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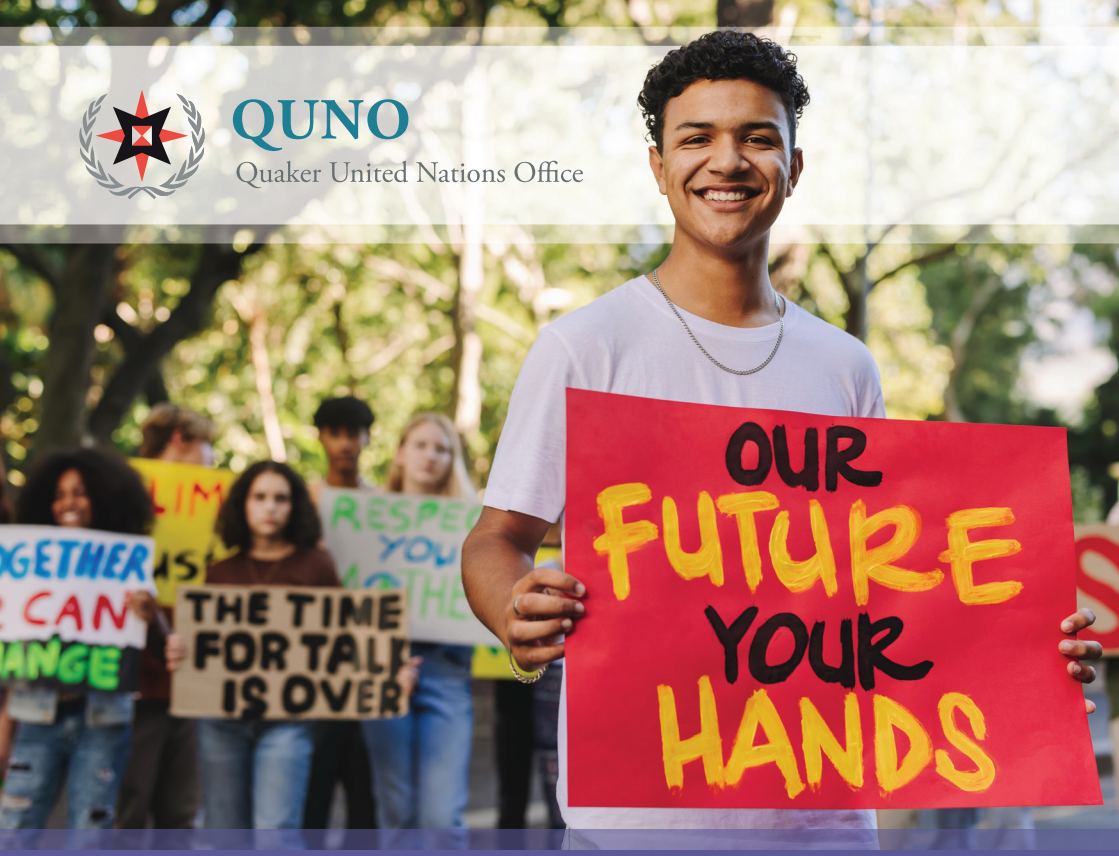

A Government Official's Toolkit
Inspiring urgent, healthy, equitable and available-at-scale climate action

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130 Findings from the
Intergovernmental Panel on Climate Change (IPCC)
6th Assessment Cycle

What is happening
Why
What we can do now to transform root causes,
and improve human well-being and planetary health.

Edited by
Lindsey Fielder Cook, Alana Carlson
and Anna Aguto
2024 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 for people seeking courageous action from their governments, their communities and themselves. We believe everyone should have easy access to the science presented to our governments.

This Government Official's Toolkit is the latest in a series by the Quaker United Nations Office (QUNO). The Toolkit gives direct quotes from the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6) and contributing Special Reports. The AR6 Report cycle was completed in 2023, took over seven years to complete, and involved hundreds of scientists worldwide (most helping voluntarily) to collate findings from over 14,000 scientific papers.

