QUNO
Quaker United Nations Office

A Government Official's Toolkit
Inspiring Urgent, Real, and Equitable climate action

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19 concise categories
Referencing excerpts from the latest scientific findings
Of the Intergovernmental Panel on Climate Change (IPCC)
Including the Synthesis Report of the Sixth Assessment Report

What is Happening
Why
And the urgent, feasible, and equitable near-term options that are already available at scale to address climate change and improve human well-being and planetary health.

Edited by Lindsey Fielder Cook and Alana Marie Carlson
2023 Edition

WELCOME

This publication is written to support government officials—at local, regional, and national levels—who are concerned about the impact of climate change on their people, their country, and the planet. It is also written to support people interested in, or already engaging with their governments on urgent, effective, and equitable climate policies to address climate change, and improve human well-being and planetary health.

This *Government Official's Toolkit* is the latest in a climate action Toolkit series, first initiated by the Quaker United Nations Office (QUNO) in 2018. This year we focused the Toolkit on the recently completed Sixth Assessment Report (AR6) by the Intergovernmental Panel on Climate Change (IPCC). This massive achievement took over seven years to prepare and involved hundreds of scientists, nearly all working voluntarily, to collate thousands of peer-reviewed articles and technical publications.

Their message is clear:
The cumulative scientific evidence is unequivocal: climate change is a threat to human well-being and planetary health (very high confidence). Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.[1]

This Toolkit is organized into 19 concise categories, which contain directly quoted findings primarily, but not solely, from the Synthesis Report (SYR Longer Report) of the IPCC Sixth Assessment Report (AR6). The Synthesis Report integrates *"the main findings of the AR6 Working Group reports and the three AR6 Special Reports."*[2] They identify opportunities for *"transformative action which are effective, feasible, just and equitable using concepts of systems transitions and resilient development pathways."*[3] **The aim of this Government Official's Toolkit is to help communicate IPCC findings on urgent, feasible, and equitable near-term options already available at scale.**

QUNO's Human Impacts of Climate Change programme is an accredited observer of the United Nations Framework Convention on Climate Change (UNFCCC), the Human Rights Council (HRC) and the IPCC. We have been closely involved in both international climate negotiations and the communication of climate science. We believe all people should have easy access to the latest scientific information. We hope this publication will help communicate to readers the IPCC findings on what is happening, why it is happening, and how, together, we can help transform the human activities driving existential rates of global temperature rise and related planetary crises.

For more information, please contact Lindsey Fielder Cook at **lfcook@quno.ch**

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[1] IPCC, (2023). *Synthesis Report of the IPCC Sixth Assessment Report (AR6): Longer Report.* [Core Writing Team, H. Lee, K. Calvin, D. Dasgupta, G. Krinner, A. Mukherji, P. Thorne, C. Trisos, J. Romero, P. Aldunce, K. Barrett, G. Blanco, W. W. L. Cheung, S. L. Connors, F. Denton, A. Diongue-Niang, D. Dodman, M. Garschagen, O. Geden, B. Hayward, C. Jones, F. Jotzo, T. Krug, R. Lasco, J.Y. Lee, V. Masson-Delmotte, M. Meinshausen, K. Mintenbeck, A. Mokssit, F. E. L. Otto, M. Pathak, A. Pirani, E. Poloczanska, H.O. Pörtner, A. Revi, D. C. Roberts, J. Roy, A. C. Ruane, J. Skea, P. R. Shukla, R. Slade, A. Slangen, Y. Sokona, A. A. Sörensson, M. Tignor, D. van Vuuren, Y.M Wei, H. Winkler, P. Zhai, Z. Zommers]. IPCC, Geneva, Switzerland, p. 55.
[2] Ibid, p. 4
[3] Ibid, p. 4

CONTENTS

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THE ROOT CAUSES

"Global greenhouse gas emissions have continued to increase over 2010-2019, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals *(high confidence)*."[4]

"Human and ecosystem vulnerability are interdependent *(high confidence)*. Vulnerability to climate change for ecosystems will be strongly influenced by past, present, and future patterns of human development, including from unsustainable consumption and production, increasing demographic pressures, and persistent unsustainable use and management of land, ocean, and water."[5]

"Observed increases in well-mixed GHG concentrations since around 1750 are unequivocally caused by human activities."[6]

"Future warming depends on future greenhouse gas (GHG) emissions, with cumulative net CO_2 (carbon dioxide) dominating."[7]

"About 80% of coal, 50% of gas, and 30% of oil reserves cannot be burned and emitted if warming is limited to 2°C. Significantly more reserves are expected to remain unburned if warming is limited to 1.5°C."[8]

"Concentrations of CH_4 (methane) and N_2O (nitrous oxide) have increased to levels unprecedented in at least 800,000 years *(very high confidence)*, and there is high confidence that current CO_2 concentrations are higher than at any time over at least the past two million years."[9]

"The net cooling effect which arises from anthropogenic aerosols peaked in the late 20th century *(high confidence)*."[10]

"Historical net cumulative net CO_2 emissions from 1859 to 2019 were 2400 ±240GtCO_2. Of these, more than half (58%) occurred between 1850 and 1989 [1400 ±195 GtCO_2] and about 42% between 1990 and 2019 [1000 ±90 GtCO_2]."[11]

"The global surface temperature (shown as annual anomalies from a 1850–1900 baseline) has increased by around 1.1°C since 1850–1900."[12]

"By 2019, the largest growth in gross emissions occurred in CO_2 (carbon dioxide) from fossil fuels and industry (CO_2-FFI) followed by CH_4 (methane), whereas the highest relative growth occurred in fluorinated gases (F-gases), starting from low levels in 1990 *(high confidence)*."[13]

"Regional contributions to global human-caused GHG emissions continue to differ widely… Least developed countries (LDCs) and Small Island Developing States (SIDS) have much lower per capita emissions (1.7 tCO_2-eq and 4.6 tCO_2-eq respectively) than the global average (6.9 tCO_2-eq), excluding CO_2-LULUCF."[14]

"Net GHG emissions have increased since 2010 across all major sectors *(high confidence)*. In 2019, approximately 34% (20 GtCO_2-eq) of net global GHG emissions came from the energy sector, 24% (14 GtCO_2- eq) from industry, 22% (13 GtCO_2-eq) from AFOLU, 15% (8.7 GtCO_2-eq) from transport and 6% (3.3 GtCO_2- eq) from buildings *(high confidence)*."[15]

[4] Ibid, p. 6
[5] Ibid, p. 63
[6] Ibid, p. 6
[7] Ibid, p. 33
[8] Ibid, p. 24
[9] Ibid, p. 6
[10] Ibid, p. 7
[11] Ibid, p.8
[12] Ibid
[13] Ibid
[14] Ibid, p.10
[15] Ibid

THE RESULTS OF GLOBAL WARMING

"Modelled pathways consistent with the continuation of policies implemented by the end of 2020 lead to global warming of 3.2 [2.2-3.5]°C (5–95% range) by 2100 *(medium confidence)*."[16]

"Deep, rapid and sustained GHG emissions reductions, reaching net zero CO_2 (carbon dioxide) emissions and including strong emissions reductions of other GHGs, in particular CH_4 (methane), are necessary to limit warming to 1.5°C (>50%) or less than 2°C (>67%) by the end of century."[17]

