Framework Convention on Climate Change

KCI/2022/6/7

Katowice committee of experts on the impacts of the implementation of response measures

20 May 2022

Sixth meeting
Bonn, 2-3 June 2022

Draft technical paper on identifying and assessing the impacts of the implementation of response measures taking into account intergenerational equity, gender considerations and the needs of local communities, indigenous peoples, youth and other people in vulnerable situations

I. Background

1. The Conference of the Parties (COP) at its twenty-fifth session, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) at its fifteenth session, and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) at its second session agreed on workplan of the forum on impacts of the implementation of response measure (the forum) and its Katowice Committee on the Impacts of the Implementation of Response Measures (KCI).

2. As per activity 9 of the workplan for forum and its KCI[1], the KCI is to prepare a technical paper on identifying and assessing the impacts of the implementation of response measures taking into account intergenerational equity, gender considerations and the needs of local communities, indigenous peoples, youth and other people in vulnerable situations.

3. As per the strategy for implementing the activity agreed at KCI 5, the KCI launched a call for input[2] from Parties and observers in accordance with the agreed outline[3] of the technical paper.

4. The open-ended working group led by the task lead, with the support of the secretariat and a consultant, has prepared a draft technical paper.

II. Scope of note

5. This background note provides in its annex the draft technical paper.

III. Expected action by the Katowice Committee on Impacts

6. The KCI will be invited to provide guidance for further improving it with a view to:

[1] Decision 4/CP.25, Decision 4/ CMP.15, Decision 4/CMA.2
[2] The inputs submitted in response to the call are available on https://unfccc.int/event/KCI6
[3] Available on https://unfccc.int/sites/default/files/resource/kci%206_call_for_inputs.pdf

(a) Finalizing it at its meeting to be held in conjunction with SB 62;

(b) Providing recommendations and/or key findings, as applicable, for inclusion in the meeting report for consideration by the forum.

Annex I

Katowice Committee of Experts on the Impacts of the Implementation of Response Measures
Sixth Meeting

Identify and Assess the Impacts of the Implementation of Response Measures Taking into Account Intergenerational Equity, Gender Considerations and the Needs of local communities, Indigenous Peoples, Youth and Other People in Vulnerable Situations

Draft technical paper

Activity 9: Workplan to identify and assess the impacts of the implementation of response measures taking into account intergenerational equity, gender considerations and the needs of local communities, Indigenous Peoples, youth and other people in vulnerable situations.

Contents

Executive Summary

An executive summary of the key findings of this technical paper will be added after the KCI considers this draft paper.

I. Introduction

1. Assessing and analysing the impacts of the implementation of response measures is one of the four work areas of the response measures forum and its KCI. The technical paper contributes to the KCI 6-year workplan, activity number 9 (UNFCCC, 2020) by providing information about identifying and assessing the impacts of the implementation of response measures taking into account intergenerational equity, gender considerations and the needs of local communities, Indigenous Peoples, youth and other people in vulnerable situations. This draft technical paper is prepared in accordance with the strategy and agreed outline for the technical paper set out in Annex VI of the Fifth Meeting of the KCI.

II. Objective

2. The objective of the paper is to identify and assess the impacts of the implementation of response measures taking into account intergenerational equity, gender considerations and the needs of local communities, Indigenous Peoples, youth and other people in vulnerable situations. It considers a selected set of mitigation policies consistent with 2°C pathways for holding the increase in the global average temperature to well below 2°C above pre-industrial levels, and with 1.5°C pathways to limit the temperature increase to 1.5°C above pre-industrial levels, taking into consideration intergenerational equity, gender considerations, local communities, Indigenous Peoples, youth, and other people in vulnerable situations. The paper includes a brief summary of concrete cases (including assessment methods used and description of possible socioeconomic impacts), references to relevant work in previous KCI technical papers, and process and reasons of selecting particular policies and measures.
3. The approach of this technical paper includes:
    (a) Identifying impacts of response measures through examining existing generic and case-specific qualitative and quantitative literature on effects of various selected policies consistent with 2°C pathways and 1.5°C pathways based on existing literature that is publicly available;
    (b) Identifying methodologies used in existing research to assess impacts of response measures, where relevant;
    (c) Reviewing inputs from the stakeholders and experts (including relevant UNFCCC constituencies and Constituted Bodies) to identify description of policies or measure consistent with 2°C pathways and 1.5°C pathways and to identify socioeconomic impacts of implementing strategies on different countries or groups identified through different forms of engagement;
    (d) Inferring, where relevant and appropriate, effects and impacts on vulnerable people from effects on a larger (sub)sets of the population which include them.

III. Background

A. Context

4. Achieving the long-term temperature goal of the Paris Agreement requires reaching global peaking of greenhouse gas (GHG) emissions as soon as possible, followed by a rapid reduction in net GHG, most notably anthropogenic carbon dioxide (CO_2), emissions, reaching net zero early 2050s (IPCC, 2022).
5. Achieving climate change targets requires enhanced ambition and effective implementation of GHG mitigation policies and actions (IPCC, 2022; UNFCCC, 2022). These response measures are understood as policies, actions, and measures taken in response to climate change, such as mitigation policies and actions, taken by Parties to the UNFCCC, the Kyoto Protocol and the Paris Agreement. Under the Convention, the term "response measure" is usually associated with social, economic and environmental impacts of implementing climate change mitigation policies. Such impacts can be direct and/or indirect, intended and/or unintended, short, medium and/or long term. They can occur in the implementing and/or in other countries, also known as cross-border impacts (KCI, 2021a). The various potential inequality impacts of selected

climate change mitigation policies are summarized in Markkanen & Anger-Kraavi (2019), emphasizing outcomes on health, wealth/income, gender, and ethnic equalities. Additional details on response measures and on analysis of the impacts of their implementation are found in Technical Paper KCI/2021/5/4 (KCI, 2021a). Additional details on tools and methodologies for modelling and assessing these impacts are found in Technical Paper KCI/2021/5/5 (KCI, 2021b).

6. The nature and scale of the potential negative and positive impacts arising from the implementation of response measures vary across and between regions and countries but can be particularly pronounced for developing countries (UNFCCC, 2008; KCI, 2021a). Further, there is recognition that "[t]he risk of negative outcomes is greater in contexts characterized by high levels of poverty, corruption and economic and social inequalities, and where limited action is taken to identify and mitigate potentially adverse side-effects" (Markkanen & Anger-Kraavi, 2019), implying that the effects of response measures are more amplified in vulnerable peoples. Climate change raises serious problems of justice between current and future generations in general, as well as current and future generations within the vulnerable peoples specifically (Government of Ghana, 2022). Vulnerability to climate change appears most likely to negatively affect poor people, particularly women, and to widen existing inequalities.
7. To that end, it is important to identify the impacts of response measures on vulnerable peoples, as these impacts can exacerbate their vulnerability and alleviating the negative ones requires the implementation of specific targeted measures commensurate with the specific impacts.
8. The impacts of climate change on vulnerable peoples are well documented in the literature on social science, and the examination of impacts of climate change mitigation is growing rapidly (IPCC, 2018, 2022). Nevertheless, compared to the general population, there is limited research on quantifying the social and economic impacts of response measures on the vulnerable peoples subject of this paper—namely women, local communities, Indigenous Peoples, youth, other people in vulnerable situations including the elderly, disabled, and poor. Further, and as far as can be established, among existing research on impacts of response measures on vulnerable peoples, there are more assessments concerning women and the poor than any other category of vulnerable peoples. As climate change mitigation policies are particularly concerned with balancing environmental protection with economic efficiency (Schuppert, 2011), the largest body of existing qualitative and quantitative studies on effects of response measures tends to more generic, examining country-wide economic impacts or effects on households.
9. Climate change has implications for intergenerational equity because its effects are temporally delayed, and, similarly, climate change mitigation policies have implications for intergenerational equity (Aldy et al., 2016; Liu et al., 2016; Vrontisi et al., 2018; IPCC, 2022). It is important to examine these implications as global and intergenerational climate inequities impact people's incomes and well-being, which in turn affects their behaviours and consumption patterns, welfare, health, political actions, and climate engagement (Albrecht et al., 2007; Clayton et al., 2015; Fritze et al., 2008; IPCC, 2022).
10. Although largely absent from the literature, intergenerational equity is an important element in impacts of response measures literature given the widening disparity in which benefits and burdens of climate change are and will be distributed among present and future generations (Page, 1999; Yang & Suh, 2021). It has been established in the literature that effects of and attitudes towards climate change vary intergenerationally. Such disparity reflects the fact that more than half of the world's current populations are from older generations, while climate change effects will be felt most likely by the youth of today who will be elderly by mid-century and beyond. In the literature that addresses impacts of these policies on youth and elderly, there is a general focus on risk of job losses, livelihood, newly redundant workers.
11. The rapid rise of youth climate mobilizations across the global has succeeded in framing global climate inaction and inertia as a problem and in framing climate change in the perspective of justice and intergenerational equity (Han & Ahn, 2020). While the youths have taken various actions to combat climate change, they have constrained power due to limited effective participation in climate change governance, mitigation policy, and policymaking (UNDP, 2015; Sanson et al., 2019;Han & Ahn, 2020).
12. Women and girls can be vulnerable because, for example, they face high rates of child marriage, domestic violence, sexual violence, human trafficking, labour displacement—a vulnerability that climate change will aggravate at social, economic and cultural levels (Osman-Elasha, 2020; CBCGDF, 2022; IPCC, 2022).