The IPCC 6th Assessment Report found that urgent, feasible, and equitable near-term options are already available at scale to address climate change and improve human well-being and planetary health. Yet political will and financial support remain insufficient.

The scientific findings quoted in this Toolkit are all referenced to IPCC Reports presented to and approved by our governments. Our decision-makers have a responsibility to healthily transform root causes to protect the most vulnerable and all future generations from catastrophic rates of global temperature rise.

ABOUT US

This year, QUNO marked its 75th year supporting peace and justice at the United Nations. Our climate programme works at the international climate negotiations, the Human Rights Council, the IPCC, and in communicating IPCC scientific findings. We believe all people should have easy access to this information. We hope this Toolkit will help empower people, and strengthen political will to implement healthy, real and rights-based policies which help transform root causes driving climate change and related planetary crises.

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"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]

[1] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, p. 89, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf


ACT
NOW

THE ROOT CAUSES

"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."[2]

"In 2019, atmospheric CO2 concentrations were higher than at any time in at least 2 million years *(high confidence)*, and concentrations of CH4 (methane) and N2O (nitrous oxide) were higher than at any time in at least 800,000 years *(very high confidence)*".[3]

"Human-induced climate change is a consequence of more than a century of net GHG emissions from unsustainable energy use, land-use and land use change, lifestyle and patterns of consumption and production. Without urgent, effective and equitable mitigation actions, climate change increasingly threatens the health and livelihoods of people around the globe, ecosystem health and biodiversity *(high confidence)*."[4]

"By 2019, the largest growth in absolute emissions occurred in CO2 from fossil fuels and industry followed CH4, whereas the highest relative growth occurred in fluorinated gases, starting from low levels in 1990 *(high confidence)*."[5]

"Historical net cumulative net CO2 emissions from 1859 to 2019 were 2400 ±240GtCO2. Of these, more than half (58%) occurred between 1850 and 1989 and about 42% between 1990 and 2019."[6]

[2] IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 4, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf
[3] Ibid, 8.
[4] IPCC, 2022: Summary for Policymakers. 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*, Cambridge University Press, Cambridge, UK and New York, NY, USA. p. 40, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
[5] Ibid., 6.
[6] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 44, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf

THE CONSEQUENCES

"The global surface temperature (shown as annual anomalies from a 1850–1900 baseline) has **increased by around 1.1°C since 1850–1900.**"[7]

"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)*."[8]

"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."[9]

"At higher levels of warming, losses and damages will increase, and additional human and natural systems will reach adaptation limits."[10]

"Global warming of 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other GHG emissions occur in the coming decades."[11]

"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."[12]

"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."[13]

"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."[14]

"It is virtually certain that hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s."[15]

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[7] Ibid., 43.
[8] Ibid., 68.
[9] Ibid.
[10] Ibid., 78.
[11] Ibid., 68.
[12] Ibid., 63, footnote 106.
[13] Ibid., 68.
[14] Ibid., 72.
[15] Ibid., 46.

"In all regions increases in extreme heat events have resulted in human mortality and morbidity *(very high confidence)*."[16]

"Based on multiple lines of evidence, upper ocean stratification (virtually certain), ocean acidification (virtually certain) and ocean deoxygenation *(high confidence)* will continue to increase in the 21st century, at rates dependent on future emissions."[17]

"Higher greenhouse gas emissions lead to larger and faster sea level rise, demanding earlier and stronger responses, and reducing the lifetime of some options."[18]

"Hundreds of local losses of species have been driven by increases in the magnitude of heat extremes *(high confidence)*, and mass mortality events on land and in the ocean *(very high confidence)* and loss of kelp forests *(high confidence)*. Some losses are already irreversible…"[19]

"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)*."[20]

"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."[21]

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[16] Ibid., 50.
[17] IPCC, 2021: *Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis.* p. 21, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf
[18] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 80, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[19] IPCC, 2022: Summary for Policymakers. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability,* p. 9, https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf
[20] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 50, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[21] Ibid., 78.

