CLIMATE JUSTICE, FROM TOP TO BOTTOM

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ABSTRACT

In this paper, I attempt to give empirical meaning to climate justice by defining simple criteria of allocation of the remaining global carbon budget based on biophysics constraints and recognized justice principles. The originality of the paper, beyond the choice of indicators meeting justice criteria and their empirical incarnation, is to connect global climate justice to national climate justice, showing how a given country (France in this case) can opt for a national strategy of emissions reduction criteria to allocate its national globally determined carbon budget. In this sense, the paper descends from biophysical constraint down to individual allocation. The first section of the paper deals with global climate justice while the second section relates to national climate justice in France.

KEYWORDS

Climate justice, carbon budget, COP 26, France.

JEL

Q3, Q5, D3, D6.

Climate justice, from top to bottom

Éloi Laurent[1]

Résumé

Dans cet article, je tente de donner un sens empirique à la notion de justice climatique en définissant des critères simples d'allocation du bilan carbone global restant à émettre d'ici à 2050 sur la base de contraintes biophysiques et de principes de justice reconnus dans la littérature académique. L'originalité de l'article, au-delà du choix des indicateurs correspondant à ces critères et de leur incarnation empirique, est de relier la justice climatique mondiale à la justice climatique nationale, en montrant comment un pays donné (la France en l'occurrence) peut opter pour une stratégie nationale de réduction de ses émissions pour allouer son budget carbone national globalement déterminé. En ce sens, l'article permet de descendre de la contrainte biophysique jusqu'à l'allocation individuelle. La première section de l'article traite de la justice climatique mondiale tandis que la deuxième section porte sur les modalités de la justice climatique nationale en France.

Abstract

In this paper, I attempt to give empirical meaning to climate justice by defining simple criteria of allocation of the remaining global carbon budget based on biophysics constraints and recognized justice principles. The originality of the paper, beyond the choice of indicators meeting justice criteria and their empirical incarnation, is to connect global climate justice to national climate justice, showing how a given country (France in this case) can opt for a national strategy of emissions reduction criteria to allocate its national globally determined carbon budget. In this sense, the paper descends from biophysical constraint down to individual allocation. The first section of the paper deals with global climate justice while the second section relates to national climate justice in France.

Keywords: Climate justice, carbon budget, COP 26, France.

JEL: Q3, Q5, D3, D6.

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Introduction: A decisive decade for climate justice[2]

The latest climate projections indicate that with current policies, global warming could reach 2,9°C at the end of the 21st century[3], way outside the "safe operating space for humanity"[4], in an unchartered territory where feedback loops could accelerate climate change beyond any possible human control (IPCC, 2021).

Yet, the most discouraging piece of news might still be overlooked. Even if all of the Paris agreement (2015) pledges were fulfilled and targets were met, warming would only be marginally lower. In this respect, one key indicator is the gap between the status quo of current policies ("business as usual") and the full implementation of the commitments made in the wake of the Paris Agreement: if business as usual was to prevail, we would be heading towards 2.9° of warming; but if all the commitments currently formulated and described in the States' respective national contributions were really met, the planet would still be heading towards 2.6° of warming by the end of the century[5]. As it stands today, the Paris Agreement (which has led to undeniable progress) is therefore worth only 0.3 degrees, or about a decade and a half of warming at the annual rate observed since 1981. In other words, it's not just that countries engaged in climate negotiations are missing climate targets, it's that climate targets are too low to be effective in curbing the climate crisis.

This lack of climate efficiency is not accidental but the logical result of the strategy chosen after the Copenhagen summit failure in 2009 on the path to COP 21 (2015). There is no reason why Intended Nationally Determined Contributions (INDCs) that were expected of parties to the UNFCCC should have led to an outcome consistent with the scientific climate consensus. Yet COP 26 (2021) is not doomed to fail to meet the climate challenge: climate negotiations, revived by the new US administration's commitment to acknowledging and mitigating climate change, could build on the Paris agreement momentum while at the same time opening, at last, a substantial global dialogue on climate justice which purpose should be to define equity criteria agreed upon top emitters to allocate the remaining carbon budget until 2050. Indeed, climate justice holds the key to the climate crisis (Jouzel, 2021).

110 countries have indeed announced their commitment to achieving carbon neutrality by 2050, with China sharing this goal, but by 2060, but these encouraging dynamics must pick up the pace. A new global climate strategy could be developed and implemented to answer two simple questions: how should national efforts to mitigate global emissions be shared among the world's countries? On the basis of what criteria could countries allocate their own national carbon budgets?

