A WTO-Compliant Climate Club that Solves the Free-Rider Problem in Global Climate Policy

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Plan of the talk

- 1. The Net-Zero emissions by 2050 target
- 2. Why we need both developing country and rich countries participation in carbon reduction
- 3. Research on how to structure a cooperative agreement on climate change that solves the free-rider problem.
- 4. Requirements of World Trade Organization (WTO) for compatibility of the Climate Club.
- 5. The Climate Club: the solution to effective international cooperation on carbon reduction
- 6. Subsidies for **transformative** green energy.

Scientific Consensus: The planet needs Net-Zero Carbon Dioxide Emissions by near 2050—

- Technical Report of the Intergovernmental Panel on Climate Change (2022)
- IPCC estimates the carbon budget for limiting temperature increases to 1.5 or 2 degrees Celsius—it will be exhausted sometime around 2050, depending on future emissions
- Global CO_2 emissions need to decline to net-zero around 2050 (in summary, timing is stochastic).
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Global Government Consensus for Net-Zero Carbon Dioxide Emissions by near 2050

- **The Glasgow Climate Pact of 2021 (part of COP26)**:
- all countries (almost 200) agreed the world needs to achieve net-zero carbon dioxide emissions around 2050.
- No political consensus on the **measures** to take.

The Free-Rider Problem: The world must overcome it to combat Global Warming

- **Global warming depends on the globally accumulated carbon emissions in the atmosphere**
- The emissions of all countries contribute to the globally accumulated carbon emissions in the atmosphere.
- A clean atmosphere is a global "public good" from which no country can be excluded.
- **Since reducing emissions is costly, self-interested countries prefer to "free ride" on the abatement efforts of other countries.**
- **No global government has authority to limit national emissions.**
- **Overcoming free riding by autonomous governments is the fundamental challenge for an effective cooperative agreement on climate change.**

There is an important need for a WTO-compliant Climate Club that addresses the free-rider problem

- The Nordhaus Climate Club addresses the free-rider problem but is not WTO-compliant.
- Policy-makers know the Nordhaus Climate Club stands virtually no chance of becoming WTO-complaint.
- It has not been endorsed by any government.
- I see the need for a WTO-compliant Climate Club that addresses the free-rider problem to gain policy support.

Multiple disciplines--successful cooperative agreements on common resources require: **Reciprocity, monitoring and penalties** for non-compliance

- **Reciprocity means interdependent commitments: "I will do more if you do more."**
- Evidence from :
- (i) **Field studies** (hundreds by Ostrom (1990) and her followers, Kraft-Todd et al. (2015) and Bowles and Gintis, 2013);
- How local communities establish rules for common resources (e.g., common fisheries, forest resources, pastures) that are both economically and ecologically sustainable, without government regulation or private ownership of the common resource.
- (ii) **laboratory experiments** (Fehr and Gächer, 2000); and
- (iii) **game theory** (Fudenberg and Tirole, 1991).

Billions of Metric tons (Gtons) of CO_2 equivalent (GHG) emissions, World and Major Emitters

					Change in Gt and %		Share of Global	
	1990	1997	2015	**2019**	**2019-1990**	**2019/1990**	**Emissions[a]**	
World	**30.6**	32.9	46.1	**48.1**	17.5	157%	**1990**	**2019**
OECD (38)	14.2	15.4	14.9	**14.6**	0.4	103%	46%	30%
Upper Middle Income	9.9	10.2	19.6	**20.9**	11.1	212%	32%	44%
Lower Middle Income	4.5	5.0	8.2	**9.2**	4.7	205%	15%	19%
Low Income	0.6	0.6	0.9	**1.0**	0.4	164%	2%	2%
The Leading Emitters								
China	3.2	4.3	11.8	**12.7**	**9.5**	**392%**	11%	26%
United States	5.8	6.6	6.1	**6.0**	0.2	103%	19%	12%
India	1.2	1.6	3.1	**3.4**	**2.2**	**278%**	4%	7%
European Union (27)	4.5	4.3	3.6	**3.4**	-1.1	76%	15%	7%
Russia	3.0	2.1	2.3	**2.5**	-0.5	82%	10%	5%
Japan	1.2	1.3	1.3	**1.2**	0.0	100%	4%	2%
Brazil	0.6	0.7	1.1	**1.1**	0.5	182%	2%	2%
Indonesia	0.5	0.6	0.9	**1.0**	0.5	211%	2%	2%

Crucial all significant emitters reduce their CO_2 emissions, including the developing countries

- GHG emissions of middle-income developing countries have grown from 47% of global emissions in 1990 to 63% in 2019
- China almost quadrupled emissions, now number 1 in the world at about 13 billion tons annually
- India almost tripled emissions—number 3 in the world at 3.4 billion tons per year
- Indonesia and Brazil doubled emissions—both over 1 billion tons of CO_2 emissions per year now.
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The Paris Climate Agreement is fundamentally flawed because it does not address **the free-rider problem**

- “Nationally determined contributions” are:
- (i) independent of each other;
- (ii) fully voluntary;
- (iii) no penalties for failure to meet commitments
- That is, there is no reciprocity or penalties.
- The Paris Agreement has failed to reverse the upward trend in global carbon emissions.