13. At the intersection between gender and climate change policy, gender equality is addressed through Gender Justice lens (Wilson & Chu, 2020). Climate change mitigation policy represents means to transition to a low carbon economy as well as to enhance gender justice; however, research on mitigation policies is "preoccupied with techno-economic transformations" that are perceived to be gender neutral (Michael et al., 2020). A study examining impacts on women economic empowerment using an intersectional approach argues that climate politics, rooted in masculinist discourses of a green economy, diverts attention from labouring bodies in climate politics, rendering climate experience of women invisible in climate solutions (Wilson & Chu, 2020). The study uses engagement of different labour segments in climate policy and a feminist-informed critical discourse analysis to show that including gender issues in green economy perspective at a superficial way perpetuates gender differences and inequality in the bodies that carry out climate policy.
14. Thus, a gap exists in the relationship between mitigation and gender justice. In qualitative assessments, there is evidence that climate change action that uses a gender lens to inform analysis and priorities can create rapid improvements in gender equality and women's empowerment, and that better climate and environmental outcomes can be achieved through addressing gender-specific barriers and enablers to women's empowerment and decent work (WOW, 2021). Gender-equitable financing of Nationally Appropriate Mitigation Actions (NAMA) would require that the needs and priorities of both women and men are identified and addressed (Di Persio, 2019).
15. The Local Communities and Indigenous Peoples Platform (LCIPP) was established in response to the recognition of the need to strengthen knowledge, technologies, practices and efforts of local communities and Indigenous Peoples related to addressing and responding to climate change. It is an open and inclusive space established for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner (UNFCCC, 2015). Indigenous Peoples and local communities are connected to nature and possess deep traditional knowledge and historical practices that contribute to the protection of biodiversity and natural resources and that to the design of better climate change mitigation and adaptation policies (Bonilla-Moheno & García-Frapolli, 2012; Larsen, 2016; Iocca & Fidélis, 2021; IPCC, 2022). A literature review of scientific articles published between 2010 and 2020 on indigenous/traditional communities in the context of climate change, nature (territory and water), and law concludes that only a residual number of research on climate change considers traditional communities, and that there is an uneven distribution of case studies across different regions (Iocca & Fidélis, 2021).
16. Relating to impacts on and the discourses surrounding indigenous communities, there is also limited research and their voices are often unrepresented. Narratives surrounding indigenous stakeholders can be thematically identified as religious, cultural, and spiritual value; land and identity; and process and procedures. Studies tend to focus more on these communities' vulnerability to climate change and on how traditional practices can inform policy and practice, rather than on the impacts of response measures on them. Engaging with these communities is critical for the protection of traditional communities from climate change impacts and for the integration of their knowledge into resilient policymaking (Iocca & Fidélis, 2021; IPCC, 2022). Reducing negative effects of mitigation policies requires increased involvement of Indigenous Peoples and local communities as they can play a leading role in the global response to climate change, especially indigenous women who play a vital role as stewards of natural resources (UN Permanent Forum on Indigenous Issues Seventh session, 2008).
17. Other groups of vulnerable peoples namely the elderly, disabled, and poor are also largely affected by climate effects and the effects of mitigation measures. Among studies on impacts of response measures on these vulnerable peoples, the poor are more represented than the other groups (examples available in KCI/2021/5/5), possibly because the largest share of climate impacts would fall on the poor (Muttitt & Kartha, 2020).
18. There is objection to accelerated mitigation policies that cause risk of job losses, increased inequality and gender inequality, diminish competitiveness; have negative impacts on vulnerable peoples and on vested interests (IPCC, 2022). In response, across all groups of vulnerable peoples, there is evidence from the literature that there is increased climate activism among the vulnerable peoples, especially the youth, women, leaders of local communities and Indigenous Peoples to influence response measures and exert political influence towards mitigation (Claeys & Delgado Pugley, 2017; Grady-Benson & Sarathy, 2016; Helferty &

Clarke, 2009; IPCC, 2022). These effort contribute to raising awareness, strengthening climate leadership in many countries, changing broad social norms by raising knowledge of Indigenous governance systems which supported sustainable lifeways over thousands of years (Temper et al., 2020; IPCC, 2022).

19. Therefore, in light of paragraphs 8 and **Error! Reference source not found.**17 above, in some cases where there is absence of literature on impacts of response measures on vulnerable peoples, this paper infers, to the extent possible , the effects on them with reference to studies on impacts of response measures on larger groups that include them. Such inference is possible if the vulnerable peoples are captured as subsections in the labour market, sectoral employments, gender, or larger populations.

B. Definitions

20. **Gender equity**: Equity between women and men with regard to their rights, resources and opportunities. In the case of climate change, gender equity recognises that women are often more vulnerable to the impacts of climate change and may be disadvantaged in the process and outcomes of climate policy (IPCC, 2022).
21. **Intergenerational equity**: Intergenerational equity articulates the concept of fairness amongst all generations in the use and conservation of the environment and its natural resources. In the context of climate change, it acknowledges that the effects of past and present emissions, vulnerabilities and policies impose costs and benefits for people in the future and of different age groups (IPCC, 2022). The UNFCCC embeds intergenerational equity as a founding principle within the international climate change regime (Venn, 2019), framed as the need to "protect the climate system for the benefit of present and future generations of humankind" (UNFCCC, 1992, Article 3), which is further reinforced by the inclusion of sustainable development as a core principle within the UNFCCC framework and the Paris Agreement Preamble.
22. **Local communities**: There is no universally accepted definition for local communities, and they are at times defined in conjunction with Indigenous Peoples as vital custodians of the world's remaining natural landscapes (ICCA Consortium, 2020). More specifically, local communities represent a heterogenous group of people living in the same country, have a common interest or passion and include communities that hold collective knowledge, and whose livelihoods are tightly connected to a common ecosystem or a natural resources (Athaydea et al., 2021). They might or might not have formal recognition of specific rights over their lands, territories, and cultural identity.
23. **Indigenous Peoples**: Indigenous Peoples are inheritors and practitioners of unique cultures and ways of relating to people and the environment. They have retained social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live. Despite their cultural differences, Indigenous Peoples from around the world share common problems related to the protection of their rights as distinct people (UN, n.d.a). They are usually rights holders with special rights formally recognized under some jurisdictions' constitutions or other laws. The Indigenous Peoples' rights are protected under of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP, 2007).
24. **Youth:** There is no universally agreed international definition of the youth age group (UN, n.d.b); however, youth is best understood as a period of transition from the dependence of childhood to adulthood's independence. The UN defines youth as those persons between the ages of 15 and 24 years, as was endorsed by the General Assembly in Resolution 36/28 of 1981 (UN, n.d.b).
25. **People in vulnerable situations**: Groups and communities that have adversely been affected by climate hazards and having limited ability to recover by themselves. This definition would include vulnerable groups and communities that have severely been affected by droughts, floods, coastal inundation, and extreme temperatures (UNFCCC, 2018). According to a resource guide by the State of California (2018) for public agencies, there are various indicators used in vulnerability assessment tools under each of the following factors: existing inequities, institutionalized racism, or exclusion; physical states or conditions that increase vulnerability; poor environmental conditions, access to services, or living conditions; and lack of investment and opportunities. The guide further sets an additional set of indicators for analysing and defining vulnerable communities, including demographics, housing security, mobility, health services, environmental hazards, business/jobs, available public and private utilities, social services, governance, community, fiscal health, culture, and geography (which may include arid or semi-arid lands, mountain regions, or remote areas).