In this paper, I offer building blocks for such two-tier climate justice system by defining simple criteria of allocation based on biophysics constraints and widely shared justice principles, updating a previous attempt (Laurent, 2015). The originality of this paper, beyond the choice of criteria and their empirical incarnation, is to connect global climate justice to national climate justice, showing how a given country (France in this case) can further opt for a national strategy of emissions reduction to allocate its globally determined carbon budget. This two-tier approach to climate justice makes sense from a biophysical and political point of view: national efforts should be calibrated taking into account both

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[2] I thank Paul Malliet for his contribution to the common reflection that led to this article, for producing the data on the just national carbon budgets and for sharing his data on France. All errors are mine.

[3] See Climate Action Tracker (CAT) update https://climateactiontracker.org/documents/829/CAT_2020-12-01_Briefing_GlobalUpdate_Paris5Years_Dec2020.pdf

[4] Rockström, J., Steffen, W., Noone, K. et al. A safe operating space for humanity. Nature 461, 472–475 (2009). https://doi.org/10.1038/461472a

[5] Climate Action Tracker, December 2020 projection https://climateactiontracker.org/publications/global-update-paris-agreement-turning-point/

the biospheric realities of climate change and geopolitical settings of climate change negotiations (which bring together States to negotiate global targets) as well as national contexts, that vary in terms of carbon budgets, socio-economic features and climate instruments. The first section of the paper deals with global climate justice, while the second section relates to national climate justice in France.

Climate justice, step 1: allocating the global carbon budget

Global climate justice has numerous and complex meanings in the existing academic literature (Bourban, 2021). Here, I limit myself to one essential question: who has the right to consume the remaining carbon budget until 2050 and on what basis? The nature of "who" is determined by the way climate negotiations work: because the countries that are parties to the UNFCC negotiate climate targets and efforts, any realistic allocation framework should end up determining national targets.

In the light of the IPCC's Special Report on 1.5° published in 2018, it is possible to determine the global carbon budget: in 2019, it amounted to 945 GtCO2e, corresponding to an intermediate target between 1.5° and 2° associated with the 67th percentile of the Transient Climate Response to Emissions (TCRE), in line with the goals set in Article 2 of the Paris Agreement[6].

The question of the fair distribution of this global carbon budget has been the subject of numerous studies (for a summary and proposals, again see Bourban, 2021), but there is currently no work that integrates a complete vision of the three justice criteria identified in the academic literature – equity, responsibility and capacity (Höhne, 2014) – in order to determine an operational distribution of national efforts or so-called "effort sharing".

I thus focus on defining operational indicators for all three of these climate justice dimensions, paying attention to their logical order, statistical robustness and straightforwardness.

My framework can be summarized in a simple step-by-step justice procedure starting with the biophysical constraint of global carbon budget and allocating the resulting universal carbon endowments through simple criteria using equity, responsibility and capacity indicators. Each country receives an initial carbon endowment that is modulated (adjusted) using first equity, then responsibility and finally capacity.

With this framework in mind, I focus on the top 20 emitting countries which accounted for 77% of emissions in 2019[7]. I assume that the emissions reduction target will be shared by all countries by 2050 and that the carbon budget therefore covers the next 30 years, which translates into an average annual budget of around 30 GtCO2e (for comparison, 36 GtCO2e were emitted in 2019). I take as a starting point an equal distribution among all members of humanity in 2019, meaning an initial allocation of 122.5 tCO2e up to 2050, i.e. about 4 tCO2e per person year (a country's budget being the aggregation of the individual allocations of its total population).

[6] The TCRE translates the average variation of average temperature with the stock of carbon in the atmosphere with an associated probability. In our analysis this translates into the following: There is a 67% chance that the carbon budget in question will lead to a temperature rise limited to 1.75°.

