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In Pursuit of the People and Planet Paradigm

Sustainable Human Development

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Existing Climate Mitigation Scenarios Perpetuate Colonial Inequalities

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Summary

The challenge of climate mitigation is made more difficult by high rates of energy use in wealthy countries, mostly in the Global North, which far exceed what is required to meet human needs. In contrast, more than 3 billion people in poorer countries live in energy poverty. A just transition requires energy convergence—reducing energy use in wealthy countries to achieve rapid emissions reductions, and ensuring sufficient energy for development in the rest of the world. However, existing climate mitigation scenarios reviewed by The Intergovernmental Panel on Climate Change do not explore such a transition. On average, existing scenarios maintain the Global North's energy privilege at a per capita level 2·3 times higher than in the Global South. Even the more equitable scenarios perpetuate large energy inequalities for the rest of the century. To reconcile the Global North's high energy use with the Paris Agreement targets, most scenarios rely heavily on bioenergy-based negative emissions technologies. This approach is risky, but it is also unjust. These scenarios tend to appropriate land in

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the Global South to maintain, and further increase, the Global North's energy privilege. There is an urgent need to develop scenarios that represent convergence to levels of energy that are sufficient for human wellbeing and compatible with rapid decarbonisation.

Introduction

The challenge of climate mitigation is made more difficult by the scale of energy use in wealthy countries. The core countries of the Organisation for Economic Co-operation and Development (OECD) and the rest of Europe (collectively referred to here as the Global North) use on average about 130 gigajoules of energy per capita each year, nearly ten times more than what low-income countries use (13·4 GJ/capita).[1] The world's wealthiest 5% of individuals use more energy than the poorest half of the global population combined.[2] High rates of energy use pose a problem, because this makes it difficult to decarbonise the energy system fast enough to stay within the carbon budgets for 1·5°C or 2·0°C.

The world's wealthiest 5% of individuals use more energy than the poorest half of the global population combined... Energy use in wealthy countries far exceeds what is required to meet human needs at a decent standard of living... More than 3 billion people in low-income countries do not have enough energy to achieve decent living standards... 1 780 million people do not have access to electricity... Effective climate action requires reducing the energy inequalities between the Global North and the Global South... Existing climate mitigation scenarios—which are assessed by the IPCC—fall foul of these principles.

Energy use in wealthy countries far exceeds what is required to meet human needs at a decent standard of living.[3] Much of this excess energy is consumed by forms of production that support corporate profits and elite accumulation, such as fast fashion, sports utility vehicles, industrial meat, and planned obsolescence, which have little relevance to wellbeing.[4] Furthermore, it is important to note that high rates of energy use in wealthy countries are sustained in large part through a net appropriation of energy from poorer countries through patterns of unequal exchange in international trade.[5]

More than 3 billion people in low-income countries do not have enough energy to achieve decent living standards.[6] 38% of the world's population has access to less than 10 gigajoules of energy per capita per year, which is too little to meet even the most basic human needs.1 780 million people do not have access to electricity.[7] Energy poverty is a reality even in countries with sufficient levels of aggregate energy use, because much of their energy—and their economic capacity—is diverted to production for consumption in wealthy countries, and is therefore unavailable to meet local human needs.

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1 ↩ International Energy AgencyData and Statistics. https://www.iea.org/data-and-statistics/data-browser?country=WORLD&fuel=Energy%20consumption&indicator=TFCShareBySector Date: 2021 Date accessed: November 24, 2021

2 ↩ Oswald Y Owen A Steinberger JK - Large inequality in international and intranational energy footprints between income groups and across consumption categories. Nat Energy. 2020; 5: 231-239

3 ↩ Millward-Hopkins J Steinberger JK Rao ND Oswald Y: Providing decent living with minimum energy: a global scenario — The Jus Semper Global Alliance, April 2022.

4 ↩ Wiedmann T Lenzen M Keyßer LT Steinberger JK: Scientists' warning on affluence. — The Jus Semper Global Alliance, December 2022.