"Economic impacts attributable to climate change are increasingly affecting peoples' livelihoods and are causing economic and societal impacts across national boundaries *(high confidence)*."[22]

"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)*."[23]

"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)*."[24]

SAVING NATURE and PEOPLE

"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."[25]

"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)*."[26]

"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)*."[27]

[22] Ibid., 51.
[23] Ibid.
[24] Ibid.
[25] Ibid., 97.
[26] Ibid., 77.
[27] Ibid., 71.

"Global warming of 4°C and above is projected to lead to far-reaching impacts on natural and human systems *(high confidence)*."[28]

"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)*."[29]

"Overshooting 1.5°C … increases the risks of severe impacts, such 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)*."[30]

"Delaying action … has the potential to lead to substantial additional GHG emissions from ecosystems that would accelerate global warming."[31]

"Without effective mitigation and adaptation, losses and damages will continue to disproportionately affect the poorest and most vulnerable populations."[32]

"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)*."[33]

"Countries with a relatively low average vulnerability often have groups with high vulnerability within their population and vice versa."[34]

[28] Ibid.
[29] Ibid., 89.
[30] Ibid., 87.
[31] IPCC, 2019: Summary for Policymakers. In: *Climate Change and Land,* p.36 https://www.ipcc.ch/site/assets/uploads/sites/4/2022/11/SRCCL_SPM.pdf
[32] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 62, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[33] Ibid., 51.
[34] Ibid., 50.

"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)*."[35]

"Feasible, effective and low-cost options for mitigation and adaptation are already available *(high confidence)*."[36]

"Reaching net zero GHG emissions primarily requires deep reductions in CO2 (carbon dioxide), methane, and other GHG emissions, and implies net-negative CO2 emissions."[37]

"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."[38]

"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)*."[39]

"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)*."[40]

"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."[41]

"Mitigation and adaptation actions have more synergies than trade-offs with Sustainable Development Goals (SDGs)."[42]

[35] Ibid., 82.
[36] Ibid., 102.
[37] Ibid., 85.
[38] Ibid., 92.
[39] Ibid., 88.
[40] Ibid., 102.
[41] Ibid.
[42] Ibid., 108.

"Limiting global warming to 2°C or below will leave a substantial amount of fossil fuels unburned and could strand considerable fossil fuel infrastructure *(high confidence)*."[43]

"Net zero CO2 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 CO2; widespread electrification; alternative energy carriers in applications less amenable to electrification; energy conservation and efficiency; and greater integration across the energy system *(high confidence)*."[44]

"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 CO2 from power plants, or 50–80% of fugitive methane emissions from energy supply."[45]

"Maintaining emission-intensive systems may, in some regions and sectors, be more expensive than transitioning to low emission systems."[46]

"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."[47]

"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)*."[48]

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[43] IPCC, 2022: Summary for Policymakers. In: *Climate Change 2022: Mitigation of Climate Change,* p. 28, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
[44] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 104, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[45] Ibid., 95, footnote 148.
[46] Ibid., 104.
[47] Ibid., 53.
[48] Ibid.

"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)*."[49]

"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)*."[50]

"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."[51]

"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)*."[52]

LAND and FOOD - SUSTAINABLE and RESTORATIVE

"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)*."[53]

"Sustainable land management [...] options include agroecology (including agroforestry), conservation agriculture and forestry practices, crop and forest species diversity, appropriate crop and forest rotations, organic farming, integrated pest management, the conservation of pollinators, rainwater harvesting, range and pasture management, and precision agriculture systems."[54]

[49] Ibid., 104.
[50] Ibid., 88.
[51] Ibid., 86.
[52] Ibid., 104-105.
[53] Ibid., 50.
[54] IPCC, 2019: Summary for Policymakers. In: *Climate Change and Land,* p. 23, footnote 33, https://www.ipcc.ch/site/assets/uploads/sites/4/2022/11/SRCCL_SPM.pdf

