
A Solutions Approach to the GST

Technical Paper¹

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Introduction: Elements for a success at COP28 and beyond

1. Ultimately, whether COP28 is judged a success will largely be determined by how the world responds to the outcomes of the global stocktake (**GST**) and the COP more widely. Headline aspirations are not enough: COP28 must help drive a shift from incremental progress toward transformational levels of implementation, fairness and ambition. In order to do so, Parties and non-Party stakeholders (**NPS**) could usefully:
 - **Identify a limited number of key, specific, operational and transformative signals to come out of COP28, including the GST**, across mitigation, adaptation and loss & damage, and means of implementation (**MOI**). The normative potential of the UNFCCC process should be leveraged to ensure that all stakeholders – national governments, local authorities, civil society, the private sector, national level practitioners, multilateral organizations and UN agencies, among others – align their efforts to deliver an effective response to COP28 and the GST. To add real value, COP28 and the GST need to send clear and specific signals as to what Parties and NPS could usefully do after COP28 in order to achieve the goals of the Paris Agreement, both as part of an immediate response as well as through more ambitious nationally determined contributions (**NDCs**).

¹ This paper has benefitted from tremendously from inputs and insights from Sebastian Obertür, Professor, Free University of Brussels (VUB) and University of Eastern Finland; Transforma; and EDF, among others.



- **Support overlaps between these signals and the COP28 Presidency vision**, while pushing for refinement and more specificity as needed.² For example, the Presidency vision calls for countries to pledge to “reach a global tripling of renewables capacity [...] by 2030,” whereas COP28 could also usefully call for an increasing share of renewable energy in electricity generation.
 - **Build momentum ahead of COP28 towards securing the signals**, including by activating existing relevant coalitions and initiatives around them, in particular the work of the High-Level Climate Champions (**HLCs**) (such as in relation to the 2030 Breakthroughs). Existing coalitions and initiatives of Parties and NPS will be vital to actively mount an effective 2024 response to the GST outcomes and to operationalize identified opportunities to be harvested in new NDCs. These initiatives provide an entry point for implementing action and enhanced international cooperation in 2024. “Enhancing international cooperation” is part of the GST mandate and presents an important opportunity to move from zero sum confrontational negotiating dynamics and incremental increases in ambition and implementation towards needed transformation.
 - **Push for COP28 to set out a plan for what will happen next year**, so all Parties and NPS are clear as to what is expected of them in an effective response to the COP28 and GST outcomes. This could build on existing mandates and could also be driven by the COP28 Presidency. An effective 2024 response will need to be informed by technical resources, such as policy pathways, and should be highlighted in the synthesis report from the GST technical dialogue process.
 - **Require that the COP28 and GST outcomes are clearly linked to the process of submitting new NDCs in 2025**. In particular Parties should be urged to set out in their new NDCs how they intend to contribute towards the achievement of any new global goals or targets agreed at COP28.
 - **Request the UN Secretary General to invite world leaders to submit their new NDCs in person on Earth Day in 2025**, creating a political backstop to the GST process that is also consistent with the requirement to submit new NDCs at least nine months before COP30.
2. This technical paper – which is an update of a previous C2ES submission on this topic³ – identifies a limited number of key, specific, operational and transformative signals that could usefully be given by COP28 and the GST. The signals have been identified as a result of well

² Message from the President-Designate of COP28/CMP18/CMA5, and UAE Special Envoy for Climate Change - COP 28 Vision, https://unfccc.int/sites/default/files/resource/COP28_Letter_July_2023_1.pdf (13 July 2023).

³ C2ES, “A Solutions Approach to the GST: Interim Technical Paper for Consultation” (May 2023), https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202303062022---20230306_A_Solutions-Oriented_Approach_to_the_GST_-_C2ES_submission_FINAL.pdf.



over two years of analytical work⁴ and outreach⁵. In the sections below, they are set out in relation to mitigation, adaptation, loss & damage, as well as MOI. (Although we acknowledge that there is considerable overlap between these categories). The sections also identify high impact opportunities/solutions to implement the signals, as well as considerations in relation to the criteria used to select the signals, such as:

- certainty of impact
 - feasibility
 - key relevant initiatives
 - barriers
 - synergies as well as trade-offs in achieving the Sustainable Development Goals (**SDGs**).
3. There have been some suggestions that the Synthesis Report of the GST Technical Dialogue process could usefully contain a 'technical annex'. The final section of this paper sets out an example of what such a technical annex could look like, focusing on mitigation and related MOI.
 4. Regardless of what collective signals or targets are agreed at COP28, it is clear that COP28 must call for Parties to reflect in their new NDCs how they intend to take them forward. Without this link, there is a real risk they will not be acted upon.

⁴ Please see Global Stocktake: An Opportunity for Ambition, <https://www.c2es.org/content/global-stocktake-an-opportunity-for-ambition/>.

⁵ Our most recent consultations on Solutions Approach to the GST paper were hosted by C2ES, EDF, and Transforma, in coordination with the main authors of the paper over the course of three days in July 2023. They can be viewed here: <https://www.c2es.org/event/convenings-on-a-solutions-oriented-approach-to-the-gst/>.

Summary of suggested high level signals/asks from COP28

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| Mitigation | Triple renewable energy capacity by 2030, including increasing the share of renewable energy sources in global electricity generation to at least two-thirds by 2030 with the aim of full decarbonization by 2050, while reducing the share of fossil sources. ⁶ |
| | Reduce methane emissions from the fossil fuel sector by 75 percent by 2030. |
| | Halt and reverse land degradation as well as biodiversity & ecosystem loss, including in particular forest loss, by 2030. ⁷ |
| | Sales of zero-emission light-duty vehicles in leading markets reach 75 per cent by 2030 and 100 per cent by 2035. ⁸ |
| | Reduce the carbon intensity of building operations, minimize embodied emissions, and increase the rate of building retrofits to 3.5 percent by 2040, aiming for all new and existing assets to be net zero across their life cycles by 2050. |

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| Adaptation/Loss & Damage | Focusing on those that are the most vulnerable to climate impacts, ensure that 50 percent of the global population is climate resilient by 2030, aspiring to 100 percent by 2050. |
| | Ensure, by 2027, universal coverage of early warning systems, connected to longer-term risk management systems, and supported by effective risk communication and public stakeholder dialogue to prompt informed action, and by 2030 universal coverage of climate services in priority climate-sensitive sectors (agriculture and food security, health, disaster risk reduction, energy, and water). |
| | By 2030: (i) foster climate resilient, sustainable agriculture that increases yields by 17 percent and reduces farm level greenhouse gas emissions by 21 percent without expansion of the agricultural frontier; and (ii) halve, relative to 2019, the share of food production lost and per capita food waste, while shifting to more healthy and plant-based diets. |
| | Significantly increase by 2030 the capacity and resources of developing countries, with a focus on those that are particularly vulnerable to the adverse effects of climate change, to avert, minimize, and address L&D, including at the local, national, regional, and international level. |

⁶ According to the IEA, the current share of all renewables in total energy demand was 12 percent in 2022. The IEA projects that the renewables share in total energy demand would need to be just over 30 percent by 2030 on its Net Zero scenario trajectory. IEA, Renewables, <https://www.iea.org/energy-system/renewables>.

⁷ This signal also has adaptation co-benefits.

⁸ Based on Race to Zero, 2030 Breakthroughs, Upgrading Our Systems Together, <https://racetozero.unfccc.int/wp-content/uploads/2021/09/2030-breakthroughs-upgrading-our-systems-together.pdf> and Marrakech Partnership, Climate Action Pathway: https://unfccc.int/sites/default/files/resource/Transport_ActionTable_2.1.pdf.

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| Means of Implementation | Urge Parties, multilateral development banks (MDBs), and NPS, in particular financial institutions (IFIs), to triple the proportion of finance and investments in renewable energy by 2030. ⁹ |
| | Urge bilateral, multilateral, and private creditors to design and implement mechanisms for debt payments suspension, restructuring, and cancellation as soon as possible and by 2030 at the latest, with a view to addressing climate-related needs. |
| | Urge MDBs, IFIs and private investors to revise and adjust their investment plans and portfolios in order to significantly increase their investments in decarbonization and resilience projects by 2030 and gradually continue increasing them to align with the long term goals of the Paris Agreement. |
| | Call upon MDBs, IFIs, climate funds, and other multilateral and bilateral cooperation agencies to increase the share of grants and highly concessional instruments for developing countries, particularly for the design, implementation, and monitoring of adaptation actions. |
| | Urge tying fossil fuel subsidies reform to broader economy-wide just transition plans and provide support to developing countries to implement it. |
| | Call for capacity building support to developing countries to create the necessary enabling environments to operationalize Article 2.1(c) of the Paris Agreement. |
| | Call upon institutional investors and corporate actors to implement concrete plans for the understanding (2025), disclosure (2028) and management (2030) of climate-related financial risks and opportunities. |

⁹ According to IRENA, to be consistent with a 1.5 degree C scenario, the amount of renewables added to the grid globally needs to reach 1000 GW/year. In 2022, 300 GW of renewables were installed, meaning a more than 3-fold increase in annual additions will be required to be consistent with a 1.5 degree C scenario. Investment required to reach this rate of installation is estimated to be US \$1.3 trillion/year by 2030, up 2.6x from current yearly investment.

A. Mitigation

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| Signal/high-level ask | Tripling of renewable energy capacity by 2030, including increasing the share of renewable energy sources in global electricity generation to at least two-thirds by 2030 with the aim of full decarbonization by 2050, while reducing the share of fossil sources, by: |
| High-impact opportunities/solutions | <ul style="list-style-type: none"> Expanding and upgrading the electricity grids to enable the integration of increasing amounts of renewable energy sources.¹⁰ |
| | <ul style="list-style-type: none"> Incentivizing the deployment of renewable energy technologies¹¹ and/or setting renewable energy targets or mandates based on national circumstances. |
| | <ul style="list-style-type: none"> Ending investments in new fossil fuel-based generation capacity and accelerate the reduction of the relative share of existing fossil fuel-based energy generation capacity, in a just and equitable manner, including by pricing or capping emissions from the electricity sector. |
| | <ul style="list-style-type: none"> Addressing regulatory barriers to the deployment, scale up, and use of renewable energy technologies, including grid infrastructure and storage. |

Impact¹²

- Deploying wind and solar energy in particular offer substantial potential and could reduce net emissions by about 8 GtCO₂eq in 2030 relative to a baseline that reflects current (2015–19) policies.¹³ While these technologies comprise a small share of global electricity generation, “recent growth rates signal the potential for these technologies to support substantial mitigation.”¹⁴
- A clean, affordable, and reliable power sector is a prerequisite for the decarbonization of the transport, industry, and buildings sectors.¹⁵ This will require addressing both existing capacity

¹⁰ Improving the integration of renewable energy sources into increasingly flexible electricity grids could include, for example, clean firm power, expanded transmission and distribution infrastructure, demand-side management and energy efficiency, incorporation of smart grids, and expansion of cooperative- and community-run distributed generation schemes.

¹¹ Incentivizing the deployment of renewable energy technologies could include, for example, investment tax credits, minimum price guarantees, and de-risking investment through innovative stacked climate financing options.

¹² Impact includes climate impacts, development impacts, and other anticipated and potential impacts.

¹³ “Climate Change 2022: Mitigation of Climate Change,” SPM-42.

¹⁴ “Climate Change 2022: Mitigation of Climate Change,” 6-18.

¹⁵ “Climate Change 2022: Mitigation of Climate Change.” 3-6.



and the new generation that will be needed to accommodate the electrification of major portions of the economy.