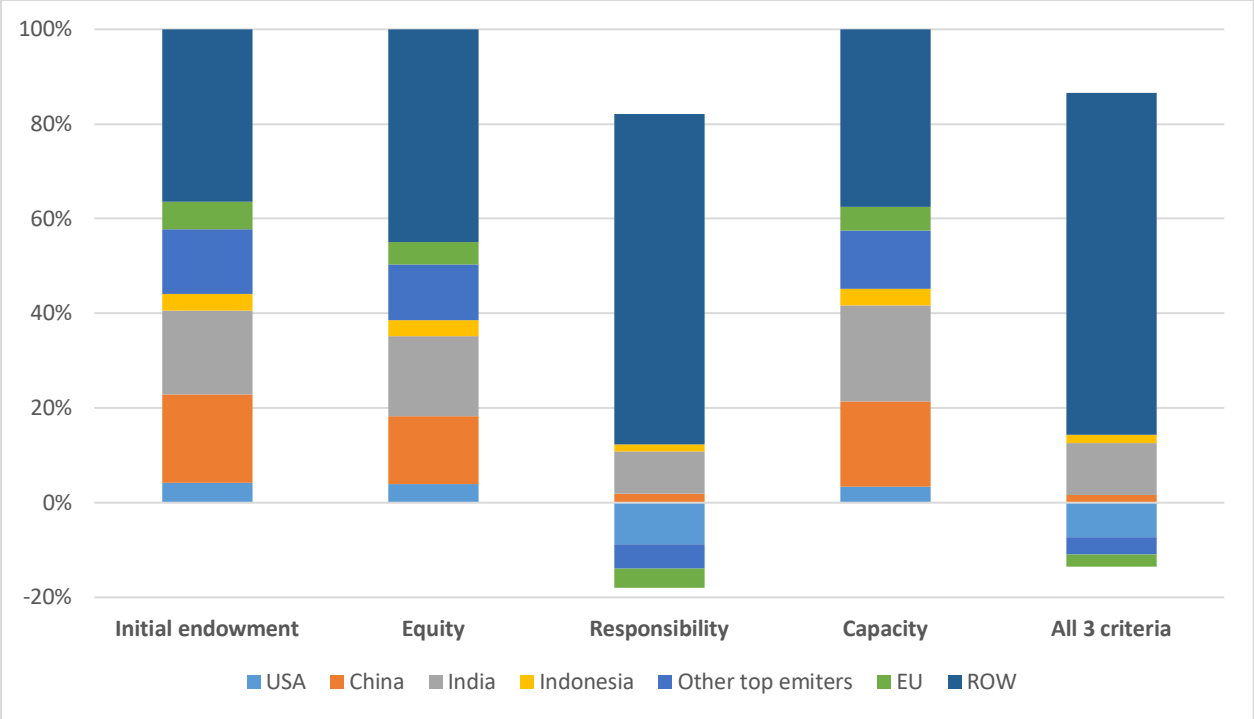
[7] The top 20 emitting countries in 2019 were: the United States, Canada, Saudi Arabia, Australia, Germany, Japan, Russia, the United Kingdom, Italy, South Korea, Poland, France, South Africa, Iran, China, Mexico, Turkey, Brazil, Indonesia, and India. I also include the 27-Member European Union to provide a basis for comparison. These the top 20 emitters represent on average 57% of the world's population until 2050 (61% in 2020 and 53% in 2050).

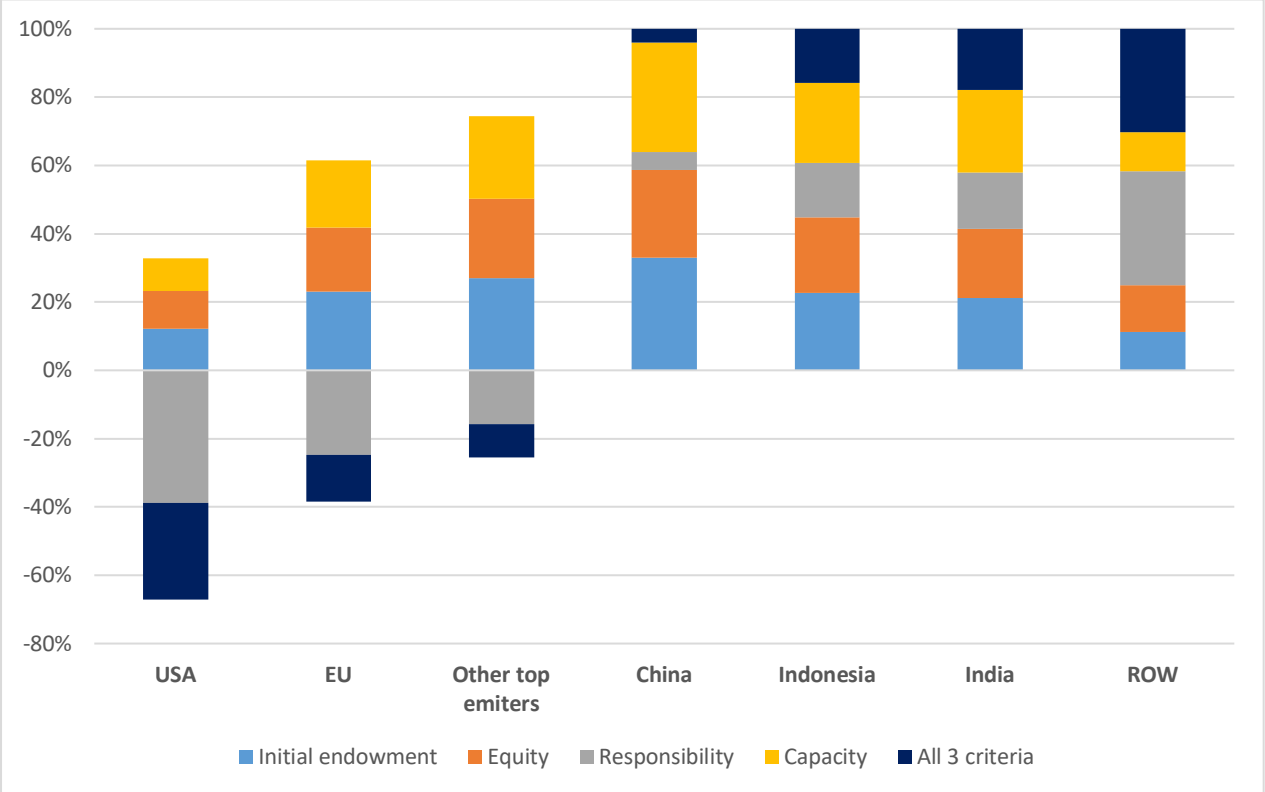
I interpret the **equity criterion** as meaning that the world's citizens all have an equal access to the greenhouse gas (GHG) storage capacity of the atmosphere (this corresponds to a universal carbon endowment corrected for each major emitter for its population and for population growth until 2050).