"Demand-side measures (shifting to sustainable healthy diets and reducing food loss/waste) and sustainable agricultural intensification can reduce ecosystem conversion and CH4 and N2O emissions, and free up land for reforestation and ecosystem restoration."[55]

"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)*."[56]

"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."[57]

"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)*."[58]

"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)*."[59]

"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)*."[60]

[55] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report*. p. 106, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[56] Ibid., 56.
[57] Ibid., 114.
[58] Ibid., 105.
[59] Ibid., 106.
[60] Ibid.

"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)*."[61]

"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)*."[62]

"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)*."[63]

ECONOMIC SYSTEMS - SUSTAINABLE and JUST

"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)*."[64]

"Continuing with current unsustainable development patterns would increase exposure and vulnerability of ecosystems and people to climate hazards *(high confidence)*."[65]

"Climate resilient development integrates adaptation and GHG mitigation to advance sustainable development for all."[66]

[61] Ibid.
[62] Ibid.
[63] Ibid., 55.
[64] Ibid., 102.
[65] Ibid., 97.
[66] Ibid., 89.

"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)*."[67]

"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)*."[68]

"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)*."[69]

"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)*."[70]

"Globally, gross domestic product (GDP) per capita and population growth remained the strongest drivers of CO2 emissions from fossil fuel combustion in the last decade *(high confidence)*."[71]

"Advances in female education and reproductive health, especially voluntary family planning, can contribute greatly to reducing world population growth."[72]

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[67] Ibid.
[68] Ibid., 102.
[69] Ibid, 88.
[70] Ibid., 101.
[71] M. Pathak, R. Slade, P.R. Shukla, J. Skea, R. Pichs-Madruga, D. Ürge-Vorsatz, 2022: Technical Summary. In: *Climate Change 2022: Mitigation of Climate Change.* Cambridge University Press, Cambridge, UK and New York, NY, USA. p.60, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_TechnicalSummary.pdf
[72] Creutzig, F., J. Roy, P. Devine-Wright, J. Díaz-José, F.W. Geels, A. Grubler, N. Maïzi, E. Masanet, Y. Mulugetta, C.D. Onyige, P.E. Perkins, A. Sanches-Pereira, E.U. Weber, 2022: Demand, services and social aspects of mitigation. In IPCC, 2022: *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. 526, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf

"Demand-side mitigation encompasses changes in infrastructure use, end-use technology adoption, and socio-cultural and behavioural change *(high confidence)*."[73]

[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.[74]

"Sufficiency measures can limit the demand for energy and materials over the lifecycle of buildings and appliances *(high confidence)*."[75]

"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)*."[76]

"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)*."[77]

"Many regulatory and economic instruments have already been deployed successfully. These instruments could support deep emissions reductions if scaled up and applied more widely."[78]

"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

[73] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 102, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[74] Ibid., 105, footnote 155.
[75] Ibid., 105.
[76] Ibid., 89.
[77] Ibid., 102.
[78] Ibid., 110.

by measures such as re-distributing revenue saved, and depend on national circumstances *(high confidence)*."[79]

"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)*."[80]

DANGER in RELIANCE

"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)*."[81]

"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 socio-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)*."[82]

"Deployment of afforestation of naturally unforested land, or poorly implemented bioenergy, with or without carbon capture and storage, can compound climate-related risks to biodiversity, water and food security, and livelihoods, especially if implemented at large scales, especially in regions with insecure land tenure *(high confidence)*."[83]

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[79] Ibid., 111.
[80] Ibid., 110-111.
[81] Ibid., 108.
[82] Ibid., 88.
[83] IPCC, 2022: *Summary for Policymakers: Climate Change 2022: Impacts, Adaptation and Vulnerability.* Cambridge University Press, Cambridge, UK and New York, NY, USA, p.19 https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