26. **Vulnerable peoples**: For purposes of this paper, vulnerable peoples denote the collective group of the groups on whom the impact of response measures is examined in this paper, namely women, local communities, Indigenous Peoples, disabled people, youth, elderly, and other people in vulnerable situation. Other people in vulnerable situations are the following.
    a. **Elderly people**: There is no one universally accepted definition for elderly people. Traditionally, the UN (2019), policymakers and researchers have most commonly used measures and indicators of population ageing that are mostly or entirely based on people's chronological age, defining older persons as those aged 60 or 65 years or over (UN, 2019).
    b. **Disabled people**: Disabled people are persons with disability**.** According to the UN Convention of the Rights of Persons with Disabilities (UNCRPD, 2006), persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.
    c. **Poor people**: While definitions vary across states and within countries, it is generally acceptable that poor peoples are members of groups, populations, households, or countries that suffer poverty. The UN Administrative Committee on Coordination defines, fundamentally, poverty as a denial of choices and opportunities, a violation of human dignity (UNACC, 1998), and means the following. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation (UNACC, 1998). In this paper, unless otherwise specified, poor refers to low-income groups.

IV. Selected policies and their impacts

27. Achieving the long-term temperature goal of the Paris Agreement requires the implementation of mitigation policies and response measures that help reduce and limit GHG emissions over the next decades to reach net zero by 2050. Policies consistent with 2°C pathways refer to pathways of policies and technologies that can reduce and limit GHG emissions to a level sufficient for holding the increase in the global average temperature to well below 2°C above pre-industrial levels. Policies consistent with 1.5°C pathways refer to those that can help reduce emissions to a sufficient level to hold the increase in the global temperature to well below 1.5°C above pre-industrial levels by 2050. Lower GHG emissions in 2030 can lead to a higher chance of keeping peak warming to 1.5°C (IPCC, 2022). Policies consistent with 2°C and 1.5°C pathways include economic and fiscal instruments (such as taxes and subsidies), regulation, energy and transport sectors, waste sector, technology, government provision of public goods or services, and nature-based solution including forestry (IPCC, 2022; Government of Ghana, 2022) (see IPCC (2022) for a detailed list of policies).
28. In assessing the literature on impacts of response measures on the vulnerable peoples, this paper selects the following policies and response measures as key policies consistent with the 2°C and 1.5°C pathways:
    a. General emissions reductions policies, such as carbon trading and energy efficiency;
    b. Phasing down of coal and the removal of inefficient fossil fuel subsidies;
    c. The adoption of renewable energy;
    d. Increasing forestry.
29. The following sections describe each of the above policies and summarize their impacts on the vulnerable peoples. Table 1 provides a preliminary summary of the impacts on each category of vulnerable peoples as detailed in the following section, which will be completed and finalized once the KCI considers this technical paper, and the paper is amended to reflect comments from the KCI.

A. Emissions reduction policies

30. This technical paper selects as a first measure general policies for emissions reduction. Excluded from this section are selected policies listed under paragraph 28(b) through (d).

31. Within the wide range of emissions reduction policies, this technical paper selects as the first policy the imposition of carbon taxes, or carbon prices generated as a result of the emissions cap associated with introduction of carbon trading scheme. It is selected because economic frameworks have generally accepted that carbon pricing (based on economic principles which extend to other GHG emissions) is the most cost-effective way to reduce emissions, notwithstanding various market failures which could limit its effectiveness (Stern, 2015). Subsequently, the paper covers impacts of other emissions reduction policies—such as the ones related to urban planning and building, transport, and energy efficiency— especially as those are shown to impact specific groups within vulnerable peoples, as summarized below.
32. Carbon taxes along with fossil fuel taxes are more prevalent among developed countries. There is a mismatch between capital availability in the developed world and the future emissions expected in developing countries (IPCC, 2022). The implementation of carbon taxes on countries based on emissions of products they produce places exporting economies at a disadvantage as it does not account for where products are consumed, thereby exacerbating inequalities among nations and "carbon equity," a concept proposed by the CBCGDF denoting people's equal carbon emission rights (CBCGDF, 2022).
33. Carbon-related climate change mitigation measures —namely cap-and-trade schemes, carbon taxes, and personal ecological space quotas are shown to not be compatible with principles of intra- and intergenerational justice and that none of these three policies can satisfy demands of effective mitigation and egalitarian justice on its own (Schuppert, 2011). This result suggests that existing proposals for the distribution of emission rights and climate change-related costs need to be supported by additional evidence for intergenerational justice.
34. Carbon pricing and taxes can have direct negative socioeconomic impacts on the poor and may exacerbate socioeconomic pressures on poorer households (Jakob et al., 2014). As carbon pricing may be regressive and perceived as additional costs by both households and industries, it could increase household energy expenses, especially for the poor (Martinez & Viegas, 2017; McDonald et al., 2020; IPCC, 2022), and would render green infrastructure investments politically unfeasible (Copland, 2020; Douenne & Fabre, 2020).
35. A literature review of empirical studies on perceived fairness and public acceptability of carbon pricing finds persistent fairness concerns over distributional effects of carbon pricing, particularly in relation to impacts on poor people which, in turn, reduce policy acceptability (Maestre-Andrés et al., 2019). It also suggests these distributional effects can be addressed by combining redistribution of revenues with support for low carbon innovation. Therefore, carbon pricing policies could receive higher acceptance if they explicitly reflect fairness and distributive consideration in revenue distribution (IPCC, 2022).
36. Beyond the aforementioned impacts on intergenerational equity and the poor, there are limited studies that quantifying effects of carbon pricing and carbon markets on the other vulnerable peoples' groups. Therefore, this paper summarizes other that studies quantify household, economic, labour, or welfare effects of carbon-related policies in populations general. Effects of these studies imply the expected minimum impacts on vulnerable peoples, given that the impact on the latter is expected to be amplified by their vulnerabilities (per paragraph 6). A review of key literature on general populations including vulnerable peoples gives some examples as follows.
    a. A study quantifying the gains/costs and welfare implications of a 2°C pathways climate scenario with emissions trading in India and China finds that negative economic impacts of international climate policy are generally larger in China than in India, and that India can even gain economically (Johansson et al., 2015).
    b. A study of the cross-border impacts of the implementation of carbon tax, an energy input tax, and a quantity restrictions for Senegal and Kenya using a global CGE model that is soft-linked to a single-country CGE model, finds the impacts depend greatly on the type of response measure implemented, with more muted effects under a carbon tax (McDonald et al., 2020). Generally, negative effects of response measures affect most households, impacts on rural households are greater than in their urban counterparts because the latter are systematically poorer. Meanwhile, incomes for rural (poorer) households rise in instances where they receive remittances from abroad which offset the decline in their wages non-agricultural capital returns caused by the tax. These results suggest an important conclusion that the cross-border effects of vulnerable peoples vary depending on whether

they form part of poorer households or households in areas that are negatively impacts by the implementation of response measures.

c. Another study on different options for transferring carbon taxes revenue in India finds, using a general equilibrium assessment, finds that welfare effects of an international climate regime vary by different household type and are affected by international price repercussions (Weitzel et al., 2015).

