



Recognizing the Right to Pollute:
Improving Access to Sustainable
Development through a Global Cap-
and-Trade Approach in a Post-Paris
Agreement World

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Dedicated to my parents.

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“Yesterday I was clever, so I wanted to change the world. Today I am wise, so I am changing myself”

- Rumi

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Acronyms

CBDR-RC: Common But Differentiated Responsibility and Respective Capability

CCS: Carbon Capture and Storage

EC: European Commission

EIT: Economies in Transition

EU ETS: European Union Emissions Trading Scheme

EU: European Union

MtCO₂eq: Million Tonnes of Carbon dioxide Equivalent

NDC: Nationally Determined Contributions

OECD: Organization for Economic Cooperation and Development

UN: United Nations

UNFCCC: United Nations Framework Convention on Climate Change

Introduction

Climate change is arguably perhaps the greatest challenge that humans collectively face today. From a scientific point-of-view, climate change has been brought about as a result of human activity, and humans alone can take the measures required to both adapt to and help mitigate the potentially disastrous effects of this phenomenon.¹ The realization of this need has been apparent for over two decades now; the Kyoto Protocol was signed in 1997, however it failed to succeed partially because the United States refused to ratify it in 2001 and Canada eventually withdrew in 2011 to avoid paying penalties. With two of the world's largest carbon polluters out of the agreement, progress by the remaining parties wasn't as significant on an international scale, bringing about the much-acclaimed Paris Agreement instead which was signed in 2015. Whilst the Kyoto Protocol followed the principle of Common But Differentiated Responsibility (CBDR) and assigned the responsibility for tackling climate change only on developed countries, the Paris Agreement is more inclusive in its approach which follows the same basis of differentiated responsibility according to respective capability, but asks all countries to contribute towards the reduction of greenhouse gases in line with a common goal of limiting global temperature increases to below 2°C.² With this renewed approach, the deal managed to gain nearly unanimous support across the international community till the United States of America withdrew under President Trump citing the unfairness of the deal. Most of the remaining parties have, however, decided to continue working towards the objectives of the agreement and several US States have pledged to reduce emissions despite the US's pending withdrawal from the deal.

The 2017 Energy Technology Perspectives Report by the International Energy Agency estimates that switching to low-carbon sources of energy from fossil fuels will cost \$44

¹ "Causes Of Climate Change - Climate Action - European Commission". 2016. *Climate Action - European Commission*. Accessed June 2 2019. https://ec.europa.eu/clima/change/causes_en.

² "Common But Differentiated Responsibilities And Respective Capabilities (CBDR-RC)". 2015. *Climate Nexus*. Accessed June 2 2019. <https://climatenexus.org/climate-change-news/common-but-differentiated-responsibilities-and-respective-capabilities-cbdr-rc/>.

trillion until the year 2050.³ This doesn't take into account other costs associated with climate change mitigation and adaptation, including expensive infrastructural needs and carbon offsetting. Not all countries can afford to bear these costs and developing countries are especially disadvantaged as they do not possess easy access to investment or funding. This is problematic partly due to one of the fundamental issues of pricing goods and services in the world today because they do not include the environmental cost of production and usage of these resources. Carbon pricing, or the act of attaching a monetary value to the pollution caused, is one way that economists and climate scientists have come up with to both discourage the emissions and help raise funds to tackle the effects of such emissions. They are usually priced by the ton and due to a variety of green-house-gases, are expressed in terms of their equivalent impact in carbon dioxide terms, leading to the expression tCO₂e. Another method that is primarily used in the European Union is the EU Emissions Trading System (or ETS) which follows a cap-and-trade model. Under this model, a finite number of 'pollution allowances' are assigned to industries covered under the system with the total allowances reducing over time, thereby cutting emissions. These allowances are either auctioned or assigned free-of-cost by the government depending on the industry, with the aim to reduce free allowances over time and the development of a trading market where companies can buy or sell additionally needed/unused allowances. If companies fail to secure the required credits in line with their emissions, heavy fines are issued by national governments within the ETS framework which has proven to be a successful compliance method. Despite its earlier issues including the over-allocation of allowances and cross-border VAT scams, the system has worked and is expected to reduce emissions by approximately 20% by the year 2020 when compared with 2005 levels, nearly meeting its target of 21%.⁴

The scope of this thesis is limited to studying the perceived effectiveness of the model under the Paris Agreement and proposing a global cap-and-trade system to supplement

³ Kamel Ben Naceur. 2017. "Energy Technology Perspectives". International Energy Agency. <https://www.iea.org/etp/>.

⁴ "2020 Climate & Energy Package - Climate Action - European Commission". 2016. *Climate Action - European Commission*. Accessed June 2 2019. https://ec.europa.eu/clima/policies/strategies/2020_en.

it, the circulating revenues from which (in addition to developmental assistance) can help improve accessibility to sustainable development for developing countries. It relies on the implementation of a global cap on emissions and equitable distribution amongst countries based on three main factors, i.e., 1) Population, 2) Climate considerations, and 3) Capacity/ability to transition (level of development). This method aims to tax and control carbon activity mainly at the production-end instead of the traditional consumption-end as it will incentivize investment in carbon-reduction technology. Whilst consumption-end taxation of carbon disincentivizes the usage by the consumer, a production-end tax will ensure that companies turn towards lower emissions long term and is more comprehensive and inclusive in its approach. Fossil fuel producers like Norway's Equinor (formerly Statoil/StatoilHydro) already take measures for carbon reduction through carbon capture and storage (CCS), including the extraction of carbon from natural gas on their rigs for a final fossil fuel product with much lower levels of carbon. The implementation of a global cap and trade system, therefore, will incentivize oil and gas companies to invest in such technology due to the carbon costs they will face otherwise. Such an approach globally will require an unprecedented level of international cooperation and a comprehensive compliance mechanism to ensure the success of such a roll-out internationally; that being said, the global consensus surrounding the need to take urgent action has been recognized in the form of the Paris Agreement and given the right circumstances could be achieved for this stricter model that will go towards achieving the targets set under the Paris Agreement. As of December 2017, 46 national and 24 sub-national jurisdictions implemented or had scheduled implementation of carbon pricing according to the World Bank.⁵ The introduction of a global cap with allowances for each country can therefore help in the overall reduction of carbon in our atmosphere and play a vital role in combatting climate change in the world. This paper will seek to examine what an ideal iteration of this system could possibly look like and test its likelihood to succeed in reducing

⁵ "Carbon Pricing". 2019. *World Bank*. Accessed June 2 2019.
<https://www.worldbank.org/en/results/2017/12/01/carbon-pricing>.

emissions whilst improving access to sustainable development for developing countries.

The Paris Agreement: Changes in approach vis-à-vis the Kyoto Protocol and Shortfalls of the Agreement

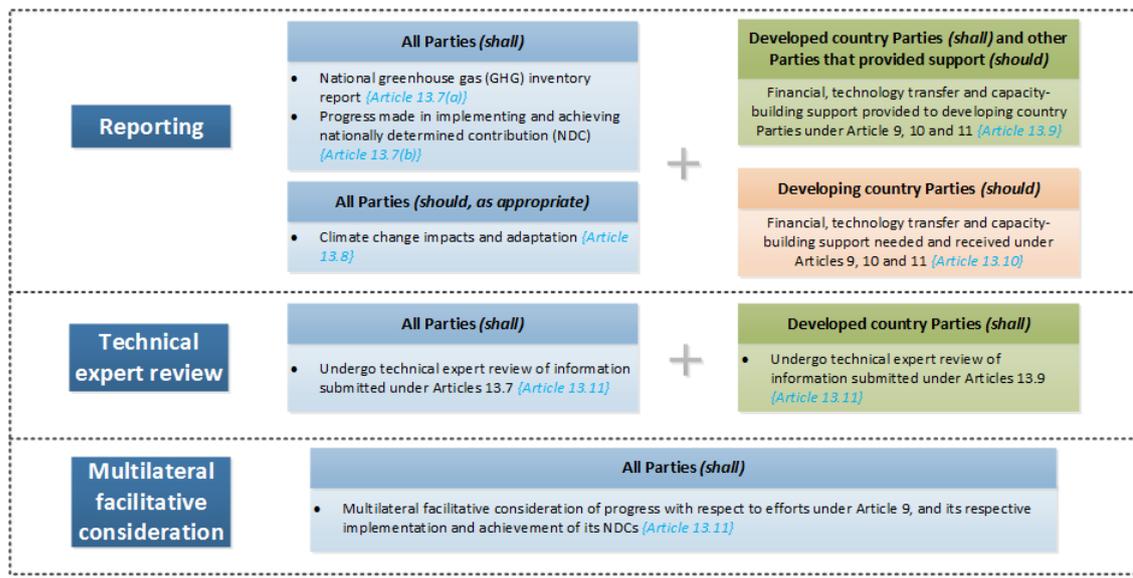
Transitioning from a punitive model to a consensus-building approach

Whilst the Kyoto Protocol sought to impose financial penalties on parties that failed to meet their obligations under the agreement, the Paris Agreement takes a very different approach. Under this new approach, there is no legal force to ensure compliance, nor are there penalties. Countries prepare voluntary targets under a Nationally Determined Contribution (NDC) which is submitted to the UNFCCC every five years; a Global Stock-Take (GST) is conducted with the same frequency starting in 2023, and it influences the composition of following NDCs aiming to raise commitments over time and working to reduce carbon emissions globally. Countries that fail to meet their commitments under their self-proposed NDCs aren't penalized; instead, compliance will be based on peer pressure from other countries. This transition away from a punitive model will go a long way to ensure that countries do not leave the treaty as readily in order to avoid paying penalties as was the case with Canada in the Kyoto Protocol. It is also hoped that this model will show developing countries that less financially demanding methods to combat climate change are available and that making a transition is easier over time with support from the international community.