The **responsibility** criterion is the amount of GHGs already emitted since 1990 in consumption, thus combining a spatial justice criterion with a temporal criterion, reflecting the global as well as the historical responsibility of individual countries.

Finally, the **capacity** criterion is expressed here by the United Nations Human Development Index (HDI), which by construction ranges from 0 to 1, and which is related for each country to the world average (which in 2019 was 0.737). Countries whose HDI is lower than the world average see their budget increase in proportion to their human underdevelopment, and vice versa for developed countries. Applying these three criteria lead to allocating a just carbon budget per and per capita for each of the top 20 emitters (Figure 1).

Figure 1. Global carbon budget allocation using three justice criteria



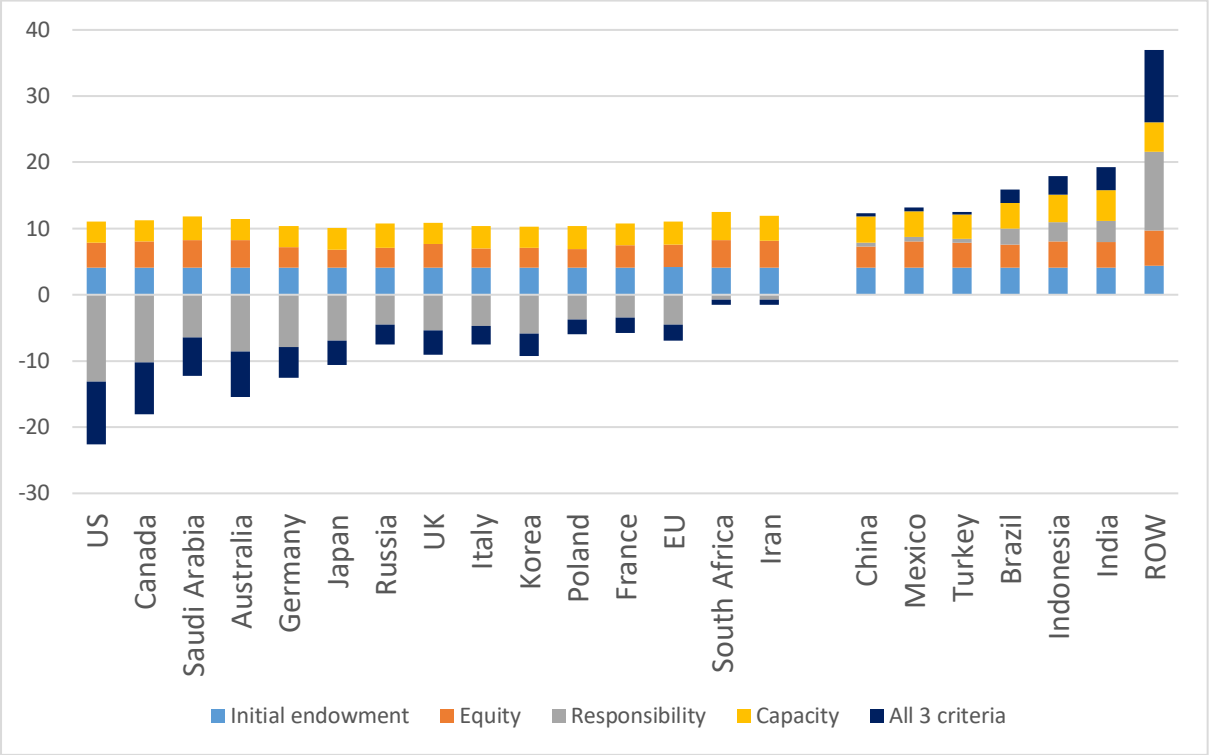


Source: UN, Global Carbon Project, author's calculations.

Looking at Figure 1, one can see that the equity criterion generally operates a reallocation from countries with a falling population to those with a rising population, which are almost entirely located in sub-Saharan Africa. In this respect, based on this criterion China undergoes a reduction in its budget of 44 $GtCO_2e$ (almost 25%), while the rest of the world benefits from an increase of 86 $GtCO_2e$. The responsibility criterion appears to be the main determinant leading to a reallocation of the global budget between countries, with a transfer of nearly 263 $GtCO_2e$ from the OECD countries to the so-called developing countries. The capacity criterion also leads to a reallocation towards developing countries, but much less (almost 34 $GtCO_2e$ in total).

Thus each criterion plays out differently (either by the nature of the rebalancing or by its extent), suggesting that the interplay of this relatively simple set of three criteria does indeed enable different understandings or conceptions of climate justice. This aggregate allocation can be translated into a distribution of the burden of the mitigation effort for all 20 top emitters (Figure 2).

Figure 2. National just carbon budgets, in TCO2e per capita and per year



Note: Each bar indicates the effect of each criterion, taken independently of the others, on the average annual carbon budget per country. For example, while each American citizen has an initial allocation of 4 tCO_2e, the equity criterion leads to this budget being reduced to 3.73 tCO_2e, the application of the responsibility principle leads to the initial allocation turning negative and corresponding to a debt of 13 tCO_2e, and the capacity criterion reduces the initial allocation to 3.25 tCO_2e. The aggregation of these different criteria results in a total negative budget of 9.5 tCO_2e per capita per year. A negative budget here reflects the fact that the historical emissions taken into account via the responsibility criterion is higher than the current carbon budget allocated via the other criteria.