Feasibility

- Renewables and energy storage technologies are generally mature, available, and quickly decreasing in cost (2015–20).¹⁶ The transformation of the electricity sector could be accelerated with scaled-up deployment of renewables and energy storage,¹⁷ along with targeted and scaled-up efforts to enhance energy efficiency.
- While appropriate renewable energy technologies will be highly context-specific, the costs of certain technologies (e.g., solar, wind) have declined over the last decade, making them price competitive with fossil fuel-based electricity generation in many geographies.¹⁸ Deployment of these technologies will become increasingly feasible over time.¹⁹

A selection of key existing initiatives

- The **Clean Power Breakthrough** aims for solar and wind to make up at least 40 percent—and all renewables to make up at least 60 percent—of global electricity generation by 2030.²⁰
- Various initiatives aim to mobilize finance for electricity sector transition, including **Just Energy Transition Partnerships** and the **Energy Transition Accelerator**.
- **SEforALL** works in partnership with the United Nations to drive the achievement of SDG7, expanding access to energy, increasing the share of renewable energy in the global energy mix, and doubling the rate of improvement in energy efficiency.²¹
- **Powering Past Coal Alliance**, launched at COP23, is a coalition of 48 national governments, 48 subnational governments, and 71 global organizations “working to advance the transition from unabated coal power generation to clean energy.”²²

Barriers

- Regulatory hurdles, high upfront capital costs, the amount of land required, and the need for public acceptance.
- Lack of accessible support for electricity sector transition in developing countries.
- Negative social impacts of plant shutdowns, such as the loss of jobs and livelihoods.

¹⁶ “Climate Change 2022: Mitigation of Climate Change.” 4-41.

¹⁷ “Climate Change 2022: Mitigation of Climate Change.” 4-41.

¹⁸ “BloombergNEF 2021 Executive Factbook,” March 2, 2021, <https://about.bnef.com/blog/bloombergnef-2021-executive-factbook>.

¹⁹ “Climate Change 2022: Mitigation of Climate Change,” SPM-48.

²⁰ Climate Champions, “2030 Breakthroughs,” n.d., <https://climatechampions.unfccc.int/system/breakthroughs/>.

²¹ “Sustainable Development Goal 7 (SDG7),” Sustainable Energy for All (SEforALL), n.d., <https://www.seforall.org/sustainable-development-goal-7-sdg7>.

²² “Powering Past Coal Alliance,” accessed January 4, 2023, <https://poweringpastcoal.org/>.



- The need for large-scale deployment of wind and solar resources to be complemented by clean firm power (i.e., clean power sources that can be dispatched as needed), energy storage, and expanded transmission infrastructure, given due to their variability and location.

Sustainable Development Goals

- Phasing out coal in favor of renewable energy sources can provide significant public health and air quality benefits.²³
- Renewable energy jobs could rise from 12.7 million today to 38.2 million in 2030, with losses in fossil fuel sectors more than offset by gains in renewables and other energy transition technologies.²⁴ While not all workers in fossil fuel sectors will easily transition to employment in renewables, it is possible to provide training and other resources to displaced workers. Renewables will also create industries along the value chain and spur new industries—all of which create indirect and induced jobs.
- As renewable energy technologies are deployed, efforts must be taken to expand energy access and mitigate the effects on vulnerable populations of policy measures that reflect the costs of fossil fuel pollution.

Options for the outcome at COP28

The Glasgow Climate Pact called on Parties to “transition toward low-emission energy systems, including by rapidly scaling up the deployment of clean power generation and energy efficiency measures, including accelerating efforts toward the phasedown of unabated coal power and phase-out of inefficient fossil fuel subsidies.”²⁵ The Sharm el-Sheikh Implementation Plan included similar language. This year, to further efforts to reduce emissions from the electricity sector, Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify in their new NDCs their contribution to any collective target agreed at COP28 on this issue.
- Mobilize investments at scale for the energy transition in developing countries, both within and outside the UN climate regime, including by calling for real and measurable innovative financing to drive project implementation, and a shift from political agreements to implementation plans.
- Phase out unabated fossil fuel-fired power generation, halting overseas financing for fossil fuel-fired power generation, and/or ending fossil fuel subsidies.

²³ “Climate Change 2022: Mitigation of Climate Change,” SPM-32.

²⁴ “World Energy Transitions Outlook 2022” (International Renewable Energy Agency, March 2022), <https://www.irena.org/publications/2022/mar/world-energy-transitions-outlook-2022>.

²⁵ “Glasgow Climate Pact.”



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| Signal/high-level ask | Reduce methane emissions from the fossil fuel sector by 75 percent by 2030, by: |
| High-impact opportunities/solutions | <ul style="list-style-type: none"> • Setting standards for equipment technology, leak detection and repair, and flaring and venting. |
| | <ul style="list-style-type: none"> • Measuring and reporting methane emissions. |
| | <ul style="list-style-type: none"> • Regulating upstream emissions, including by pricing emissions or setting performance or procurement standards. |

Impact

- Reductions of methane emissions across all sectors can deliver 0.25 degree C of avoided temperature rise by 2050, a significant contribution to reaching the long-term temperature goal of the Paris Agreement.²⁶ While anthropogenic methane emissions are generated across the fossil fuel (35 percent), waste (20 percent), and agriculture (40 percent) sectors, the oil and gas sector offers the largest share of low- and negative-cost reduction opportunities.²⁷
- The IPCC found that reductions of methane emissions would lower peak warming and reduce the likelihood of overshooting warming limits.²⁸ Due to methane's warming power and relatively short atmospheric lifetime, reducing methane emissions is the fastest way to slow the rate of global warming in the near term.²⁹

Feasibility

- Technologies and practices to prevent vented and fugitive methane emissions in the energy sector are well-known, and a new wave of technologies holds promise for remote monitoring of methane, which could help improve inventory data.
- 50–80 percent of oil and gas sector methane emissions could be abated at less than US \$50 per ton of CO₂eq using currently available technologies.³⁰

A selection of key existing initiatives

A range of actors, from civil society to governments to the private sector, have actively cooperated to raise the profile of this issue over the last few years, and resources exist to help

²⁶ "Benefits of Measurement-Based Methane Estimates and Timely Emissions Reductions for Reaching the Long-Term Global Goal on Temperature: Submission to the Global Stocktake by the Environmental Defense Fund," August 3, 2022, https://unfccc.int/sites/default/files/resource/202208040943—Environmental%20Defense%20Fund_GST%2004.08.22.pdf.

²⁷ "Benefits of Measurement-Based Methane Estimates and Timely Emissions Reductions for Reaching the Long-Term Global Goal on Temperature: Submission to the Global Stocktake by the Environmental Defense Fund."

²⁸ "Climate Change 2022: Mitigation of Climate Change," The Intergovernmental Panel on Climate Change 3-5 (2022). <https://www.ipcc.ch/report/ar6/wg3>.

²⁹ "Benefits of Measurement-Based Methane Estimates and Timely Emissions Reductions for Reaching the Long-Term Global Goal on Temperature: Submission to the Global Stocktake by the Environmental Defense Fund."

³⁰ "Climate Change 2022: Mitigation of Climate Change," SPM-37.



countries both improve their methane inventories and reduce methane emissions. Key existing initiatives include:

- **Climate and Clean Air Coalition** is comprised of governments, intergovernmental organizations, businesses, scientific institutions, and civil society organizations. It oversees a range of methane-related initiatives, including the Oil and Gas Methane Partnership 2.0, which is the only comprehensive, measurement-based reporting framework for the oil and gas industry.³¹
- **Global Methane Pledge**, launched at COP26, commits participants to contributing “to a collective effort to reduce global methane emissions at least 30 percent from 2020 levels by 2030.” 150 countries have joined the pledge, and more than 50 countries have developed (or are developing) national methane plans. Select participating countries have also now launched “pathways” for key emitting sectors—energy, agriculture, and waste.³²
- **Global Methane Hub** is a philanthropy that supports action under the Global Methane Pledge, with a focus on driving emission reductions in the highest emitting sectors and regions.³³

Barriers

- Abatement of methane emissions depends on accurate characterization of emission sources, and existing inventory methodologies do not fully capture methane emissions.³⁴
- Lack of infrastructure may prevent captured gas from being brought to market, especially where gas is co-produced with oil.³⁵
- Lack of incentives and technical expertise for abatement, including in contexts where the environmental costs of emissions are not considered.³⁶
- Difficult-to-quantify costs of refining business operations and worker training, as well as institutional inertia.

Sustainable Development Goals

- Methane is a precursor to ground-level or tropospheric ozone, exposure to which causes about one million premature deaths per year. Addressing methane emissions can have positive effects on human health and air quality.³⁷ Reducing methane emissions by 30 percent

³¹ “Climate and Clean Air Coalition,” n.d., <https://www.ccacoalition.org/en>.

³² “Global Methane Pledge: From Moment to Momentum” (U.S. Department of State, November 17, 2022), <https://www.state.gov/global-methane-pledge-from-moment-to-momentum>.

³³ “Global Methane Hub,” n.d., <https://www.globalmethanehub.org/>.

³⁴ “Benefits of Measurement-Based Methane Estimates and Timely Emissions Reductions for Reaching the Long-Term Global Goal on Temperature: Submission to the Global Stocktake by the Environmental Defense Fund.”

³⁵ “Driving Down Methane Leaks from the Oil and Gas Industry: A Regulatory Roadmap and Toolkit” (International Energy Agency, January 2021), https://iea.blob.core.windows.net/assets/465cb813-5bf0-46e5-a267-3be0ccf332c4/Driving_Down_Methane_Leaks_from_the_Oil_and_Gas_Industry.pdf.

³⁶ “Driving Down Methane Leaks from the Oil and Gas Industry: A Regulatory Roadmap and Toolkit.”

³⁷ “Methane Emissions Are Driving Climate Change. Here’s How to Reduce Them,” UNEP, August 20, 2021, <http://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them>.



below 2020 levels by 2030 could avoid roughly 6 million premature deaths per year due to ozone exposure and about 1,600 billion lost work hours per year due to heat exposure.³⁸

- Strategies to reduce methane emissions (and resulting tropospheric ozone) can also positively impact agricultural yields and ecosystem services (including carbon sequestration), with benefits for the economy and employment.³⁹ Reducing methane emissions by 30 percent below 2020 levels by 2030 is estimated to avoid approximately 580 million tons of yield losses to wheat, corn, rice, and soybeans per year.⁴⁰ Crop yield benefits are felt strongest in locations near the equator.

Options for the outcome at COP28

The Glasgow Climate Pact invited Parties to “consider further actions to reduce by 2030 non-carbon dioxide greenhouse gases emissions, including methane.”⁴¹ This year, to further efforts to reduce methane emissions from the energy sector, Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify in their new NDCs their contribution to any collective target agreed at COP28 on this issue.
- Initiate a process to regularly take stock of the progress made toward the Global Methane Pledge, including by incorporating insights from annual ministerial meetings.
- Call on all countries to include non-carbon dioxide greenhouse gas emissions, including methane, in their updated NDCs and sectoral mitigation plans, when available.
- Encourage all Parties (and relevant non-Party stakeholders) to address methane emissions in the energy sector—possibly in the context of a broader approach to reducing methane emissions—and include related targets in their NDCs as a contribution to collective targets.
- Encourage countries to improve methane inventories using newly available measurement-based methane data, consistent with IPCC guidelines.
- Encourage all oil and gas companies to report and reduce their methane emissions, including by employing the United Nations Environment Programme’s Oil and Gas Methane Partnership 2.0 Framework.

³⁸ “Global Methane Assessment: 2030 Baseline Report” (United Nations Environment Programme, 2022), https://wedocs.unep.org/bitstream/handle/20.500.11822/41108/methane_2030_SPM.pdf?sequence=1&isAllowed=y.

³⁹ “Tropospheric Ozone,” Climate & Clean Air Coalition, n.d., <https://www.ccacoalition.org/en/slcp/tropospheric-ozone>.