37. Redistributive measures could help ease impacts of carbon pricing and taxes on the poor. Such measurers vary from redistributing the tax revenue to favour of low-income groups, applying differentiated carbon taxes (Klenert & Mattauch, 2016; Metcalf, 2009; Stiglitz, 2019). An analysis of Latin America and the Caribbean finds that allocating 30% of carbon revenues would on average suffice to compensate poor and vulnerable households, leaving the rest for other uses (Vogt-Schilb et al., 2019). This study suggests that cash transfer programs ae some of the most efficient tools for poverty reduction in developing countries.
38. The implementation of carbon taxes or carbon trading mechanisms can result in unmeasured or inaccurately measured impacts on the industries employing vulnerable peoples owing to existing variations and regional and/or in-country inconsistencies in measuring carbon emissions per industry or product and, therefore, by country and per capita (Shehabi et al, 2021). These inconsistencies can unintentionally exacerbate existing inequalities and negative effects of carbon reduction policies on vulnerable peoples.
39. As part of mitigating this problem, CBCGDF (2022) proposes the use of alternative methods of calculating emissions and apportioning corresponding responsibility to all nations based on their emissions through tracking each person's consumed carbon emissions. This proposal is presented as a more equitable solution to the concept of "polluters pay," which places the burden on producers irrespective of the end consumers.
40. Women, as other vulnerable peoples, are negatively impacted by some mitigation policies. Various programs can be implemented to increase carbon and economic equality and to minimise negative gender effects of response measures. Examples include programs specifically targeting underdeveloped areas with abundant carbon emissions, such as the Chinese Rural Revitalization program (CBCGD, 2022). Another example is the introduction of various indicators to measure and raise women's participation in skilled and management positions to a given level (15%) (Bonsucro Production Standard, 2022). Such indicators promote gender inclusion in management and skilled positions in Mill and Agriculture operations and offer community-based women's empowerment training and recruitment operations. Women, as well as racialised and marginalised groups, largely benefit from policies that increase their political access and participation, which increase their climate action and render climate mitigation policies more effective (IPCC, 2022).
41. A positive correlation exists between the effective climate change policy and gender equality as well as between effective climate policy and the participation of Indigenous Peoples and women in decision making (IPCC, 2022). Women and Indigenous Peoples have, in general, lower carbon-footprints than other groups and their increased participation can increase their influence on grassroots change (IPCC, 2022).
42. Within the context of emissions reducing policies as defined in paragraph 30, the following paragraphs review studies on impacts of policies other than carbon pricing and carbon markets.
43. Mitigation measures generally are shown to result in a disparity in the economic impacts (costs and benefits) across generations (Yang & Suh, 2021). The elderly born prior to 1960 generally experience a net reduction in lifetime gross domestic product per capita, while those born after 1990 will gain net benefits from climate change mitigation in most lower (lower-middle- and low-) income countries (Yang & Suh, 2021). By contrast, in many higher income countries, no age cohorts enjoy net benefits regardless of the birth year. With time, the cost-benefit disparity among different age cohorts is expected to widen, with a wider gap in lower-income countries. The rise of the youth in climate movements across the World cannot be explained by the economic self-interest in the short-term but they do benefit from climate change mitigation in the long-term.
44. Carbon sequestration and GHG emission reduction options have both co-benefits and risks in terms of biodiversity and ecosystem conservation, food and water security, wood supply, livelihoods and land tenure and land-use rights of local communities, Indigenous Peoples, as well as small landowners (IPCC, 2022). To increase carbon and economic equality and to minimise negative effects of response measures on Indigenous Peoples and local communities, projects like the UN-REDD (Reducing Emissions from Deforestation and

Forest Degradation) can aid in carbon data collection systems to identify and minimise effects on Indigenous Peoples (CBCGDF, 2022).

45. Other emissions-reducing mitigation policies include bottom-up industrial initiatives, such as building clean cookstoves with clay construction techniques to reduce solid fuel use. These clean cookstoves reduce firewood toxic fumes by 75%, improving the health and livelihood of women (Women Engage for a Common Future, 2022); allowing them to spend less time collecting firewood and cooking and more time empowering more women to engage in local advocacy, gain technical skills, and join income generating activities (Women Engage for a Common Future, 2022; IPCC, 2022). Such positive health improvements are likely to extend to other members of the vulnerable peoples, especially the youth, elderly, and disabled.
46. Energy efficiency especially in buildings have positive effects on the elderly through alleviating energy poverty, reducing fuel consumption and, therefore, associated financial stress. It also improves health conditions for the elderly through reducing effects to high temperature and improved indoor temperatures and comfort (IPCC, 2022). The reason for these large gains is that many elderly live in fuel poverty, especially particularly in cold and damp houses, they suffer various health effects including excess winter mortality, increased morbidity rates (due to respiratory, cardiovascular, and arthritic and rheumatic diseases) (Camprubí et al., 2016; Lacroix & Chaton, 2015; Ormandy & Ezratty, 2016; Payne & Weatherall, 2015; Thema et al., 2017). Economic pressures exacerbate negative mental health outcomes, and high temperatures especially during summer can also be dangerous for those living in buildings with inadequate thermal insulation and inappropriate ventilation (Ormandy & Ezratty, 2016; Sanchez-Guevara et al., 2019; Thomson et al., 2019).
47. Downsizing dwelling through cohousing strategies is another mitigation policy with positive impacts on the elderly and intergenerational equity (IPCC, 2022). These policies enable the construction of senior cooperative housing and eco-villages through repurposing existing or new building to convert them to multi-family, rather single-family buildings, with common shared spaces (for laundry, dining, or other purposes). These strategies reduce demand for materials in constructions and energy demand for heating (IPCC, 2022), and can encourage inter-generational cohousing and interactions among people of different backgrounds (Lietaert, 2010; IPCC, 2022).
48. Mitigation policies concerning urban planning and transport as well as the automation of vehicles have positive effects on the disabled as well as the elderly. There is increased pressure to engage disabled individuals in the consultation and decision-making process of urban governance to create a more inclusive and effect urban development and avoid negative impacts on the disabled (Colenbrander et al., 2019; IPCC, 2022). Improving the transport sector and road accessibility will enhance the welfare of disabled users by offering them a more inclusive, affordable, safe, and clean passenger and freight mobility (IPCC, 2022). The automation of vehicles to become driverless could improve vehicle efficiency and reduce congestion and, consequently, emissions (Massar et al., 2021; Vahidi & Sciarretta, 2018), which could increase travel demand for the elderly (Harper et al., 2016) and make transit more accessible and less risky (Auld et al., 2017; Sonnleitner et al., 2021) particularly for the disabled and elderly.
49. Demand-side mitigation measures, such as energy efficiency, can also have multiple interacting and positive benefits on the poor (IPCC, 2022). Improving energy services to meet energy and other needs can provide the poor and citizens of less-developed countries much needed access to safe and low-emissions energy sources necessary for decent living, as well as increase energy savings from service improvements by 20-25% (IPCC, 2022).
50. Minimising impacts of response measures on vulnerable peoples requires incorporating actions on gender and vulnerable peoples to enhance their resilience into climate actions and NDCs (Government of Ghana, 2022) as well as just transition concepts into climate policies and/or NDCs (Climate Strategies, 2022). Such incorporation is a key to ensuring a well-planned and equitable just transition aligned with a country's development frameworks and priorities and the Paris Agreement and addressing key effects on vulnerable groups (Climate Strategies, 2022; Government of Ghana, 2022). To that end, some efforts have been implemented, to increase stakeholder engagement with government officials and different social groups such as gender, local communities and Indigenous Peoples, to aid in mainstreaming these groups into Climate Actions (Climate Strategies, 2022; Government of Ghana, 2022; World Bank, 2022; Women Engage for a Common Future, 2022). Efforts also include specified programs of actions expected to build the resilience

of nationals, the majority of whom are the youth and women, while reducing GHG emissions and creating jobs, as well as targeted training to various institutions to better understand the social and employment implications of climate policies and the NDCs (Government of Ghana, 2022).