"Large-scale land conversion for bioenergy, biochar, or afforestation can increase risks to biodiversity, water and food security."[84]

"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)*."[85]

"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 *(high confidence)*."[86]

"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."[87]

"Effects of SRM would depend on the specific approach used, and a sudden and sustained termination of SRM in a high CO2 emissions scenario would cause rapid climate change *(high confidence)*. SRM would not stop atmospheric CO2 concentrations from increasing nor reduce resulting ocean acidification under continued anthropogenic emissions *(high confidence)*."[88]

[84] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report.* p. 106, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
[85] Ibid., 114.
[86] Ibid., 86, footnote 136.
[87] Ibid., 72.
[88] Ibid.

Many options available now in all sectors are estimated to offer substantial potential to reduce net emissions by 2030. Relative potentials and costs will vary across countries and in the longer term compared to 2030.

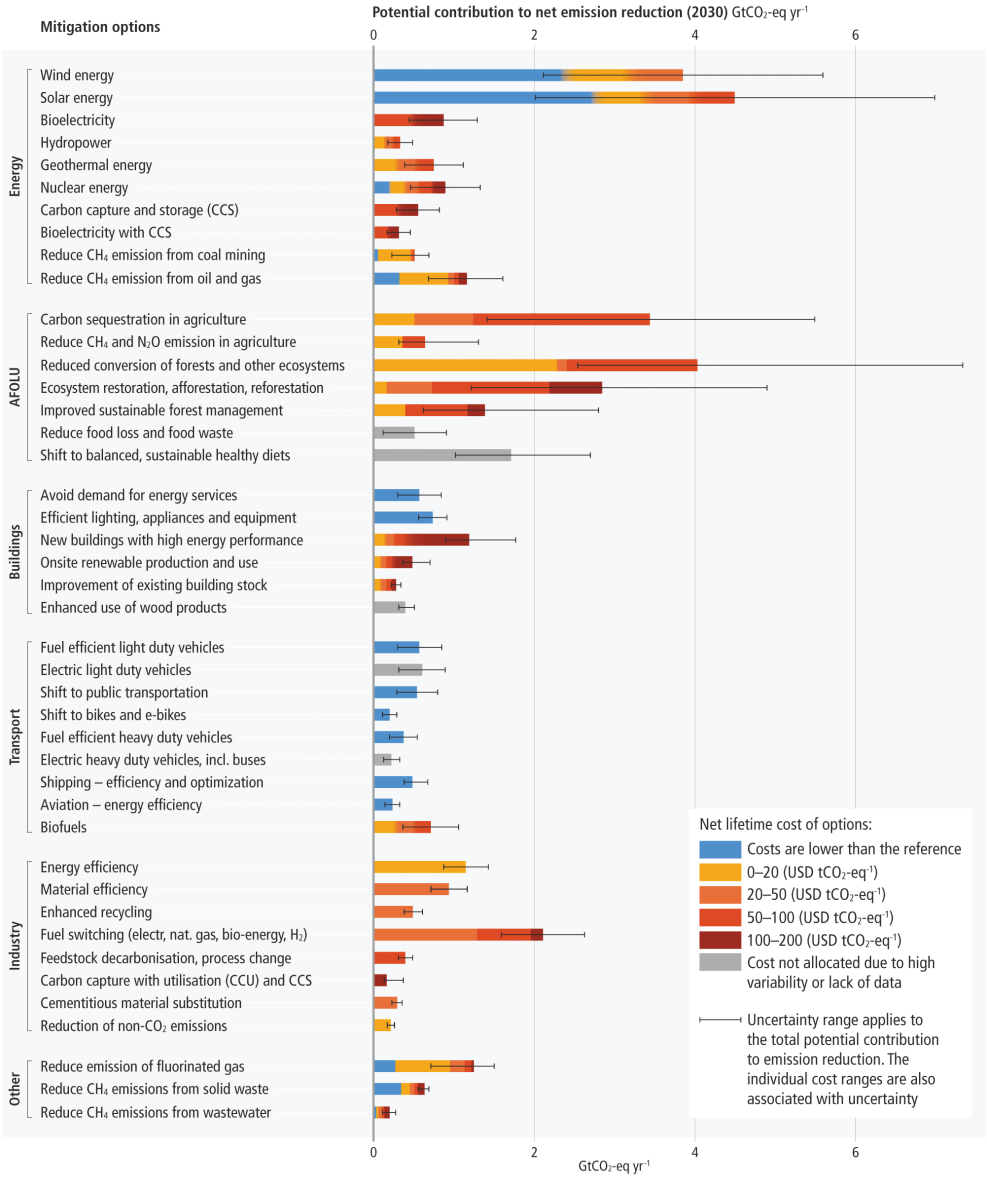

Figure SPM.7 from IPCC, 2022: Summary for Policymakers [P.R. Shukla, J. Skea, A. Reisinger, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, P. Vyas, (eds.)]. In: *Climate Change 2022: Mitigation of Climate 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: 10.1017/9781009157926.001.

PROTECTING HEALTH with CLIMATE ACTION

"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)*."[89]

"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)*."[90]

"Many mitigation actions would have benefits for health through lower air pollution, active mobility (e.g., walking, cycling), and shifts to sustainable healthy diets *(high confidence)*."[91]

"The benefits from air quality improvement include prevention of air pollution-related premature deaths, chronic diseases and damages to ecosystems and crops."[92]

"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)*."[93]

"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)*."[94]

SUCCESSFUL PEOPLE-SUPPORTED CLIMATE POLICIES

"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)*."[95]

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[89] Ibid., 50-51.
[90] Ibid., 50.
[91] Ibid., 26.
[92] Ibid., 95.
[93] Ibid., 106.