⁴⁰ “Global Methane Assessment: 2030 Baseline Report.”

⁴¹ “Glasgow Climate Pact,” UNFCCC, November 13, 2021, <https://unfccc.int/documents/310475>.

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| Signal/high-level ask | Halt and reverse land degradation as well as biodiversity & ecosystem loss, including in particular forest loss, by 2030,⁴² by: |
| High-impact opportunities/solutions | <ul style="list-style-type: none"> • Conserving healthy, living forests, and supporting the livelihoods of forest dependent communities, including through large-scale incentive programs. |
| | <ul style="list-style-type: none"> • Curbing and reversing deforestation and degradation, including by expanding conservation areas, instituting moratoria on forest conversion, securing tenure and protection of Indigenous territories, encouraging sustainable land-use practices, developing sustainable land-use and management plans, and decreasing pressure from the agricultural sector. |
| | <ul style="list-style-type: none"> • Implementing moratoria on products associated with deforestation and provide support for monitoring and verification of deforestation-related products. |
| | <ul style="list-style-type: none"> • Integrating local communities and civil society in the planning, implementation, and monitoring of conservation activities to ensure good governance, accountability, rule of law, and the upholding of human rights. |
| | <ul style="list-style-type: none"> • Strengthening synergies and avoiding trade-offs between climate action and action needed to halt and reverse biodiversity and ecosystem loss and degradation and put nature on a path to recovery by 2030, in a manner that is consistent with the Kunming-Montreal Global Biodiversity Framework. |
| | <ul style="list-style-type: none"> • Expanding support for ecosystem stewardship by indigenous peoples and local communities, including by strengthening legislation for securing land rights of indigenous peoples and local communities according to traditional values and practices of land tenure. |
| | <ul style="list-style-type: none"> • Promoting nature-based solutions and/or ecosystem-based approaches as an adaptation option for terrestrial, freshwater, coastal, and ocean ecosystems and urban environments, including for significantly enhancing resilience and reducing exposure of coastal communities impacted by sea level rise. |
| | <ul style="list-style-type: none"> • Restoring areas of degraded terrestrial, inland water, and marine and coastal ecosystems. |
| | <ul style="list-style-type: none"> • Conserving and managing areas of particular importance for biodiversity and ecosystem functions and services through ecologically representative, well-connected, and equitably governed systems of |

⁴² “Glasgow Leaders’ Declaration on Forests and Land Use,” UN Climate Change Conference UK 2021, February 11, 2021, <https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use>. This signal also has adaptation co-benefits.

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| | protected areas and other effective area-based conservation measures. |
| | <ul style="list-style-type: none"> Implementing deep, rapid, and sustained reductions in global greenhouse gas emissions at their sources, while minimizing other ecosystem stressors different from climate change such as changes in land and sea use, direct exploitation of organisms, pollution, and invasion of alien species. |

Impact

- Estimates suggest that cost-effective land-based climate mitigation measures could mitigate up to 13.8 GtCO₂eq per year between 2020 and 2050, with “50 percent from forests and other ecosystems, 35 percent from agriculture, and 15 percent from demand-side measures.”⁴³
- Protecting, managing, and restoring forests and other ecosystems represent the largest potential among mitigation options for land-based mitigation assessed by the IPCC, with the ability to reduce emissions and/or sequester 7.3 GtCO₂eq per year.⁴⁴ Reduced deforestation in tropical regions holds the highest mitigation potential.⁴⁵
- Halting and reversing forest loss and land degradation “would deliver 10 percent of the climate mitigation action needed by 2030 to deliver on the Paris Agreement,” according to the Forests and Climate Leaders’ Partnership.⁴⁶
- Human and ecosystem vulnerability are interdependent,⁴⁷ which means that halting and reversing ecosystem loss and degradation and making ecosystems more resilient will also make human societies more resilient, and vice versa.
- Nature restoration can reduce the exposure or vulnerability for most people in the world (i.e., more than 5 billion people); minimizing ecosystem stressors can reduce the exposure or vulnerability of many people in the world (i.e., between 1–5 billion people); and ecosystem-based adaptation can reduce the exposure or vulnerability of specific groups of people (i.e., less than one billion people).⁴⁸
- Gender-sensitive, equity- and justice-based adaptation approaches, integration of indigenous knowledge systems within legal frameworks and the promotion of indigenous land tenure rights reduce vulnerability and increase resilience.”⁴⁹

⁴³ Stephanie Roe, Charlotte Streck, and Robert Beach, “Land-Based Measures to Mitigate Climate Change: Potential and Feasibility by Country” 27, no. 23 (October 11, 2021),

<https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15873>.

⁴⁴ “Climate Change 2022: Mitigation of Climate Change,” 108.

⁴⁵ “Climate Change 2022: Mitigation of Climate Change,” SPM-33.

⁴⁶ “World Leaders Launch Forests and Climate Leaders’ Partnership to Accelerate Momentum to Halt and Reverse Forest Loss and Land Degradation by 2030,” November 7, 2022, <https://ukcop26.org/world-leaders-launch-forests-and-climate-leaders-partnership-to-accelerate-momentum-to-halt-and-reverse-forest-loss-and-land-degradation-by-2030/>.

⁴⁷ IPCC AR6 SYR SPM A.2.2.

⁴⁸ IPCC AR6 WGII Ch. 17, figure 17.3.

⁴⁹ IPCC AR6 Technical Summary, TS.E.2.4.



Feasibility

- Most mitigation options in forests and other natural ecosystems—and in the Agriculture, Forestry, and Other Land Use (**AFOLU**) sector more generally—are available and ready to deploy. Additionally, the conservation of natural ecosystems has especially high co-benefits and cost efficiency.⁵⁰
- The annual mitigation potential of protecting, restoring, and managing forests and other ecosystems is 2.9 GtCO₂eq at less than US \$20 per tCO₂eq. This increases to 3.1 GtCO₂eq at less than US \$50 per tCO₂eq and 7.3 GtCO₂eq per year at less than US \$100 per tCO₂eq.⁵¹
- The IPCC undertook feasibility assessments for forest-based adaptation and for biodiversity management and ecosystem connectivity as adaptation options, concluding in both cases that there is robust evidence and medium agreement on their feasibility.⁵²
- Nevertheless, adaptation options that are feasible and effective today will become constrained and less effective with increasing global warming.⁵³ Biodiversity and ecosystem services have limited capacity to adapt to increasing global warming levels, and consequences of current and future global warming for climate resilient development include reduced effectiveness of Ecosystem-based Adaptation and approaches to climate change mitigation based on ecosystems and amplifying feedbacks to the climate system.⁵⁴

A selection of key existing initiatives

- The **Land Use Breakthrough** aims for more than 10 GtCO₂eq mitigated per year through nature-based solutions by 2030.⁵⁵
- **Glasgow Leaders' Declaration on Forest and Land Use**, signed by 145 global leaders, is a collective commitment to halt and reverse forest loss and land degradation by 2030 while delivering sustainable development and promoting an inclusive rural transformation.⁵⁶ At COP27, 26 countries and the European Union launched the **Forests and Climate Leaders' Partnership** to drive accountability through annual high-level events and progress reports.⁵⁷
- The **Green Gigaton Challenge** is a global effort that brings together public, private, and philanthropic partners to transact one gigaton of high-quality emissions reductions from forest-based natural climate solutions by 2025 (and annually after that).⁵⁸

⁵⁰ "Climate Change 2022: Mitigation of Climate Change."

⁵¹ "Climate Change 2022: Mitigation of Climate Change," TS-86.

⁵² IPCC AR6 WGII Ch. 18 Cross-Chapter Box FEASIB.

⁵³ IPCC AR6 SYR SPM B.4.

⁵⁴ IPCC AR6 WGII SPM D.4.3.

⁵⁵ Climate Champions, "2030 Breakthroughs."

⁵⁶ "Glasgow Leaders' Declaration on Forests and Land Use."

⁵⁷ "World Leaders Launch Forests and Climate Leaders' Partnership to Accelerate Momentum to Halt and Reverse Forest Loss and Land Degradation by 2030."

⁵⁸ "Green Gigaton Challenge," n.d., <https://www.greengigaton.com/>.



- The **High Ambition Coalition for Nature and People**, led by Costa Rica and France, aims to protect and conserve 30 percent of land and ocean by 2030.⁵⁹ More than 100 countries joined the coalition, and the 30x30 target was enshrined in the Kunming-Montreal Global Biodiversity Framework.
- The **FACT Dialogue** convenes producers and consumers of internationally traded agricultural commodities,⁶⁰ and the **Tropical Forest Alliance**, hosted by the World Economic Forum, aims to remove deforestation from supply chains.⁶¹
- The **UN Decade on Ecosystem Restoration (2021-2030)**.⁶² At the Convention on Biological Diversity (**CBD**) COP15 in Montreal (December 2022), the UN recognized ten initiatives that aim to restore more than 68 million hectares and declared them World Restoration Flagships.⁶³
- The **Forest Declaration Platform** (related to the New York Declaration on Forests) is intended to foster political ambition, scale up and accelerate action, and, through the Forest Declaration Assessment, enable critical accountability to end natural forest loss and restore 350 million hectares of degraded landscapes and forestlands by 2030.⁶⁴ This is also in line with the Bonn Challenge.⁶⁵
- **Business for Nature** is a global coalition that brings together business and conservation organizations and forward-looking companies to encourage companies to commit and act to reverse natural loss and advocate for greater policy ambition.⁶⁶
- The **Science Based Targets Initiative (SBTi)** has elaborated **the Forest, Land and Agriculture (FLAG) Guidance** to provide a standard method for companies in land-intensive sectors to set science-based targets that include land-based emission reductions and removals⁶⁷.
- The **Finance Sector Deforestation Action (FSDA)** was launched at COP26 as a results-driven collaborative of financial institutions that unites signatory organizations around an engagement approach to addressing nature-related risks and opportunities by tackling deforestation and creating essential convergence across other climate and nature-related initiatives. 38 financial institutions with more than US \$8.9 trillion in assets under management have committed to eliminating agricultural commodity-driven deforestation risks (from cattle, soy, palm oil, pulp, and paper) in their investment and lending portfolios by 2025.⁶⁸

⁵⁹ "High Ambition Coalition for People and Nature," n.d., <https://www.hacfornatureandpeople.org/home>.

⁶⁰ "FACT Dialogue," n.d., <https://www.factdialogue.org/>.

⁶¹ "Tropical Forest Alliance," n.d., <https://www.tropicalforestalliance.org/>.

⁶² <https://www.decadeonrestoration.org>.

⁶³ <https://www.unep.org/news-and-stories/press-release/un-recognizes-10-pioneering-initiatives-are-restoring-natural-world>.

⁶⁴ <https://forestdeclaration.org>.

⁶⁵ <https://www.bonnchallenge.org>.

⁶⁶ <https://www.businessfornature.org/about>.

⁶⁷ <https://sciencebasedtargets.org/sectors/forest-land-and-agriculture>.

⁶⁸ <https://climatechampions.unfccc.int/system/nature-and-tackling-deforestation/>.



- The **Race to Resilience** campaign has partners that are innovating science-based solutions to accelerate action on ocean and coastal ecosystems include: the Ocean Risk and Resilience Alliance (**ORAA**), the Global Mangrove Alliance and Global Fund for Coral Reef.
- The **Kunming-Montreal Global Biodiversity Framework** set up specific quantified targets for halting ecosystem loss, restoring degraded ecosystems and effectively conserving and managing areas of particular importance for biodiversity and ecosystem functions and services, in addition to targets related to tools and solutions for implementation and mainstreaming.