5 ↩ Hickel J Dorninger C Wieland H Suwandi I - Imperialist appropriation in the world economy: drain from the global South through unequal exchange, 1990–2015. Glob Environ Change. 2022; 73102467

6 ↩ Kikstra JS Mastrucci A Min J Riahi K Rao ND Decent living gaps and energy needs around the world. Environ Res Lett. 2021; 16095006

7 ↩ The World Bank - Access to electricity (% of population). https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS Date: 2021 Date accessed: November 24, 2021

Effective climate action requires reducing the energy inequalities between the Global North and the Global South. The Paris Agreement calls for a just transition, to ensure that global emissions decline fast enough to keep global warming below 2·0°C, and to pursue sustainable development and poverty reduction.[8] The agreement also enshrines the principle of common but differentiated responsibility, which acknowledges that wealthy countries have an obligation to decarbonise faster than other countries, given their disproportionate contributions to historical emissions. The Intergovernmental Panel on Climate Change (IPCC) recognises that the transition requires restricting the growth of global energy consumption and acknowledges that current patterns of consumption among the global rich are unsustainable.[9]

However, existing climate mitigation scenarios—which are assessed by the IPCC and form the basis for authoritative IPCC reports—fall foul of these principles. Instead of including scenarios which explore a fair and just transition, they reproduce colonial inequalities well into the future.

Key messages

- The world is characterised by striking inequalities of energy use between the Global North and the Global South
- Existing climate mitigation scenarios reviewed by the Intergovernmental Panel on Climate Change perpetuate Global North–Global South inequalities for the rest of the century
- Scenarios that rely on bioenergy-based negative emissions technologies appropriate land in the Global South to support the Global North's energy privilege
- There is an urgent need to develop scenarios that represent energy convergence to just and sustainable levels

Research approach and methods

We analysed regional per-capita energy use in the 172 mitigation scenarios represented in the Integrated Assessment Modelling Consortium scenario explorer database that have a regional energy breakdown and that are consistent with the Paris Agreement targets of staying under 1·5°C or 2·0°C (ie, RCP1.9 and RCP2.6 scenarios).[10] We found that these scenarios maintain substantial energy disparities between the Global North and the

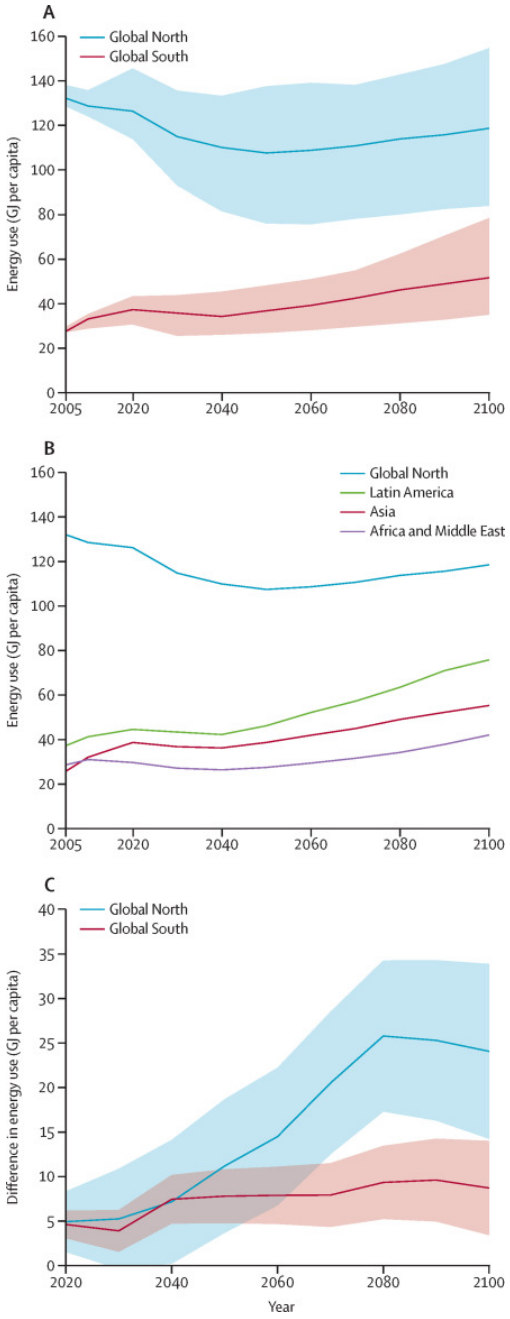

Figure: Unequal access to energy between the Global North and the Global South in climate mitigation scenarios