Source: UN, Global Carbon Project, author's calculations.

In the light of these results, it is clear that developed countries have a climate debt in the form of negative emissions meaning that they must not only cut emissions to zero but then help cutting emissions in accordance to their remaining carbon debt in countries that have a positive remaining carbon budget. This additional effort can take the form of financial or technology transfers. In this respect, if the new US administration does indeed intend to reassume global climate leadership, in association with the European Union, it will have no choice but to face the existence of a climate debt to the rest of the world. Given its level, it is illusory to believe that this can be offset by hypothetical negative emissions and should therefore be subject to one form or another of compensation. This could for example mean much more significant amounts than those currently paid into the Green Climate Fund, which is still underfunded in relation to the initial stated ambition of reaching a budget of $100 billion in 2020.

A second clear point is that China can no longer claim to be a major emerging country in the climate negotiations, with an exploding emissions trajectory that is supposedly part of its right to development and economic growth. In 2020, and taking into account all the criteria adopted, its carbon budget, at 21 Gt, would be close to that of Indonesia, which has one-fifth of China's population.

This first step toward climate justice gives insights as to what could be a fair distribution of the global carbon budget capable of more explicitly capturing the guiding principle of the international community since the Rio summit in 1992 of "shared but differentiated responsibility".

However, this figure does not tell us anything about the future emissions trajectories of the different countries, the instruments that will be implemented and the justice criteria specific to each country that will govern the deployment of these instruments. Each country should thus extend the logic of climate justice within its national frontiers in order to allocate globally determined national carbon budgets to social groups and down to individuals.

Climate justice, step 2: allocating a globally determined national carbon budget

The question I now turn to is indeed the national climate justice strategy: on what basis can a given country allocate its globally determined national carbon budget? According to Figure 2, France has to cut 2,3 ton per capita and per year until 2050, how can this be done in an equitable way according to France's own justice principles and mitigation policies?