Barriers

- Insufficient access to finance,⁶⁹ pressures from large-scale commodity production and extractive industries, and commodity demand from developed countries.
- Insecure land rights, human rights violations, and violence against environmental defenders, particularly in countries with the highest deforestation rates.⁷⁰
- Perceived illegitimacy of conservation actions due to lack of community participation, and the perception that forest conservation is incompatible with sustainable development and growth.
- Institutional fragmentation, under-resourcing of services, inadequate adaptation funding, uneven capability to manage uncertainties and conflicting values, and reactive governance across competing policy domains collectively lock in existing exposures and vulnerabilities, creating barriers and limits to adaptation, and undermine climate resilient development prospects.⁷¹
- Many natural systems are near the hard limits of their natural adaptation capacity and additional systems will reach limits with increasing global warming.⁷²

Sustainable Development Goals

- Conserving, managing, and restoring forests and other ecosystems have implications for mitigation, adaptation, food security, biodiversity, and ecosystem services.⁷³ If implemented in a manner that prioritizes high quality decision making, these measures can achieve climate and non-climate goals, such as increasing resilience, preserving biodiversity, enhancing food security and human health, and safeguarding livelihoods.^{74,75}

⁶⁹ "Climate Change 2022: Mitigation of Climate Change," TS-86.

⁷⁰ "Climate Change 2022: Mitigation of Climate Change."

⁷¹ IPCC AR6 WGII, Technical Summary, TS.E.5.1.

⁷² IPCC WGII AR6 SPM C.3.3.

⁷³ "Climate Change 2022: Mitigation of Climate Change," 7-40.

⁷⁴ Conservation International, Environmental Defense Fund, and The Nature Conservancy, "Submission for the Information Collection and Preparation (ICP) Component of the Global Stocktake (GST)," UNFCCC, n.d., <https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202202281912---CI-EDF-TNC%20Joint%20Submission%20for%20the%20ICP%20Component%20of%20the%20GST%20-%20FINAL.pdf>.

⁷⁵ Bronson Griscom et al., "Natural Climate Solutions," *Publication of the National Academy of Sciences of the United States of America* 114, no. 44 (October 16, 2017), <https://doi.org/10.1073/pnas.1710465114>.



- Benefits of ecosystems and biodiversity to human societies have been widely recognized through concepts such as “ecosystem services” and “nature’s contributions to people”. Even though biodiversity and ecosystems are generally associated with **SDG 14** (life on land) and **SDG 15** (life below water), the achievement of virtually all other SDGs is directly dependent on them, as they are a precondition for the fulfilment and respect of people’s basic needs and rights and for maintaining a healthy planet.

Options for the outcome at COP28

The need to address biodiversity loss and climate change in an integrated manner has been explicitly recognized in COP cover decisions.⁷⁶ The Glasgow Climate Pact emphasized the importance of “protecting, conserving and restoring nature and ecosystems, including forests and other terrestrial and marine ecosystems, to achieve the long-term global goal of the Convention by acting as sinks and reservoirs of greenhouse gases and protecting biodiversity, while ensuring social and environmental safeguards.”⁷⁷ The Sharm el-Sheikh Implementation Plan reiterates this language and goes one step further, encouraging Parties to consider nature-based solutions or ecosystem-based approaches for their mitigation and adaptation action.⁷⁸

To further efforts to conserve, manage, and restore forests and other ecosystems, Parties could:

- Adopt or recognize the collective signal/high level ask as a target.
- Be urged to specify in their new NDCs their contribution to any collective target agreed at COP28 on this issue.
- Initiate a process to regularly take stock of the progress made toward the Glasgow Leaders’ Declaration on Forest and Land Use, including by incorporating insights from the Forests and Climate Leaders’ Partnership’s annual high-level events and progress reports.
- Consider nature-based solutions and ecosystem-based approaches as crucial components of their efforts to meet the goals of the Paris Agreement, as well as to advance global goals on biodiversity, human health, and sustainable development.
- Emphasize that nature-based solutions are not a substitute for decarbonization of the energy sector but rather an essential complement to decarbonization efforts.⁷⁹
- Respond to the invitation made by CBD COP15 decision 15/13 to the governing bodies of biodiversity-related conventions and relevant multilateral environmental agreements, to contribute to the implementation and monitoring of the Kunming-Montreal Global Biodiversity Framework (**KMGBF**) and encourage mutually supportive decisions. This could include encouraging Parties to consider mitigation and adaptation options that increase the resilience of biodiversity and ecosystems (target 8 KMGBF) and optimizing co-benefits and synergies of finance targeting both the biodiversity and climate crises (target 19(e) KMGBF).

⁷⁶ Paragraph 15 of decision 1/CP.25 and 10th preambular paragraph of decision 1/CP.26, respectively.

⁷⁷ “Glasgow Climate Pact.”

⁷⁸ “Sharm El-Sheikh Implementation Plan,” November 20, 2022, <https://unfccc.int/documents/624441>.

⁷⁹ Conservation International, Environmental Defense Fund, and The Nature Conservancy, “Submission for the Information Collection and Preparation (ICP) Component of the Global Stocktake (GST).”



- Promote integration and complementarity between the Paris Agreement’s long-term goal of making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development (Article 2.1(c)) and the KMGBF target 14, which aims at progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of the Framework. This call could include emerging businesses, cities, and regions with material land-use emissions, as part of their net-zero and adaptation plans, to achieve and maintain operations and supply chains that avoid the conversion of remaining natural ecosystems, with a view to eliminating deforestation and peatland loss by 2025 at the latest, and the conversion of other remaining natural ecosystems by 2030.⁸⁰

| | |
|--|---|
| Signal/high-level ask | Sales of zero-emission light-duty vehicles in leading markets reach 75 per cent by 2030 and 100 per cent by 2035.⁸¹ |
| High-impact opportunities/solutions | <ul style="list-style-type: none"> • Incentivizing a shift toward EVs through purchase subsidies or mandates, charging discounts, regulations that cap emissions or limit emissions intensity, and/or gas taxes that reflect the negative impacts of fossil fuel combustion. • Investing in battery technology improvements and the coordinated expansion—and standardization—of charging infrastructure, especially on priority routes. • Phasing out internal combustion engines and tightening of regulatory trajectories across key markets in a coordinated way. • Providing alternatives to private vehicles by incentivizing modal shifts and expanding viable public transportation options, including by investing in electrified public transit. • Implementing strong normative safeguards in mining operations for lithium, cobalt, and other critical minerals for renewable energy technologies. |

Impact

- In land transport, roughly 85 percent of CO₂ emission reductions needed for 1.5 degree C can be achieved with existing and emerging transport policies and technologies, with the other 15 percent driven by changes in behavior, especially for urban passenger transport.⁸²

⁸⁰ https://www.un.org/sites/un2.un.org/files/high-level_expert_group_n7b.pdf.

⁸¹ Based on Race to Zero, 2030 Breakthroughs, Upgrading Our Systems Together, <https://racetozero.unfccc.int/wp-content/uploads/2021/09/2030-breakthroughs-upgrading-our-systems-together.pdf> and Marrakech Partnership, Climate Action Pathway: https://unfccc.int/sites/default/files/resource/Transport_ActionTable_2.1.pdf.

⁸² “Climate Action Pathway: Transport Vision and Summary,” UNFCCC, 2021, https://unfccc.int/sites/default/files/resource/Transport_Vision%26Summary_2.1.pdf.



- EVs offer the largest decarbonization potential for land-based transport (compared to sustainable biofuels and other measures), if they are powered by low-emissions electricity.⁸³ As such, they are an essential piece of a broader decarbonization strategy—along with demand-side shifts and alternative fuels—for a sector in which emissions have remained roughly constant.⁸⁴
- Scaling solutions in this sector is critical to reduce emissions in developed countries and limit emissions growth in developing countries.⁸⁵ Demand for transport is expected to continue rising rapidly⁸⁶ and, without intervention, “CO₂ emissions from transport could grow in the range of 16 percent and 50 percent by 2050.”⁸⁷

Feasibility

- EVs are “proven technology for light-duty vehicles, buses, small- or medium-sized trucks used for urban logistics, and other short-distance or intra-city freight transport.”⁸⁸ They are increasingly competitive with internal combustion engines, and the cost of batteries has fallen dramatically.⁸⁹
- While decarbonization of long-haul heavy transport may require a broader portfolio of solutions, “advances in battery technologies could facilitate the electrification of heavy-duty trucks.”⁹⁰

A selection of key existing initiatives

- The High Level Champions’ **Road Transport Breakthroughs** set targets for buses, heavy goods vehicles, passenger vehicles, and vans, including a target for 100 percent of global passenger vehicle and van sales to be ZEVs by 2030 (in key markets).⁹¹
- The **COP26 Declaration on Accelerating the Transition to 100% Zero Emissions Cars and Vans** garnered more than 120 signatories at COP26 (and 200 by COP27), including countries, carmakers, subnational governments, fleet owners, and financial institutions. Signatories aim to ensure all sales of new vehicles are zero emission by 2040 globally (and no later than 2035

⁸³ “Climate Change 2022: Mitigation of Climate Change,” SPM.

⁸⁴ “Climate Change 2022: Mitigation of Climate Change.”

⁸⁵ “Climate Change 2022: Mitigation of Climate Change,” SPM-32.

⁸⁶ “Transport,” IEA, n.d., <https://www.iea.org/topics/transport>.

⁸⁷ “Climate Change 2022: Mitigation of Climate Change,” 1053.

⁸⁸ “Transport Vision and Summary.”

⁸⁹ “Climate Change 2022: Mitigation of Climate Change,” TS-53, TS-10, SPM.

⁹⁰ “Climate Change 2022: Mitigation of Climate Change,” SPM-42.

⁹¹ Climate Champions, “2030 Breakthroughs.”



in leading markets).⁹² The **Accelerating to Zero Coalition** was launched to secure more signatories and support implementation.⁹³

- **Zero Emission Government Fleet Declaration** and **EV30@30**, campaigns of the Clean Energy Ministerial, aim for 100 percent zero-emission LDV acquisitions of government-owned and operated fleets by 2035 and 30 percent of vehicle sales to be EVs by 2030, respectively.⁹⁴
- **EV100** is comprised of companies that have committed to switching their vehicle fleets to EVs and/or installing charging infrastructure for staff and customers by 2030.⁹⁵
- The **Zero Emissions Vehicles (ZEVs) Transition Council**, launched in 2020, provides a forum for many of the world's largest automotive markets to enhance political cooperation on the transition to ZEVs.⁹⁶

Barriers

- Lack of charging infrastructure and high up-front costs of some EVs (e.g., zero-emission trucks), especially in developing countries.⁹⁷
- Supply chain limitations, geopolitical risks, and negative environmental and social impacts associated with critical minerals used in batteries.

Sustainable Development Goals

- Reducing emissions from on-road transportation can deliver a range of co-benefits, including improved air quality and public health.
- Jobs in energy transition-related sectors—including EVs—could reach 74.2 million in 2030 under the International Renewable Energy Agency's 1.5 degree C scenario. This compares to 45.8 million under governments' 2020 energy plans, targets, and policies.⁹⁸
- Some policy options to shift toward EVs and away from internal combustion engines (e.g., gas taxes) could have regressive impacts on low-income populations.
- Negative environmental and social impacts are associated with the mining of critical minerals, which are required for batteries and found in a limited number of countries.⁹⁹

⁹² "COP26 Declaration on Accelerating the Transition to 100% Zero Emission Cars and Vans," gov.uk, August 1, 2022, <https://www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans>.

⁹³ "COP26 Presidency Outcomes," accessed January 5, 2023, <https://ukcop26.wpenginepowered.com/wp-content/uploads/2022/11/COP26-Presidency-Outcomes.pdf>.

⁹⁴ "EV30@30 Campaign," accessed January 5, 2023, <https://www.cleanenergyministerial.org/initiatives-campaigns/ev3030-campaign/>.