In order to limit the global temperature increase to under 2°C, these NDCs will need to get increasingly ambitious over time and countries will have to commit vast financial resources to ensure a successful and economically viable transition away from fossil fuel dependency. A complete cessation in the use of fossil fuels isn't entirely possible in the short term; after all, fossil fuels power cars, industries, and households among other things. A change in the energy mix, however, is a good start to reducing the dependency as it makes up a major chunk of emissions worldwide today. Over time, carbon offsetting initiatives to reduce the existing amount of carbon in the atmosphere will also play an important role towards keeping the temperature rise in check. The Paris Agreement hopes to achieve all of this through a self-commitment and peer review system dependent on voluntary targets. An assessment of initial NDCs submitted to the

UNFCCC show that many countries have made commitments that are well below what is needed to limit the rise in temperature to under 2°C. This is one of the main criticisms which my model for accelerated control of emissions through a cap-and-trade system is based on.

Article 13 of the Paris Agreement: transparency of action and support



* The transparency framework shall provide flexibility in the implementation of the provisions of this Article to those developing country Parties that need it in the light of their capacities (Article 13.2);
 * The transparency framework shall recognize the special circumstances of the least developed countries and small island developing States (Article 13.3).

Figure 1: Enhanced Transparency Framework (ETF)⁶

To make the deal unanimously palatable for the international community, the system’s ability to ensure compliance with its targets is compromised as a non-punitive model does not provide as much of an incentive to comply especially when one looks at the alternative on offer: peer pressure from the international community. Whilst such a system will go a long way to ensure that parties do not leave the treaty to avoid financial penalties, it also places the burden for compliance on the conscience of a country’s leaders which is unfortunately not actionable or punishable, being subjective as it is in its nature. The withdrawal of the United States and the dismantling of climate protections in Brazil are testaments to this hypothesis, where the leaders’ unwillingness

⁶ "Reporting And Review Under The Paris Agreement | UNFCCC". 2019. *Unfccc.Int*. Accessed June 2 2019. <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-paris-agreement/reporting-and-review-under-the-paris-agreement>.

to remain in the agreement combined (in the case of the US at least) with the sheer lack of belief in empirical scientific evidence has resulted in the aforementioned consequences. The case for a conciliatory approach is further weakened by the current timeline of global warming, which has become much shorter vis-à-vis the time when the Kyoto Protocol was signed, making the matter more urgent than ever. To my knowledge, diligent following and strict compliance with the current set of NDCs will still result in a higher-than-recommended increase in global temperatures and sea-levels by 2030 (and by 2050), which goes to show that the targets on a collective scale just don't go far enough to curb climate change.

[Assigning global responsibility to a global problem](#)

Another major difference between the Kyoto Protocol and the Paris Agreement has to do with the scope of the agreements. The Kyoto Protocol made a clear distinction between 'developed countries' that were placed in Annex I (based on OECD membership at the time, in addition to Economies in Transition or EIT), and the remaining countries which were addressed as non-Annex I countries. It assigned the major chunk of financial and technological responsibilities to combat climate change on yet another list, known as Annex II, which included Annex I countries minus the EIT, whilst also recognizing the additional assistance that Least Developed Countries (LDCs) would need due to their limited capacity to adapt and respond appropriately. This model, whilst seemingly equitable, assigned responsibilities on the basis of CBDR-RC whilst leaving out prosperous non-OECD countries, many of which are the top exporters of fossil fuels with considerable financial resources. It sought to soften the blow that would arise from a global drop in demand for these resources, but instead removed any culpability in the form of their contribution towards making the matter worse instead of simply not helping it get better. Unfortunately, with the switch to the new system under the Paris Agreement has still failed to account for this discrepancy instead choosing to leave the discussion for a later time in order to achieve a consensus on the initial agreement itself.

Under the Paris Agreement, all parties must submit an NDC irrespective of their level of development or their capacity to transition towards a greener energy mix. Whilst doing this, it still retains some of the key aspects of the Kyoto Protocol by way of assigning more responsibility to developed states in terms of technology-transfers and encouraging them to invest in capacity building for developing countries. This can, in its best iteration, mean that countries within developed markets like the EU share cost-efficient innovations in the renewable energy sector along with developing countries that need them, but also means that they benefit from it immensely because corporations within their jurisdictions hold the patents to those technologies. If the way to reduce carbon pollution from coal fired plants in a developing country like India is to install wind or solar farm using German technology, more than just the willingness to share the technology itself is needed; factors like developmental assistance in the form of long-term low-interest loans, foreign direct investment in the renewable energy sector, or even grants will go a longer way and the Paris Agreement hopes that the financial incentives created from the transition will push the private sector to fund at least part of the transition. Climate change will cost a lot of money, and governments and multilateral institutions collectively do not possess the necessary resources to fund this transition on their own, so the involvement of the private sector is key here for global effectiveness. That being said, the private sector is less likely to provide the capital for projects with low or uncertain returns and that's where government-level developmental assistance comes in under the agreement. Being voluntary, there are no firm obligations on richer countries to provide this assistance but hope again dictates that the urgency of the situation and the tendency of carbon pollution to affect the world as a whole instead of the jurisdiction of its release is what will push richer countries to pitch in for a collectively sustainable future for all.

[The case for carbon-reparations and addressing technology-bias](#)

Many of the countries that form the Kyoto Protocol's list of non-Annex I parties are former European colonies which were occupied for the better part of the past six centuries. Specifically, during the 19th and 20th centuries, resources from many of these countries were exported back to their colonizers and were used for technological

advancements and rapid industrialization. The current state of affairs with regards to the high levels of carbon dioxide pollution in the atmosphere is partly due to this historical pollution from which only a limited number of European countries benefited but the resulting pollution of which affects the world as a whole (and especially the former colonies, many of whose coastal areas are under threat from rising sea levels). This has resulted in the call for developed countries with records of past pollutions like the United Kingdom to do more to help developing countries that they previously colonized as those countries have effectively been on the losing end thrice: firstly by historically having their resources usurped and being deprived from their utility whilst failing to achieve growth and development due to the remnants of their colonial past, secondly by having to transition away from cheap carbon-based fuels because of environmental pollution that they did not contribute significantly to (especially on a per capita basis), and thirdly by the newer standard for green-energy that is set by developed countries which are better able to afford to transition and meet that standard when compared to these developing countries.

To my knowledge, it is accepted within the international community that a global transition away from carbon-based fuel sources cannot be achieved in a sustainable manner unless countries come together to help curb pollution and promote clean energy. Many developed countries actively contribute towards renewable energy projects in developing countries despite not having colonized them and without a feeling of responsibility arising from 'guilt'; rather, their sense of responsibility arises from their concern for the world's collective future as well as the welfare of the people in the countries where they invest as well as that of their own citizens. Assigning a responsibility for this contribution based on historical events like colonization or the industrial revolution might feel counter-productive for developed countries that would rather not reconcile with their past but is a key issue for developing countries that cannot or simply do not want to foot the bill for an expensive transition. There is also the concern that technology development in the renewable sector focuses on climatic conditions of developed countries which makes a lot of that cost-efficient equipment unsuitable for other climates. An example of this is the Quaid-e-Azam Solar Park located

in semi-rural Bahawalpur in Pakistan with a 100MW capacity. The plant produces an average of 17MW because of a combination of high temperatures (45°C instead of the optimal 25°C required for solar efficiency based on current technology) and an arid climate which requires millions of litres of waters annually to clean the dust off the panels on a regular basis to ensure efficient electricity production.^{7 8 9} Whilst Saudi Arabia is reportedly working on solar technology adapted more to their hot and arid climate, these efforts for global adaptability of renewable energy generation systems is microscopic in the larger context. These concerns are a ground-reality for many developing countries with harsh climates that will be the most susceptible to climate change; even if the will to change exists and the funding is managed, the existing technology less-than-efficient compatibility with diverse local climates affects overall project viability.

All pledges are not created equal: the inequality of pledges and resulting issues

One of the major criticisms of the Paris Agreement has been the lack of set guidelines or a format for the NDCs submitted by parties to the UNFCCC. The pledges differ not just in the goals they set but also a host of other sensitive parameters. Most countries have submitted pledges running for a decade, from 2020 till 2030. Other countries, like the US, have submitted only a 5-year pledge, from 2020 till 2025. Others still have submitted only monthly commitments, and some haven't bothered to include a set timeframe at all instead only promising to try to reduce emissions eventually or expressing their commitments to peak by 2030 (thereby stating that they will continue to pollute increasingly year-on-year for the next decade). Such a stark contrast between pledges prevents a harmonization of the system which is primarily why it is so difficult to compare the NDCs against one another. The aim of just an overall goal to reduce pollution without setting specific short/medium-term targets for all countries to try to

⁷ Ebrahim, Zofeen. 2015. "World's Largest Solar Park To Light Up Pakistan's Future". *DAWN.COM*. Accessed June 4 2019. <https://www.dawn.com/news/1205484>.