B. Phasedown of coal and the removal of inefficient fossil fuel subsidies

51. The phasing down of coal and the removal of inefficient fossil fuels subsidies are key response measures that affect vulnerable peoples. Fossil fuel subsidies are most commonly prevalent in developing countries, implemented for socioeconomic and development purposes to increase energy access and reduce energy poverty by reducing the cost of energy inputs, or as rent distributive mechanisms in countries that rely heavily on rents from fossil fuel exports (Shehabi, 2017). Fossil fuel subsidies incentivise increased use of fossil fuels, and they are regressive benefiting the rich more than the poor, distortionary, and inefficient (Lockwood, 2015). Nonetheless, they also provide access to modern energy sources to the poor (Kimemia & Annegarn, 2016).
52. The phasing out of coal and fossil fuel subsidies are part of the larger global transition to a low-carbon development, which is directly linked to issues of justice and equity (IPCC, 2022). Distributive justice requires a fairer sharing of both the benefits and burdens of the energy transition process, along with procedural justice required to ensure that the demands of vulnerable groups are not ignored in the transition (IPCC, 2022).
53. A literature review of geography and political ecology of 198 studies and their corresponding 332 case studies conducted over 20 years, finds that low-carbon transitions consist of four distinct processes: enclosure (capture of land or resources), exclusion (unfair planning), encroachment (destruction of the environment), or entrenchment (worsening of inequality or vulnerability) (Sovacool, 2021). Accordingly, the impacts of climate change and low carbon transition are experienced differently by different countries, mitigation options, and social actors (Sovacool, 2021). Within the social actors, indigenous communities face multiple threats and are subjected to unequal power dynamics (Sovacool, 2021) because the energy transition is dominated by interests of fossil fuel producers and investors who belong powerful groups or companies that could be vocal if their interests are at risk (Lazarus & van Asselt, 2018). This reality implies that vulnerable peoples especially indigenous communities who are subject to unequal power relations are risk in transition process. Thus, social equality in general and in fossil fuel producing and dependent economies in particular is at the heart of the transition process (IPCC, 2022).
54. Along with general energy transition projects, the phasing out of coal will cause job losses for those working in the fossil fuel sectors, rendering the expansion of jobs and support for the transition to low-carbon energy a key priority (IPCC, 2022). This is especially the case for workers in coal and other fossil fuel sectors land and other effects for indigenous communities (Zografos & Robbins, 2020), as well as low-income and other countries that depend on fossil fuels for their energy and exports and jobs (IPCC, 2022).
55. Within this context, studies on impacts on women are limited. Women and migrants tend to be over-represented in indirect or supportive roles to the energy sector, including lower-paid and unpaid services and care work. As such, they often do not access worker compensation and re-training policies that are proposed to mitigate negative effects of coal phaseout and fossil fuel subsidy reform (Bacchiocchi et al., 2022; Piggot et al., 2019).
56. As far as can be established, there are no studies that measure directly impacts of phasing out of coal and inefficient fossil fuel subsidies on intergenerational equity, the youth, the elderly, and the disabled. Effects on their health are inferred from studies on general populations. For example, these policies are likely to improve air quality and reduce (IPCC, 2022), which will improve health conditions of the vulnerable groups, especially of those dealing with respiratory illnesses often common among the elderly. Further, for members of these vulnerable peoples groups who belong to poor households, the impacts on them will be similar to those on the poor, as described below in paragraph 56 to 61.
57. The phasing out of coal and other fossil fuel extraction and subsidies raises questions pertaining to climate justice. Poor households and poor vulnerable peoples tend to allocate a larger share of their incomes to energy and to basic needs. Coal can also be a more affordable energy source than renewable energy. Thus, the implementation of these response measures will have a larger impact on the livelihoods of poorer and

vulnerable populations (Shehabi, 2017; Timperley, 2021; Zimmer et al, 2021; KCI, 2021b, IPCC, 2022) and, therefore, exacerbate their vulnerability. Therefore, a transition must respect and uphold the rights of groups harmed by the loss of affordable (and/or subsidized) coal and fossil fuels, including consumers and workers in extractive industries (Muttitt & Kartha, 2020).

58. In developing countries, various studies show that access to renewable energy sources such as small-scale biofuel production can aid Indigenous Peoples and other remote rural populations in securing greater energy security and higher standards of living standards, thereby reducing regional economic inequalities and even ethnic conflict (such Bhattacharyya, 2013; Gomez et al., 2015; da Silveira Bezerra et al., 2017; Renewable Energy Policy Network for the 21st Century, 2017).
59. Eliminating inefficient fossil fuels has similar effects on the poor as implementing other carbon-specific response measures and are likely to reinforce inequality, as follows. Removing subsidies not only raises prices of energy goods, but also prices in energy-intensive goods and services, including food (Hasegawa et al., 2018), thereby affecting poorer households disproportionally and low-skilled workers (IPCC, 2022; Bento, 2013). Similar effects on are shown in a study on the removal of energy subsidies in oil economies which shows, using a CGE model, that subsidy removal harms employment levels and welfare of unskilled workers especially non-nationals employed on temporary employer-sponsored contracts as well as unskilled labour (Shehabi, 2017) with unguaranteed wages and a higher portion of it spent on energy. National workers are less affected because they ae largely concentrated in guaranteed public sector jobs (Shehabi, 2017). Another CGE-based study shows that removing subsidies on imported fuel benefits increases GDP and other economic indicators but reduces household incomes especially poor households (Siddig et al., 2014).
60. These effects can be alleviated if a subsidy reduction is accompanied with income transfers aimed at poor households or domestic production of petroleum products (Siddig et al., 2014; Vogt-Schilb et al., 2019). A study on options for mitigating adverse effects using a general equilibrium model suggests that removing subsidies on fossil fuels would create opportunities if done in tandem with complementary policies, such as agricultural productivity improvement and a reduction in trade transaction costs (Wesseh & Lin, 2017). Cash transfer programs which have been implemented in almost all countries (Beegle et al. 2018) are found central to the success of energy subsidy reforms (Rentschler & Bazilian, 2017).
61. A study on impacts of phasing out coal plants focusing on labour and economy-wide effects in general shows that phasing out of coal-powered plants in Chile would result in significative negative impact on the overall labour market, including the progressive disappearance of 4 thousand jobs in coal power plants by 2030 or 2050 (depending on the scenario), but that such effects are not significative when compared to Chile's labour markets and GDP (Vogt-Schilb & Feng, 2019).
62. In summary, examining the literature related to the phasedown of coal and the removal of inefficient fossil fuel subsidies shows they tend to focus on general populations or effects on poor households, revealing a gap in assessments on impacts of response measures on vulnerable groups. Studies examining in-country effects focus largely on impacts on household income, livelihoods, and job losses, and poverty and, to a lesser degree, women.

C. Renewable energy

63. The implementation of renewable energy technologies is an integral component of mitigation policies consistent with 2°C and 1.5°C pathways (KCI, 2021a; IPCC, 2022; ILO, 2022). Renewable energy technologies enable the production of power and energy primarily from solar (photovoltaic or concentrating solar power), wind, hydropower, but also from geothermal and biomass. The energy transition away from fossil fuels has accelerated by the rapid rise in adopting renewable energy technology over the past decade partly due to the reduction of their production costs to levels competitive with those of fossil fuels in many jurisdictions (IPCC, 2022). Models on future emissions pathways show the net-zero emissions target cannot be achieved without integrating renewable energy solutions along with other solutions (such as energy storage, energy efficiency, and others) (IEA, 2021; IPCC, 2022). As such, international and local policymakers attempted to accelerate the transition to renewable energy through policies such as increasing

renewable energy investments, implementing subsidies towards green jobs (re)training programmes; improving energy technology standards and emission regulations; and others (ILO, 2022).