⁹⁵ "EV100 Members," Climate Group, n.d., <https://www.theclimategroup.org/ev100-members>.

⁹⁶ "ZEV Transition Council," n.d., <https://zevtc.org/>.

⁹⁷ David G. Victor, Frank W. Geels, and Simon Sharpe, "Accelerating the Low Carbon Transition: The Case for Stronger, More Targeted and Coordinated International Action" (Brookings, December 9, 2019), <https://www.brookings.edu/research/accelerating-the-low-carbon-transition/>.

⁹⁸ "World Energy Transitions Outlook 2022."

⁹⁹ "Climate Change 2022: Mitigation of Climate Change," 6-31.



Options for the outcome at COP28

COP decisions have not yet recognized the importance of specific measures to decarbonize the transport sector. Nevertheless, to further efforts to reduce emissions from the transport sector, Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify in their new NDCs their contribution to any collective target agreed at COP28 on this issue.
- Commit to additional concrete measures (e.g., the Clean Energy Ministerial’s Zero Emission Government Fleet Declaration) and encourage initiatives to align these measures with the scale and speed of the transition required for 1.5 degree C scenarios.
- Increase climate finance, technology transfer and capacity building to support developing countries, both at the national and subnational level, in the transition to EVs, including for policy design, planning and investment in necessary infrastructure (e.g., grids, charging).

| | |
|--|---|
| Signal/high-level ask | Reduce the carbon intensity of building operations, minimize embodied emissions, and increase the rate of building retrofits to 3.5 percent by 2040, aiming for all new and existing assets to be net zero across their life cycles by 2050,¹⁰⁰ by: |
| High-impact opportunities/solutions | • Electrifying energy end-use in buildings and improving energy efficiency. ¹⁰¹ |
| | • Adopting green procurement policies or revising construction codes to require the purchase of low-carbon construction materials (e.g., low-carbon cement). |
| | • Utilizing innovative finance models that reduce up-front costs. |
| | • Strengthening insulation and energy efficiency standards in building/construction codes (for new buildings and renovation). |
| | • Install programs for subsidizing upfront investment costs. |

Impact

- The global mitigation potential of existing solutions in the buildings sector is substantial—at least 8.2 GtCO₂eq, or 61 percent, of global building emissions by 2050 compared to their baseline—with the largest potential available in developing countries.¹⁰² In 2019, the sector was responsible for 16 percent of total greenhouse gas emissions.¹⁰³

¹⁰⁰ Boehm, “State of Climate Action 2022.”

¹⁰¹ This could be done by enacting increasingly stringent (and/or more broadly applicable) building energy codes and appliance performance standards, mandating the use of fossil-free energy sources, and/or offering incentives for efficient appliances.

¹⁰² “Climate Change 2022: Mitigation of Climate Change,” SPM-31.

¹⁰³ “Climate Change 2022: Mitigation of Climate Change,” SPM-8.



- Nevertheless, emissions from the sector have increased by 0.7 percent per year over the last decade, with emission increases outpacing efficiency improvements and the decarbonization of electricity and heating. Addressing this trend is critical to reaching Paris temperature goals. 40 percent of buildings expected to exist in 2050 have yet to be built,¹⁰⁴ and adaptation measures could increase demand for energy and materials in this sector.¹⁰⁵

Feasibility

- Reducing emissions from the buildings sector relies “primarily on technologies that are already available,”¹⁰⁶ and literature reviewed by IPCC scientists foresees a significant cost reduction for key decarbonization technologies.¹⁰⁷ However, much of the mitigation potential of this sector remains untapped.¹⁰⁸

A selection of key existing initiatives

- The upcoming **Buildings Breakthrough**, due to launch in advance of COP28 and coordinated by the **Global Alliance for Buildings and Construction (GlobalABC)**, will aim to make near-zero emission and resilient buildings the new normal by 2030.
- The **C40 Net Zero Carbon Buildings Declaration** aims to ensure that new buildings operate at net-zero carbon by 2030, and all buildings by 2050.¹⁰⁹
- The **Zero Carbon Buildings for All** initiative also aims for the decarbonization of new buildings by 2030 and existing buildings by 2050, as well as the mobilization of US \$1 trillion in “Paris-compliant” building investments in developing countries by 2030.”¹¹⁰
- The World Green Building Council’s **Net Zero Carbon Buildings Commitment** brings together over 170 signatories to address both operational and embodied carbon in the built environment.¹¹¹

Barriers

- High heterogeneity of the sector, with varying approaches required for individual buildings and differing heating and cooling needs across regions.¹¹²

¹⁰⁴ “Climate Action Pathway: Human Settlements Vision and Summary,” UNFCCC, 2021, https://unfccc.int/sites/default/files/resource/HS_Vision%26Summary_2.1_0.pdf.

¹⁰⁵ “Climate Change 2022: Mitigation of Climate Change.”

¹⁰⁶ Boehm et al., “State of Climate Action 2021.”

¹⁰⁷ “Climate Change 2022: Mitigation of Climate Change,” 994.

¹⁰⁸ “Human Settlements Vision and Summary.”

¹⁰⁹ “Net Zero Carbon Buildings Declaration” (C40 Cities), accessed February 7, 2023, https://www.c40.org/wp-content/uploads/2022/02/C40-Net-Zero-Carbon-Buildings-Declaration_Public-progress-report_Feb-2022.pdf.

¹¹⁰ “Zero Carbon Buildings for All” (UN Habitat), accessed February 7, 2023, https://unhabitat.org/sites/default/files/documents/2019-09/zcbs_for_all_overview_6_aug_19_1.pdf.

¹¹¹ “The Net Zero Carbon Buildings Commitment,” accessed February 7, 2023, <https://worldgbc.org/thecommitment/>.

¹¹² “Climate Change 2022: Mitigation of Climate Change,” 956.



- Lack of institutional capacity and appropriate governance structures,¹¹³ with sometimes competing priorities for key actors (e.g., building owners vs. tenants).¹¹⁴
- Limited incentives and high upfront investment costs.

Sustainable Development Goals

- Decarbonizing the buildings sector has positive implications for employment and economic growth. Up to 30 jobs could be created for every million dollars (USD) invested in building retrofits or new energy efficient buildings.¹¹⁵
- Measures to reduce emissions in the buildings sector can also yield co-benefits that improve well-being, including by improving indoor air quality, reducing gender inequalities, and addressing energy poverty.¹¹⁶

Options for the outcome at COP28

In the GST outcome, Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify in their new NDCs their contribution to any collective target agreed at COP28 on this issue.
- Recognize the need for measurement and reporting of operational and embodied emissions from the built environment.
- Increase climate finance in developing countries to promote zero-carbon buildings and mitigate investment risk.

¹¹³ "Climate Change 2022: Mitigation of Climate Change," 956.

¹¹⁴ Boehm, "State of Climate Action 2022."

¹¹⁵ "Climate Change 2022: Mitigation of Climate Change," 999.

¹¹⁶ "Climate Change 2022: Mitigation of Climate Change," 959.

B. Adaptation and Loss and Damage

| | |
|------------------------------|---|
| Signal/high-level ask | Focusing on those that are the most vulnerable to climate impacts, ensure that 50 percent of the global population is climate resilient by 2030 aspiring to 100 percent by 2050. |
|------------------------------|---|

The Global Goal on Adaptation (**GGA**)—established under Article 7.1 of the Paris Agreement to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change—is part of the GST in which Parties to the Paris Agreement will assess the collective progress toward achieving it. The ongoing work under the Glasgow-Sharm-el-Sheikh work programme on the GGA aims to find ways to operationalize the GGA.

At COP28 in Dubai, Parties could benefit from a clear overarching signal on the timeline and urgency of implementing the goal and achieving climate resilience. In that context, the suggested signal above is intended to catalyze ambition toward transformational adaptation and development, and as such could serve as a useful ‘umbrella’ for the sector-specific solutions presented below.

| | |
|--|---|
| Signal/high level ask | Ensure, by 2027, universal coverage of early warning systems, connected to longer-term risk management systems, and supported by effective risk communication and public stakeholder dialogue to prompt informed action, and by 2030 universal coverage of climate services in priority climate-sensitive sectors (agriculture and food security, health, disaster risk reduction, energy, and water), by: ¹¹⁷ |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Improving climate and weather observations to close the substantial basic weather and climate data gap and build robust Earth observation systems and related long-term data records. • Improving access to climate science information, both historical climate data and projected impacts. • Promoting and supporting the establishment of national frameworks for climate services and enhancing the Climate Services Information System component of the Global Framework for Climate Services.¹¹⁸ • Catalyzing new and pre-existing innovative finance solutions |

¹¹⁷ <https://public.wmo.int/en/bulletin/what-do-we-mean-climate-services>.

¹¹⁸ https://gfcs.wmo.int/sites/default/files/Components/Climate%20Services%20Information%20System//GFCS-ANNEXES-CSIS-FINAL-14204_en.pdf.



Impact

- Early warning systems (**EWS**) have been described as a proven, effective, and feasible climate adaptation measure, that save lives, reduce poverty and economic losses, and are shown to provide near a tenfold return on investment.¹¹⁹ According to the IPCC, early warning systems can reduce the exposure or vulnerability for most people in the world (i.e., more than 5 billion people) (high confidence).¹²⁰ The COP and the CMA recognized in their Sharm el-Sheikh cover decisions that one third of the world does not have access to early warning and climate information services.
- Enhancing international cooperation, coordination, action, and support for systematic observation, climate services and early warning systems can help to close fundamental data, early warning, and early action preparedness gaps that many developing countries face and that prevents them from being able to adequately and effectively engage in adaptation and climate risk management decision making and implementation processes.

Feasibility

- The World Meteorological Organization (**WMO**) has described early warning systems as “the low-hanging fruit of climate change adaptation” because they are a relatively cheap and effective way to protect people and assets from hazards.¹²¹ A wide variety of organizations, networks, funds, and others already work on different parts of the puzzle and the UNSG “Early Warnings for All” initiative is rallying them in a coordinated effort.

A selection of key existing initiatives

- The **UN Early Warning Initiative for the Implementation of Climate Adaptation (“Early Warnings for All”)**,¹²² championed by the UNSG, has created momentum, and is convening action and support around its objective to ensure every person on Earth is protected by early warning systems within five years (i.e., by 2027). It has been estimated that new targeted investments of US \$3.1 billion are needed over the five years.¹²³ The initiative counts on a range of new and pre-existing innovative financing solutions to implement the plan, including scaling up the **Climate Risk Early Warning Systems (CREWS) Initiative**, the **Systematic Observations Financing Facility (SOFF)**, and accelerating investment programs of climate funds such as the Green Climate Fund, the Adaptation Fund, and key Multilateral Development Banks.¹²⁴

¹¹⁹ Executive Action Plan 2023-2027 of the UN Global Early Warning Initiative for the Implementation of Climate Adaptation, p. 13.

¹²⁰ IPCC AR6 WGII Ch. 17, figure 17.3.

¹²¹ <https://public.wmo.int/en/media/press-release/early-warnings-all-initiative-scaled-action-ground>.

¹²² <https://public.wmo.int/en/earlywarningsforall>.

¹²³ Executive Action Plan 2023-2027 of the UN Global Early Warning Initiative for the Implementation of Climate Adaptation, p. 5.

¹²⁴ <https://public.wmo.int/en/media/press-release/early-warnings-all-initiative-scaled-action-ground>.



