

The Themis Mechanism: A Proposal for Equitable Global Emission Reduction

We're creating a future world which very few of us want, because of our poor collective response to climate change. This short document discusses the nature of climate change, why our current approaches are failing and what properties alternative mechanisms must have in order to be successful. Finally, a concrete proposal is made: the Themis Mechanism.

Climate change is a resource management problem

The atmosphere is a shared global resource. Increasing the atmospheric content of greenhouse gases leads to higher global average temperature, which causes detrimental living conditions almost everywhere. Therefore, greenhouse gas emissions have the essential properties of using a limited, valuable resource. However, our current system neglects explicitly valuing the atmosphere, we treat it as what economists call an unpriced externality. The refusal to explicitly value the resource leads to overexploitation, and consequently climate change.

Once we accept that our shared atmosphere is a resource, the question naturally arises, who has the rights and responsibilities to this resource? The only fair and reasonable answer to this question is that it should belong equally to everyone. At this point it is useful to distinguish two issues: historical and future emissions. Historical emissions have been very unevenly distributed, generally speaking industrialised nations have had per capita emissions greatly exceeding those of less developed nations. And these emissions have substantially contributed to the wealth of these nations. So, by any reasonable notion of fairness, this inequality would be considered unacceptable. However, there are good reasons to treat past and future emissions separately; most significantly, emission reductions are an option in the future but not in the past. Traditionally, negotiations have combined multiple issues and sought mutually acceptable compromises, instead of seeking fair solutions to separate issues. However, given the urgency of reducing future emissions and the difficulty associated with potential historical reparations, it is essential to separate the issues, and seek separately fair solutions. In this view, future emissions agreements should have no impact on resolution of past emission disparities.

A consequence of equality of rights to the future use of explicitly valued atmospheric resources is that above average emitters should pay below average emitters for using more than their fair share. Note, that in this view, such payments are not seen as taxes or subsidies, but simply as paying for the use of valuable resources (which is how all other resources are treated). Let's add precision to a couple of things. We envision directly using payments for emissions rather than more complex systems relying on buying rights to emission quotas etc. Whereas our ethical motivation of equal rights apply to individuals, managing a system with 8000 million participants is impractical. In practice it is therefore necessary to invoke nation states to implement agreements. Nation states are already equipped with payment and monitoring systems.

Another crucial issue is the price of emissions. It is essential that a single global price of emissions is used to avoid creating economic pressures to move emission intensive activities across borders. However, we cannot simply use the "true" cost of emissions for two reasons. Firstly, these costs are difficult to estimate, and depend crucially on what time horizon is considered, a question that doesn't have a meaningful answer. Secondly, different regions have very different exposure to the consequences of climate change, and therefore the estimates of the price

for emissions will differ by region. Because of these issues with defining the notion of “true” cost, a democratic voting mechanism is suggested as a practical proxy. The underlying idea is that although different nations may not be able to agree on a best price, they may be able to agree that a non-zero price is much preferable to no price, and democratic voting is a fair mechanism.

To further motivate an actual implementation and avoid repeating the problems which are causing the failure of the Paris Agreement, we discuss some of these in the next section.

Comparing to the Paris Agreement

Above, we’ve motivated a framework very different to the UNFCCC COP framework and the Paris Agreement. By now, 10 years after its adoption, it is widely accepted that the Paris Agreement will fail to limit global average temperature increase to $+1.5^{\circ}\text{C}$. Here we discuss some of the design principles, and how to avoid some of the worst problems.

Our proposed framework is based directly on cooperating to share a common resource, through fair pricing. Our notion of fairness as equal rights and responsibilities towards our shared atmosphere is strictly limited to future emissions, but it is precise and actionable. This contrasts greatly with the Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) adopted by the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 in article 3.1:

The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

The problem with the CBDR-RC is that it is impossible in practise to operationalise. That would require interpreting what exactly the differentiated responsibilities and the respective capabilities are. So, although the CBDR-RC sounds good, it doesn’t lead to anything practical. In contrast, our proposed framework is essentially oposite to the CBDR-RC, using a precise concept of equality wrt future emissions, which doesn’t require further interpretation.