⁸ "The Solar Project | Epaper | DAWN.COM". 2019. *Epaper.Dawn.Com*. Accessed June 4 2019. https://epaper.dawn.com/DetailImage.php?StoryImage=30_09_2015_009_004.

⁹ "The Impact Of Temperature On Solar Panels - Thegreenage". 2019. *Thegreenage*. Accessed June 4 2019. <https://www.thegreenage.co.uk/article/the-impact-of-temperature-on-solar-panels/>.

work towards means that countries' progress cannot be monitored effectively against others to help correct models regularly, instead having to wait for the five-year period to end and an assessment to be carried out on the progress of promises made five years ago. Bureaucracy is famously slow and painful around the world, but the urgency of climate action demands that an efficient and time-saving system be implemented to ensure greater chances of success in tackling this global issue.

Another major issue caused by the lack of harmonization in the pledges is the impossibility of an efficient global emissions trading scheme. Robert Stavins, a Harvard professor put it eloquently when he said, "The next steps are going to be to put some flesh onto what is really the bare bones, the basic structure of the agreement."¹⁰ The Paris Agreement does a great job by presenting a well-framed issue but the lack of a comprehensive framework to tackle the issue actually hinders multilateral cooperation. Important issues like double-counting haven't been addressed which is odd considering the potential for abuse when conducting cross-border emissions trading. The Paris Agreement goes as far as endorsing possible market solutions to the problem but doesn't do a very good job at creating a suitable environment for them. The priority for consensus-building instead of effectiveness in the case of this agreement seems to have jeopardized the chances of its success; one wonders if success or failure is even possible given the largely vague aims of the agreement itself. A later part of this paper will explore in detail these vague targets themselves in light of scientific views on the matter.

The lack of harmony in commitments made through NDCs also opens the door to another potential issue already experienced by certain markets; that of carbon leakage. Carbon leakage occurs when companies simply move their carbon-emitting production to a lesser-regulated jurisdiction to avoid having to comply with strict regulations. It is hard to tackle within a jurisdiction itself because there are no laws preventing

¹⁰ "Paris Pact Promotes But Complicates Carbon Trading". 2019. *Climatecentral.Org*. Accessed June 5 2019. <https://www.climatecentral.org/news/paris-pact-promotes-but-complicates-carbon-trading-20058>.

companies from moving their businesses on the basis of regulation; in fact, many countries including the United States have a strong tradition of states competing for investment on the basis of massive financial incentives but also regulatory strictness (or rather the lack thereof). A global framework that makes it difficult for companies to simply move in order to continue polluting is badly needed; companies can't move if countries simply stop competing for heavily pollutant investment. Efforts like these would push the companies to make the requisite technological investments to reduce their carbon footprint instead of simply going across the border to pollute without the same level of government-oversight. Unfortunately, however, this is perhaps one of the more difficult regulatory issues to achieve consensus on. Industries susceptible to carbon leakage are often large employers and have substantial infrastructural investment as well as high tax contributions making them valuable for governments and hence important to retain within the jurisdiction of said governments. Capital flight aside, countries are also aware of the negative potential of carbon leakage to inadvertently increase pollution which is why efforts are under way in cap-and-trade markets to ensure the provision of sufficient transition times for energy-intensive industries. Under the EU ETS for example, sectors that have a significant risk of carbon leakage are allotted a higher share of free allowances to lower the overall burden of carbon pricing on them and to retain them within the jurisdiction whilst still maintaining their competitiveness. This is a preferable approach as it recognizes that business too need to make money and strict regulations with a large financial cost attached can negatively impact them to the extent of making their operations unviable. Giving them a longer time to adapt to the regulations whilst softening the financial burden in the short-term helps them utilize those funds for technological advancements to comply with the regulations over a longer period of time and in a more sustainable manner. The approach, in my opinion, can be adapted globally within a comprehensive emissions trading system to help mitigate industrial concerns especially from energy-intensive sectors which will be impacted the hardest in the long-term.

Governance Challenges

As mentioned previously, the Paris Agreement revolves around a consensus-making approach where countries are depended upon by each other to keep collective interest at heart. The key to the success of the very agreement depends on it. The lack of concrete goals and the freedom of parties to voluntarily commit to whatever they want is a difficult subject to broach; on one end of the spectrum lies the importance of state sovereignty and its inviolability, while on the other end lies the importance of collective good and the right to a clean environment for all living beings. Balancing the two can be tricky, especially when countries cannot agree on what the term 'collective good' entails and what responsibilities it assigns and to whom. We've already touched the subject of CBDR-RC which is the basis of the UNFCCC and on the greater role that developed nations will have to play but this section will focus more on the equity in decision making and governance because of the nature of the issue itself.

Tying decision-making ability to financial commitments is a concept used often in international relations and multilateral institutions; the IMF assigns voting shares based on financial commitments and the Young Professionals' Program of the United Nations takes financial contribution to the UN into account when deciding which countries are eligible for the programme on a yearly basis. It could be argued that climate governance cannot or should not function in the same manner because of its fundamentally different dynamics. Although climate change affects all of us, it doesn't affect us all equally. Countries with coastlines and deserts, those along the Sahel, and pacific islands amongst others are disproportionately affected by climate change both in terms of the severity and the shorter timeline. The effect of climate change on populations therefore is not dependent on how much their government contributed towards mitigation efforts but rather their unalterable geographic position. For example, rising sea levels will wreak havoc in Bangladesh with some estimates putting the entire country under water, though unfortunately it's impossible to physically move the country of Bangladesh elsewhere on the world map. Switzerland, by comparison, will not be as severely affected by the same issue within the same time period due to their inland geographical position. Despite their ability to contribute more financially to global

efforts, the concerns of the average Swiss citizen with regards to rising sea levels are vastly different from that of a Bangladeshi subsistence fisherman or farmer because of the different way that the changing climate affects each of them. Bangladesh, with its 160 million strong population compared to Switzerland's 8 million might not have the capacity or the resources to tackle climate change on their own but their elevated risk levels and larger at-risk population would mean they should still have a seat at the table to shape the policy that affects them more than it affects others. Herein lies one of the biggest problems with climate governance: whether it should be on a country wide basis where Luxembourg and Indonesia have an equal vote, or whether it should be on a population wide basis where smaller sovereigns like Luxembourg (including many countries in the EU which are expected to finance the endeavour) will have a miniscule say compared to giants like India and China. Assigning voting rights on a population basis even if accounting for factors like susceptibility will alienate the nations with comparatively lesser populations but assigning votes on the basis of one-country-one-vote will mean the concerns of the larger global population may potentially go unheard or unaddressed. The combined population of 28 EU member-states stands at roughly 500 million inhabitants today which makes up roughly 6.5% of the 7.7 billion people living on the planet but according to Credit Suisse's Global Wealth Databook of 2018, Europe holds nearly 27% of global wealth. India by comparison has a little less than 1.9% of global wealth whilst accounting for 17.5% of the global population or 1.35 billion people, nearly thrice that of the EU. An adoption of a population-based-voting approach suggests that the likelihood of European financial contribution towards mitigation efforts in developing countries like India would be affected if they don't have as much of a say in how or where it is spent. The global wealth disparity adds a complexity of a unique nature to this problem because the worst affected have the least recourse in terms of affordability. On the other hand, if contributions from developed countries fail to materialise, their own efforts for pollution reduction will be moot since developing countries will inadvertently match that with increased pollution by them. Whether this realization alone is enough to bridge the divide created by this issue remains to be seen but the signs are promising at least as far as the EU is concerned. Being the forerunner

in tackling climate change be it through doubling their renewables capacity in the past decade or seeking to ban the usage of diesel and coal in the upcoming years, Europe understands the need to affect change elsewhere to complement its own efforts by investing in capacity building for developing countries which it is doing so increasingly (albeit still at a very small scale compared to global needs).

[Redefining the threat of climate change in perspective: climate-induced migration](#)

It could be argued that part of the reason why climate action has been slow is the way it is defined. It is universally accepted by all barring the current Executive Branch of the United States of America that climate change is an urgent issue that could threaten the future of humanity on this planet. Unfortunately, however, it has been looked upon as a long-term concern pertinent to the next generation and the buck has just been passed along. The Rio Conventions of 1992 date back over a quarter of a century, clearly showing that climate risks were at least understood in part and the need to tackle them was accepted almost universally since then but the expectation of a solution somehow materializing down the road possibly hampered the search for one in the short-term. A lot of the progress made today is in part thanks to technological advancements but have been made possible only through massive investments in research and development and in achieving economies of scale. The drastic reduction in the cost of energy storage technology like batteries has also made systems a lot more viable than they were two decades ago. The international community's current response might not be adequate to tackle the issues at hand, but it is undoubtedly a much more committed and financed response when compared to the past partly thanks to a better understanding of the urgency of the situation. A measured response, however, would require tackling all the accompanying effects of climate change instead of only seeking to slow it down or halt it. The unprecedented level of carbon content in the atmosphere today means that climate change is inevitable and all we're currently doing through our energy transitions and reduction in pollution is softening the impact in the short term whilst we figure out how to go carbon-free in the long term. Fossil fuels play an important part in our lives and ceasing their usage overnight isn't just expensive, it is practically impossible. Most

decisions that are made with regards to climate mitigation efforts try to take this fact into concern whilst drafting policies which is why we hear the word transition used a lot more frequently than replacement.