- In Glasgow, the Green Climate Fund (**GCF**) and WMO released **the Climate Science Information for Climate Action resource pack**¹²⁵ and an accompanying guidance document.¹²⁶

Barriers

- Common challenges and obstacles that have been found to limit the expansion or success of EWS are related to:
 - Legal and institutional arrangements;
 - Technology, infrastructure, and forecasting capability in developing countries;
 - Human resources and expertise;
 - Addressing impacts of climate change on disaster risks;
 - Public engagement, empowerment, and community outreach;
 - Response co-ordination and disaster preparedness; and
 - Budget.¹²⁷

Sustainable Development Goals

- **SDG 2 Zero hunger:** Droughts, floods, and rainfall variability have contributed to reduced food availability and increased food prices. Early warning systems will contribute to managing the threatening food and nutrition security, and the livelihoods of millions globally.
- **SDG 3 Good health and well-being** and **SDG 6 clean water and sanitation:** Early warning systems allow the identification of temperature changes, precipitation, and water-related disasters that could increase incidences of waterborne diseases such as cholera, especially in regions with limited access to safe water, sanitation, and hygiene infrastructure.
- **SDG 13 Climate action:** Early warning systems will contribute improve the understanding on how to integrate climate change measures into national policies, strategies, and planning. Therefore, if there is a wide range of knowledge and information related to climate risks available to policy makers, those policies will emerge from an informed basis.

Options for the outcome at COP28

The Sharm el-Sheikh COP27 and CMA4 cover decisions emphasized the need to address existing gaps in the Global Climate Observing System, particularly in developing countries. They recognized that one third of the world does not have access to early warning and climate information services. They also acknowledged the need to enhance coordination of activities by the systematic observation community and to provide useful and actionable climate information for mitigation, adaptation and early warning systems, as well as to access information to enable understanding of adaptation limits and of attribution of extreme events. They also welcomed and reiterated the UNSG's call to protect everyone on Earth through universal coverage of early warning systems within the next five years, and invited development partners, international

¹²⁵ <https://public.wmo.int/en/media/news/climate-science-information-climate-action>.

¹²⁶ https://library.wmo.int/index.php?lvl=notice_display&id=21974#.ZEkyi0isWp.

¹²⁷ https://www.adaptation-undp.org/sites/default/files/resources/undp_brochure_early_warning_systems.pdf.



financial institutions, and the operating entities of the Financial Mechanism to provide support for implementation of the Early Warning for All Initiative.

To further build on these efforts, Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify, for example in their new NDCs, their contribution to any collective target agreed at COP28 on this issue.
- Reiterate the invitation to provide support for the implementation of the UNSG's initiative in all regions.
- Emphasize the need to make rapid progress in addressing both the gaps in the Global Climate Observing System and the lack of universal access to early warning systems and climate services that affect developing countries in particular.
- Establish a global goal on observation as a concrete way to promote and measure progress by 2028 in the global climate observing system, particularly in developing countries.

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| Signal/high level ask | By 2030: (i) foster climate resilient, sustainable agriculture that increases yields by 17 percent and reduces farm level greenhouse gas emissions by 21 percent without expansion of the agricultural frontier; and (ii) halve, relative to 2019, the share of food production lost and per capita food waste, while shifting to more healthy and plant based diets, by: |
| High impact opportunities/solutions | • Employing regenerative land use and agricultural practices, agro-ecology, and agroforestry. |
| | • Eliminating and repurposing harmful subsidies, enforcing existing laws and regulations, and providing incentives to shift from resource-depleting models of production to those that link resource efficiency and productivity gains to healthy and resilient food systems. |
| | • Investing in young human capital by providing incentives and training for land restoration |
| | • Reducing food loss in the global south through improved harvesting techniques and post-harvest storage and logistics and food waste in the global north through improved use of treatments, consumer education, labelling, and expanded composting infrastructure. |
| | • Increasing production of healthy plant-based proteins, plant-based meat alternatives, and cultured meat. |
| | • Improving consumer education and food marketing to drive consumer demand. |
| | • Increasing production of nutrient-dense foods. |
| | • Improving distribution and access to nutritious foods, particularly in the global south. |



Impact

- According to the IPCC, behavior change in diets and food waste is not only highly beneficial for ecosystems and ecosystem services, but it can also reduce the exposure or vulnerability for most people in the world (i.e., more than 5 billion people). A transition to plant-based diets, where appropriate, would be a logical first step to transform food systems since nearly 80 percent of total agricultural land is dedicated to feed and livestock production while providing less than 20 percent of the world's food calories.¹²⁸
- Transforming agriculture and food systems will have a great impact on tackling the climate and biodiversity global crises and contribute to the achievement of the SDGs, since, globally, modern agriculture and food systems are responsible for 80 percent of deforestation, 70 percent of freshwater use, and are the single greatest cause of terrestrial biodiversity loss, having also neglected soil health and biodiversity below ground, which are the source of almost all our food calories.¹²⁹ Besides a myriad of benefits that increase their resilience and, at the same time, human resilience, transforming these systems contributes to greenhouse gas emissions reductions through halting and reversing the destruction of forests and other ecosystems, as well as through reducing emissions of nitrous oxides from fertilizer use and methane from ruminant livestock.¹³⁰

Feasibility

- According to the Sharm el-Sheikh Adaptation Agenda, achieving these adaptation outcomes will require substantial policy action and mobilization of funds. On policy, actions should include incentivizing scaling of green technology (e.g., subsidizing organic fertilizers and precision agriculture), creating a policy framework to drive change in consumer demand (e.g., subsidizing fruit and vegetables), and transitioning away from policies that promote unhealthy practices (e.g., re-purposing and increasing agricultural subsidies to support regenerative practices). On funding, actions should include investment from the global north in subsidies to drive regenerative practices, support for the global south's transition in adaptation and resilience, and creation of a safety net for the global south's response to climate shocks.
- Sustainable food production alternatives, inspired by agro-ecological approaches, are affordable and effective, although the transition will require time and money.¹³¹

A selection of key existing initiatives

- The **UN Decade on Ecosystem Restoration (2021-2030)**¹³² is led by the United Nations Environment Programme (**UNEP**) and the Food and Agriculture Organization, in collaboration

¹²⁸ UNCCD, Global Land Outlook 2, p. 5.

¹²⁹ UNCCD, Global Land Outlook 2, p. x.

¹³⁰ UNCCD, Global Land Outlook 2, p. x.

¹³¹ UNCCD, Global Land Outlook 2, p. 5.

¹³² <https://www.decadeonrestoration.org>.



with the secretariats of the Rio convention, other relevant multilateral environmental agreements, and entities of the United Nations system.¹³³

- The **Coalition of Action for Healthy Diets from Sustainable Food Systems for Children and All** was formed as an outcome of the 2021 UN Food Systems Summit. It brings together UN Member States, UN agencies, civil society organizations, academic institutions, and social movements.¹³⁴
- The **Science Based Targets Initiative (SBTi)** has elaborated the **Forest, Land and Agriculture (FLAG) Guidance** to provide a standard method for companies in land-intensive sectors to set science-based targets that include land-based emission reductions and removals.¹³⁵
- The Marrakech Partnership works together with multiple organizations and initiatives in advancing these solutions, including: **Agriculture Innovation Mission for Climate (AIM4C)**, **Africa Food Systems Transformation Initiative (AFSTI)**, **Food and Agriculture Organization (FAO)**, **EAT Foundation**, the **Global Alliance for Improved Nutrition**, the **Sustainable Consumption and Diets Platform**, **Global Alliance for Future of Food** and **Good Food Institute**.

Barriers

- Some possible barriers to transforming agriculture and food systems in all regions of the world could be related to constraints caused by projected impacts of climate change as identified by the IPCC. For example: climate change will make some current food production areas unsuitable; climate change will increase the number of people at risk of hunger in mid-century, concentrated in Sub-Saharan Africa, South Asia, and Central America; increased CO₂ concentration will reduce nutrient density of some crops; climate change will reduce the effectiveness of pollinator agents; greenhouse gas emissions will negatively impact air, soil, and water quality, exacerbating direct climatic impacts on yields; the occurrence and distribution of pests, weeds, and diseases, including zoonoses, in agricultural, forest, and food systems will be altered, and their control will become costlier.¹³⁶
- The fact that more than 70 percent of the world's agricultural land is controlled by just 1 percent of farms, primarily large agribusiness, constitutes a barrier to agriculture and food systems transformation, as agro-ecological and regenerative methods are particularly well suited to small-scale food producers, who typically rely on low-tech and labor-intensive practices.¹³⁷

¹³³ United Nations General Assembly A/RES/73/284, 69th plenary meeting, 1 March 2019.

¹³⁴ <https://www.who.int/initiatives/food-systems-for-health/the-coalition-of-action-on-healthy-diets-from-sustainable-food-systems-for-children-and-all>.

¹³⁵ <https://sciencebasedtargets.org/sectors/forest-land-and-agriculture>.

¹³⁶ IPCC AR6 WGII, Ch. 5, p. 717-718.

¹³⁷ UNCCD, Global Land Outlook 2, p. 6.



Sustainable Development Goals

- Transforming agriculture and food systems, including by transitioning to healthy diets, contributes directly to the achievement of many of the SDGs, including ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture (**SDG 2**), but also others such as ensuring healthy lives and promoting well-being for all at all ages (**SDG 3**), ensuring sustainable consumption and production patterns (**SDG 12**), and taking urgent action to combat climate change and its impacts (**SDG 13**).
- It is also strongly related to **SDG 14** and **SDG 15** (life below water and life on land) and to **SDG 6** (clean water and sanitation).

Options for the outcome at COP28

Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Be urged to specify, for example in their new NDCs, their contribution to any collective target agreed at COP28 on this issue.
- Recognize current and projected risks and impacts of climate change to agriculture and food systems and the way they constraint their possibilities for transformation in some regions of the world, particularly those in low latitudes.
- Urge all Parties to invest in smallholder farmers to scale-up regenerative land use and agricultural practices, agro-ecology, and agroforestry, while facilitating secure land tenure, access to technology, credit, and markets, and urging developed country Parties to scale-up their provision of support.
- Urge all Parties to invest in increasing consumer awareness for making more sustainable dietary choices and reducing food waste.

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| Signal/high level ask | Significantly increase by 2030 the capacity and resources of developing countries, with a focus on those that are particularly vulnerable to the adverse effects of climate change, to avert, minimize, and address L&D, including at the local, national, regional, and international level, by: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Strengthening international cooperation and support, including finance, capacity-building, and technology, for closing the gap in addressing loss and damage in a way that does not increase indebtedness or income loss of developing countries. |
| | <ul style="list-style-type: none"> • Increasing the capacity and resources of developing countries to make use of communication and reporting mechanisms under the Convention and the Paris Agreement to give visibility to their needs and priorities for addressing ongoing and projected loss and damage, as well as to report on ongoing and experienced loss and damage. |
| | <ul style="list-style-type: none"> • Integrating national adaptation planning processes with climate risk management and processes for assessing and addressing limits to adaptation and loss and damage needs. |



Impact

- Climate change has already caused widespread adverse impacts and related losses and damages to nature and people,¹³⁸ and projected adverse impacts and related losses and damages escalate with every increment of global warming.¹³⁹ Furthermore, the IPCC has clearly stated that adaptation does not prevent all losses and damages, even with effective adaptation and before reaching soft and hard limits.¹⁴⁰ The risk for further L&D is thus very high taking into consideration that approximately 3.3 to 3.6 billion people live in contexts that are highly vulnerable to climate change.¹⁴¹

Feasibility

- Increasing momentum has been created around the issue of addressing L&D, including dedicated L&D finance, especially since the review of the Warsaw International Mechanism (*WIM*) in 2019 and the COP/CMA in Glasgow in 2021. The IPCC AR6 WGII contribution in 2022 left no doubt that L&D is not only a future risk but already a lived reality for many people around the world. Technical assistance to developing countries for implementing approaches on L&D will be catalyzed through the Santiago Network, which should be fully operationalized during 2024 according to the roadmap agreed at COP27/CMA4 in Sharm el-Sheikh. Also, the Transitional Committee established in Sharm el-Sheikh for making recommendations to COP28 and CMA5 with a view to operationalizing the funding arrangements and the fund for responding to loss and damage that were also established by decisions 2/CP.27 and 2/CMA.4 has begun its work for delivering on its mandate before COP28 and CMA5. The same decisions 2/CP.27 and S/CMA.4 have also sent important signals to international financial institutions and other relevant entities to identify effective ways to contribute to funding for addressing L&D.