[94] Ibid., 53.
[95] Ibid., 101.

"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)*."[96]

"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)*."[97]

"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)*."[98]

"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)*."[99]

"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)*."[100]

"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)*."[101]

[96] Ibid., 102.
[97] Ibid., 110.
[98] Ibid., 101.
[99] Ibid.
[100] Ibid.
[101] Ibid., 52.

"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)*."[102]

"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)*."[103]

"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)*."[104]

"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)*."[105]

"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)*."[106]

"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)*."[107]

"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)*."[108]

[102] Ibid., 53.
[103] Ibid., 110.
[104] Ibid., 107.
[105] Ibid., 86.
[106] Ibid., 105.
[107] Ibid., 107.
[108] Ibid.

"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)*."[109]

"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 *(high confidence)*."[110]

"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."[111]

MONEY and POWER

"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."[112]

"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)*."[113]

"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)*."[114]

[109] Ibid., 52.
[110] Ibid., 108.
[111] Ibid.
[112] Ibid., 111.
[113] Ibid., 102.
[114] Ibid., 62.

"Both adaptation and mitigation finance need to increase many-fold, to address rising climate risks and to accelerate investments in emissions reduction *(high confidence)*."[115]

"Accelerated financial support for developing countries from developed countries and other sources is a critical enabler to enhance mitigation action."[116]

"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)*."[117]

"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)*."[118]

Emissions have grown in most regions but are distributed unevenly, both in the present day and cumulatively since 1850

a) Historical cumulative net anthropogenic CO2 emissions per region (1850-2019)

b) Net anthropogenic GHG emissions per capita and for total population, per region (2019)