We propose a Climate Club for CO_2 emissions, with the following rules for members:

(i) commit to net-zero CO_2 emissions by 2050 with intermediate goals using any regulatory approach;

(ii) impose a uniform tariff surcharge (of up to ten percent) on imports of all non-members, except products that lead to reduced GHG emissions; (like Nordhaus)

(iii)impose high and progressive import tariffs and export taxes on trade in carbon-intensive products with non-members;

(iv)impose a progressive tariff on members who fail to meet intermediate goals.

(v)Multilateral Fund: rich country members voluntarily contribute for additional costs to developing country members for net-zero emissions. For accesss, developing country members must have per capita CO2 emissions below an agreed threshold.

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Our Climate Club contains the required reciprocity and penalties.

- Reciprocity: all members commit to net-zero emissions
- Monitoring: aggregate emissions are monitored at five-year intervals for successful progress
- Penalties: two kinds of tariff penalties on non-members and tariffs on members who don’t meet intermediate goals
- Developing countries: obtain membership benefits from the Multilateral fund
- **non-participants are penalized for not participating;** Impacts their strategic decision.

Uniform Tariff Surcharge Violates GATT Articles I and II

- It violates the most-favored nation principle of the GATT, Article I
- Many Climate Club participants will violate their maximum bound tariff WTO commitments, Article II of the GATT
- Nordhaus proposes an Amendment for his Climate Club.
- Experience shows that a WTO amendment would likely take about 20 years to pass and allow developing countries to “opt out.”
- And requiring a specific regulatory approach (e.g., carbon pricing) has been ruled to be discriminatory by the Dispute Settlement Body of the WTO.

WTO-Compatibility of our Climate Club via the Escape Clause: allows immediate application of the measures

- GATT Article XX is the “Escape Clause. ” It allows **measures** that violate commitments of members for ten purposes. One purpose is the ”conservation of exhaustible natural resources.”
- Our measures must pass several tests in a Dispute Settlement Case
- Does CO_2 threaten an exhaustible natural resource? Clean air has been declared an exhaustible resource by the WTO Dispute Settlement Body.
- Do our measures contribute to the conservation of the exhaustible natural resource?
- Does domestic production and consumption face comparable measures?
- These are easily passed by our Climate Club as well as the Nordhaus-style Climate Club

The discrimination test: Our Climate Club passes but requiring carbon pricing does not.

- But the Climate Club must avoid a discrimination finding.
- **WTO: it is unacceptable discrimination to impose a regulatory regime on another WTO member country whose regulatory regime achieves comparable conservation of the exhaustible natural resource. (US Shrimp-Turtle case)**
- **Implies the membership rule must be extremely broad in permitting alternate methods of conserving the exhaustible natural resource.**
- Why our proposed Climate Club allows ANY regulatory regime and only monitors the environmental outcome.
- Why the Nordhaus-style Climate Club can’t use the Escape Clause

Various regulatory approaches to carbon reduction

Subsidies for game-changing technologies;

command and control technical and performance regulations;

removal of fossil fuel subsidies;

support for carbon-saving infrastructure;

subsidies for production and consumption of green energy;

carbon capture and storage ; carbon sequestration; carbon dioxide recovery and storage;

border carbon adjustment measures;

the voluntary and cooperative agenda of the G7 Climate Club;

international sector agreements (Stiglitz *et al*., 2023); and

local experimentation with international technology cooperation (Sabel and Victor, 2022).

We have added incentives to join the Climate Club

- Nordhaus (2015) estimates that the import tariff surcharge cannot induce substantial membership for a carbon price above $50 per ton of CO_2. Bekkers and Cariola (2022) find similar results.
- Compared to Nordhaus, there are greater incentives to join: we impose high tariffs on trade in carbon-intensive products. Not dependent on carbon content of the good, i.e., not a carbon border adjustment mechanism. (cf. Montreal Protocol).
- Multilateral Fund: developing countries with per capita emissions below a cutoff have access to grants and preferred finance (cf. Montreal Protocol).