64. Implementing renewable energy technologies as well as subsidies that encourage their production and adoption can result in various positive social and economic impacts, such as boosting jobs in the renewable energy sector and green jobs (OECD, 2011; ILO, 2022; IPCC, 2022), increasing imports of renewable energy products (if imported) and reducing electricity blackouts (KCI, 2022a).
65. Simultaneously, the expansion of renewables has negative effects as they also cause job losses in the industries they replace (KCI, 2022a), the displacement of communities out of land that can be used for renewable energy production, and gender inequality (IRENA, 2019).
66. Renewable energy transitions in rural and impoverished locations can simultaneously reinforce and disrupt local power structures and inequalities (IPCC, 2022), directly impacting local communities and Indigenous Peoples. Indigenous Peoples are often marginalised in development decisions on renewable energy as the latte do not properly integrate the burdens and risks placed on them, while risk assessments fail to differentiate these burdens and risks between different groups, thereby reinforcing existing power imbalances (Healy et al. 2019; Kojola 2019).
67. The expansion of large-scale renewable energy projects (including wind and marine) can harm Indigenous Peoples and local communities because it is land intensive and often requires access to tribal land; lacks consultation in the set-up process (from planning to implementation stages) including on effects of women; and engages complex legal frameworks surrounding stakeholder consultation and involvement, tribal autonomy, and self-determination (Unger, 2009; Bacchiocchi et al., 2022; Kerr et al., 2015; QUNO-AIDA-GI ESCR-FWCC, 2022) that are complex for many members of local communities and Indigenous Peoples.
68. In a statement by the OHCHR (2017), indigenous communities whose lands are often used for these projects have no possibility to actively share their concerns or be heard in formal processes and often have not given their free, prior, and informed consent to the construction of projects on their lands (OHCHR, 2017; QUNO-AIDA-GI ESCR-FWCC, 2022). Similarly, a qualitative study on effects of large-scale offshore wind energy development finds that the concerns and perspectives of indigenous communities about mitigation policies are mostly brought forth by non-group members and were found to be leveraged or diminished by non-indigenous individuals pushing anti- or pro-offshore wind (Bacchiocchi et al., 2022). There are also findings that indigenous concerns are being co-opted or side-lined through formal and legal decision-making processes (Bacchiocchi et al., 2022), indicating that the formal consultation processes for assessing mitigation policies can fail to meet standards of energy justice by inadvertently giving outsize voice to lesser impacted communities owing to the lack of "inclusive" processes and decision making.
69. Expansion of large-scale renewable projects also hurts women as they tend to have highly unequal land tenure rights and are commonly marginalized from processes of negotiation, consultation and compensation between project developers and local communities (GI-ESCR, 2020; QUNO-AIDA-GI ESCR-FWCC, 2022).
70. The expansion of off-grid, small-scale, decentralized, and community-based energy models can also enable households, and individuals to collectively meet their local energy needs at lower emissions levels while encouraging democratic control of new renewable energy systems. A study of impacts of small-scale solar power deployment from a gender-lens in Tanzania shows significant socioeconomic benefits resulting from improving access to renewable energy (Gray et al. 2019). Off-grid small-scale renewable energy also empowers women through lifting their domestic care burden oof women and providing them leadership opportunities to learn how to install, use, and repair off-grid energy solutions (QUNO-AIDA-GI ESCR-FWCC, 2022).
71. Relating to impacts on women and gender equality, a study by IRENA (2019) estimates that the number of jobs in renewables could increase from 10.3 million in 2017 to nearly 29 million by 2050. Engaging women in consultation processes of renewable energy projects render them more prone to gain awareness, advocate for socioeconomic advancement (such as investments in schools, healthcare, and infrastructure) as part of compensation plans of large-scale development projects (QUNO-AIDA-GI ESCR-FWCC, 2022; IPCC, 2022). Although the share of women in renewable energy labour (32%) is higher than their share in the total energy sector labour (22%), women might not occupy a substantial share of the new jobs because their participation in science, technology, engineering and mathematics (STEM) jobs is far lower than in

administrative jobs (IRENA, 2021) and the resulting new job opportunities are male-dominated (QUNO-AIDA-GI ESCR-FWCC, 2022). Measures that ensure equitable access to new technologies (such as financial support through subsidies or microcredit for poorer households) benefit women and the general population through improve access to overall energy in remote communities (Markanen & Anger-Kraavi, 2019), thereby benefiting vulnerable peoples living there. These benefits can be maximised by incorporating renewable energy projects as part of larger development strategy, inclusion of measures of vulnerable peoples, and incentivise commercial activities enabled by electricity access.

72. Communication with local and indigenous communities is important to evaluate positive socioeconomic impacts of energy transition on them while mitigating negative impacts of on-grid energy as an imposition on self-determination (Fitzgerald & Lovekin, 2018; Mercer et al., 2020). A study on local community engagement on heat insecurity in diesel-powered indigenous communities, using a mixed-methods approach (of community-member interviews and key informant interviews), finds that community-members value socioeconomic contributions of diesel-generation—such as employment, reliability, familiarity, and contributions to community-resilience—but remain concerned about environmental degradation and the risk of fuel spills affecting their livelihoods (Mercer et al., 2020). Primary energy-system concerns relate to heat insecurity, and energy systems dependent on external control, support, and imports. Privileging voices of indigenous community members enables the identification of community strengths associated with local energy systems while shifting focus to what issues considered most pressing energy-related challenges in their communities (Mercer et al., 2020, IPCC, 2022). Opportunities for Indigenous inclusion reduce power imbalances between utilities and Indigenous power proponents resulting from lack of transparent information sharing and the utilities' authoritative advance (Fitzgerald & Lovekin, 2018). Motivations related to sustainable energy projects among some indigenous communities are linked to autonomy and self-determination and exerting sovereignty (Hasegawa et al., 2018; Jaffar, 2015).
73. Renewable energy technology is likely to reduce health risks of the elderly (IPCC, 2022), particularly in buildings. The implementation of renewable energy-based electrification of the energy system reduces outdoor air pollution, improves indoor air quality through reducing smoke from heating and cooking (Kjellstrom & McMichael, 2013).
74. At a general level, it is likely that the expansion of renewable energy will increase poverty in countries that depend on fossil fuel subsidies, in the absent of other export revenue sources (Shehabi, 2022). If renewable energy replaces fossil fuels in power generation, it will reduce demand for fossil fuels which, and, in turn, will have detrimental fiscal effects on countries that depend on the exportation of fossil fuels, by reducing export revenues, energy security, and available incomes for poverty alleviation and development (Lazarus & van Asselt, 2018; Shehabi, 2022).

D. Increasing forestry

75. Increasing forestry is part of mitigation policies aimed increasing forests to develop and preserve carbon sinks. These policies have become an important nature-based solution as forests and trees are carbon "sinks," whereby they absorb carbon dioxide from the atmosphere, store it as carbon, then release oxygen into the atmosphere (UNFCCC, 2017; IPCC, 2022). The rate of build-up of carbon dioxide in the atmosphere can be reduced through land use, land-use change, and forestry (LULUCF) activities as enable atmospheric carbon dioxide can accumulate as carbon in trees, vegetation, and soils in terrestrial ecosystems. Forests' carbon sequestration ability has attracted much interest as a relatively inexpensive means of addressing climate change with immediate solutions. Increasing forestry policies include Reducing Emissions from Deforestation and Forest Degradation (REDD), Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+), and payments for ecosystem services (PES) schemes exists to promote biodiversity conservation in forests.
76. While a very important and effective mitigation measure, forestry requires access to land often inhabited and/or used by populations, particularly local communities and Indigenous Peoples especially women. The effects of forestry of these vulnerable groups have been documented in existing literature and inputs from stakeholders, as follows.