The question of the distribution of emissions among a given population has been primarily addressed in the literature at first to establish a clearer view on how different consumption profiles can lead to the different carbon footprints. For France, Malliet (2020) has shown that the average elasticity of carbon emissions to income is around 0.54 with two mechanisms explaining this outcome: first, the marginal consumption propensity is declining with the level of income, meaning that the richer a household is, the smaller its share of income spent on consumption. Second, the average carbon intensity (which measures the emissions resulting from one 1€ spending in consumption) declines with the level of income, due to a composition effect of the household's consumption where "superior goods" (i.e., goods for which the consumption increases with the income) are less carbon-intensive than "inferior" ones.

Taking the carbon distribution as computed by Malliet (2020) based on the French Household Budget Survey data conducted by INSEE in 2011, one can determine how the aggregated carbon footprint is shared among the French population with respect to income distribution (Figure 3a), carbon footprint inequality translating by definition into larger reduction efforts being demanded from the top 4 deciles in the perspective of global climate justice developed in the first section (Figure 3b).

Figure 3a. Carbon footprint by income decile in France, in tCO2e per capita on average

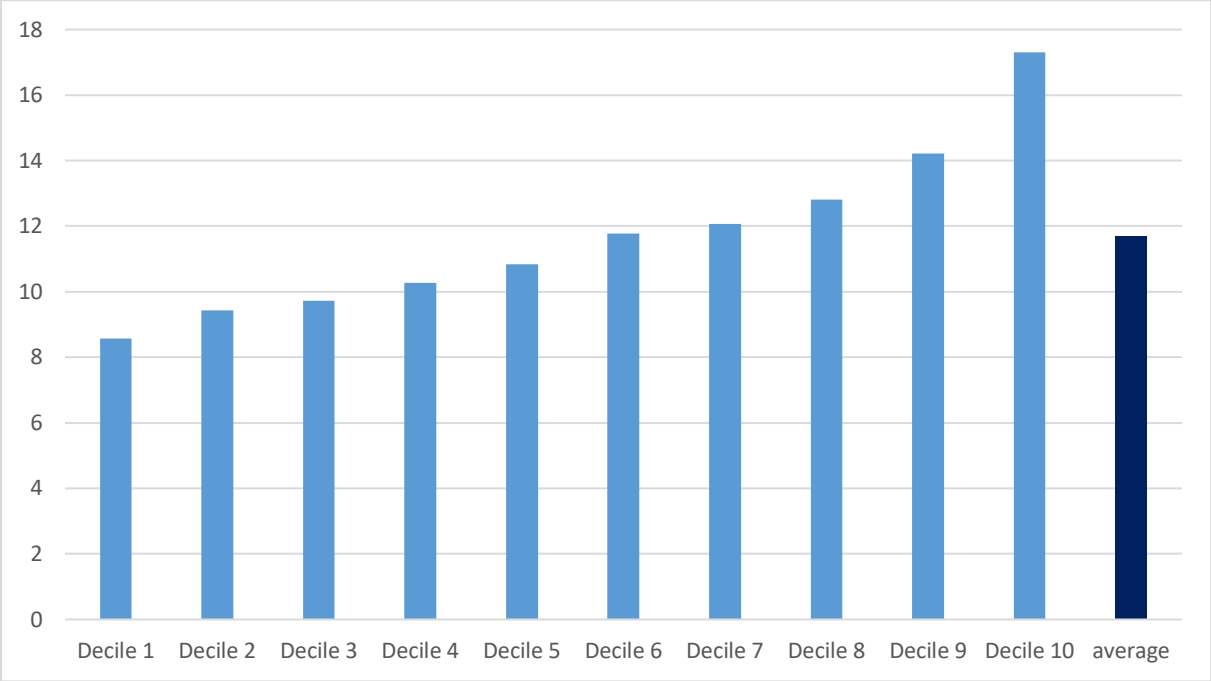
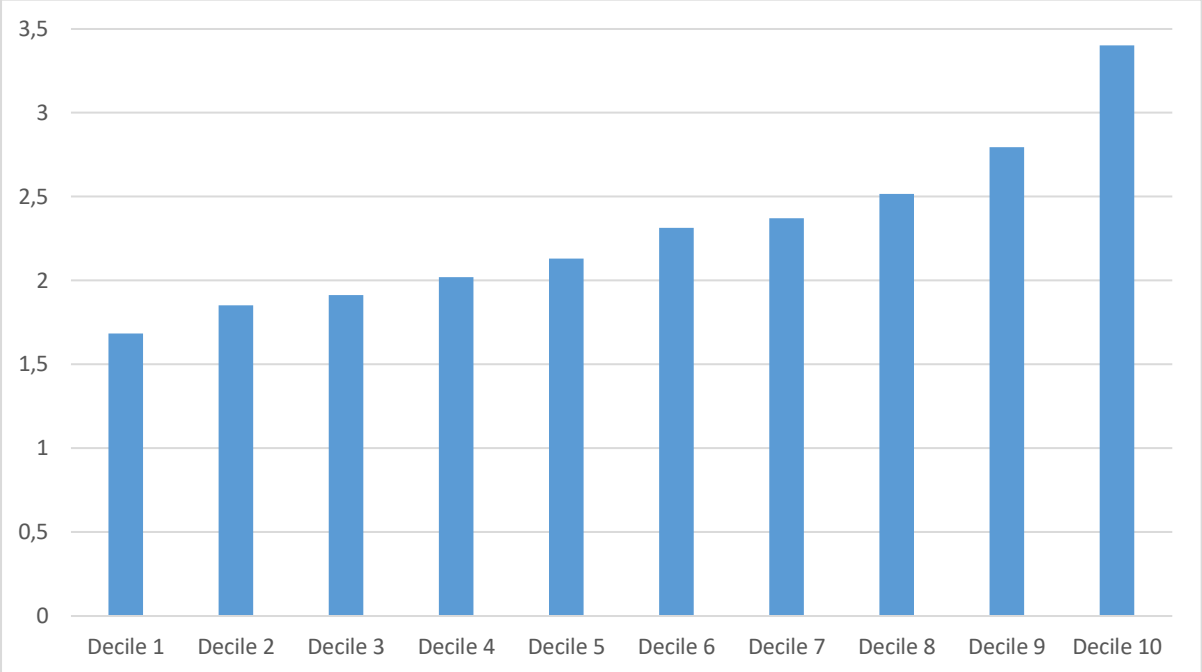