When compared with the global response towards other emerging threats like religious or ideological extremism and terrorism, one cannot help but notice the differences in response compared to climate change. Global defence spending is a mammoth compared to investment in renewable energy and climate adaptation partly because of the threat perception it provides. It is an urgent problem which kills people today instead of two or three decades down the road, so it is dealt with urgently, or at least that is how the issue is framed. Climate change could displace and kill a far larger number of people, but it is only now that politicians and policymakers are beginning to realize that the timeline is much shorter. It is with that realization in mind that the importance of climate refugees arises. By one estimate, the number of climate refugees could reach one billion by the year 2050, or nearly 1 in 9 people globally.¹¹ Other estimates like those of the World Bank are more conservative in their approach, estimating 143 million displaced people by 2050 in just three regions alone when accounting for climate mitigation and adaptation activities as they are currently projected. ¹²This when combined with economic migrants would be an alarming number of people being forced to move to ensure survival competing for a decreasing landmass and resources with an ever-growing global population. If the outcome of the European migrant crisis stemming from the Syrian Civil War and the larger conflict in the Levant has taught us anything, it is that migration is voluminous and practically impossible to stop by force (at least not without violating human rights or threatening lives in the process). To avoid a disaster of a similar nature, logic would suggest that preparedness would be the best course of action. Climate change has already displaced millions (nearly 20 million people in 2014 alone), but the impact has largely been absorbed within the regions themselves, placing pressure on already scarce resources

¹¹ Kamal, Baher. "Climate Migrants Might Reach One Billion by 2050." *Habrá mil millones de migrantes por razones climáticas en 2050* (2017).

¹² "Https://Time.Com". 2019. *Time*. Accessed June 5 2019. <https://time.com/5206716/world-bank-climate-change-internal-migration/>.

in especially vulnerable regions like Sub-Saharan Africa.¹³ This trend is expected to change as more people are affected over a larger area and the lack of economic opportunities in the region for these fresh migrants might (and possibly will) mean that the flow is redirected towards developed countries which may also be unable to tolerate the burden in sheer numerical terms unless they are adequately prepared for it.

The 1951 Refugee Convention does not recognize climate or extreme weather as grounds for asylum.¹⁴ This effectively means that those fleeing climate crises are not given the same protections and social benefits as those fleeing persecution or political crises, which places these migrants in a limbo. These people are making a permanent move however, as the climate where they come from is no longer liveable or sustainable for long term survival so placing them under the category of people seeking temporary protection (such as those fleeing civil unrest) is also not a sustainable option as they aren't there temporarily. The threat they face is permanent in nature making the place of their origin uninhabitable in many cases, making their migration long-term to permanent. This increases instability for these migrants as the lack of recognized protective status burdens them financially, deprives them of the benefits afforded to other refugees that help them integrate and progress, whilst simultaneously placing a psychological burden of uncertainty on them. The effect of climate change is thought to be so serious that many experts now agree on its contributory status towards the Syrian Civil War where the extended drought between 2006-2010 led to inflation and urban migration as well as increasing resentment towards the ruling regime for their corruption, bad governance, and inability to mitigate the problems of the masses.¹⁵

There are a few reasons as to why the Refugee Convention hasn't been kept up-to-date; climate-induced migration has only intensified as much recently but has still been going

¹³ "Publications | IDMC". 2019. *Internal-Displacement.Org*. Accessed June 5 2019. <http://www.internal-displacement.org/publications/global-estimates-2015-people-displaced-by-disasters>.

¹⁴ Refugees, United. 2019. "Convention And Protocol Relating To The Status Of Refugees". *UNHCR*. Accessed June 5 2019. <https://www.unhcr.org/3b66c2aa10>.

¹⁵ Kelley, Colin P., Shahrzad Mohtadi, Mark A. Cane, Richard Seager, and Yochanan Kushnir. "Climate change in the Fertile Crescent and implications of the recent Syrian drought." *Proceedings of the National Academy of Sciences* 112, no. 11 (2015): 3241-3246.

on long enough to demonstrate a possible gap in legislation with regards to this category of migrants who seek refuge from the changing climate or its side effects. One of these reasons for the lack of a framework or set of conditions under which to inspect the applications of the applicants to deduce eligibility is the difficulty in attributing the share that climate alone played in each specific case as climate change is usually a driver for other issues that culminate in the decision to move to another country. Climate change induced calamities also differ greatly from region to region and even within different parts of a region itself; harmonizing those different scenarios into a set criterion is difficult because the evaluation of each scenario is largely subjective owing to their uniqueness. Another problem encountered when developing such a framework under the Refugee Convention is the lack of consensus on how severely climate change can impact someone on an individual level requiring them to migrate abroad instead of within their country, or whether the threat to life is serious enough in the majority of cases to justify protection and asylum status. There's also the issue of authenticity; irregular migrants have been caught multiple times lying about their origins and pretending to be from a warring country instead to improve their chances. Poor local citizen identity records in many developing countries make it difficult to pinpoint where in a specific country a person lived or has migrated from, and the combination of these factors demand a strict regime to lower the potential for abuse. The consensus on the need to protect people fleeing from climate-related disasters, therefore, will possibly be a lot easier if the potential for economic migrants slipping into the same count is reduced to help tackle concerns from states less amicable to the idea. Regardless of the issues that are likely to crop up when discussing this specific topic, the larger issue is the sheer lack of discussion within the international community on this topic to begin with. Climate refugees are expected to pose significant financial and logistical challenges to all target countries and the lack of preparedness to address such an issue which is agreeable on an international level will prove to be detrimental. By leaving out this important effect of climate change when devising policy, policymakers are potentially putting other plans for climate change mitigation and adaptation at risk by not diverting funds and attention in a timely fashion to a problem that already exists

today that will simply become worse as time passes. Unprepared massive climate-induced migration will take attention and resources away from other efforts in addition to possibly invoking migration-related surges in right-wing nationalism as was seen in the case of Europe during the Syrian Refugee Crisis. To my knowledge, anti-immigrant rhetoric has gotten exponentially worse despite a drastic decrease in migrant numbers thanks to the deal with Turkey and European efforts to process migrants in detention centres overseas at points of transit or origin instead of within its boundaries. This sets a dangerous tone for future conversations about migration which despite all its opposition is a reality that will continue to not only exist but worsen in intensity and nature due to the catastrophic effects of climate change.

[The role of affordability and access to finance in determining success on a micro-level](#)

The existence of Common But Differentiated Responsibility and Respective Capability tells us that the world understands how difficult it can be for developing countries to finance a transition towards cleaner energy sources and lower pollution. Mentioned earlier in the paper are just some of the disadvantages that developing countries face but nothing is more challenging than the lack of finance and technological ability. Decades of migration of skilled workers, professionals, and academics from the developing to the developed world has resulted in developing countries struggling to retain and subsequently exploit their human capital. This continuous brain drain has now led to a situation where countries like India which have produced some of the brightest minds in the technology industry are forced to buy the technology created by their own citizens at a premium from their employers abroad in places like Silicon Valley. Whilst this issue has been covered extensively by multiple researchers and is easy to diagnose, there's another largely ignored issue and that is of the effectiveness of government policy in developing countries in an environment largely un conducive for micro-level change. Simply put, how effective government policy can be if its citizens do not possess the resources to help complement those policies to cut down on pollution.

Many developed countries have seen a promising surge in citizen action to help combat climate change. Be it through the installation of solar panels or wind turbines in homes to reduce dependency on the fossil-fuel powered grid or shifting to an all-electric car for their daily commutes, citizens in these countries are playing an increasingly active role in supplementing and in many cases even driving government action on climate change. Governments in these countries have largely offered rebates in the form of tax credits and refunds to citizens making capital expenditures on environmentally friendly goods to help incentivize and reward their action. In Germany, multilateral lenders like the KfW Bank (Kreditanstalt für Wiederaufbau or the Credit Institute for Reconstruction) commit tens of billions of euros on a yearly basis towards housing and the environment, providing low-interest loans for solar panel and wind turbine installations as well as for renovations to make houses more energy efficient. These loans are accessible for citizens and aren't predatory in nature; the bank needs to make money, but since it is owned by the government and the states in Germany, the priority is to assist citizens in making the transition instead of bankrupting them in order to repossess their collateral. Such loans by the KfW alone have directly assisted in thousands of homes making the transition and they aren't alone. Businesses too benefit from KfW's low-interest loans to transition towards carbon neutrality and are better equipped to make the investment due to the low cost of financing. Whilst KfW's largest share of investments is within Germany and Europe, they finance renewable energy abroad as well and have in the past years increased solar-energy production in India by 200MW in addition to their work on pre-fab carbon neutral housing for the country's low-income groups though these figures are dwarfed when compared with their work in their own region. The existence of such institutions and the ability of developed countries to easily afford providing tax rebates to citizens proves as a catalyst for change; a catalyst that is sorely missing in developing countries. It can therefore be argued that the success of a global effort to tackle climate change will definitely hinge on improving this accessibility to transition not only at a government level, but also at a citizen level. A 2013 estimate predicts that developing countries will be responsible

for the consumption of 65% of global energy by the year 2040.¹⁶ This 65% in today's context might turn out to be wildly inaccurate; since 2013, birth rates in the developed world have steadily fallen and the Chinese government has abandoned its one-child policy, both of which could take this share much higher than the prediction. If that is truly the case, household consumption in developing countries will form the lion's share of global energy consumption by that time and not providing adequate resources to ensure that that energy is clean could prove detrimental to the success of other efforts.