[8] ↩ UN - The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement Date: 2015 Date accessed: October 8, 2021

[9] ↩ Fleurbaey M Kartha S Bolwig S et al. Sustainable development and equity. in: Edenhofer O Pichs-Madruga R Sokona Y Climate change 2014: mitigation of climate change. Cambridge University Press, New York, NY2014: 287-350

[10] ↩ Huppmann D Kriegler E Krey V et al. IAMC 1·5°C scenario explorer and data hosted by IIASA. https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/#/login?redirect=%2Fworkspaces Date: 2019 Date accessed: November 24, 2021

Global South for the rest of the 21st century (figure).[11] Energy and population data in the integrated assessment models (IAMs) are reported at the level of regional and geopolitical country groups. In this Viewpoint, the Global North refers to the IAM categories of OECD90+EU and REF, which encompass Europe, the USA, Canada, Australia, New Zealand, Japan, Turkey, and the former Soviet Union. The Global South refers to the rest of Asia, Africa, and Latin America.

In the analysed scenarios, African and Middle Eastern countries tend to be limited to their existing rates of energy use for most of the century—ie, less than 30 gigajoules per capita per year (figure). It is worth noting that these aggregate regional figures are skewed upward by the Persian Gulf nations—energy use for sub-Saharan Africa must therefore remain constrained to much less than 30 gigajoules in these scenarios. By contrast, the OECD countries and the rest of Europe are, on average, allocated energy well in excess of 100 gigajoules per capita per year for the rest of the century. Even in 2100, the allocation to OECD countries and the rest of Europe is 2·3 times more than the average energy consumed in the Global South (119 GJ per capita vs 52 GJ per capita). Latin America and Asia have rising energy use in these scenarios, but even by the end of the century their allocation amounts to barely half of what countries in the Global North consume.

Existing climate mitigation scenarios therefore tend to maintain the status quo... most of the mitigation scenarios rely on large-scale use of negative emissions technologies, especially bioenergy with carbon capture and storage... the scenarios appropriate land in the Global South to support, and further boost, the energy privilege of the Global North.

In addition to these average figures, we also assessed the scenario ranges. We found that although some scenarios are less unequal than others, none represent true convergence pathways. Only 11 of the 172 scenarios analysed have the Global North–Global South energy gap declining to less than 30 gigajoules per capita per year by the end of the century. Even these more equitable outliers still have substantial inequalities, with the Global North enjoying 40% more energy use than the Global South. Existing climate mitigation scenarios therefore tend to maintain the status quo, whereby wealthy countries continue to use disproportionately high amounts of energy, and energy consumption for much of the Global South is restrained in the decades to come.

To reconcile the high energy use in wealthy countries with the Paris Agreement targets, most of the mitigation scenarios rely on large-scale use of negative emissions technologies, especially bioenergy with carbon capture and storage (BECCS). These scenarios suggest that the Global North can continue to use high rates of energy, and emit additional carbon, so long as emissions can be pulled back out of the atmosphere in the future. But BECCS has been criticised by scientists as a risky and dangerous strategy. Scaling bioenergy monoculture would require large amounts of land—up to three times the size of India—with devastating effects on biodiversity, forests, water tables, and food systems.[12] Furthermore, if carbon capture technology fails to work at scale, we will be locked into a high temperature trajectory from which it would be impossible to escape.[13]

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[11] ↩ **Figure:** Unequal access to energy between the Global North and the Global South in climate mitigation scenarios: (A) shows the 10–90% percentile range of per-capita energy use in the Global North and the Global South, corresponding to the 172 analysed scenarios that are compatible with keeping global warming below 1·5°C or 2·0°C. (B) compares the median pathways of per-capita energy use in the Global North with energy use in the three regions of the Global South. (C) shows the difference in per-capita energy use for the Global North and the Global South, between scenarios that assume large-scale use of negative emissions (exceeding 700 GtCO2 in the period from 2020 to 2100) and scenarios that assume moderate or small-scale deployment of negative emissions (less than 400 GtCO2). Panel C shows how energy consumption in each of the two respective regions benefits from an increasing global deployment of negative emissions. In panels A and C, the range of scenario projections is illustrated with median values (solid line) and 90% confidence intervals of the analysed scenarios.