"The best estimate of reaching 1.5°C of global warming lies in the first half of the 2030s in most of the considered scenarios and modelled pathways."[18]

"Global warming of 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other GHG emissions occur in the coming decades."[19]

"Global GHG emissions in 2030 associated with the implementation of NDCs announced prior to COP26 would make it *likely* that warming will exceed 1.5°C during the 21st century and would make it harder to limit warming below 2°C – if no additional commitments are made or actions taken."[20]

"Many climate-related risks are assessed to be higher than in previous assessments, and projected long-term impacts are up to multiple times higher than currently observed."[21]

"Very high emission scenarios have become less likely but cannot be ruled out. Temperature levels > 4C may result from very high emission scenarios, but can also occur from lower emission scenarios if climate sensitivity or carbon cycle feedbacks are higher than the best estimate."[22]

Shutterstock: UweMosch

[16] Ibid, p.33
[17] Ibid
[18] Ibid
[19] Ibid
[20] Ibid, p.23-24
[21] Ibid, p.33
[22] Ibid, p. 30, footnote 49

THE CONSEQUENCES OF OUR HUMAN ACTIVITIES - HURTING PEOPLE AND THE PLANET

"Climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric and coastal and open ocean ecosystems. The extent and magnitude of climate change impacts are larger than estimated in previous assessments. Approximately half of the species assessed globally have shifted polewards or, on land, also to higher elevations. Biological responses including changes in geographic placement and shifting seasonal timing are often not sufficient to cope with recent climate change. Hundreds of local losses of species have been driven by increases in the magnitude of heat extremes and mass mortality events on land and in the ocean. Impacts on some ecosystems are approaching irreversibility such as the impacts of hydrological changes resulting from the retreat of glaciers, or the changes in some mountain and Arctic ecosystems driven by permafrost thaw. Impacts in ecosystems from slow-onset processes such as ocean acidification, sea level rise or regional decreases in precipitation have also been attributed to human-caused climate change. Climate change has contributed to desertification and exacerbated land degradation, particularly in low lying coastal areas, river deltas, drylands and in permafrost areas. Nearly 50% of coastal wetlands have been lost over the last 100 years, as a result of the combined effects of localised human pressures, sea level rise, warming and extreme climate events."[23]

"It is unequivocal that human influence has warmed the atmosphere ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred."[24]

"It is *virtually certain* that hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s."[25]

"Marine heatwaves have approximately doubled in frequency since the 1980s *(high confidence)*, and human influence has *very likely* contributed to most of them since at least 2006."[26]

"Human-caused climate change has contributed to increase in agricultural and ecological droughts in some regions due to increased land evapotranspiration *(medium confidence)*."[27]

"Ocean warming in the 20th century and beyond has contributed to an overall decrease in maximum catch potential *(medium confidence)*, compounding the impacts from overfishing for some fish stocks *(high confidence)*. Ocean warming and ocean acidification have adversely affected food production from shellfish aquaculture and fisheries in some oceanic regions *(high confidence)*."[28]

[23] Ibid, p.15
[24] Ibid, p. 11
[25] Ibid, p.12
[26] Ibid
[27] Ibid
[28] Ibid, p.15

THE LOSS OF LIFE, LIVELIHOODS, AND NATURE

"Hundreds of local losses of species have been driven by increase in the magnitude of heat extremes *(high confidence)* and mass mortality events on land and in the ocean *(very high confidence)*."[29]

"Climate change has reduced food security and affected water security due to warming, changing precipitation patterns, reduction and loss of cryospheric elements, and greater frequency and intensity of climatic extremes, thereby hindering efforts to meet Sustainable Development Goals *(high confidence)*."[30]

"Unsustainable agricultural expansion, driven in part by unbalanced diets, increases ecosystem and human vulnerability and leads to competition for land and/or water resources *(high confidence)*."[31]

"Increasing weather and climate extreme events have exposed millions of people to acute food insecurity and reduced water security, with the largest impacts observed in many locations and/or communities in Africa, Asia, Central and South America, LDCs, Small Islands and the Arctic, and for small-scale food producers, low-income households and Indigenous Peoples globally *(high confidence)*."[32]

"In all regions increases in extreme heat events have resulted in human mortality and morbidity *(very high confidence)*."[33]

"In assessed regions, some mental health challenges are associated with increasing temperatures *(high confidence)*, trauma from extreme events *(very high confidence)*, and loss of livelihoods and culture *(high confidence)*."[34]

"In urban settings, climate change has caused adverse impacts on human health, livelihoods and key infrastructure *(high confidence)*. Hot extremes including heatwaves have intensified in cities *(high confidence)*, where they have also worsened air pollution events *(medium confidence)* and limited functioning of key infrastructure *(high confidence)*."[35]

"Economic impacts attributable to climate change are increasingly affecting peoples' livelihoods and are causing economic and societal impacts across national boundaries *(high confidence)*."[36]

"Individual livelihoods have been affected through changes in agricultural productivity, impacts on human health and food security, destruction of homes and infrastructure, and loss of property and income, with adverse effects on gender and social equity *(high confidence)*."[37]

"For example, changes in snow cover, lake and river ice, and permafrost in many Arctic regions, are harming the livelihoods and cultural identity of Arctic residents including Indigenous populations *(high confidence)*."[38]

"Vulnerability is higher in locations with poverty, governance challenges and limited access to basic services and resources, violent conflict and high levels of climate-sensitive livelihoods (e.g., smallholder farmers, pastoralists, fishing communities) *(high confidence)*."[39]

"Vulnerability at different spatial levels is exacerbated by inequity and marginalization linked to gender, ethnicity, low income or combinations thereof *(high confidence)*."[40]

[29] Ibid
[30] Ibid
[31] Ibid, p.15-16
[32] Ibid, p.16
[33] Ibid
[34] Ibid
[35] Ibid
[36] Ibid
[37] Ibid, p.17
[38] Ibid
[39] Ibid
[40] Ibid

THE IMPORTANCE OF LIMITING GLOBAL WARMING TO 1.5C WITH NO OR LIMITED OVERSHOOT

"Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present (1.1°C) but lower than at 2°C *(high confidence)*."[41]

"Near-term actions that limit global warming to close to 1.5°C would substantially reduce projected losses and damages related to climate change in human systems and ecosystems, compared to higher warming levels, but cannot eliminate them all."[42]

"There are limits to adaptation and adaptive capacity for some human and natural systems at global warming of 1.5°C, and with every increment of warming, losses and damages will increase."[43]

"As warming levels increase, so do the risks of species extinction or irreversible loss of biodiversity in ecosystems such as forests *(medium confidence)*, coral reefs *(very high confidence)* and in Arctic regions *(high confidence)*. Risks associated with large-scale singular events or tipping points, such as ice sheet instability or ecosystem loss from tropical forests, transition to high risk between 1.5°C–2.5°C *(medium confidence)* and to very high risk between 2.5°C–4°C *(low confidence)*."[44]

"At 2°C of global warming, overall risk levels associated with the unequal distribution of impacts, global aggregate impacts and large-scale singular events would be transitioning to high *(medium confidence)*, those associated with extreme weather events would be transitioning to very high *(medium confidence)*, and those associated with unique and threatened systems would be very high *(high confidence)*."[45]