¹⁶ Woody, Todd. 2013. "Here's Why Developing Countries Will Consume 65% Of The World's Energy By 2040". *The Atlantic*. Accessed June 6 2019.
<https://www.theatlantic.com/technology/archive/2013/12/heres-why-developing-countries-will-consume-65-of-the-worlds-energy-by-2040/282006/>.

A 'global' cap-and-trade system

The idea of cap-and-trade systems is not new in 2019. The EU ETS has been functional for over a decade now and is currently in its third phase where the free allowances are limited mainly to carbon-leakage-prone sectors and total allowances have dramatically decreased (the cap, in the name cap-and-trade) when compared to the previous two phases. The program is on track to mostly meet its target of 21% reductions by 2020 compared to 2005 levels and despite its earlier hiccups has proven to be highly effective in reducing the single market's carbon emissions. Other cap-and-trade systems are being piloted in selected locations in other countries; China has cap-and-trade models being tested in many mid-to-large cities with a wider implementation expected in the upcoming year or two and in North America, the Canadian province of Quebec has a joint market with the US State of California where limited cross-border carbon emissions trading is taking place. There is no truly 'global' system or a wider iteration outside the EU and with the targets under the Paris Agreement looking increasingly difficult to meet, it could be argued that the time is now or never.

A cap-and-trade system has two major components: the cap, whereby a total allowance for a specific jurisdiction is decided and allotted either by auction or by way of free allowances or a combination of both and the total number of allowances are reduced over time; and the trade, whereby companies then fulfil their shortfalls by buying the credits from other companies that have excess credits or from a registered carbon offsetting program eligible to sell credits. The decrease in total allowances cuts total pollution over time as companies gradually make the technological investments needed to reduce their carbon footprints whilst simultaneously propping up the price of the allowances (also known as credits) which go up as the supply decreases. Therefore, in order to implement a global cap-and-trade system, the introduction of a cap will entail calculating the 'acceptable' level of pollution to meet the necessary targets required to keep pollution below 2°C and then allocating it to each country party to the agreement which would then allocate credits to local business in the selected sectors and establish local trading markets for the credits. The changes in allocation year-over-year need to be pre-defined in order to provide a transition timeline to affected businesses, and the

global trading system as well as its framework has many needs including those of governance, oversight, compliance, and regular evaluation-based upgradation. The allocations of these allowances will need to be based on a system of equity, preferably via a per-capita method accounting for deficits like development statuses and climate-induced energy needs. This chapter will seek to lay out how the hypothesized system would be structured, focusing mainly on its premise, functioning, governance, and compliance mechanism aspects as well as what equity means and how it can be translated into agreeable policy. It will present this based on the presumption that national governments are rational and possess the will to affect actual change as well as the assumption that climate change and the contribution of humans to that change are universally accepted facts by all parties.

Equity instead of equality

The word 'equity' is often overlooked in favor of the more popular 'equality'. Merriam-Webster defines equity as 'justice according to natural law or right',¹⁷ which sounds like it is based on subjective individualistic judgement. Loosely defined, however, equity is the act of treating everyone the same. In contrast with equality, equity doesn't aim to treat everyone similarly; instead, it strives to provide everyone the tools needed for success by levelling the playing field, or making sure people have an equal opportunity to succeed by allocating proportionally more resources to those who have been historically disadvantaged or face more challenges to achieve success. In an increasingly changing world with dynamically different challenges facing the global community, an approach that tackles both historic disadvantages as well as current capabilities to adapt needs to be adopted in order to tackle the biggest threat that we as humans face in the 21st century: climate change. At the risk of sounding repetitive, it is important to underline the financial struggle that the majority of developing countries face whilst attempting to meet the basic needs of their citizens today. Drowning in debt, many of these economies have deep-rooted structural issues that would require expertise,

¹⁷ "Definition Of EQUITY". 2019. *Merriam-Webster.Com*. Accessed June 2 2019. <https://www.merriam-webster.com/dictionary/equity>.

policy overhaul, and considerable financial resources in order to redirect them towards a sustainable economic future. Facing these conditions, often over decades of economic mismanagement, both the feasibility and the willpower for financial commitment to fighting climate change is non-existent. Indeed, one of the goals of the NDC-based mechanism of the Paris Agreement is to demonstrate to these countries the relative easiness of achieving modest targets as well as the benefits they can bring if achieved. If a global cap-and-trade system is to play a role in helping to achieve these targets, then a global cap will have to account for many factors whilst distributing the allowances among the parties.

Even before accounting for development status, climate-related externalities, and perceived past injustices, consensus needs to be reached on the basic principle of this allocation being based on a per-capita calculation. Countries with larger populations, regardless of their current per-capita energy consumptions, should have a higher allowance than those with fewer people. This is to say that the current environment of an average American citizen consuming five times more energy than his or her counterpart in a developing country should not be the basis of allocating five times more allowances to the United States, rather they should both be allotted the same per capita allowance in principle, with countries later being able to trade their excesses and deficits between themselves. An extensive mapping carried out by a recently formed alternative ratings institution called Beyond Ratings that focuses on including sustainability as a key performance indicator for credit ratings provides a good basis for the proposal laid out in this paper. Their model is based on UN populations estimates for 2030 and includes a whole set of criteria including GDP per capita, GDP energy intensity, primary energy CO₂ intensity, greenhouse gas emissions per capita, energy-related CO₂ emissions per capita, greenhouse gas emissions excluding CO₂ from energy, primary energy consumption per capita, and cumulative CO₂ emissions per capita. Their model as published is based primarily on Japanese professor Yoichi Kaya's model which lays down a method to allocate pollution 'rights' by taking into account GDP,

population, energy needs, and levels of pollution.¹⁸ They calculate the total carbon emissions cap to keep global warming under 2°C to be 38416 MtCO₂eq and then allocate that pollution among all the countries in the world based on the factors mentioned above. Most countries have a per capita allowance of between 3.5 tCO₂eq and 4.5 tCO₂eq whilst some countries include those around the Sahel and central Africa have allowances as high as 9.13 tCO₂eq to account for the additional challenges they will face as the climate changes.

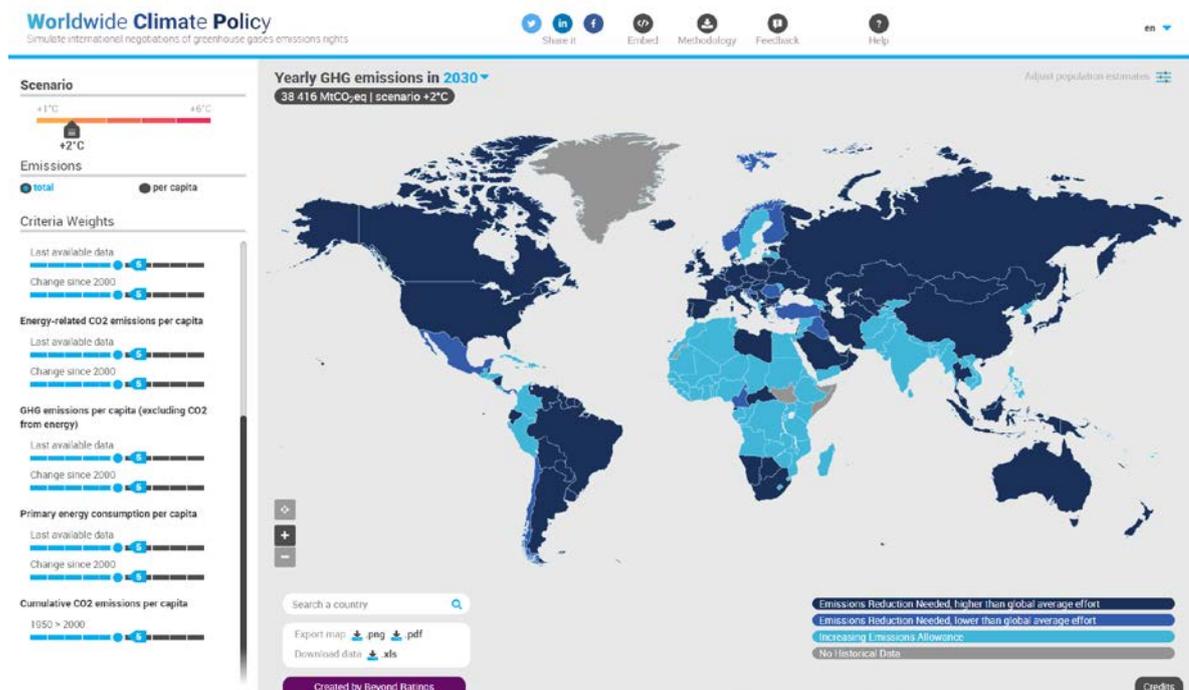


Figure 2: A look at the Worldwide Climate Policy model¹⁹

An allocation of pollution ‘rights’ to countries based on this model would mean that the majority of the developing world will have to cut down on carbon emissions faster than the global average with only some countries’ obligations lying below the average global effort required. Most developing countries outside of South America that do not possess hydrocarbon reserves (and with them, the finances to fulfil the needs for

¹⁸ Developed by Yoichi Kaya, professor at Keio Tokyo University and President of Japan Society of Energy and Resources, in « Environment, Energy, and Economy: strategies for sustainability », 1997. The work of the Intergovernmental Panel on Climate Change (IPCC) makes explicit reference to this tautology (see <http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=50>)

¹⁹ Beyond Ratings, “Worldwide Climate Policy” <http://worldwideclimatepolicy.eu>

transition) have increased allowances through 2030 which is partly also due to their increasing populations.