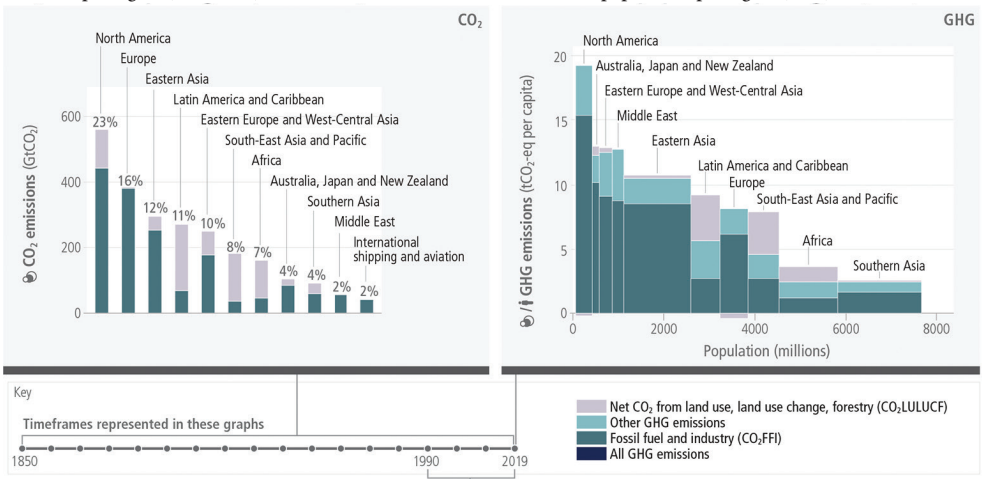

Figure 2.2 (a) and (b) from IPCC, 2023: Current Status and Trends. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647.

[115] Ibid., 111.
[116] Ibid., 62.
[117] Ibid., 112.
[118] Ibid.

"Globally, households with income in the top 10% contribute about 36–45% of global GHG emissions (robust evidence, medium agreement)."[119]

"Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected *(high confidence)*."[120]

"For every 1000 GtCO2 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."[121]

"Based on central estimates only, historical cumulative net CO2 emissions between 1850 and 2019 amount to about four-fifths of the total carbon budget for a 50% probability of limiting global warming to 1.5°C and to about two-thirds of the total carbon budget for a 67% probability to limit global warming to 2°C."[122]

"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."[123]

"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)*."[124]

"By 2020, laws primarily focused on reducing GHG emissions existed in 56 countries covering 53% of global emissions *(medium confidence)*."[125]

[119] M. Pathak et al., 2022: Technical Summary. In: *Climate Change 2022: Mitigation of Climate Change*, p. 65, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGII_TechnicalSummary.pdf

[120] IPCC, 2023: Sections. In: *Climate Change 2023: Synthesis Report*. p. 42, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf

[121] Ibid., 82.

[122] Ibid.

[123] Ibid., 61.

[124] Ibid., 52.

[125] Ibid.

"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)*."[126]

"Multilateral governance efforts can help reconcile contested interests, world views and values about how to address climate change… 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."[127]

"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)*."[128]

"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)*."[129]

"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)*."[130]

[126] Ibid., 110.
[127] Ibid., 112.
[128] Ibid.
[129] Ibid., 114.
[130] Ibid., 115.

BIBLIOGRAPHY

Creutzig, F., J. Roy, P. Devine-Wright, J. Díaz-José, F.W. Geels, A. Grubler, N. Maïzi, E. Masanet, Y. Mulugetta, C.D. Onyige, P.E. Perkins, A. Sanches-Pereira, E.U. Weber, 2022: Demand, services and social aspects of mitigation. In *IPCC, 2022: 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: 10.1017/9781009157926.007.

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* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, 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.)]. https://doi.org/10.1017/9781009157988.001.

IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. In Press.

IPCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.

IPCC, 2022: Summary for Policymakers [P.R. Shukla, J. Skea, A. Reisinger, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, P. Vyas, (eds.)]. 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: 10.1017/9781009157926.001.

IPCC, 2023: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 184 pp., doi: 10.59327/IPCC/AR6-9789291691647.

M. Pathak, R. Slade, P.R. Shukla, J. Skea, R. Pichs-Madruga, D. Ürge-Vorsatz, 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.

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