"At global warming of 3°C, additional risks in many sectors and regions reach high or very high levels, implying widespread systemic impacts, irreversible change and many additional adaptation limits *(high confidence)*. For example, very high extinction risk for endemic species in biodiversity hotspots is projected to increase at least tenfold if warming rises from 1.5°C to 3°C *(medium confidence)*."[46]

"Global warming of 4°C and above is projected to lead to far-reaching impacts on natural and human systems *(high confidence)*. Beyond 4°C of warming, projected impacts on natural systems include local extinction of ~50% of tropical marine species *(medium confidence)* and biome shifts across 35% of global land area *(medium confidence)*. At this level of warming, approximately 10% of the global land area is projected to face both increasing high and decreasing low extreme streamflow, affecting, without additional adaptation, over 2.1 billion people *(medium confidence)* and about 4 billion people are projected to experience water scarcity *(medium confidence)*. At 4°C of warming, the global burned area is projected to increase by 50–70% and the fire frequency by ~30% compared to today *(medium confidence)*."[47]

"With every increment of warming, climate change impacts and risks will become increasingly complex and more difficult to manage…In addition, multiple climatic and non-climatic risk drivers such as biodiversity loss or violent conflict will interact, resulting in compounding overall risk and risks cascading across sectors and regions."[48]

[41] Ibid, p.36
[42] Ibid, p.59
[43] Ibid, p.61
[44] Ibid, p.42
[45] Ibid, p.36
[46] Ibid, p.37
[47] Ibid
[48] Ibid

URGENT ACTION TO KEEP GLOBAL WARMING TO A SAFER TEMPERATURE RISE LIMIT

"Pathways consistent with 1.5°C and 2°C carbon budgets imply rapid, deep, and in most cases immediate GHG emission reductions in all sectors *(high confidence)*. Exceeding a warming level and returning (i.e. overshoot) implies increased risks and potential irreversible impacts; achieving and sustaining global net negative CO_2 emissions would reduce warming *(high confidence)*."[49]

"Reaching net zero GHG emissions primarily requires deep reductions in CO_2 (carbon dioxide), methane, and other GHG emissions, and implies net-negative CO_2 emissions."[50]

"Global net zero CO_2 emissions are reached in the early 2050s in pathways that limit warming to 1.5°C (>50%) with no or limited overshoot, and around the early 2070s in pathways that limit warming to 2°C (>67%)."[51]

"In modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot and in those that limit warming to 2°C (>67%) and assume immediate action, global GHG emissions are projected to peak in the early 2020s followed by rapid and deep reductions."[52]

"Strengthening climate change mitigation action entails more rapid transitions and higher up-front investments, but brings benefits from avoiding damages from climate change and reduced adaptation costs."[53]

"Limiting global warming to 1.5°C instead of 2°C would increase the costs of mitigation, but also increase the benefits in terms of reduced impacts and related risks and reduced adaptation needs *(high confidence)*."[54]

"Rapid and deep reductions in GHG emissions require major energy system transitions *(high confidence)*. Adaptation options can help reduce climate-related risks to the energy system *(very high confidence)*. Net zero CO_2 (carbon dioxide) energy systems entail: a substantial reduction in overall fossil fuel use, minimal use of unabated fossil fuels, and use of Carbon Capture and Storage in the remaining fossil fuel systems; electricity systems that emit no net CO_2; widespread electrification; alternative energy carriers in applications less amenable to electrification; energy conservation and efficiency; and greater integration across the energy system *(high confidence)*."[55]

" 'Unabated fossil fuels' refers to fossil fuels produced and used without interventions that substantially reduce the amount of GHG emitted throughout the life cycle; for example, capturing 90% or more CO_2 from power plants, or 50–80% of fugitive methane emissions from energy supply."[56]

"Maintaining emission-intensive systems may, in some regions and sectors, be more expensive than transitioning to low emission systems."[57]

"Energy generation diversification (e.g., wind, solar, small-scale hydroelectric) and demand side management (e.g., storage and energy efficiency improvements) can increase energy reliability and reduce vulnerabilities to climate change, especially in rural populations *(high confidence)*."[58]

[49] Ibid, p.46
[50] Ibid, p.50
[51] Ibid
[52] Ibid, p.56
[53] Ibid, p.54
[54] Ibid
[55] Ibid, p.70-71
[56] Ibid, p.71, footnote 89
[57] Ibid, p. 19
[58] Ibid

"Reducing industry emissions will entail coordinated action throughout value chains to promote all mitigation options, including demand management, energy and materials efficiency, circular material flows, as well as abatement technologies and transformational changes in production processes *(high confidence)*."[59]

"Mitigation interventions for buildings include: at the construction phase, low-emission construction materials, highly efficient building envelope and the integration of renewable energy solutions; at the use phase, highly efficient appliances/equipment, the optimisation of the use of buildings and their supply with low-emission energy sources; and at the disposal phase, recycling and re-using construction materials."[60]

SAVING LIVES WITH URGENT, EFFECTIVE AND EQUITABLE CLIMATE ACTION

"Without urgent, effective and equitable adaptation and mitigation actions, climate change increasingly threatens the health and livelihoods of people around the globe, ecosystem health, and biodiversity, with severe adverse consequences for current and future generations *(high confidence)*."[61]

"The magnitude, the rate, the timing of threshold exceedances, and the long-term commitment of sea level rise depend on emissions, with higher emissions leading to greater and faster rates of sea level rise."[62]

"Global mean sea level rise above the likely range – approaching 2 m by 2100 and in excess of 15 m by 2300 under a very high GHG emissions scenario (SSP5-8.5) *(low confidence)* – cannot be ruled out due to deep uncertainty in ice-sheet processes and would have severe impacts on populations in low elevation coastal zones."[63]

"The Atlantic Meridional Overturning Circulation is very likely to weaken over the 21st century for all considered scenarios *(high confidence)*, however an abrupt collapse is not expected before 2100 *(medium confidence)*. If such a low probability event were to occur, it would very likely cause abrupt shifts in regional weather patterns and water cycle, such as a southward shift in the tropical rain belt, and large impacts on ecosystems and human activities."[64]

"At higher levels of warming, losses and damages will increase, and additional human and natural systems will reach adaptation limits."[65]

"Higher greenhouse gas emissions lead to larger and faster sea level rise, demanding earlier and stronger responses, and reducing the lifetime of some options."[66]

"Responses to ongoing sea level rise and land subsidence include protection, accommodation, advance and planned relocation. These responses are more effective if combined and/or sequenced, planned well ahead, aligned with sociocultural values and underpinned by inclusive community engagement processes *(high confidence)*."[67]

"Overshooting 1.5°C will result in irreversible adverse impacts on certain ecosystems with low resilience, such as polar, mountain, and coastal ecosystems, impacted by icesheet glacier melt, or by accelerating and higher committed sea level rise *(high confidence)*. Overshoot increases the risks of severe impacts, such