Figure 3b. Annual emissions reduction by income decile in France, in tCO2e per capita on average



Source: Malliet (2020) and author's calculations.

The magnitude of the effort expected to comply with biospheric limits and global justice principles is such that these reductions in emissions can appear unrealistic and unfeasible. In fact, the national carbon strategy (Stratégie nationale bas carbone or SNBC) adopted in its latest version in 2019 recommends annual cuts on the order of 5% while Figure 3b implies annual cuts close to 20%. But the SNBB does not account for biospheric limits, nor historical responsibility nor global impact of French carbon consumption (it is based on national/production emissions cuts in line with a general EU target loosely based on climate science). What is more, the considerable effort of getting to zero emissions can be spread over a longer period of time resulting in lesser annual cuts, with a financial compensation matching this extension in the period post-zero, where France would commit to cutting emissions in countries with positive carbon budgets.

Even more importantly, in order to be sustainable, this effort should be calibrated among different social groups based on national climate justice principles. The mitigation effort is by definition steeper for higher income deciles but this is clearly not fair enough. A possible just transition strategy could imply designing a tax and transfer policy able to connect reductions in "luxury emissions" (air and road leisure travel, luxury consumption[8]) to reductions in "essential emissions" (food, housing and work mobility).

Important cuts can indeed be achieved quickly in the carbon footprint of French social groups. A round-trip flight to New York is worth a ton of CO2e, the same as 6 round trips flights from Paris to the South of France (luxury emissions), which is equivalent to a year of home heating or the average emissions of a car used to drive 5000 km (essential emissions)[9].

Using equity and capacity as guiding justice principles (leaving out the share collective historical national responsibility of the French population), one could imagine a social-ecological progressive taxation system whereby the carbon footprint of the higher deciles would be heavily taxed and reduced, generating important revenues to finance the reduction in emissions for lower deciles, via public investment (for instance in home retrofit). Designing these social-ecological progressive tax policies using income and location as justice criteria is clearly feasible in France and beyond (see Berry and Laurent, 2019 for France and Andersson and Atkinson, 2020 for other countries).

As is well-known, introducing social compensation based on income level but also location (rural areas versus urban areas, suburban areas vs. urban centers, etc.) can maintain the environmental efficiency of the policy measure (compensation should not be understood as exoneration) while easing and even erasing its social regressive impact and therefore increasing its political acceptability as well as fairness (see Laurent, 2011).