A selection of key existing initiatives

- Besides action and processes that have been triggered by COP and CMA decisions inside and outside the UNFCCC and the Paris Agreement, the UNSG initiative “**Early Warnings for All**” has potential to contribute with the generation of climate data and downscaled projections that could be useful for developing countries not only for preparing for early action in the face of an extreme weather event, but also to prepare for recovering, reconstructing and rehabilitating in a climate-resilient way ex-post an extreme weather event.

¹³⁸ IPCC AR6 WGII SPM B.1.

¹³⁹ IPCC AR6 WGII SPM B.2.

¹⁴⁰ IPCC AR6 WGII SPM C.3.5.

¹⁴¹ IPCC AR6 WGII SPM B.2.



- Other initiatives are the G7's **Global Shield against Climate Risks**,¹⁴² launched on 14 November 2022 at COP27 and the **InsuResilience Global Partnership for Climate and Disaster Risk Finance and Insurance Solutions**,¹⁴³ launched at COP23.
- Existing regional risk pooling initiatives are the **African Risk Capacity**,¹⁴⁴ the **Caribbean Catastrophe Risk Insurance Facility**,¹⁴⁵ and the **Pacific Catastrophe Risk Insurance Company (PCRIC)**.¹⁴⁶

Barriers

- One important barrier to significantly increasing the capacity and resources of developing countries to avert, minimize, and address L&D consists of the actual difficulty of distinguishing between “adaptation action and finance,” and “L&D action and finance.” Actions to “avert and minimize” L&D overlap with adaptation. There is also a tendency to associate the whole continuum of risk management with “averting, minimizing, and addressing” L&D. These terminological confusions should be clarified; and an agreement should be reached on what constitutes adaptation action and finance, as well as what constitutes L&D action and finance should be reached, hopefully in the context of the work of the Transitional Committee.

Sustainable Development Goals

- L&D associated with the adverse effects of climate change has the potential to hinder the achievement of virtually **all the SDGs**. When addressing experienced L&D, it is paramount for countries and communities to have the capacity and resources to build back (or forward) better, building resilience during the recovery, reconstruction, and rehabilitation phase in areas such as infrastructure, health, food, water, livelihoods, ecosystems, and safety in general, contributing in that way to numerous SDGs.

Options for the outcome at COP28

Parties could:

- Adopt or recognize the signal/high level ask as a collective target.
- Invite developing country Parties to establish national inventories and registries of L&D due to climate change and to provide information on ongoing and experienced L&D in national communications and biennial transparency reports that distinguish between economic and non-economic losses and damages associated with the adverse effects of climate change and whether they relate to extreme weather events or slow onset events.
- Invite Parties to enhance international cooperation and support for enabling developing countries to effectively prepare in advance not only for taking early action to respond to

¹⁴² <https://www.bmz.de/en/issues/climate-change-and-development/global-shield-against-climate-risks>.

¹⁴³ <https://www.insuresilience.org>.

¹⁴⁴ <https://www.arc.int>.

¹⁴⁵ <https://www.ccrif.org>.

¹⁴⁶ <https://pcric.org>



extreme weather events, but also for fully recovering, rehabilitating, and reconstructing in a climate-resilient way after such events.

- Invite developing country Parties, as part of their national adaptation plan (**NAP**) processes, to identify ongoing and projected limits to adaptation and related needs and priorities based on appropriately downscaled climate projections and to include information thereon in their nationally determined contributions and adaptation communications.
- Accelerate the full operationalization of the fund for responding to L&D referred to in paragraph 3 of decisions 2/CP.27 and 2/CMA.4, so as to have it fully operationalized by COP29/CMA6.
- Increase capacity-building efforts for extending the reach of L&D databases in every sector and for including loss and damage into NDCs, as an effective way to raise the necessary attention to step up the necessary research and policy responses.

C. Means of Implementation

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| Signal/high level ask | Urge Parties, multilateral development banks (MDBs), and NPS, in particular financial institutions (IFIs), to triple the proportion of finance and investments in renewable energy by 2030, including through: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Creating the necessary enabling environments and leveraging public and private financing to foster greater investments in support to the development and deployment of renewable energy and renewable energy technologies, with particular focus in developing countries |
| | <ul style="list-style-type: none"> • Redirecting funding from fossil fuel subsidies and investments, carbon pricing instruments, and canceled debt payments, to finance the creation and implementation of national Just Energy Transition funds and plans. |
| | <ul style="list-style-type: none"> • Pursuing further research and case studies for redesigning the provision of public services such as electricity, scaling down energy subsidies or cross-subsidies at the consumer level, to strengthen cooperative- and community-owned distributed renewable energy generation schemes. |

Impact

- According to the International Renewable Energy Agency (**IRENA**)’s estimations, a 1.5 degree C path that supports the energy transition would result in the reduction of 37 gigatons of annual CO₂ emissions by 2050.
- As requested in the Sharm el-Sheikh Implementation Plan, meeting climate finance needs—estimated at about US \$4 trillion per year in renewable energy up until 2030—is a necessary step to ensuring “immediate, deep, rapid and sustained reductions in global greenhouse gas emissions,” to transform “energy systems to be more secure, reliable, and resilient,” and to stay on track to reach net-zero emissions by 2050.

Feasibility

- In recent years, the world has seen a profound shift in the cost-competitiveness of renewable energy, which is now cheaper than any other form of power generation in virtually every market and geography—even before externalized costs of energy are taken into account. The global weighted-average, levelized cost of electricity from solar photovoltaic projects fell 85 percent between 2010 and 2020, from concentrated solar power 68 percent, from onshore wind 56 percent, and from offshore wind 48 percent. Between 2020 and 2021, investments in clean energy increased by 12 percent, compared to a bare 2 percent throughout the five years after the signing of the Paris Agreement. In 2021, governments’, companies’, and households’ investments in renewable energy projects and small-scale systems increased 6.5 percent in comparison with 2020. And in 2022, the pace accelerated even further, with a 17



percent year-on-year increase in renewable energy investment. Public finance has also increased.

A selection of key existing initiatives

- The **IRENA Coalition for Action** brings together over 130 leading renewable energy players including private sector, civil society, industry associations, intergovernmental organizations, and research institutes to discuss industry trends, determine actions, share knowledge, and exchange best practices with the vision to drive the global energy transition.
- The **Glasgow Financial Alliance for Net Zero (GFANZ)** is a global coalition of financial institutions committed to accelerating and mainstreaming the decarbonization of the world economy and reaching net-zero emissions by 2050. Despite these commitments, however, GFANZ's success has been limited in reducing investments in fossil fuels among its members.
- The UN-convened **Net Zero Asset Owner Alliance (NZAOA)** is a member-led initiative of institutional investors committed to transitioning their investment portfolios to net-zero greenhouse gas emissions by 2050—consistent with a maximum temperature rise of 1.5 degree C. Responsible for \$10 trillion in assets, NZAOA committed to phase out most thermal coal assets by 2030 for industrialized countries and worldwide by 2040.
- The **Powering Past Coal Alliance (PPCA)** is an initiative, launched at COP23, committed to turn individual commitments to a diplomatic offensive to advance the transition from coal power to clean energy. It includes both the PPCA declaration and the PPCA finance principles, the latter which commits private and financial actors to cease investments in coal, phase-out existing coal capacity, and boost investment in clean energies. At COP26, the PPCA declaration had been joined by a quarter of all countries.

Barriers

- The elevated cost of capital and lack of fiscal space in debt-distressed emerging markets and developing countries continue to stymie capital flows for renewable energy. Public climate finance is not on track to grow six-fold, as needed to achieve a 1.5 degree C future. Only 6 percent of the G20's COVID recovery funding between 2020 and 2021 went to clean energy. In addition, it is crucial to engage: (1) MDBs and IFIs to increase public and multilateral investments in the sector, including by driving in private finance at scale; (2) legislators and policymakers, to create the enabling conditions at a national level; (3) and local communities, where renewable energy projects will operate, in order to guarantee their right to free, prior, and informed consent.
- The pandemic and the energy crisis have deepened inequality and energy poverty, leaving 75 million people without the ability to pay for extended electricity services and 100 million people for clean cooking solutions.
- The just energy transition will also require addressing relevant supply chains. For instance, demand for critical minerals for clean energy technologies is set to quadruple by 2050, indicating the need for strong social and environmental safeguards for mining operations.



- The fossil fuel lobby continues to expand efforts not just in the national legislative bodies, but also in the international arena of negotiations.

Sustainable Development Goals

- **SDG 7 Affordable and clean energy:** Considering that around 80 percent of the global population resides in net-energy importing countries, fostering renewable energy investment worldwide will also have a welcome impact in enhancing access to and more democratic control over energy sources, and putting an end to the geopolitical gridlocks in global fossil fuel transport routes and general access to energy supply.

Options for the outcome at COP28

The GST outcome should recognize the need to rapidly ramp up global investment in renewable energy generation, mobilizing both public and private sources, and prioritizing developing countries across the board. Parties could:

- Call on relevant stakeholders to shift investments of public and private capital toward renewable energy to reduce the risks of stranded assets in the fossil fuel industry and/or avoid lock-in of long-lived carbon intensive assets.
- Call upon the largest energy consumers and emitters, such as the G7 countries, to lead the way, strengthening existing policies, regulations, and investment plans (i.e., NDCs) by 2030, while facilitating funds, knowledge, and technology transfer to developing countries—for instance through Just Energy Transition Partnerships.
- Call upon the international financial system to support capital flows toward renewables energy, as part of their current reform.

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| Signal/high level ask | Urge bilateral, multilateral, and private creditors to design and implement mechanisms for debt payments suspension, restructuring, and cancellation as soon as possible and by 2030 at the latest, with a view to addressing climate-related needs, by: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Instituting Debt-for-Climate and nature swaps, or conditioned debt forgiveness for developing countries, supported by redistributed Special Drawing Rights and other existing tools, in exchange for trackable and ambitious action in fostering a just energy transition, as well as in protecting key ecosystems and carbon sinks. |
| | <ul style="list-style-type: none"> • Cancelling debt related to fossil fuel projects to enable the early retirement of polluting energy plants, mines, and wells, under the condition that profits are reinvested directly into renewable energies and a green electric grid. |
| | <ul style="list-style-type: none"> • Cancelling or suspending debt payments for developing countries recently struck by extreme weather events, to free up budget space for the country's disaster response and recovery efforts. |



Impact

- Almost 80 percent of all climate finance being provided and mobilized over the last decade was in the form of loans, contributing to the already unsustainable debt burden of many climate-vulnerable countries. This has created a phenomenon called “climate-induced debt,” increasing the cost of capital and reducing the fiscal space to invest in climate action. Lower-income countries are spending five times more on debt repayments than on tackling climate change. In 2020 alone, low- and middle-income countries spent US \$372 billion on debt repayments.
- Debt relief—including an immediate moratorium on debt payments after a climate event and a pre-designed debt restructuring process, including debt cancellation, as soon as the damages and losses are evaluated—constitutes one of the most efficient and fast mechanisms at hand to provide support when it is most needed. In addition, debt payment suspension has the potential to provide immediate access to resources that are already in the hands of the authorities and thus do not have to be mobilized through lengthy pledging exercises. According to estimates from The Nature Conservancy, US \$10 billion of debt forgiveness can harness into US \$2 billion in conservation actions, with not one penny of new philanthropy coming from private sector.