Once these 'rights' or 'allowances' are distributed, they can be revisited and reassigned based on changing demographics and needs once every 5 years starting from 2030 up until 2050, after which depending on the results it may be extended to a 10-year period to allow for longer term planning. Besides these periodic revaluations of the distribution of the total pollution allowances, a tiered rate for the reduction of total emissions, i.e. the annual reduction of the cap, is also needed based on the distribution of all parties into four major groups that are discussed in detail in sub-section immediately following this one. The reduction of this total cap on an annual basis will result in the reduction of total pollution in the world. Throughout this time, biannual reviews of carbon reduction efforts resembling the already proposed system under the Paris Agreement can be conducted with input from the Subsidiary Body of Scientific and Technological Advice (SBSTA) to ensure that joint mitigation and adaptation resources can be allocated based on need and effectiveness. The UNFCCC will retain guardianship of the allowances and their allocation within the larger role it plays in combating climate change.

[Tiered markets and price-control](#)

The success of a cap-and-trade approach depends on being able to prevent the issues that other iterations such as the EU ETS faced or still face, including the ability to buy Certified Emissions Reduction credits from developing countries at a lower cost compared to EUAs from other European countries. A tiered system is proposed which will ensure price stability of credits, revenue generation opportunities for the governments, and improve incentives for companies to invest in transitioning instead of relying on the availability of cheaper allowances. A big reason that the EU ETS works well is because it is limited to the European Union and only 3 other countries that are already within its single market, making the countries largely economically comparable in terms of key performance indicators. Whilst market sizes and outright values differ greatly even within the EU, the markets have a lot in common with each other in terms of stability, outlook, structure, governance, and harmonized laws and regulations. To

ensure that the global iteration is also successful, it will need to build up on a similar model for which this paper proposes 4 different tiers. These tiers will range from Highly Developed Economies (Kyoto Protocol Annex-I inspired), Economies in Transition (also inspired by the Kyoto Protocol's distinction), Least Developed Economies (inspired by the UN's LDC list), and Developing Economies (everyone else). The distribution of countries into these four groups will create four operationally separate but collectively governed emissions exchanges for cross-border emissions trading. Instead of using national exchanges for local trading, economies at a similar stage of development can be grouped into these tiers to create larger markets with more potential for trade and enough diversification to prevent country-specific shocks to pricing of the credits on the specific exchange in concern. The target pricing for each of the exchanges will be different and optimally on a scale with the Highly Developed Economies exchange having the most expensive credits and the Least Developed Economies exchange having the cheapest. All trading will be subject to a fee across all exchanges, and trading between exchanges of different tiers will be streamlined and taxed to generate revenues for the countries that are part of the selling exchange (the presumption here being that higher tiers will purchase credits from lower tiers owing to their abundance and lower prices in accordance with market principles). This will theoretically also support the price of the credits within their individual exchanges as the additional taxation on credits traded between exchanges will lower the price gap enough to still keep credits from higher tiered markets relatively competitive while also making the lower tiered market's credits attractive enough to purchase. The financial details and revenue generation model are covered in the next section.

[Using tiered markets as an additional financing mechanism](#)

While the introduction of cap-and-trade worldwide will mean that states can generate revenues by way of auctioning their allowances domestically, there is a lot more potential for revenue generation in this model. As a start, all transactions regardless of the exchange tier can be taxed modestly between 3-5% to generation a steady stream of revenue that will contribute to a global pool administered by the UNFCCC for strategic investments for climate change mitigation efforts in the most severely affected areas

that need additional finances, a kind of emergency response fund of sorts. This will help ensure the constant availability of a considerable sum of money; the value of global CO₂ markets last year stood at a record €144 billion, up 250% from the preceding year with volume exceeding 9 billion carbon permits.²⁰ This figure mainly comprises the EU ETS, the Western Climate Initiative (WCI), and Regional Greenhouse Gas Initiative (RGGI) with the emerging markets in China and South Korea still seeing very limited trading despite encompassing large volumes of emissions.²¹ This amount would go up considerably with the introduction of the new markets and exchanges and 3-5% of this amount would be a relatively large sum at the disposal of the UNFCCC to commit towards the global collective effort especially since private industries will be financing it through the special taxes and not the party governments themselves.

Another revenue generation method to complement the first is the taxation of cross-tier trading by governments where the credits are coming from. Since the trading will be conducted via the exchange, this can be collected upon sale and the credits exiting the respective exchange and held in a general pool, the proceeds from which can be disbursed on a bi-annual or annual frequency according to the origin of the 'exported' carbon allowances. The reason for this money being held in the general pool also relates to compliance which is explained in more detail in a later section. The idea of taxing cross-tier trading to reduce price gaps is also very useful since it will generate finances for countries that do not use up their entire quota and instead resell it abroad; a provision for countries having the ability to not allocate all their free allowances and sell some directly on the exchange as the government instead of locally auctioning them can also be introduced to incentivize governments to take a more conservative approach to giving away free allowances. As the cap decreases over time, these extra allowances will reduce in number making them more valuable. In the short run, it will ensure a stream of financing coming from corporations in developed countries and the

²⁰ "Value Of Global CO₂ Markets Hit Record 144 Billion Euros In 2018:...". 2019. *U.S.*. Accessed June 5 2019. <https://www.reuters.com/article/us-global-carbontrading-report/value-of-global-co2-markets-hit-record-144-billion-euros-in-2018-report-idUSKCN1PA27H>.

²¹ *Ibid.*

levy can be earmarked for climate mitigation and adaptation investments especially those relating to infrastructural needs in developing countries. Since developed markets will already have to make more than the average effort to combat climate change and reduce the number of allowances much faster to stay within their 'pollution rights', this availability of allowances from other countries will help supply keep up with demand whilst ensuring a decrease in total global pollution. Since this money is coming from the private sector in developed countries and not from the government budgets, the risk of opposition from citizens of these developed countries is also reduced as it isn't equivalent to the government handing over large sums generated through domestic taxation to foreign governments in developing countries. Whilst the developed countries will still be making infrastructural investments, assist with easy financing, and engage in technology-sharing efforts to help improve the accessibility to sustainable development for developing countries, this can serve as an additional measure to reduce the direct financial burden on them whilst simultaneously lowering the domestic audience costs for the governments of these developed countries.

[Regulatory oversight of the new system](#)

The success of this global cap-and-trade system also heavily hinges on its successful governance. In order to lower the cost of governance and improve both its efficiency and effectiveness, the regulatory oversight component of the exchanges needs to be separated from the overall governance of the project. Whilst the UNFCCC is equipped to help shape policy on climate change, market regulation and the oversight of exchanges lies outside of the scope of its competency. This is why the plan suggests the moving of the securities portion of this approach (exchanges, derivatives, futures, and the like) over to an organization like the World Trade Organization which has a history of expertise in trade, dispute settlement, and duties. It has most of the necessary qualifications, with a few additions of course, to regulate the exchanges and the government-set taxes on them, and can adapt to fulfill the role a traditional Securities and Exchange Commission would play in the regulation of emissions trading exchanges and markets. An middle-ground will be needed between regulation and the forces of

the free market, and the WTO has considerable experience dealing with both as the main arbitrator dealing with trade wars in the world.

With this component of market regulation separated from the larger issue, the UNFCCC can focus on climate policy and monitoring the failures and successes of country-specific, regional, and wider efforts being made. Besides this, the UNFCCC will also be in charge of deciding which projects to finance with the common fund generated through the levy on all trading and will be conducting oversight for technology sharing between developed and developing countries. Governance, however, is more than just the fulfillment of mandated tasks. Effective governance demands that accepted good practices are followed and this demand with regards to tackling climate change is no different. The new system is being proposed to help make the targets of the Paris Agreement more achievable with a collective global effort to implement a system that has already proven to work in Europe, but its implementation does not mean that it will seek to replace all other existing or proposed efforts to combat the larger problem. Indeed, the emissions trading system is just one component of the larger fight against climate change that deals specifically with reduction of pollution through the cap-and-trade system. It will theoretically help work towards the goal of reducing the speed at which the temperature of our planet is rising, but it cannot do it alone. The controlling of emissions will only be possible in the long term if the necessary infrastructural changes and expensive investments are made and whilst this cap-and-trade system will partly assist with the finances of that transition, it will not automatically make the right investments. That function will still lay largely with the countries, many of which will look towards the UNFCCC for policy guidance and expertise on the matter.

[Compliance and governance](#)

A large portion of the previous section has been focused on criticizing the shortcomings of the compliance mechanisms of the current Paris Agreement and the difference in the approach when compared to the Kyoto Protocol. This paper has tried to demonstrate the perceived ineffectiveness of this system and the need for reformation proportional to the urgency of the threat of climate change. The introduction of the global cap-and-trade model opens up an important discussion within this realm: what does the failure

of a country to fulfill its commitments under this new regime exactly entail? This subsection will aim to address this question in the context of the larger problem and define the different levels of governance as well the different stages at which they will be needed to ensure the success of this system but more importantly its larger mission of emissions control.