77. At a general level, increasing forestry schemes such as REDD and REDD+ can exacerbate income inequalities and increase risks of conflict when financial benefits are not equally distributed, property rights are not granted to selective local beneficiaries, and vulnerable peoples or distant forest users [4] are not provided opportunities to engage in the decision making surrounding these schemes (Khatun et al., 2015; Nhantumbo & Camargo, 2015; Bee, 2017; Duker et al., 2018; IPCC, 2022).
78. There are various trade-offs resulting from the adoption of forestry and supporting policies (such as improved sustainable forest management, agroforestry, soil carbon management) have potential negative impact on various groups including Indigenous Peoples and women (IPCC, 2022). Valuing, managing, and minimising these tradeoffs and maximising synergies can be done through specific practices, such as increased involvement of local communities and Indigenous Peoples and through benefit sharing, as well as emphasizing capacity building, finance, governance, technology transfer, investments, and development and social equity considerations with meaningful participation of Indigenous Peoples and vulnerable populations (IPCC, 2022). Programs such as the UN-REDD and Agriculture, forestry and other land use (AFOLU) mitigation can respond to the needs and perspectives of multiple stakeholders to maximise co-benefits while limiting trade-offs (IPCC, 2022).
79. The effects on women of policies that promote increasing forestry feature in different studies. Women routinely experience discrimination and harmful outcomes in their use of land and natural resources and in gaining rights to them (World Bank, 2022). In India, building REDD+ strategy upon the operational framework of existing schemes and programmes (such as the Joint Forestry Management Program (JFM)) emphasizes compulsory representation of women yet lack recognition of gendered forms of injustices manifested in the way men and women access forest resources and take part in decision making processes (Michael et al., 2020). It has been argued that operationalizing the REDD+ framework without adequate capability development of women can accentuate gendered vulnerabilities by restricting access to forest use for fuel, fodder or non-timber forest produce (Elias & Grosse, 2017). A study on communities dependent on livestock and forests in northern Mali shows that migration in response represented one of the most important strategies for men, while women perceived this strategy more as a cause of vulnerability than an adaptive strategy (Djoudi & Borckhasu, 2011). Field assessments for countering deforestation can contribute to local decisions on water technologies and develop a gender-responsive emergency preparedness program targeted at women (Women Engage for a Common Future, 2022).
80. The implementation of a waste recovery organic materials (such as cassava peelings and other household waste instead of firewood) to produce biogas contributes to reforestation and reduction in burn pollutions, thereby reducing respiratory and skin diseases for women and the elderly (NGO Africa Hope, 2022; IPCC, 2022).
81. The effects of increasing forests on local communities and Indigenous Peoples are substantial but depend on the extent to which the clear (and enforced) communal land tenure or ownership rights for affected communities; the inclusion of all affected local populations in the decision-making process; equitable distribution of financial support or community projects to realize co-benefits and to avoid negative side-effect (Markkanen & Anger-Kraavi, 2019). Afforestation or production of biomass crops, when poorly implemented, can result in negative socioeconomic and environmental impacts, including on local livelihoods and on the rights of Indigenous Peoples if implemented at large scales and where land tenure is insecure (IPCC, 2022).
82. Literature on REDD+ and increasing forestation and conservation suggests that there is little attention to the well-being of populations in rural and agricultural areas (Kongsager & Corbera, 2015) and has negative effects on indigenous communities and indigenous women, for example, as follows.
    a. Indigenous and/or local rural communities and indigenous women are found at risk of deprivation of rights (Larson et al., 2013). In many cases, authorities are being empowered to arrest and prosecute people for illegal logging and encroachment of land, and confiscate land and destroy crops (Larson et al., 2013). In countries examined in the available literature, forests are primarily public land and usually formally administered by the state, increasing potential risks of land grabbing by

[4] Distant foreign users are those whose participation may be constrained by informal rules, customary laws, social norms, and bias.

outsiders and loss of local user rights to forests and forest land for indigenous and local rural communities (Larson et al., 2013). Within the indigenous groups, women's voices are often marginalised due to a common tendency to view members of local communities undifferentiated (Larson et al., 2013; IPCC, 2022). Failures to recognise gender differences connected to social structures of forest communities and forest resource distribution and uses results in greater hardships for women (Killian & Hyle, 2020; Larson et al., 2015).

b. At a general level, initiatives for forest conservation harm socioeconomic equality among different local communities and ethnicities, as the use of land displaces these communities' members and causes loss in their livelihoods (Bhattacharya et al., 2010; Jindal et al., 2012; Khatun et al., 2015; Robinson, Holland, & Naughton-Treves, 2014; Smith et al., 2014). Yet, these effects can be mitigated, and equality increased if communal land rights are formally acknowledged and the financial and other benefits from project participation exceed any negative impacts due to loss of livelihoods for the local populations.

c. Efforts to manage and increase forestry have prevented Indigenous Peoples and communities from carrying out traditional environmental management practices including rotational agriculture and animal grazing (Haenssgen et al., 2022), culminating in Indigenous Peoples being declared "forest intruders" since 2014 due to conservation laws. Some local regulations under forestry plans continue to deprive Indigenous Peoples of their rights by empowering authorities to confiscate their land and destroy their crops or even arrest and prosecute them for "illegal logging and encroachment of land" (UPR, 2016; Phongchiewboon et al., 2020).

d. A study on implementing policies in support of agreement at COP26 to halt deforestation shows that these policies forced forest-dwelling communities and some Indigenous Peoples into a precarious existence and undermined forest conservation goals (Henssgen et al., 2022). These impacts are due to misunderstanding Indigenous Peoples' land-tenure rights, governance autonomy, human dignity, material livelihood and cultural production (Henssgen et al., 2022). Policies of reforestation and conservation in South America, Asia and Africa have worked to legitimise state control of ancestral lands and interfere with local (often sustainable) forest management practices, thereby creating artificial pressures on land that accelerate deforestation and land degradation (Phongchiewboon et al., 2020).

e. Some forestry and forest policies have been very successful in generating economic benefits, for example in Chile but to the detriment of local and traditional communities (Reyes & Nelson, 2014). Exotic plantation or monocrop forests have had negative socioeconomic and environmental impacts on local communities and Indigenous Peoples, which raised inequalities and conflicts at local levels (Reyes & Nelson, 2014).

83. The literature offers various ways in which negative impacts on local communities and Indigenous Peoples and women can be reduced. For example, the documentation of rights to land and the processes for titling or certifying rights should be accessible to men and women and address specific barriers facing women in minority ethnic groups (World Bank, 2022c). Increasing indigenous women's access to land tenure rights allows women farmers to develop agroforestry activities while promoting ancestral knowledge and empowering indigenous women. Increase in food security and income, gender equality (Women Engage for a Common Future, 2022). Institutionalizing payments on carbon sequestration and biodiversity conservation values of ecosystems services from global to local indigenous communities has conceptualized as a 'win-win-win' for climate mitigation the protection of biodiversity and conserving indigenous culture. (IPCC, 2022). Such institutionalization occurred through the the UNFCCC and UN-REDD focus on REDD+ and the UNEP program focusing on TEEB (a global initiative concerning the economics of ecosystems and biodiversity).

84. A study examining effects on youth and migration in the Global South shows that community forestry largely increases migration among the youth out of these areas (Brown, 2021). Those who remain are often highly dependent on forests for goods and services for their livelihood. As such, community forestry to be an effective strategy for sustainable forest management and livelihoods, yet youth have often been marginalised in benefiting from or participating in decision-making about community forests due to local, cultural, and traditional norms that give priority to older generations in decision-making (Brown, 2021).

85. Polices that expand urban forestry green infrastructure are likely to have positive health impacts on all vulnerable peoples, especially the elderly. Forests and green infrastructure reduce heat stress (Kim & Coseo, 2018; IPCC, 2022), and improve air quality by absorbing pollutants and sequestering carbon emissions (De la Sota et al., 2019; Scholz et al., 2018). In turn, these effects improve vulnerable peoples' health conditions aggravated by climate change—which affect the elderly the most.

*Table 1**: Preliminary summary of impacts of response measures on vulnerable peoples and intergenerational equity and gender considerations (Arrows indicate positive or negative effects)***

Policy	Intergeneration equity	Women and gender	local communities & Indigenous Peoples	Youth	Elderly	Disables	Poor
Emissions reduction mitigation policies	↓ Carbon taxes exacerbate vulnerabilities and inequalities. ↓ Carbon taxes lead to higher welfare and socioeconomic losses in rural households than in urban counterparts.						
	↓ Increased disparity in the economic impacts (costs and benefits) across generations. ↑ Downsizing dwelling through cohousing projects improves intergenerational equity.	↑ Building clean cookstoves empowers women as it frees them from collecting firewood and cooking and other domestic activities and enables their learning of technical skills and improves health.	↓ Losses in land tenure and land-use rights and livelihood from these lands. ↓ Increases power imbalances.	↑ Building clean cookstoves improves air quality and will have health benefits that extend to the youth. ↑ Downsizing dwelling through cohousing projects increases interactions of the youth with the elderly and peoples of other backgrounds.	↑ Energy efficiency alleviates energy poverty, reduces fuel consumption and associated financial stress, improves health resulting from health and in-door pollution. ↑ Automation of vehicles reduces risk of travel and increases demand for travel.	↑ Building clean cookstoves improves air quality and will have health benefits that extend to the elderly. ↑ Urban planning, transport infrastructure, and automation reduce risk of travel for disabled and increases their inclusion.	↓ Exacerbates poverty. ↑ Urban planning, transport infrastructure, and automation reduce risk of travel for the elderly and increases their demand for travel.
Phasedown of coal and removal of inefficient subsidies	↓ Decreases jobs and employments in fossil fuel industries. ↑ Increases jobs in renewable energy and green jobs. ↓ Social equality.						
		↓ Job losses in energy industry, with less access to worker compensation and re-training policies	↑ Small-scale biofuel production can aid Indigenous Peoples and other remote rural populations in securing greater energy security, higher standards of living standards, reducing regional economic				↓ Hurts socioeconomic welfare, raises prices of goods, reduces energy access, exacerbates inequality as the poor rely on subsidies and