Importance of Rapid Technological Progress to Reduce the cost of green energy

- Energy Modeling Forum: 16 modeling teams estimate the impact of net-zero on North American countries, see Browning et al. (2023)
- 11 teams report carbon prices.
- **If Moderate technological progress in green technology :**
- 8 models estimate prices will exceed $400 per ton in 2050.
- Remaining 3 estimate carbon prices at between $100 and $200.
- **If Rapid technological progress:**
- Carbon prices are reduced from 15 to 65 percent

Subsidies for Rapid Technological Progress

- Nordhaus (2021) estimates that neither the Climate Club nor rapid technological progress will independently achieve net-zero emissions by 2050.
- But with both, it will be achieved.
- We propose a 0.2 percent of GDP subsidy by rich countries for game changing green technologies that would lower the cost of alternatives to GHG producing products or processes.

Developing Country Accommodation

- 1. The Multilateral Fund of grants and preferred finance if per capita emissions are below the threshold
- 2. For the poorest countries with low per capita emissions:
- (a) may become members with an extended deadline for net-zero emissions; and
- (b) lower penalty tariffs for these countries that are not members.
- 3. Subsidies for game-changing technology are the burden of rich countries.

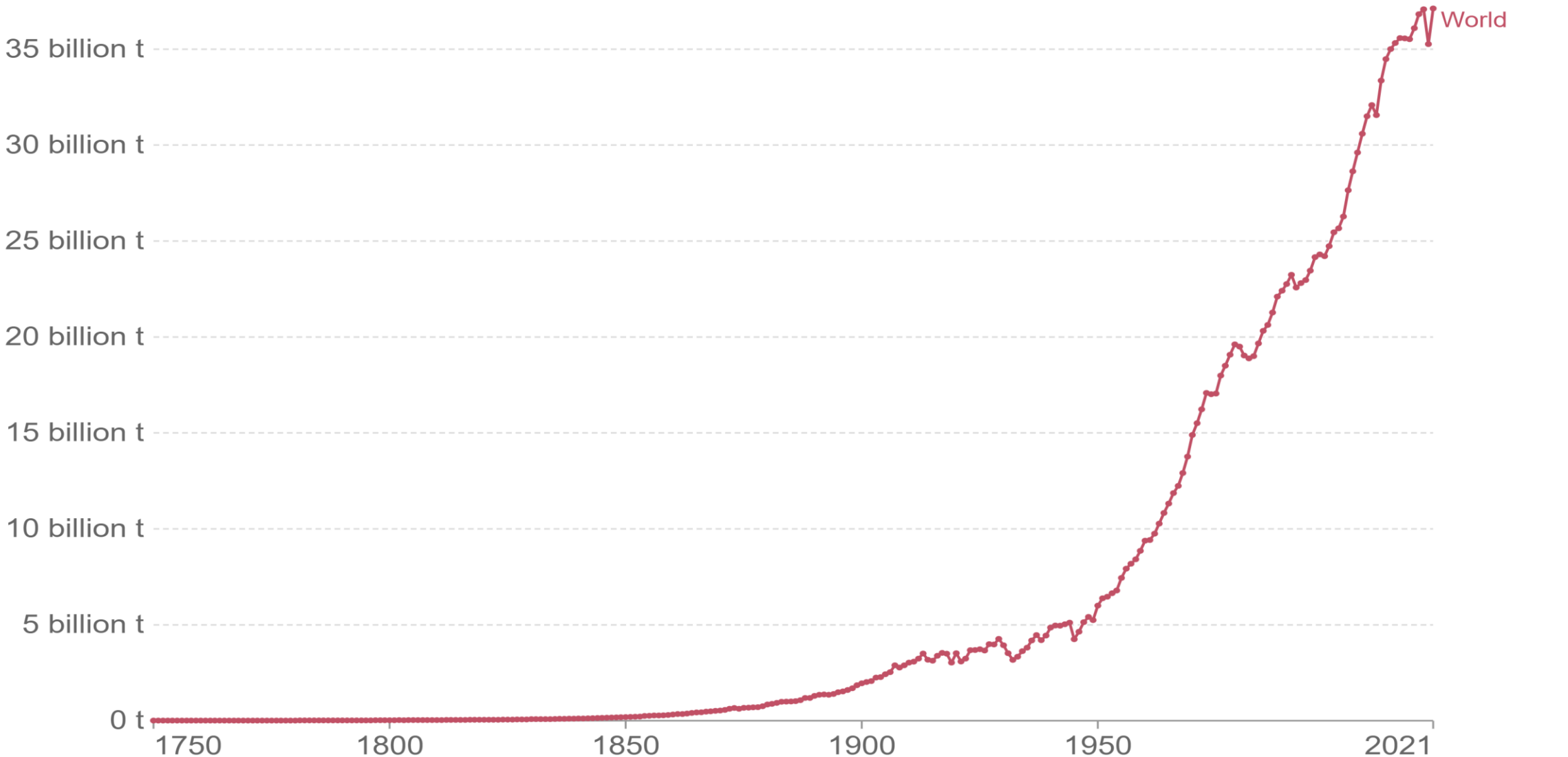
Conclusions

- Science and governments agree on the need to achieve net-zero carbon emissions by near 2050—the goal.
- We propose a Climate Club that (i) is WTO-compliant under the GATT Escape clause and (ii) addresses the free-rider problem.
- Members must agree to the net-zero goal with intermediate targets. There are multiple tariff penalties for non-members and for members who do not meet intermediate goals, plus a Multilateral Fund.
- To be WTO compliant, any regulatory regime is accepted.
- We also propose subsidies for game-changing technologies to reduce the cost of alternatives to GHG products and processes.

Additional Slides for Q&A period follow

Annual CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry[1] . Land use change is not included.



Source: Our World in Data based on the Global Carbon Project (2023)

OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

Carbon Budgets: Estimated remaining cumulative carbon emissions after Jan.1, 2020 in billions of metric tons of CO_2.

Likelihood = The probability (times 100) of holding temperatures within 1.5 or 2 degrees Celsius above the 1850 to 1900 average.

Source: IPCC Technical Summary (2022, p. 98)

Global Warming	Likelihood				
Relative to 1850-1900	17%	33%	50%	67%	83%
1.5°C	900	650	500	400	300
2°C	2300	1700	1350	**1150**	900