After heavily criticizing the lack of decisive repercussions for the failure to meet targets in favor of consensus building, this author is by no means suggesting that a similar approach be used to govern this new mechanism. From reductions of the total cap to allocating the allowances, each step of the process as well as its iteration in the different countries will have to be governed. Once the allowances are assigned, monitoring systems as well as a large ground team will need to be established to ensure that countries are keeping with their assigned allowances. This is by far the main monitoring need that the system has, as self-reporting of emissions figures cannot be relied on in an absolute manner due to the potential and incentive to misrepresent figures. A monitoring body can ensure, through a combination of random checks and inspections as well as technological aids like air and water quality monitors at strategic locations to ensure that countries party to the agreement are successfully implementing the necessary directives.

Another necessity for governance is the establishment of a punitive framework to deal with violators. Countries that fail to meet their obligations by a margin higher than the predetermined cut-off percentage without a good reason that is accepted by at least a simple majority of other parties should be financially penalized to ensure compliance. In the case of the bottom two tiers, developmental assistance and technology sharing as well as the proceeds held in the exchanges from taxed credit exports can be leveraged against this compliance and induce the willingness to pay the relevant fines. In the case of developed countries the leverage decreases, but if a joint mechanism is developed whereby access to markets of all other members is temporarily suspended for the offending party refusing to pay, or a sanction on exports or other activities collectively by all the other parties is placed, it can possibly prove to be a serious enough set of repercussions to ensure compliance. The risk of countries exiting the agreement

always exists, but that risk exists with or without financial penalties. Canada's withdrawal was almost a decade ago and the narrative on climate change has developed considerably since then as has public opinion and pressure. Domestic pressure from an increasingly aware populace will increase domestic audience costs for non-cooperative governments, and that can be as if not more effective than the current compliance system in place which depends on peer-pressure from other countries to perform better with no real consequences.

Scope of the cap-and-trade system

Like the EU ETS, the scope of the cap-and-trade system can have a timeline for the roll-out and implementation. In order to curb global pollution and reduce carbon emissions, the regulation of every single particle of carbon released into the atmosphere will not be necessary. Despite the urgency of the situation and the unprecedented level of carbon content in our atmosphere today, we do not need to eliminate all carbon emissions from our lives (not to mention it is impossible as things stand both in terms of practicality and technology). The EU ETS targets just over 11,000 installations across 31 countries and manages to cover 45% of combined EU greenhouse gas emissions through a method of highly selective targeting. It targets heavy energy-using installations like power generation plants and industrial units as well as airlines, whilst ignoring the things like domestic usage of natural gas for cooking or heating purposes, effectively leaving much of the population's daily lives largely unfringed. Like the ETS, this global cap-and-trade system will target mainly industrial units, power plants, and air travel, placing regulation on large corporations many of whom already have compliance officers for other regulations and can adapt quickly and more efficiently than individual consumers or citizens. By targeting the source of the bulk of our emissions today (excluding those from livestock farming) and reducing them dramatically over time, meeting the targets under the Paris Agreement will not just be more realistic, but will be a lot faster and consistent. Heavily pollutant sectors like those shown in Figure 3 below will bear the major target under the different phases of the roll-out. It is up to policymakers and representatives of the different countries to work out the final details of what the system can or should be; this paper just looks at some

scenarios and mechanisms based on other successful implementations and tries to model them for a more global iteration to complement current efforts to mitigate climate change.

Key features	Phase 1 (2005–2007)	Phase 2 (2008–2012)	Phase 3 (2013–2020)
Geography	EU27	EU27 + Norway, Iceland, Liechtenstein	EU27 + Norway, Iceland, Liechtenstein Croatia from 1.1.2013 (aviation from 1.1.2014)
Sectors	Power stations and other combustion plants ≥ 20 MW Oil refineries Coke ovens Iron and steel plants Cement clinker Glass Lime Bricks Ceramics Pulp Paper and board	Same as phase 1 plus Aviation (from 2012)	Same as phase 1 plus Aluminium Petrochemicals Aviation from 1.1.2014 Ammonia Nitric, adipic and glyoxylic acid production CO ₂ capture, transport in pipelines and geological storage of CO ₂
GHGs	CO ₂	CO ₂ , N ₂ O emissions via opt-in	CO ₂ , N ₂ O, PFC from aluminium production
Cap	2058 million tCO ₂	1859 million tCO ₂	2084 million tCO ₂ in 2013, decreasing in a linear way by 38 million tCO ₂ per year
Eligible trading units	EUAs	EUAs, CERs, ERUs Not eligible: Credits from forestry, and large hydropower projects.	EUAs, CERs, ERUs Not eligible: CERs and ERUs from forestry, HFC, N ₂ O or large hydropower projects. Note: CERs from projects registered after 2012 must be from Least Developed Countries

Figure 3: Key features of the EU ETS across trading phases²²

²² European Commission, *EU ETS Handbook (2015)*, p. 18, 19; available on https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf

Conclusion: Criticisms and the wider debate on climate change

Dissecting the proposal on a global cap-and-trade system

The proposal for a global cap-and-trade system is surely one based on an ideal world where countries cannot wait to cooperate with each other to help tackle serious issues and are in need of a quick and effective way to tackle climate change, preferably one that is tried and tested and can be implemented in a smooth manner. The problem with the proposal above is that is precisely everything but that. Through the course of my research on the topic and the formation of an ideal system with minimal hiccups to test the hypothesis of whether such a system would make sustainable development more accessible and combat climate change, many issues with a global approach as well as the system itself have come to light. The model is based loosely on the EU Emissions Trading Scheme, so it would be prudent to start from the major differences that make that model difficult to implement on a global level.

Countries within the European Union and the single-market voluntarily 'give up' parts of their sovereignty on issues that fall within the competency of the European Commission, for example on external trade, or the visa regime of the bloc in the case of countries that are also a part of the Schengen Agreement. Whilst the European Commission gets its authority from these countries voluntarily handing over the right/responsibility on matters falling within the competency of the EC, the situation is very different when it comes to how the rest of the world conducts itself. The UNFCCC or even the larger United Nations system is not an international parliament; the UN is instead an intergovernmental organization that has very limited powers outside its Security Council which is the only body within the system whose decisions are legally binding. Countries have no obligation to follow the recommendations or decisions of the United Nations unless they come from the Security Council, in which case their legitimacy stems from the member-countries that comprise that Security Council and other member countries of the UN that pledge to help implement those decisions of the council. The European Union is a very well-integrated group of countries with complex interdependencies and shared common values and goals that make working together easier. Despite differences in opinion on specific issues between member

states of the European Union, it largely functions well together as a group owing to many factors including geography and largely similar levels of development among the majority of its members. This is why something that works in the European Union cannot and will not necessarily work the same way elsewhere because the same environment to foster cooperation as well as the presence of a higher authority that states agree to listen to and be a part of does not exist, authority being the key word here. States around the world treasure their sovereignty and whilst a system like the European Union can work with 28 members (cracks amongst whom are already visible), even their ability to work as effectively with 193 members would be seriously reduced. The current system allows member countries to veto decisions and make contributions on equal footing to regulations and legislature, but if it is difficult to get consensus amongst 28 members, one can only imagine how difficult it will be to get consensus amongst all the countries of the world for such a system to be put into place. Since no supranational authority exists to implement such a framework even by means of a qualified majority, none of the member states of the United Nations will be specifically inclined to join the system or be willing to subject themselves to its authority. Yes, the question of climate change relates to the collective future of humanity, but the diversity of the countries in the world be it with regards to their economic status, political system, level of education, or anything else, is a divisive factor for them.

The idea of tiered markets can help mitigate the differences between the economies, but larger issues like currency for trading and settlement mechanisms for dues remain unanswered. The size of the issue and the mammoth task of actually implementing such a system could make it a decades-long process if not an entirely impossible one which will defeat the aim of faster action to combat climate change. A regional approach like that of the EU on a regional scale or national scales instead of an international one will therefore prove to be faster even if it is not theoretically as efficient, cooperative, or multilateral. The costs of governing and monitoring this system will just add to the already large costs associated with climate change and add layers of red-tape and bureaucracy to an already slow and painful process. Dispute resolution in the absence of binding international legislation to follow and accept the results of the proceedings

will make the processes effectively useless as they will hold no legal force. The potential for the system failing before it is even implemented and functional is so large that the entire exercise looks too futile to even attempt from a practical standpoint.

[Examining the issue of sustainable development and growth to fight climate change and the model's ability to improve accessibility](#)

One of the things this paper sought to examine was the likelihood of such a system improving accessibility to sustainable development for developing countries. Improving this access through the system itself is obviously not possible if the system itself faces, but in order to access its potential impact let's assume for a second that the model for a global cap-and-trade system is viable and works. We then reach the question of whether the revenues generated from the system will actually make a noticeable impact on improving the accessibility for these developing countries or not. Some main factors that will affect this improvement in accessibility include wealth disparity between nations as well as the difference in the needs of countries to implement more sustainable development and growth.

