIVE POLICIES

The international community is a long way from adopting a Climate Club or a similar arrangement to slow the ominous march of climate change. The obstacles include ignorance, the distortions of democracy by anti-environmental interests, free-riding among those looking to the interests of their country, and shortsightedness among those who discount the interests of the future. Additionally, nations have continued with the losing strategy (zero wins, 25 losses) pursued by the UNFCCC's Conference of the Parties

structure. Global warming is a **trillion-dollar problem**

[<https://www.forbes.com/sites/sergeiklebnikov/2019/10/24/stopping-global-warming-will-cost-50-trillion-morgan-stanley-report/#21a3926151e21>] requiring a trillion-dollar solution, and that demands a far more robust incentive structure.

There are many steps necessary to slow global warming effectively. One central part of a productive strategy is to ensure that actions are global and not just national or local. The best hope for effective coordination is a Climate Club—a coalition of nations that commit to strong steps to reduce emissions and mechanisms to penalize countries that do not participate. Although this is a radical proposal that breaks with the approach of past climate negotiations, no other blueprint on the public agenda holds the promise of strong and coordinated international action.

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