Carbon Budget implications—Must progressively decrease global emissions and achieve net-zero emissions

- 1150 billion tons = Carbon Budget to hold temperature increase to less than 2 degrees Celsius with probability 0.67
- 37 billion tons per year = 2021 CO_2 emissions
- At that rate, the globe exhausts the carbon budget by 2050.
- Since it is cumulative emissions that impacts temperatures, the globe must get to net-zero emissions.
- We can't suddenly go from 37 billion tons of CO_2 emissions in 2050 to net-zero emissions in the next year.
- We must reverse the trend of increase in emissions and progressively reduce emissions.

Unilateral action (leading by example) will not work in gaining GHG reduction in developing countries.

- “Free riding by others leads to a belief that you are a “sucker” for taking costly actions to reduce emissions. This leads to less efforts to reduce emissions (Ostrom, 2009)

In the Kyoto Protocol agreement, rich countries (including the U.S.) took binding commitments, but developing countries refused to follow.

Proposal 2: Government subsidies of about 0.15% to 0.2% of GDP for Investment in *Transformative* Technology to make it economically efficient to avoid fossil fuels.

- Developing countries will adopt clean energy solutions if they are cheaper than fossil fuels.
- We need game-changing technologies that provide an economic incentive to adopt clean energy.
- Many **new ideas** for transformative technologies will fail--it is difficult to get private funds for ideas that are far from commercially profitable.
- There is a rationale for government subsidies.
- Inflation Reduction Act of 2022 provides substantial subsidies for green energy including potentially transformative green energy
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GHG emissioins in millions of metric tons (2019)

Annex 1 countries	GHG emissions	**Non-Annex I countries**	GHG emissions
USA	6,572	China	12,705
EU countries	4,044	India	3,395
Japan	1,210	Russia	2,123
Canada	738	Brazil	1,057
Australia	546	Indonesia	1,002
Turkey	508	Iran	894
United Kingdom	448	Saudi Arabia	723
Kazakhstan	360	South Korea	698
Ukraine	334	Mexico	653
Belarus	92	South Africa	555
New Zealand	82	Vietnam	450
Norway	51	Pakistan	432
Switzerland	45	Thailand	422
Iceland	5	Argentina	369
Liechtenstein	0.2	Egypt	351
Monaco	0.1	**Total of above**	25,829
TOTAL (Annex I)	15,035	**Rest of non-Annex I**	7,253
		TOTAL (non-Annex I)	33,082
	World Total	48,117	

- Emissions are a function of various regulatory policies $R_1 \ldots R_n$
- The impact of each regulatory policy is stochastic and interdependent with other policies.

$$CO_2(t) = f\left[R_1(t), \ldots, R_n(t)\right] + e(t)$$