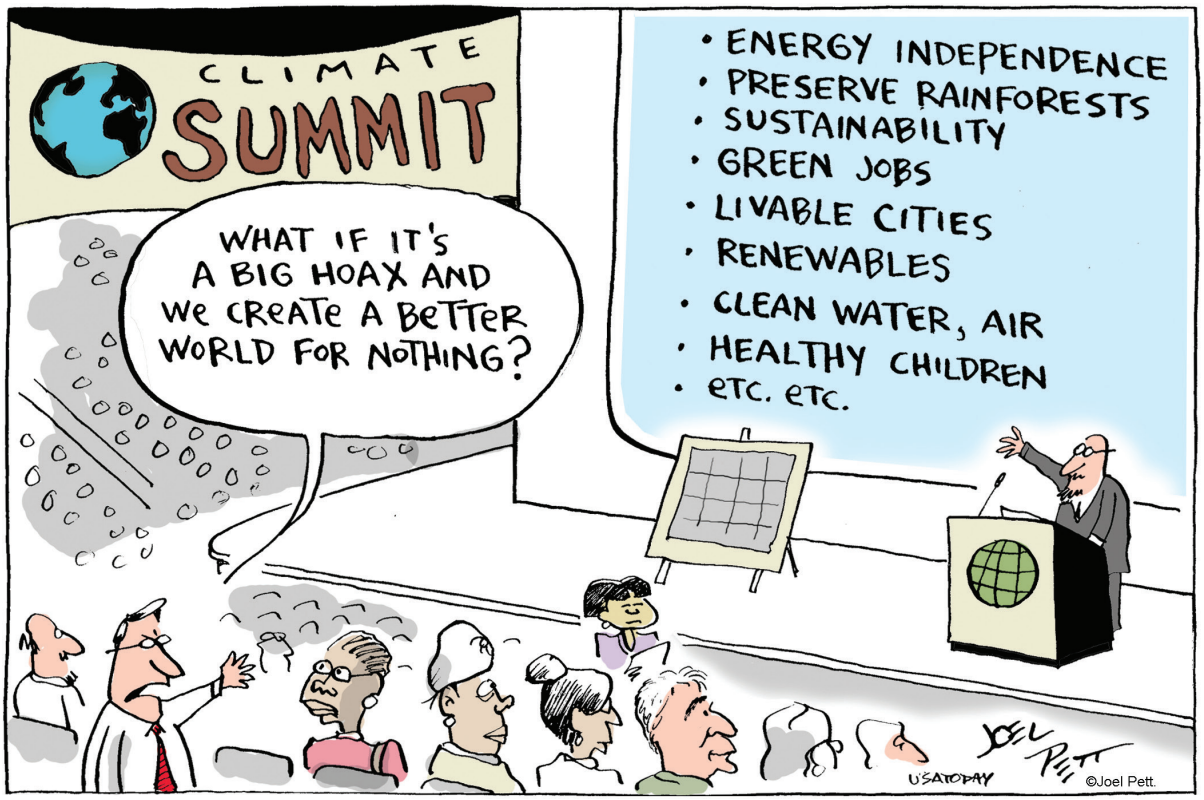
[59] Ibid
[60] Ibid, p.72
[61] Ibid, p.56
[62] Ibid, p.42
[63] Ibid, p.43
[64] Ibid
[65] Ibid
[66] Ibid, p.45
[67] Ibid, p.72

as increased wildfires, mass mortality of trees, drying of peatlands, thawing of permafrost and weakening natural land carbon sinks; such impacts could increase releases of GHGs making temperature reversal more challenging *(medium confidence)*."[68]

"Safeguarding biodiversity and ecosystems is fundamental to climate resilient development, but biodiversity and ecosystem services have limited capacity to adapt to increasing global warming levels, making climate resilient development progressively harder to achieve beyond 1.5°C warming *(very high confidence)*."[69]

"Delaying action as is assumed in high emissions scenarios could result in some irreversible impacts on some ecosystems, which in the longer-term has the potential to lead to substantial additional GHG emissions from ecosystems that would accelerate global warming."[70]

"Multiple climate change risks will increasingly compound and cascade in the near term *(high confidence)*… Risks to health and food production will be made more severe from the interaction of sudden food production losses from heat and drought, exacerbated by heat-induced labour productivity losses *(high confidence)*."[71]



[68] Ibid, p.53
[69] Ibid, p.55
[70] IPCC, (2019). IPCC, (2019). *Summary for Policymakers.* In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.* [PR. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Portner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.
[71] IPCC, (2023). Longer Report. [Lee, Calvin, Dasgupta, Krinner, et al,]. IPCC, , Switzerland, p. 63

AVERTING SUFFERING, DEATH, LOSS AND DAMAGE

"Without effective mitigation and adaptation, losses and damages will continue to disproportionately affect the poorest and most vulnerable populations."[72]

"Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected *(high confidence)*."[73]

"Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts on food and water security, human health and on economies and society and related losses and damages to nature and people *(high confidence)*."[74]

"Climate change has caused widespread adverse impacts and related losses and damages to nature and people *(high confidence)*."[75]

"Losses and damages are unequally distributed across systems, regions and sectors *(high confidence)*. Cultural losses, related to tangible and intangible heritage, threaten adaptive capacity and may result in irrevocable losses of sense of belonging, value cultural practices, identity and home, particularly for Indigenous Peoples and those more directly reliant on the environment for subsistence *(medium confidence)*."[76]

"There is improved understanding of both economic and non-economic losses and damages which is informing international climate policy, and which has highlighted that losses and damages are no comprehensively addressed by current financial, governance and institutional arrangements, particularly in vulnerable developing countries *(high confidence)*."[77]

PROTECTING THE MOST VULNERABLE

"Climate change has impacted human and natural systems across the world with those who have generally least contributed to climate change being the most vulnerable."[78]

"Countries with a relatively low average vulnerability often have groups with high vulnerability within their population and vice versa."[79]

"Climate and weather extremes are increasingly driving displacement in Africa, Asia, North America *(high confidence)*, and Central and South America *(medium confidence)*, with small island states in the Caribbean and South Pacific being disproportionately affected relative to their small population size *(high confidence)*."[80]

[72] Ibid, p.29
[73] Ibid, p.6
[74] Ibid
[75] Ibid, p.17
[76] Ibid
[77] Ibid, p.18
[78] Ibid, p.13
[79] Ibid, p.15
[80] Ibid, p.16

PEOPLE SUPPORTED CLIMATE POLICIES – GROUNDED IN HUMAN RIGHTS-BASED APPROACHES

"Mass social movements have emerged as catalysing agents in some regions, often building on prior movements including Indigenous Peoples-led movements, youth movements, human rights movements, gender activism, and climate litigation, which is raising awareness and, in some cases, has influenced the outcome and ambition of climate governance *(medium confidence)*."[81]

"Engaging Indigenous Peoples and local communities using just-transition and rights-based decision-making approaches, implemented through collective and participatory decision-making processes has enabled deeper ambition and accelerated action in different ways, and at all scales, depending on national circumstances *(medium confidence)*."[82]

"In some instances, public discourses of media and organised counter movements have impeded climate action, exacerbating helplessness and disinformation and fueling polarisation, with negative implications for climate action *(medium confidence)*."[83]

"Many regulatory and economic instruments have already been deployed successfully *(high confidence)*. By 2020, laws primarily focused on reducing GHG emissions existed in 56 countries covering 53% of global emissions *(medium confidence)*."[84]

"Combining mitigation with policies to shift development pathways, policies that induce lifestyle or behaviour changes, for example, measures promoting walkable urban areas combined with electrification and renewable energy can create health co-benefits from cleaner air and enhanced active mobility *(high confidence)*."[85]