First and foremost, we come to the effectiveness of the revenue generated through the trading system in helping developing countries better-afford technological advancements to not only combat climate change but simultaneously implement a more sustainable long-term growth plan and follow it. The key issue over here is that the revenue generated through the taxation of the trading system will turn around and return to the developed countries, the firms in which paid that money to begin with. Because developed countries effectively hold the monopoly on technological advancements in the 21st century, developing countries are forced to turn towards them for their technological needs. While technology-sharing is an integral part of the Paris Agreement, developed countries have less of an incentive to sincerely follow it because the opportunity cost is lost growth for their own economies. If their companies can sell the latest technology for large sums of money, the technology transfers will be comprised mostly of older technology whose R&D costs have already been recouped repeating the circle where developing countries continue to lag behind unless they can pay for newer technology. Technology sharing is also a lot easier said than done because

in developed economies the majority of technological advancements are achieved under the private sector which invests heavily in research and development and secures patents to protect their intellectual property. Because these patents are owned by private corporations and not the governments of developed countries, it is not up to the governments to share the latest technology with developing countries. Assuming an exception is somehow legally made possible, sharing this technology for free with developing countries will result in lost revenue for the companies that own the patents and they will be unable to recoup their investment into R&D and the necessary profits to justify the investment. This places a major hurdle, as the prevalent system will then have to be based on these technologies being purchased by developing countries using the funds generated through taxing the credits, further increasing the wealth gap and reducing the accessibility long-term as affordability of the new technologies gradually drops as market forces come into play.

If this extra revenue doesn't improve long-term accessibility to sustainable development for developing countries, it means that growth will not continue in a manner which doesn't reduce the earth's utility for future generations. If that is accepted as a probable scenario, one cannot help but wonder whether taking on this mammoth task will achieve anything at all in the larger scheme of things. If developing countries cannot keep up with developed ones in the long run, should they be jeopardising their short-term growth by implementing costly changes? Is the planet collectively better off by only targeting pollution by developed countries that are mainly to blame for the collective situation we find ourselves in today? Do we need to revisit the idea of a Common But Differentiated Responsibility to include culpability? These are just some of the questions that further research on the topic can help answer.

[The validity of aspirations: is the maximum of 2°C realistic?](#)

The 2°C figure is one that has largely escaped doubt or debate within the international community. In fact, it could be argued that this upper limit has formed the very basis for climate action for almost a decade and continues to be widely quoted in academics and policymaking as an unquestionable ceiling, the breaching of which would be catastrophic for the future of human life on this planet. The increase of mean surface

temperatures 2°C beyond pre-industrial levels is recognised by the UNFCCC as dangerous anthropogenic interference which must be curbed. However, questions about the history of this limit raise doubts about its suitability for achieving the main reason the targets were set in the first place: to save the world.

The concept has existed since the 1970s when William Nordhaus, an economist from Yale University suggested, as an initial estimation, that the planet shouldn't warm more than it had in the preceding 100,000 years. This count was based on the availability of ice-core data going back that long, however, the lack of available research at the time about climate change and its disastrous effects led Dr. Nordhaus himself to admit that his approximation was "deeply unsatisfactory".²³ While research continued in Europe on this limit in the following decade, it was the Swedish Environment Institute that in its paper published in 1990 admitted that based on "the vulnerability of ecosystems to historical temperature changes," it was inadvisable to breach 1°C. The authors of the paper suggested 2°C once they realized that the world had already crossed the turning point for keeping within the 1°C limit. Fast-forward to 1996 and the Council of Ministers of the European Union had set it as its maximum and it was officially adopted by the G8 in 2009. The same year at the UNFCCC COP, the Copenhagen Accord adopted it and it became a crucial part of UN policy the following year. For some reason, because 2°C was still in the future instead of the past and no other target could be agreed on, it was just accepted as *the* target to keep in mind and base policy decisions on. It's a simple figure, sellable to the public and the politicians because of its status as the embodiment of the entire issue condensed into one number. The idea that the world would be safe as long as they stayed away from this dangerous line only accounted for a part of the world; we haven't yet crossed 2°C but the effects have been devastating especially for low-lying islands and coastal areas around the world suffering flooding from rising sea levels, proving this limit wasn't universally applicable if it really did represent the point of no return. After all, couldn't we surely expect the maximum to be set at the threshold at which the most vulnerable country is still safe? Unfortunately, the 2°C maximum isn't

²³ "The 2°C Limit On Global Warming". 2019. *The Economist*. Accessed June 4 2019. <https://www.economist.com/the-economist-explains/2015/12/06/the-2degc-limit-on-global-warming>.

really as simple as the simplification of climate-change that it has come to represent. There's the measurement problem, since accuracy is a sacrificed concept when talking about the earth's temperature. There is also the issue of scientists being unable to agree whether the trend of warming slowed in the decade and a half leading up to 2013, and whether that affected the predictions in any way assuming a slower rate of warming due to the said hiatus. All in all, setting the uncrossable maximum at 2°C fails to take into account many variables that experts insist must be a part of the calculation, including the concentration of greenhouse gases in the air and ocean heat-content.²⁴ Unfortunately, the narrowing of the issue to a single number might mean that efforts are either slower than needed based on a false perception of time which could prove to be catastrophic for the future of human civilization on Earth. A new analysis by a former fossil fuel executive which has been endorsed by the former chief of the Australian military describes climate change as a "near to mid-term existential threat to human civilization" by the year 2050, which only goes to show that we might have a lot less time than we are convinced we might have.²⁵

The failure to address livestock

Depending on who is asked, livestock contributes anywhere from 14.5% to 51% towards global greenhouse emissions which at first glance is a very wide range. Animal agriculture has perhaps been the most avoided topic on the agenda when discussing climate change and making policy to tackle it.²⁶ Of this pollution, 39% is estimated to come from mainly cows, goats, and sheep belching and farting to release the methane produced in their stomachs as part of their digestion process. Another 21% is estimated to come from feed production for the cattle, and 26% from manure, which are large figures to reconcile when considering that the total contribution could be as high as 51% as

²⁴ Ibid

²⁵ "'High Likelihood Of Human Civilization Coming To An End' In 2050, New Report Suggests". 2019. *Vice*. Accessed June 7 2019. https://www.vice.com/en_us/article/597kpd/new-report-suggests-high-likelihood-of-human-civilization-coming-to-an-end-in-2050?utm_source=vicenewsfacebook&fbclid=IwAR30oqzOlvlIBU1NYntdrZkTHkmN_p7b1J6eUBx3gacdYAs-fjihguLboF8.

²⁶ "Paris Agreement Portends A Reckoning For Meat And Dairy". 2019. *Forbes.Com*. Accessed June 7 2019. <https://www.forbes.com/sites/jeffmcmahon/2016/01/01/paris-agreement-will-impact-meat-and-dairy/#5c90e933446b>.

mentioned above. The disastrous effects of meat on climate change have only recently come into a limited spotlight resulting in a small but growing community of vegans, people who get their nutrition from plant-based sources exclusively. It could be argued that the position against meat and dairy is a tough one to take; asking people to go vegan is considered a lot more demanding than encouraging them to drive an electric car and politicians realise this. Additionally, meat and dairy are, in many countries around the world, heavily subsidized industries which provide sizeable employment to unskilled labour and advocating for lesser consumption of meat could have ripple effects across the economy. Scientists agree that the consumption of meat at current levels is bad not just for the environment, but also for human health. Policymakers and politicians, however, have still not caught up and to be fair, there does not seem a straightforward way to address this issue head-on that would not cause massive outrage amongst populations around the world. Red meat and dairy have both traditionally been included in government set nutrition guides and throughout the decades have become a staple consumption. The issue needs to be studied in more detail to obtain a more accurate estimate of the contribution that livestock have so that appropriate measures can be mooted based on that information.²⁷

Final Remarks

After formulating an idealistic model based on unprecedented international cooperation to check if it could positively impact accessibility to sustainable development and the reduction of carbon emissions in a meaningful manner, it could be said that the simple answer isn't yes or no, but rather maybe. Climate change is unlike a threat we have seen before and its increasing impact might have the unique ability to serve as the catalyst for said unprecedented international cooperation especially due to its urgency but more so because of the graveness of the threat it poses to the collective future. Maybe the future of effective climate action lays in an overhaul of the global economic system and how we measure wealth and success, whether growth is important for prosperity, and whether sustainability as we understand it today has the long-term potential to remain as sustainable. The complexity of the way

²⁷ Ibid.

in which countries conduct their relations with others and the large number of total countries that together form the international community make idealistic efforts to combat problems like climate change effectively nearly impossible to implement or achieve. This is also complicated by the diversity within humans themselves from one region to another, and further complicated by the constantly changing power dynamics and roles of countries across the world. It can now be asserted that technology alone will not be able to save us; the falling cost of solar energy is a miracle in itself but if countries cannot cooperate to deploy it across the world as a viable alternative to fossil fuel based energy production, then the low price isn't as meaningful. Action against climate change is currently under assault by the presidents of both the United States of America and Brazil, two countries that are perhaps crucial to tackling climate change. One is the perhaps the world's largest per capita polluter, whilst the other is home to the Amazon rainforest, the survival of which is crucial for the environment. Arguments have been made to reclassify the Amazon as a collective heritage of the world over which Brazil should not have an exclusive say, while in the United States individual States have stepped up to contribute towards efforts to tackle climate change. It remains to be seen what the future of climate policy will look like five or ten years down the road and whether the Paris Agreement will be able to survive if other countries decide to pull out. The collective future of human beings might be at risk, but in the short-term, politics and indeed some politicians will continue to divert the discussion away from the existentially threatening nature of the issue.

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