Policy	Intergeneration equity	Women and gender	local communities & Indigenous Peoples	Youth	Elderly	Disables	Poor
			inequalities and ethnic conflict.				affordable energy from coal-fired power plants.
Renewable energy	↓Decreases jobs and employments in fossil fuel industries. ↓ Causes displacement of communities. ↑ Boosts jobs in renewable energy and green jobs. ↑ Increases imports of renewable energy which in turn, can have positive economic impacts.						
		↑ Reduces domestic burden and empowers women in leadership and political opportunities. ↓ Large-scale renewable projects hurt women as they tend to have highly unequal land tenure rights and are commonly marginalized from processes of negotiation.	↓ Large-scale renewable projects hurt indigenous as they tend to have highly unequal land tenure rights and are commonly marginalized from processes of negotiation. ↑ Some socioeconomic contributions of diesel-generation—such as employment, reliability, familiarity, and contributions to community-resilience. ↓ Environmental degradation and the risk of fuel spills affecting livelihoods.				↑ Off-grid, small-scale, decentralized, and community-based energy projects improve energy access and have significant socioeconomic benefits.
Increasing forestry	↑ Improves health conditions, especially for the elderly. ↓ Forest conservation harms socioeconomic equality among different local communities and ethnicities and the use of land displaces communities and causes loss in their livelihoods. ↑ Reduces poverty and welfare losses in countries that depend on exports of fossil fuels.						

Policy	Intergeneration equity	Women and gender	local communities & Indigenous Peoples	Youth	Elderly	Disables	Poor
		↑ Engaging women in the consultation process offers socioeconomic advancements.	↓ Land losses ↓ Not engaged in the consultation process. ↓ Unbalanced power ↑ Engaging them in the consultation process can reduce power imbalances and utilities authoritative advances	↑/↓ Increases migration among the youth. ↓Can result in negative socioeconomic and environmental impacts, especially if implemented at large scales and where land tenure is insecure.	↑ Renewable energy-based electrification reduces air pollution and quality and improves health.	↑ Renewable energy-based electrification reduces air pollution and quality and improves health.	

V. Conclusions

86. This technical paper reiterates previous conclusions of KCI technical papers on the impacts of response measures, recognising the importance of evaluating both the positive and negative socioeconomic impacts of climate change response measures on vulnerable peoples.
87. While studies on impacts of mitigation measures are rising rapidly and point to the existence of various trade-offs and negative impacts, there is relatively limited research on assessing and quantifying the social and economic impacts of response measures on the vulnerable peoples. The literature examined in this paper reveals that there is also an increased focus on policy making process and participation rather than on assessing impacts of the implementation of existing policies on vulnerable peoples.
88. In the literature reviewed in this paper on impacts of response measures on vulnerable peoples, there is an evident variation and unequal coverage across the different groups within them. The Climate change literature that largely engages with social identities like gender and other vulnerable peoples is largely adaptation-centric, routinely emphasizing these groups' vulnerability and capacity to adapt, with limited focus on mitigation. The extent to which there is literature on the vulnerable peoples is summarized as follows.
    a. Across all selected mitigation policies and for all groups of vulnerable peoples, there are various positive as well as negative impacts and co-benefits of the implementation of response measures on them, yet there is general agreement in the literature that response measures exacerbate these groups' vulnerability. The literature also reveals that vulnerable peoples are consistently marginalised from the process of planning and implementing response measures.
    b. Women and poor populations are the vulnerable peoples' groups most examined in assessments of response measures.
    c. Climate change mitigation policies have implications for intergenerational equity, and attitudes towards them vary intergenerationally as well. On the one hand, carbon-related mitigation policies—such as cap-and-trade schemes, carbon taxes, and personal ecological space quotas—are shown to be incompatible with principles of intra- and intergenerational justice. On the other hand, for example, policies that support downsizing dwellings through cohousing strategies can improve intergenerational equity.
    d. Women are generally more negatively impacted by mitigation policies than men when the impacts of these policies are erroneously viewed by policymakers as gender neutral, because that results in ignoring negative impacts on women and therefore exacerbating them. Response measure that require land use, such as the expansion of renewable energy, negatively impacts women as they tend to have highly unequal land tenure rights and are commonly marginalized from processes of negotiation. Energy transition policies that generate new job opportunities disproportionately benefit more men than women, given that women are less represented in these industries or hold low paid or unpaid work. By contrast, women reap empowerment and socioeconomic benefits from energy transition policies that reduce their domestic burden and fuel gathering activities, as these policies enabling them to participate in revenue-generating activities and increase their power and political participation.
    e. Local communities and Indigenous Peoples are also examined in the context of impacts of mitigation measures that affect usage and rights of their land, such as renewable energy projects and forestry. Studies reviewed in this paper posit that there is a balance of power in the policies impacting local communities and Indigenous Peoples, which renders their needs often ignored or represented by individuals who are not members of their communities. They reap some socioeconomic benefits from mitigation policies that expand energy access and security but also suffer environmental degradation and possible displacement and loss of land. Indigenous knowledge can play a critical role in the success of response measures implementation.
    f. The youth is the group that will be most impacted in the future by both climate change and current implementation of response measures. The rapid rise of youth climate mobilizations globally has succeeded in showing global climate inaction as a problem change framed in the perspective of justice and intergenerational equity. Yet they remain marginalised from participating in decision-making pertaining to mitigation policies.

g. The elderly are currently the most impacted by climate change, especially by increased heat and pollution. Mitigation policies involving energy transition and energy efficiency improve air quality and in-door pollutions, thereby improving climate-related health condition affecting the elderly.

h. Disabled people are almost absent from the assessments of impacts of response measures on vulnerable peoples or larger populations. Mitigation policies that increase electrification and automation can reduce risks for the disabled and improve energy and transport accessibility as well as health conditions.

i. The poor feature in various studies of impacts of response measures on them, possibly because the largest impacts of climate change would fall on them. The implementation of response measures of namely carbon taxes, phasing out of coal and reduction of fossil fuel subsidies affects poor households and particularly rural ones (which tend to be poorer than their urban counterparts), by raising energy and non-energy prices and exacerbating their poverty and welfare losses. Labour working in those industries will also be negatively affected through job and welfare losses, although some would benefit from retraining and opportunities in new clean energy sectors.

89. A common theme emerges in the studies and inputs from stakeholders reviewed in this technical paper, namely that engaging vulnerable peoples in the process of designing and implementing response measures is key to the latter's success along with harnessing indigenous knowledge, increasing awareness and technology transfers, and implementing policies to reduce vulnerable peoples' vulnerabilities. The examined literature shows that the effectiveness of mitigation policies increases by incorporating diverse knowledge and input from stakeholders from different groups within the vulnerable peoples. The analysis and conclusions of this technical paper point to an urgent need for further research for measuring impacts of response measures on the vulnerable peoples, for incorporating the ensuing research results in the design of response measures, and for designing policies that reduce negative impacts of response measures on vulnerable peoples. Response measures need to be framed, understood, and implemented from a lens that prioritises concepts of gender justice and equality, intergenerational equity, energy democracy, as well as the rights of local communities and Indigenous Peoples and of the youth, elderly, and disabled. Using this lens to meet the aforementioned urgent need necessitates designing response measures and measuring their impacts through active and meaningful engagement by researchers and policymakers with the vulnerable peoples, increasing governance, prioritizing local and community-controlled response measures (such as renewables), incorporating local and indigenous knowledge in response measures, and restoring the balance of power to represent their interests of vulnerable peoples.

90. As data on the vulnerable people are not always readily available in economic and labour force data, the research needs to also include qualitative analysis as well as primary research based on direct input and engagement from the vulnerable groups on their experiences and knowledge. Meaningful engagement with vulnerable people should also involve discussions with and representation from the vulnerable peoples in policy discussions to identify impacts on response measures on them and ways of reducing negative impacts, and to incorporate their input in the design and implementation of in-jurisdiction and global mitigation policies.

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