"Effective and equitable climate governance builds on engagement with civil society actors, political actors, businesses, youth, labour, media, Indigenous Peoples and local communities *(medium confidence)*."[86]

"The adoption of low-emission technologies lags in most developing countries, particularly least developed ones, due in part to weaker enabling conditions, including limited finance, technology development and transfer, and capacity."[87]

"Low-emission innovation along with strengthened enabling conditions can reinforce development benefits, which can, in turn, create feedbacks towards greater public support for policy."[88]

"Maladaptation can be avoided by flexible, multi-sectoral, inclusive and long-term planning and implementation of adaptation actions with benefits to many sectors and systems *(high confidence)*."[89]

"Regions and people with considerable development constraints have high vulnerability to climatic hazards. Adaptation outcomes for the most vulnerable within and across countries and regions are enhanced through approaches focusing on equity, inclusivity, and rights-based approaches, including 3.3 to 3.6 billion people living in contexts that are highly vulnerable to climate change *(high confidence)*."[90]

"Meaningful participation and inclusive planning, informed by cultural values, Indigenous Knowledge, local knowledge, and scientific knowledge can help address adaptation gaps and avoid maladaptation *(high confidence)*."[91]

[81] Ibid, p.18
[82] Ibid
[83] Ibid
[84] Ibid, p.19
[85] Ibid
[86] Ibid, p.19
[87] Ibid, p. 27
[88] Ibid
[89] Ibid, p.28
[90] Ibid, p.66
[91] Ibid, p.67

"Equity, inclusion, just transitions, broad and meaningful participation of all relevant actors in decision making at all scales enable deeper societal ambitions for accelerated mitigation, and climate action more broadly, and build social trust, support transformative changes and an equitable sharing of benefits and burdens *(high confidence)*."[92]

"Implementing just transition principles through collective and participatory decision-making processes is an effective way of integrating equity principles into policies at all scales depending on national circumstances, while in several countries just transition commissions, task forces and national policies have been established *(medium confidence)*."[93]

"Consideration of climate justice can help to facilitate shifting development pathways towards sustainability."[94]

"Drawing on diverse knowledge and partnerships, including with women, youth, Indigenous Peoples, local communities, and ethnic minorities can facilitate climate resilient development and has allowed locally appropriate and socially acceptable solutions *(high confidence)*."[95]

"Choices and actions that treat humans and ecosystems as an integrated system build on diverse knowledge about climate risk, equitable, just and inclusive approaches, and ecosystem stewardship."[96]

CLIMATE ACTION THAT IS REAL, TRANSFORMATIVE, FEASIBLE AND AVAILABLE AT SCALE

"The unit costs of several low-emission technologies, including solar, wind and lithium-ion batteries, have fallen consistently since 2010 (Figure 2.4). Design and process innovations in combination with the use of digital technologies have led to near-commercial availability of many low or zero emissions options in buildings, transport and industry."[97]

"Electricity from PV and wind is now cheaper than electricity from fossil sources in many regions, electric vehicles are increasingly competitive with internal combustion engines, and large-scale battery storage on electricity grids is increasingly viable."[98]

"Several mitigation options, notably solar energy, wind energy, electrification of urban systems, urban green infrastructure, energy efficiency, demand side management, improved forest- and crop/grassland management, and reduced food waste and loss, are technically viable, are becoming increasingly cost effective and are generally supported by the public, and this enables expanded deployment in many regions *(high confidence)*."[99]

"Some land-related adaptation actions such as sustainable food production, improved and sustainable forest management, soil organic carbon management, ecosystem conservation and land restoration, reduced deforestation and degradation, and reduced food loss and waste are being undertaken, and can have mitigation co-benefits *(high confidence)*."[100]

"Adaptation can generate multiple additional benefits such as improving agricultural productivity, innovation, health and well-being, food security, livelihood, and biodiversity conservation as well as reduction of risks and damages *(very high confidence)*."[101]

[92] Ibid
[93] Ibid
[94] Ibid, p.79
[95] Ibid
[96] Ibid, p.84
[97] Ibid, p.19
[98] Ibid
[99] Ibid, p. 20
[100] Ibid, p.22
[101] Ibid

"Reductions in GHG emissions in industry, transport, buildings, and urban areas can be achieved through a combination of energy efficiency and conservation and a transition to low-GHG technologies and energy carriers."[102]

"Socio-cultural options and behavioural change can reduce global GHG emissions of end-use sectors, with most of the potential in developed countries, if combined with improved infrastructure design and access *(high confidence)*."[103]

"In global modelled pathways that limit warming to 2°C or below, almost all electricity is supplied from zero or low-carbon sources in 2050, such as renewables or fossil fuels with CO_2 capture and storage, combined with increased electrification of energy demand. Such pathways meet energy service demand with relatively low energy use, through e.g., enhanced energy efficiency and behavioural changes and increased electrification of energy end use."[104]

"Transport-related GHG emissions can be reduced by demand-side options and low-GHG emissions technologies. Changes in urban form, reallocation of street space for cycling and walking, digitalisation (e.g., teleworking) and programs that encourage changes in consumer behaviour (e.g. transport, pricing) can reduce demand for transport services and support the shift to more energy efficient transport modes *(high confidence)*. Electric vehicles powered by low-emissions electricity offer the largest decarbonisation potential for landbased transport, on a life cycle basis *(high confidence)*."[105]

"Feasible, effective and low-cost options for mitigation and adaptation are already available *(high confidence)*."[106]

Shutterstock: Diyana Dimitrova

[102] Ibid, p.51
[103] Ibid
[104] Ibid, p. 52
[105] Ibid, p.72
[106] Ibid, p.68

CLIMATE ACTION IMPROVES HEALTH

"For agriculture, land, and food systems, many land management options and demand-side response options (e.g., dietary choices, reduced post-harvest losses, reduced food waste) can contribute to eradicating poverty and eliminating hunger while promoting good health and wellbeing, clean water and sanitation, and life on land *(medium confidence)*."[107]

"Simultaneous stringent climate change mitigation and air pollution control policies limit this additional warming and lead to strong benefits for air quality *(high confidence)*."[108]

"In the energy sector, transitions to low-emission systems will have multiple co-benefits, including improvements in air quality and health. There are potential synergies between sustainable development and, for instance, energy efficiency and renewable energy *(high confidence)*."[109]

"Considering other sustainable development dimensions, such as the potentially strong economic benefits on human health from air quality improvement, may enhance the estimated benefits of mitigation *(medium confidence)*."[110]

"Mitigation actions will have other sustainable development co-benefits *(high confidence)*… The benefits from air quality improvement include prevention of air pollution-related premature deaths, chronic diseases and damages to ecosystems and crops."[111]

"Human health will benefit from integrated mitigation and adaptation options that mainstream health into food, infrastructure, social protection, and water policies *(very high confidence)*. Balanced and sustainable healthy diets and reduced food loss and waste present important opportunities for adaptation and mitigation while generating significant co-benefits in terms of biodiversity and human health *(high confidence)*."[112]

THE GREATER RISKS OF RELYING ON GEO/CLIMATE ENGINEERING

"Risks also arise from some responses intended to reduce the risks of climate change, including risks from maladaptation and adverse side effects of some emissions reduction and carbon dioxide removal measures, such as afforestation of naturally unforested land or poorly implemented bioenergy compounding climate-related risks to biodiversity, food and water security, and livelihoods *(high confidence)*."[113]