[12] ↩ Creutzig F Erb KH Haberl H Hof C Hunsberger C Roe S - Considering sustainability thresholds for BECCS in IPCC and biodiversity assessments.GCB Bioenergy. 2021; 13: 510-515

[13] ↩ Van Vuuren DP Hof AF Van Sluisveld MA Riahi K - Open discussion of negative emissions is urgently needed. Nat Energy. 2017; 2: 902-904

This reliance on negative emissions technologies is risky, but it is also unjust. We analysed the scenarios that assume large-scale deployment of negative emissions (more than 700 GtCO2 from 2020 to 2100) and compared these with scenarios with lower reliance on negative emissions (less than 400 GtCO2). We found that most of the additional energy that can be consumed in high-negative emissions scenarios is not allocated to the Global South, but rather to the Global North, thus maintaining or further widening global energy inequalities (figure). Moreover, these scenarios typically assume that the bulk of negative emissions will be realised by the biomass-rich countries of the Global South, with their cropland and natural ecosystems diverted to energy crop plantations.[14,15] In other words, the scenarios appropriate land in the Global South to support, and further boost, the energy privilege of the Global North.

The scenarios reviewed here are neither morally acceptable nor politically tenable.... wealthy countries must scale down excess production and consumption to enable a faster transition to low-carbon energy. Low-income countries should be granted access to the finance and technology necessary to deploy modern renewable energy systems sufficient to provide decent living for all.

Discussion

The scenarios reviewed here are neither morally acceptable nor politically tenable. Why should countries in the Global South accept such an inequitable future? Why should these countries accept heightened risk of climate catastrophe—which already disproportionately harms them—so that wealthy countries can maintain an economic model based on overproduction and accumulation? Why should the Global South hand over their cropland and ecosystems to support excess in the Global North?

Climate mitigation scenarios are intended to represent a range of possible futures, to explore trade-offs, and to facilitate public debate about how best to approach the transition. This range is supposed to include undesirable or unjust futures, as well as better, alternative futures that show how the world could be arranged differently. The problem is that the existing range overwhelmingly represents futures of substantial Global North–Global South inequality, and does not explore futures of convergence and equity. A truly just transition is not represented—in marked contrast to the principles inscribed in the Paris Agreement and the Sustainable Development Goals—even though such a transition would make climate mitigation easier (and more politically acceptable to governments in the Global South), and would arguably improve the lives of most of the world's population.

What would such a transition look like? To decarbonise fast enough to keep global warming under 1·5°C (without gambling on negative emissions), wealthy countries must scale down excess production and consumption to enable a faster transition to low-carbon energy. Low-income countries should be granted access to the finance and technology necessary to deploy modern renewable energy systems sufficient to provide decent living for all, and they should have the freedom to organise energy use and economic capacity around meeting national needs.[16] Global energy use should converge at a level that is sufficient for human wellbeing and compatible with keeping global warming to no more than

[14] ↩ Roe S Streck C Obersteiner M et al. - Contribution of the land sector to a 1·5°C world. Nat Clim Chang. 2019; 9: 817-828

[15] ↩ Popp A Rose SK Calvin K et al. Land-use transition for bioenergy and climate stabilisation: model comparison of drivers, impacts and interactions with other land use based mitigation options. Clim Change. 2014; 123: 495-509

[16] ↩ Hickel J Brockway P Kallis G et al. - Urgent need for post-growth climate mitigation scenarios. Nat Energy. 2021; 6: 1-3

1·5°C, without gambling on dangerous technologies.[17,18] The planet is finite and it should be shared fairly. To stop climate breakdown and achieve human development for all, scenarios—and strategies—for radical convergence are needed.

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[17] ↩ Keyßer LT Lenzen M - 1.5 °C degrowth scenarios suggest the need for new mitigation pathways. Nat Commun. 2021; 122676

[18] ↩ Kuhnhenn K da Costa LFC Mahnke E Schneider L Lange S - A societal transformation scenario for staying below 1·5°C. https://www.boell.de/sites/default/files/2020-12/A%20Societal%20Transformation%20Scenario%20for%20Staying%20Below%201.5C.pdf Date: 2020 Date accessed: September 28, 2021

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