On the contrary, introducing carbon taxation without social compensation is likely to trigger political opposition and even social protest. In France, the revolt of the so-called "yellow vests" that shook the country in Fall of 2018 and early 2019 precisely started because of a protest against a rise of fuel prices evolved into a social-ecological revolt against the unfair social effect of a planned rise in carbon taxation, taking place against the backdrop of widespread fuel poverty[10], an environmental inequality

[8] For an empirical study of energy concumption inequality, see Oswald et al. (2020).

[9] Source : DGAC (Direction générale de l'aviation civile).

[10] Fuel poverty can be defined in many different ways, so that a clear definition should be provided when using this concept. In France, the law of July 10, 2010, known as the Grenelle 2 law, sets out a legal definition of energy poverty: "Is in a situation of energy poverty [...] a person who experiences particular difficulties in his home in having the supply of energy necessary for the satisfaction of his/her basic needs because of the inadequacy of his resources or of his habitat conditions". The EU relies on a different definition: "Adequate warmth, cooling,

which public policy has not recognized until recently and is still unable to curb. Close to 5,5 million French households (i.e. 8 million of people) are currently estimated to suffer from fuel poverty (close to 15% of the French population), with over 40% of households of the first income quartile considered fuel poor. Consequently, the increase of the French carbon tax was clearly socially unjust in three measurable ways: it created vertical inequality, horizontal inequality and finally increased fuel poverty stemming from the tax and pre-existing inequality (Berry and Laurent, 2019).

But all of these inequities can be mitigated and even reversed. Appropriate social compensation appears to be both minimal in cost and easy to implement. Many countries and localities (such as the Nordic countries but also Indonesia) have indeed successfully introduced such compensations, for instance the province of British Columbia, where a carbon tax was rejected by 43% of its residents when it was introduced without social compensations in 2008 and is now supported by large majority (support grew when compensations were introduced).

For France, many options of progressive social-ecological taxation exist. For instance, increasing the currently frozen carbon tax to 55 euros per ton of carbon in 2021 as an environmental objective and redistributing 25% of revenues to households using already existing mechanisms, a majority of households (more than 50% of households in the first 6 deciles of standard of living)[14] could gain from carbon taxation (receiving more in social transfers than what they pay in carbon taxation). The 75% of the remaining revenue could be allocated to mitigating fuel poverty but also to provide financial help to shift to low-carbon equipment, reducing social inequality further in a context of rising energy prices (Berry and Laurent, 2019).

Hence, progressive social-ecological tax policies may be able to both lower the carbon footprint of the highest deciles while redistributing money to compensate the reduction of lower deciles while allowing them to invest in low-carbon lifestyles.

lighting and the energy to power appliances are essential services needed to guarantee a decent standard of living and citizens' health. Furthermore, access to these energy services empowers European citizens to fulfil their potential and enhances social inclusion. Energy poor households experience inadequate levels of these essential energy services, due to a combination of high energy expenditure, low household incomes, inefficient buildings and appliances, and specific household energy needs." According to this definition, it is estimated that more than 50 million households in the European Union are experiencing energy poverty.

Conclusion: climate justice as a way toward SSP1

On page 18 of the Summary for Policymakers of the Working Group I contribution to the Sixth Assessment Report by the IPCC, the second column shows that all of the five main climate scenarios considered converge toward a 1.5 C degrees world at more or less rapid pace. In the same table, the third line shows that one climate scenario dubbed "SSP1-1.9" foresees a stabilization of global warming at 1.6 degrees between 2041–2060 before witnessing a decrease to 1.4 degrees at the end of the 21st century. Riahi et al (2017) have defined SSP1 in the following terms:

Sustainability – Taking the Green Road (Low challenges to mitigation and adaptation) The world shifts gradually, but pervasively, toward a more sustainable path, emphasizing more inclusive development that respects perceived environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and **the emphasis on economic growth shifts toward a broader emphasis on human well-being. Driven by an increasing commitment to achieving development goals, inequality is reduced both across and within countries.** Consumption is oriented toward low material growth and lower resource and energy intensity.

SSP1 thus translates into important challenges: prioritizing well-being instead of GDP growth (on this point, see Laurent 2021) and reducing inequality both between and within countries. In this article, I have attempted to show how such two-tier inequality mitigation could convert into climate crisis mitigation, first by allocating fairly the remaining global carbon budget, second by allocating fairly globally determined national carbon budgets. This two-tier climate justice might be the key to the acceptance of the global carbon budget by the largest emitting countries on the planet, a consensus out of which the worst climate scenarios are sure to materialize for lack of cooperation and coordination.

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