"Reforestation, improved forest management, soil carbon sequestration, peatland restoration and coastal blue carbon management are examples of carbon dioxide removal (CDR) methods that can enhance biodiversity and ecosystem functions, employment and local livelihoods, depending on context. However, afforestation or production of biomass crops for bioenergy with carbon dioxide capture and storage or biochar can have adverse so-

[107] Ibid, p.54
[108] Ibid, p.34
[109] Ibid, p.54
[110] Ibid
[111] Ibid, p.59
[112] Ibid, p.74
[113] Ibid, p.64

cio-economic and environmental impacts, including on biodiversity, food and water security, local livelihoods and the rights of Indigenous Peoples, especially if implemented at large scales and where land tenure is insecure *(high confidence)*."[114]

"Modelled pathways that assume using resources more efficiently or shift global development towards sustainability include fewer challenges, such as dependence on carbon dioxide removal and pressure on land and biodiversity, and have the most pronounced synergies with respect to sustainable development *(high confidence)*."[115]

"Solar Radiation Modification (SRM) approaches, if they were to be implemented, introduce a widespread range of new risks to people and ecosystems, which are not well understood…SRM would not stop atmospheric CO_2 concentrations from increasing nor reduce resulting ocean acidification under continued anthropogenic emissions *(high confidence)*."[116]

"Implementation of carbon capture storage (CCS) currently faces technological, economic, institutional, ecological environmental and socio-cultural barriers. Currently, global rates of CCS deployment are far below those in modelled pathways limiting global warming to 1.5°C to 2°C. Enabling conditions such as policy instruments, greater public support and technological innovation could reduce these barriers *(high confidence)*."[117]

OUR FAIR SHARE IN REDUCING GREENHOUSE GAS EMISSIONS

"Globally, households with income in the top 10% contribute about 36–45% of global GHG emissions *(robust evidence, medium agreement)*."[118]

"For every 1000 $GtCO_2$ emitted by human activity, global mean temperature rises by *likely* 0.27°C–0.63°C (best estimate of 0.45°C). This relationship implies that there is a finite carbon budget that cannot be exceeded in order to limit warming to any given level."[119]

"Based on central estimates only, historical cumulative net CO_2 emissions between 1850 and 2019 (2400 ±240 $GtCO_2$) amount to about four-fifths of the total carbon budget for a 50% probability of limiting global warming to 1.5°C (central estimate about 2900 $GtCO_2$) and to about two-thirds of the total carbon budget for a 67% probability to limit global warming to 2°C (central estimate about 3550 $GtCO_2$)."[120]

[114] Ibid, p.54
[115] Ibid
[116] Ibid, p.37
[117] Ibid, 52 footnote 82
[118] IPCC, (2022), *Technical Summary.* In: *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. Doi: 10.1017/9781009157926.002.
[119] IPCC, (2023). *Longer Report.* [Lee, Calvin, Dasgupta, Krinner, et al,]. IPCC, Switzerland, p. 46
[120] Ibid, p.47

"Green/natural and blue infrastructure such as urban forestry, green roofs, ponds and lakes, and river restoration can mitigate climate change through carbon uptake and storage, avoided emissions, and reduced energy use while reducing risk from extreme events such as heatwaves, heavy precipitation and droughts, and advancing co-benefits for health, wellbeing and livelihoods *(medium confidence)*."[121]

"The greatest gains in well-being in urban areas can be achieved by prioritising finance to reduce climate risk for low-income and marginalised communities including people living in informal settlements *(high confidence)*."[122]

"Conservation, improved management, and restoration of forests and other ecosystems offer the largest share of economic mitigation potential, with reduced deforestation in tropical regions having the highest total mitigation potential. Ecosystem restoration, reforestation, and afforestation can lead to trade-offs due to competing demands on land. Minimizing trade-offs required integrated approaches to meet multiple objectives including food security. Demand-side measures (shifting to sustainable healthy diets and reducing food loss/waste) and sustainable agricultural intensification can reduce ecosystem conversion and CH_4 and N_2O emissions, and free up land for reforestation and ecosystem restoration."[123]

"Some options, such as conservation of high-carbon ecosystems (e.g., peatlands, wetlands, rangelands, mangroves and forests), have immediate impacts while others, such as restoration of high-carbon ecosystems, reclamation of degraded soils or afforestation, take decades to deliver measurable results *(high confidence)*."[124]

"Maintaining the resilience of biodiversity and ecosystem services at a global scale depends on effective and equitable conservation of approximately 30–50% of Earth's land, freshwater and ocean areas, including currently near-natural ecosystems *(high confidence)*."[125]

"Large-scale land conversion for bioenergy, biochar, or afforestation can increase risks to biodiversity, water and food security. In contrast, restoring natural forests and drained peatlands, and improving sustainability of managed forests enhances the resilience of carbon stocks and sinks and reduces ecosystem vulnerability to climate change. Cooperation, and inclusive decision making, with local communities and Indigenous Peoples, as well as recognition of inherent rights of Indigenous Peoples, is integral to successful adaptation across forests and other ecosystems *(high confidence)*."[126]

"Enhancing natural water retention such as by restoring wetlands and rivers, land use planning such as no build zones or upstream forest management, can further reduce flood risk *(medium confidence)*."[127]

"Protection and restoration of coastal 'blue carbon' ecosystems (e.g., mangroves, tidal marshes and seagrass meadows) could reduce emissions and/or increase carbon uptake and storage *(medium confidence)*."[128]

[121] Ibid, p.72
[122] Ibid, p.72-73
[123] Ibid, p. 73
[124] Ibid
[125] Ibid
[126] Ibid
[127] Ibid
[128] Ibid, p.74

"Annual tracked total financial flows for climate mitigation and adaptation increased by up to 60% between 2013/14 and 2019/20, but average growth has slowed since 2018 *(medium confidence)* and most climate finance stays within national borders *(high confidence)*."[129]

"Accelerated international financial cooperation is a critical enabler of low-GHG and just transitions *(high confidence)*."[130]

"Economic instruments have been effective in reducing emissions, complemented by regulatory instruments mainly at the national and also sub-national and regional level *(high confidence)*."[131]

"Equity and distributional impacts of carbon pricing instruments can be addressed by using revenue from carbon taxes or emissions trading to support low-income households, among other approaches *(high confidence)*."[132]

"Globally tracked adaptation finance has shown an upward trend since AR5, but represents only a small portion of total climate finance, is uneven and has developed heterogeneously across regions and sectors *(high confidence)*."[133]

"Reduction of food loss and waste, and adaptation measures in support of balanced diets contribute to nutrition, health, and biodiversity benefits *(high confidence)*."[134]

"Some land-based adaptation options provide immediate benefits (e.g., conservation of peatlands, wetlands, rangelands, mangroves and forests); while afforestation and reforestation, restoration of high-carbon ecosystems, agroforestry, and the reclamation of degraded soils take more time to deliver measurable results."[135]

"Agroecological principles and practices and other approaches that work with natural processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services *(high confidence)*."[136]

"Insufficient financing, and a lack of political frameworks and incentives for finance, are key causes of the implementation gaps for both mitigation and adaptation *(high confidence)*. Financial flows remained heavily focused on mitigation, are uneven, and have developed heterogeneously across regions and sectors *(high confidence)*."[137]