The Paris Agreement relies on Nationally Determined Contributions, NDCs, national emission promises 10 years into the future. NDCs introduce multiple weaknesses, here are some of the most significant: NDCs are not legally binding. NDCs are insufficient, but there is no mechanism for improving them. It was somehow hoped, that nations would “ratchet up” their commitments spontaneously. Since NDCs make unenforceable promises a decade into the future, this spreads mistrust between partners, as there is no way to verify whether your partners are sincere. To avoid these problems, a framework should be built on actual emissions rather than promises, and it should run on a rapid annual schedule, allowing verification of committments between partners, and thereby building mutual trust.

The UNFCCC COP meetings rely heavily on unanimity. This is not a good principle for climate negotiations because it allows single nation states way too much leverage. Repeatedly agreements have been watered down by tiny minorities. Instead, an effective framework must be built as a coalition of the willing. If nations won’t agree, they cannot be forced against their will to comply but that should not allow them to hold the rest of the world hostage.

The Themis Mechanism

In this section we synthesise our equal rights and responsibilities towards future emissions with the required properties discussed in the previous section into a specific proposal called the Themis /θɛmɪs/ Mechanism.

Themis is built entirely on immediate annual commitments. Adherence is verifiable by partners, enabling the building of mutual trust. Themis is governed by a single number, p , the price of emitting one ton of carbon dioxide equivalent, or CO₂e. The annual cycle has four steps:

1. Each year, all nations are invited to join at a predefined emissions price, p .
2. At year-end, each member reports their national average per capita emissions.
3. Nations pay (or receive) what their national per capita emission exceed (or fall short of) the Themis grand average per capita emissions, multiplied by the price, p , per capita.
4. Members vote openly on next year's price; the median vote determines p .

In the inaugural year, the price is set to zero.

Only *per capita* emissions are relevant, reflecting equitability. Above average per capita emitters pay, below average per capita emitters get paid. All members (not just large emitters) immediately experience economic pressures to reduce emissions. Themis is deliberately as simple as possible. It is designed for efficiency, eliminating complex negotiations that would delay urgent action. Themis can coexist with other initiatives, including the Paris Agreement.

Why would nations join? Below average emitters have an immediate economic incentive to join. Themis is a credible mechanism, guaranteed to reduce greenhouse gas emissions provided membership is widespread and the price is sufficiently high. Themis is also fair, relying on clear notion of equality. Free-riding non-participating nations will undermine Themis. Accepting the equality of rights and responsibilities to our atmospheric resource immediately makes clear that non-membership is unacceptable. In effect, non-members would be stealing our shared resources, which would be inadmissible for any other resource. Trading products with embedded emissions would also undermine Themis. Unwilling nation states cannot be forced to join, but should be penalised by trade barriers.

Unfortunately starting Themis from a small group of countries won't work well in practice, because large membership is necessary to guarantee meaningful emission reduction. Instead, large membership is necessary from the start, and a gradual ramp-up can be achieved by increasing emission pricing, starting from zero in the inaugural year. Even when the price is too low to massively reduce emissions, the mere existence of the mechanism and annual membership decisions and the open ballot price vote are a welcome recurring opportunity for nations to show their hand.

How may nation states vote for emission prices? It will be in the interest of low emitters that the price is high, but not so high that large emitters are likely to give up membership. Similarly, large emitters may favour a lower price, but not so low as to render the emission reductions ineffective. Nations will have to balance these pressures when voting for future emission prices.

If a previous non-member wants to join Themis, then membership must be paid right back to the inaugural year for two reasons. Firstly, a mechanism is necessary to avoid the temptation of postponing membership to the future. And secondly, Themis needs to avoid building a new emissions inequalities (in addition to the historical ones). This rule accurately reflects the urgency of climate change.

Implementation may face some challenges: enforcement of emissions reporting standards may be difficult, although existing reporting standards could be adopted from the UNFCCC. Some

nations may choose not to participate for economic or ideological reasons. Nevertheless, for the majority of nations, Themis will be better than its absence.

While Themis is not a complete solution, it is a crucial step toward fair and effective global emissions reduction. Supporting Themis means taking immediate, verifiable action toward a fairer and more effective global climate strategy.