"In 2018, public and publicly mobilised private climate finance flows from developed to developing countries were below the collective goal under the UNFCCC and Paris Agreement to mobilise USD 100 billion per year by 2020 in the context of meaningful mitigation action and transparency on implementation *(medium confidence)*."[138]

"Accelerated financial support for developing countries from developed countries and other sources is a critical enabler to enhance mitigation action."[139]

"Nevertheless, average annual modelled investment requirements for 2020 to 2030 in scenarios that limit warming to 2°C or 1.5°C are a factor of three to

[129] Ibid, p.21
[130] Ibid
[131] Ibid
[132] Ibid
[133] Ibid, p.22
[134] Ibid
[135] Ibid, p.23
[136] Ibid
[137] Ibid, p.28
[138] Ibid, p.28-29
[139] Ibid, p.29

six greater than current levels, and total mitigation investments (public, private, domestic and international) would need to increase across all sectors and regions *(medium confidence)*."[140]

"Finance, international cooperation and technology are critical enablers for accelerated climate action. If climate goals are to be achieved, both adaptation and mitigation financing would have to increase many-fold."[141]

"Improved availability and access to finance will enable accelerated climate action *(very high confidence)*."[142]

"Accelerated international financial cooperation is a critical enabler of low-GHG and just transitions, and can address inequities in access to finance and the costs of, and vulnerability to, the impacts of climate change *(high confidence)*."[143]

"Both adaptation and mitigation finance need to increase many-fold, to address rising climate risks and to accelerate investments in emissions reduction *(high confidence)*."[144]

"Average annual modelled mitigation investment requirements for 2020 to 2030 in scenarios that limit warming to 2°C or 1.5°C are a factor of three to six greater than current levels, and total mitigation investments (public, private, domestic and international) would need to increase across all sectors and regions *(medium confidence)*. Even if extensive global mitigation efforts are implemented, there will be a large need for financial, technical, and human resources for adaptation *(high confidence)*."[145]

"There is sufficient global capital and liquidity to close global investment gaps, given the size of the global financial system, but there are barriers to redirect capital to climate action both within and outside the global financial sector and in the context of economic vulnerabilities and indebtedness facing many developing countries *(high confidence)*."[146]

"Macroeconomic barriers include, amongst others, indebtedness and economic vulnerability of developing regions *(high confidence)*."[147]

"Tracked financial flows fall short of the levels needed for adaptation and to achieve mitigation goals across all sectors and regions. These gaps create many opportunities and the challenge of closing gaps is largest in developing countries. This includes a stronger alignment of public finance, lowering real and perceived regulatory, cost and market barriers, and higher levels of public finance to lower the risks associated with low-emission investments."[148]

"The largest climate finance gaps and opportunities are in developing countries *(high confidence)*."[149]

"Climate resilient development is enabled by increased international cooperation including mobilising and enhancing access to finance, particularly for developing countries, vulnerable regions, sectors and groups and aligning finance flows for climate action to be consistent with ambition levels and funding needs *(high confidence)*."[150]

"By integrating equity and climate justice, national and international policies can help to facilitate shifting development pathways towards sustainability, especially by mobilising and enhancing access to finance for vulnerable regions, sectors and communities *(high confidence)*."[151]

[140] Ibid
[141] Ibid, p.80
[142] Ibid
[143] Ibid
[144] Ibid
[145] Ibid
[146] Ibid, p.80-81
[147] Ibid, p. 81
[148] Ibid
[149] Ibid, p.82
[150] Ibid
[151] Ibid

SUSTAINABLE AND JUST ECONOMIC SYSTEMS THAT PROTECT PEOPLE AND THE PLANET

"Shifting development pathways towards sustainability and advancing climate resilient development is enabled when governments, civil society and the private sector make development choices that prioritise risk reduction, equity and justice, and when decision making processes, finance and actions are integrated across governance levels, sectors and timeframes *(very high confidence)*."[152]

"Combining mitigation with action to shift development pathways, such as broader sectoral policies, approaches that induce lifestyle or behaviour changes, financial regulation, or macroeconomic policies can overcome barriers and open up a broader range of mitigation options *(high confidence)*."[153]

"Climate resilient development integrates adaptation and GHG mitigation to advance sustainable development for all."[154]

"Societal choices and actions implemented in this decade determine the extent to which medium- and long-term pathways will deliver higher or lower climate resilient development *(high development)*."[155]

"The feasibility and effectiveness of options increase with integrated, multi-sectoral solutions that differentiate responses based on climate risk, cut across systems and address social inequities."[156]

"Continuing with current unsustainable development patterns would increase exposure and vulnerability of ecosystems and people to climate hazards *(high confidence)*."[157]

"Future exposure to climatic hazards is increasing globally due to socio-economic development trends including growing inequality, and when urbanisation or migration increase exposure *(high confidence)*. Urbanisation increases hot extremes *(very high confidence)* and precipitation runoff intensity *(high confidence)*."[158]

"Adaptation and mitigation actions, across scales, sectors and regions, that prioritise equity, climate justice, rights-based approaches, social justice and inclusivity, lead to more sustainable outcomes, reduce trade-offs, support transformative change and advance climate resilient development *(high confidence)*."[159]

"Redistributive policies across sectors and regions that shield the poor and vulnerable, social safety nets, equity, inclusion and just transitions, at all scales can enable deeper societal ambitions and resolve trade-offs with sustainable development goals (SDGs), particularly education, hunger, poverty, gender and energy access *(high confidence)*."[160]

"Individuals with high socio-economic status contribute disproportionately to emissions, and have the highest potential for emissions reductions, e.g., as citizens, investors, consumers, role models, and professionals *(high confidence)*."[161]

"There are options on design of instruments such as taxes, subsidies, prices, and consumption-based approaches, complemented by regulatory instruments to reduce high-emissions consumption while improving equity and societal well-being *(high confidence)*."[162]

[152] Ibid, p.55
[153] Ibid
[154] Ibid
[155] Ibid, p.56
[156] Ibid, p.60
[157] Ibid, p.62
[158] Ibid
[159] Ibid, p.66
[160] Ibid
[161] Ibid, p.67
[162] Ibid

"Behaviour and lifestyle changes to help end-users adopt low-GHG-intensive options can be supported by policies, infrastructure and technology with multiple co-benefits for societal well-being *(high confidence)*."[163]

"Broadening equitable access to domestic and international finance, technologies and capacity can also act as a catalyst for accelerating mitigation and shifting development pathways in low-income contexts *(high confidence)*."[164]

"Eradicating extreme poverty, energy poverty, and providing decent living standards to all in these regions in the context of achieving sustainable development objectives, in the near-term, can be achieved without significant global emissions growth *(high confidence)*."[165]

"Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all *(high confidence)*… Such a systemic change is unprecedented in terms of scale, but not necessarily in terms of speed *(medium confidence)*."[166]

"The system transitions make possible the transformative adaptation required for high levels of human health and well-being, economic and social resilience, ecosystem health, and planetary health."[167]

"Demand-side mitigation encompasses changes in infrastructure use, end-use technology adoption, and socio-cultural and behavioural change *(high confidence)*."[168]

"Sufficiency measures can limit the demand for energy and materials over the lifecycle of buildings and appliances *(high confidence)*."[169]

"[Sufficiency is] a set of measures and daily practices that avoid demand for energy, materials, land and water while delivering human well-being for all within planetary boundaries."[170]

"Many regulatory and economic instruments have already been deployed successfully. These instruments could support deep emissions reductions if scaled up and applied more widely."[171]

"Revenue from carbon taxes or emissions trading can be used for equity and distributional goals, for example to support low-income households, among other approaches *(high confidence)*."[172]

"Removing fossil fuel subsidies would reduce emissions, improve public revenue and macroeconomic performance, and yield other environmental and sustainable development benefits such as improved public revenue, macroeconomic and sustainability performance; subsidy removal can have adverse distributional impacts especially on the most economically vulnerable groups which, in some cases, can be mitigated by measures such as re-distributing revenue saved, and depend on national circumstances *(high confidence)*."[173]

"Fossil fuel subsidy removal is projected by various studies to reduce global CO_2 emissions by 1–4%, and GHG emissions by up to 10% by 2030, varying across regions *(medium confidence)*."[174]

[163] Ibid
[164] Ibid
[165] Ibid
[166] Ibid, p.68
[167] Ibid
[168] Ibid
[169] Ibid, p.72
[170] Ibid, footnote 98
[171] Ibid, p.79
[172] Ibid
[173] Ibid
[174] Ibid

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"Climate literacy and information provided through climate services and community approaches, including those that are informed by Indigenous Knowledge and local knowledge, can accelerate behavioural changes and planning *(high confidence)*."[175]

"The way choices are presented can enable adoption of low GHG intensive socio-cultural options, such as shifts to balanced, sustainable healthy diets, reduced food waste, and active mobility *(high confidence)*."[176]

"A range of adaptation options, such as disaster risk management, early warning systems, climate services and risk spreading and sharing approaches, have broad applicability across sectors and provide greater risk reduction benefits when combined *(high confidence)*."[177]

"Policy mixes that include weather and health insurance, social protection and adaptive safety nets, contingent finance and reserve funds, and universal access to early warning systems combined with effective contingency plans, can reduce vulnerability and exposure of human systems *(high confidence)*."[178]

"Social safety nets can build adaptive capacities, reduce socioeconomic vulnerability, and reduce risk linked to hazards *(robust evidence, medium agreement)*."[179]

"Reducing future risks of involuntary migration and displacement due to climate change is possible through cooperative, international efforts to enhance institutional adaptive capacity and sustainable development *(high confidence)*."[180]

"Mitigation and adaptation actions have more synergies than trade-offs with Sustainable Development Goals (SDGs)."[181]

"Eradicating extreme poverty, energy poverty, and providing decent living standards to all, consistent with near-term sustainable development objectives, can be achieved without significant global emissions growth *(high confidence)*."[182]

"There are potential synergies between multiple Sustainable Development Goals and sustainable land use and urban planning with more green spaces, reduced air pollution, and demand-side mitigation including shifts to balanced, sustainable healthy diets. Electrification combined with low-GHG energy, and shifts to public transport can enhance health, employment, and can contribute to energy security and deliver equity. Conservation, protection and restoration of terrestrial, freshwater, coastal and ocean ecosystems, together with targeted management to adapt to unavoidable impacts of climate change can generate multiple additional benefits, such as agricultural productivity, food security, and biodiversity conservation *(high confidence)*."[183]

"Social safety nets that support climate change adaptation have strong co-benefits with development goals such as education, poverty alleviation, gender inclusion and food security. Land restoration contributes to mitigation and adaptation with synergies via enhanced ecosystem services and with economically positive returns and co-benefits for poverty reduction and improved livelihoods."[184]

"Context relevant design and implementation requires considering people's needs, biodiversity, and other sustainable development dimensions *(very high confidence)*."[185]

[175] Ibid, p.74
[176] Ibid
[177] Ibid, p.75
[178] Ibid
[179] Ibid
[180] Ibid
[181] Ibid
[182] Ibid
[183] Ibid, p.76
[184] Ibid
[185] Ibid

"Effective governance is needed to limit trade-offs of some mitigation options such as large scale afforestation and bioenergy options due to risks from their deployment for food systems, biodiversity, other ecosystem functions and services, and livelihoods *(high confidence)*. Effective governance requires adequate institutional capacity at all levels *(high confidence)*."[186]

"Effective governance enhances monitoring and evaluation and regulatory certainty, prioritising inclusive, transparent and equitable decision-making, and improves access to finance and technology *(high confidence)*."[187]

"Vulnerabilities and climate risks are often reduced through carefully designed and implemented laws, policies, participatory processes, and interventions that address context specific inequities such as based on gender, ethnicity, disability, age, location and income *(high confidence)*. Policy support is influenced by Indigenous Peoples, businesses, and actors in civil society, including, youth, labour, media, and local communities, and effectiveness is enhanced by partnerships between many different groups in society *(high confidence)*."[188]

"Climate-related litigation is growing, with a large number of cases in some developed countries and with a much smaller number in some developing countries, and in some cases has influenced the outcome and ambition of climate governance *(medium confidence)*."[189]

"By integrating equity and climate justice, national and international policies can help to facilitate shifting development pathways towards sustainability, especially by mobilising and enhancing access to finance for vulnerable regions, sectors and communities *(high confidence)*."[190]

"Multilateral governance efforts can help reconcile contested interests, world views and values about how to address climate change. International environment and sectoral agreements, and initiatives in some cases, may help to stimulate low GHG investment and reduce emissions (such as ozone depletion, transboundary air pollution and atmospheric emissions of mercury). Improvements to national and international governance structures would further enable the decarbonisation of shipping and aviation through deployment of low-emissions fuels, for example through stricter efficiency and carbon intensity standards."[191]

"International environmental and sectoral agreements, institutions, and initiatives are helping, and in some cases may help, to stimulate low GHG emissions investment and reduce emissions *(medium confidence)*."[192]

"Adoption of low-emission technologies lags in most developing countries, particularly least developed ones, due in part to weaker enabling conditions, including limited finance, technology development and transfer, and capacity building *(medium confidence)*."[193]

[186] Ibid
[187] Ibid, p.78
[188] Ibid
[189] Ibid, p.78-79
[190] Ibid, p.82
[191] Ibid, p.83
[192] Ibid
[193] Ibid

"International cooperation on innovation works best when tailored to and beneficial for local value chains, when partners collaborate on an equal footing, and when capacity building is an integral part of the effort *(medium confidence)*."[194]

"Technological innovation can have trade-offs that include externalities such as new and greater environmental impacts and social inequalities; rebound effects leading to lower net emission reductions or even emission increases; and overdependence on foreign knowledge and providers *(high confidence)*."[195]

"For example, digital technologies can promote large increases in energy efficiency through coordination and an economic shift to services *(high confidence)*. However, societal digitalization can induce greater consumption of goods and energy and increased electronic waste as well as negatively impacting labour markets and worsening inequalities between and within countries *(medium confidence)*."[196]

"Effective action in all of the above areas will require near-term political commitment and follow-through, social cooperation, finance, and more integrated cross-sectoral policies and support and actions *(high confidence)*."[197]

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[194] Ibid
[195] Ibid
[196] Ibid
[197] Ibid, p.84-85

QUNO

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