Feasibility

- According to the OECD estimates, “green” recovery measures by many governments could already be around US \$312 billion, including “grants, loans and tax reliefs directed toward green transport, circular economy and clean energy research, development and deployment.”
- Debt-for-Nature swaps have been regularly implemented since 1987. They have generated by 2010 an estimated US \$140 million in local currency for conservation projects, as a result of the purchase of approximately US \$170 million in debt at face value for approximately US \$49 million. While the rate of debt-for-nature swaps has diminished drastically since the 2000s to only about two per year, there are already rich experiences to draw from in this regard, not only limited to conservation projects.

A selection of key existing initiatives

- From May 2020 to December 2021, the **Debt Service Suspension Initiative**—supported by the World Bank and the International Monetary Fund—suspended US \$12.9 billion in debt-service payments for 48 countries.
- The **IMF Resilience and Sustainability Trust** helps low-income and vulnerable middle-income countries build resilience to external shocks and ensure sustainable growth, contributing to their longer-term balance of payments stability.
- The **Network for Greening the Financial System (NGFS)** and the **Coalition of Finance Ministers for Climate Action (CFMCA)** have both recently taken significant steps to advance



their understanding of nature-related risks, recognizing the significant economic, financial, and fiscal implications associated with nature loss.

- At COP27, numerous developing countries voiced their demands to engage in **Debt-for-Nature Swaps**, including Gambia, Sri Lanka, Pakistan, Kenya, Colombia and Eswatini.

Barriers

- The swaps are still a niche business, mainly because of high transaction costs, the need to monitor conservation or climate projects, and the requirement that a debtor country makes a long-term financial commitment.

Sustainable Development Goals

- With the implementation of debt relief measures, countries with high vulnerabilities will be in a better capacity not only to invest in addressing climate impacts, but also in decent work, social programs, and economic progress (**SDG 8**).
- Debt-for-Nature swaps could become important pillars in the conservation strategies of key ecosystems (**SDGs 14, 15**).

Options for the outcome at COP28

The GST Outcome should acknowledge the international debt crisis, and its deep interlinkages with climate change and nature, as well as its differential impacts upon developing countries. The system requires a full overhaul, including the contribution of innovative debt arrangements to expand the fiscal space in developing economies, in order to enable these countries to commit to ambitious climate policies. Parties could:

- Call upon Paris Club members, MDBs, DFIs, and the private sector to implement innovative debt solutions, such as haircuts, write-offs, Debt-for-Nature, and Debt-for-Climate swaps, among other tools, allowing developing countries to dedicate budget space to strategic climate change mitigation and adaptation actions.
- Also call upon G20 countries to reform the G20 Common Framework for Debt Treatments, to better allow developing countries to service debt payments, while also dedicating resources to addressing their climate-related needs and actions.

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| Signal/high-level ask | Urge MDBs, IFIs and private investors to revise and adjust their investment plans and portfolios in order to significantly increase their investments in decarbonization and resilience projects by 2030 and gradually continue increasing them to align with the temperature and resilience goals of the Paris Agreement, by: |
| | <ul style="list-style-type: none"> • Strengthening mandates and incentives to deliver transformative and scaled-up climate action. |



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| High-impact opportunities/solutions | <ul style="list-style-type: none"> • Adopting core definitions and mechanisms to ensure alignment with the 1.5 degrees Celsius goal. |
| | <ul style="list-style-type: none"> • Scaling up public finance and investments, particularly for low-carbon infrastructure, in addition to de-risking instruments in MDBs and IFIs and increase optimize the risk-taking by development banks to invest in decarbonization and resilience technologies, policies and measures in developing countries. |
| | <ul style="list-style-type: none"> • MDBs and IFIs should support the development of the necessary enabling environments for public and private investments in decarbonisation and resilience projects, i.e., through policy and regulatory support. |

Impact

- The IPCC has reiterated in its last assessment report that a dramatic increase in funding will be essential and has the potential to substantially reduce emissions while supporting adaptation and resilience efforts, while reducing longer term costs.

Feasibility

- Innovative instruments have been deployed for the debt relief of developing countries, e.g., debt and trilateral swaps. Although debt swaps have not resulted in significant amounts for developing countries (US \$2.6 billion in total, according to UNDP (2017), funding about US \$1.2 billion in nature- or development-related spending), they have the potential to become targeted instruments for climate change.
- Important experience on risk assessments for both concessional financing and loan operations already exists, although an adjustment must be made in a way that the risk reduction of future debts is considered as a result of the implementation of adequate investments in adaptation and mitigation.

A selection of key existing initiatives

- In response to the fiscal and financial stress of most economies but, in particular, developing countries' debt crisis, Barbados Prime Minister Mia Mottley launched the **Bridgetown Initiative** in 2022, to propose the reform of the global financial architecture to drive financial resources toward climate action and SDGs, through the provision of emergency liquidity, the expansion of multilateral lending to governments by US \$1 trillion, and the activation of private sector savings for climate mitigation and fund reconstruction after a climate disaster through new multilateral mechanisms.
- Multilateral banks have the **2025 climate finance goals**, outlined at the 2019 UN Secretary General's Climate Action Summit in New York amounting to an expected collective total of US \$50 billion for low- and middle-income economies, and at least US \$65 billion of climate finance globally, with a projected doubling of adaptation finance to US \$18 billion, and private mobilization of US \$40 billion.



Barriers

- MDBs have mobilized very little private finance to date. According to the MDB Joint report on Climate Finance, current provision and mobilization of climate finance corresponds to a range of 2.4 (Asian Development Bank) to a maximum of 13.7 percent (Asian Infrastructure Investment Bank) of climate finance, therefore, increasing the consistency of financial flows toward decarbonization and resilience pathways requires greater ambition.
- Developing countries increased their external debt stocks to US \$11.1 trillion in 2021. In addition, 60 percent of the low-income economies are classified by the IMF and the World Bank as being either in debt distress or at high risk of debt distress. Therefore, instead of devoting funds from the public treasury to address the effects of the climate crisis, countries pay the debt and/or become more indebted in order to carry out efficient mitigation and adaptation investments to respond to the crisis.
- The cost of capital for investing in climate solutions has been rising for the very same countries that are most vulnerable to climate impacts and/or seeing worsening debt crises tied to worsened climate impacts that they already are enduring.

Sustainable Development Goals

- **SDG 17 Partnerships for the goals:** Strengthening the long-term perspective and the efficiency of climate funds would play an important role in reducing waste and ensuring resources reach those who need them the most.
- **SDG 13 Climate action:** The consistency of financial flows to achieve the long-term goals of the Paris Agreement are required, in order to achieve the sub-target 13.4 on implementing the UNFCCC.

Options for a GST Outcome

Decision 1/CP.27 already calls MDBs and IFIs to reform their operational models and align its resources to climate action. To build on that language, Parties could:

- Call upon MDBs and IFIs to align all operations, internal incentives, and investments with the 1.5 degree C goal by 2025, at the latest.
- Call upon MDBs and IFIs to adopt core definitions and mechanisms to ensure Paris alignment at the system level.
- Call upon MDBs and IFIs should increase the use and quantity of availability of concessional financing (i.e., grants, guarantees, blended finance, and non-debt instruments) strategically to deliver transformative climate action.
- Call upon MDBs and IFIs to create fiscal relief in developing countries and new de-risking mechanisms and approaches in consultation with leading private financial institutions or alliances to enable successful calibration for mobilizing private investment for climate solutions at scale.
- Call upon MDBs and IFIS to include L&D and adaptation needs in their assessment criteria for support.

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| Signal/high level ask | Call upon MDBs, IFIs, climate funds, and other multilateral and bilateral cooperation agencies to increase the share of grants and highly concessional instruments for developing countries, particularly for the design, implementation, and monitoring of adaptation actions, by: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Advancing in the full replenishment of multilateral channels that support developing countries, such as the Green Climate Fund, the Global Environment Facility, the Adaptation Fund and the Loss and Damage Fund, and significantly increase their proportion of funding in the form of grants and highly concessional instruments |
| | <ul style="list-style-type: none"> • Developing tools and methodologies to better appraise and track climate finance for adaptation action in the form of grants and concessional instruments. |
| | <ul style="list-style-type: none"> • Incentivizing vehicles for long-term adaptation solutions, including via blended finance. |
| | <ul style="list-style-type: none"> • Promoting interlinkages between adaptation and mitigation when setting up adaptation measures to generate co-benefits in both areas. |

Impact

- In 2020 alone, developing countries spent US \$372 billion on servicing debt. Several studies provide a general sense of how much adaptation finance developing countries will need. UNEP's Adaptation Gap Report 2022 estimates that the annual cost of adaptation in developing countries could be between US\$ 160 billion and US\$ 340 billion by 2030 and between US\$ 315 and US\$ 565 billion per year by 2050.¹⁴⁷ The Climate Policy Initiative (**CPI**) in its 2021 edition on *Global Landscape of Climate Finance* highlighted that the public sector continues to provide almost all adaptation financing, and it represented just 14 percent of total public finance.¹⁴⁸ On top of this, almost 80 percent of all climate finance being provided and mobilized in the period 2017–18 was in the form of loans, contributing to the already unsustainable debt burden of many climate vulnerable countries.
- In that sense, scaling grants and other concessional finance for adaptation will deliver beneficial climate impacts in at least two major respects: building resilience to the impacts of climate change; and boosting fiscal space for investment in climate mitigation and adaptation alike.

¹⁴⁷ <https://www.unep.org/resources/adaptation-gap-report-2021>.

¹⁴⁸ <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>.



Feasibility

- All relevant technological and policy instruments exist within MDBs and IFIs to expand grants and concessional finance for adaptation actions in developing countries. However, further efforts should go to strengthening implementation and monitoring efforts at the national level, to ensure adequate reporting of results in order to fully access the benefits of concessional instruments.

A selection of key existing initiatives:

- **Coalition of Finance Ministers for Climate Action:** Launched in April 2019 with the participation of 26 countries, the Coalition “brings together fiscal and economic policymakers from over 80 countries in leading the global climate response and in securing a just transition toward low-carbon resilient development.”
- **Coalition for Climate Resilient Investment (CCRI):** Launched at the UN Climate Action Summit in 2019, CCRI was established as a multi-industry, multi-region, public/private coalition. With over 120 members of the private sector representing over US \$20 trillion in assets.
- **UN4NAP:** In 2021, the UNFCCC secretariat launched a UN-wide partnership, UN4NAPs, to mobilize the whole UN system to support the most vulnerable countries in preparing and implementing their National Adaptation Plans (**NAPs**).
At COP27, MDBs delivered a **joint statement** highlighting their interest in booster support to build climate resilience providing particular attention and support to Low-Income Countries, Small Island Developing States.

Barriers

- Limited private finance has been directed toward adaptation to date: or the period of 2018, only 1.6 percent of the global adaptation flows were sourced from private financing.
- Lack of consistent information regarding costs and methodologies for the identification of adaptation needs.
- The majority of adaptation finance is provided in the form of loans rather than grants, and this percentage has been increasing over the last few years.
- It is always a challenge to build government capacity to institutionalize climate change in planning and budgeting in particular for addressing the gaps and needs on adaptation and loss and damage.

Sustainable Development Goals

- **SDG 8 Decent Work and Economic Growth:** Predictable funds for the implementation of adaptation measures will allow countries to be prepared for the adverse effects of climate change and to avert and minimize future losses and damages.
- **SDG 13 Climate action:** Subsidies for adaptation measures could help countries to establish mechanisms to reduce impacts of climate change and support the fulfillment of international commitments without hindering the development of other national activities.



- **SDG 17 Partnerships for the goals:** Financial mechanisms in place for adaptation measures that allow the participation of different stakeholders, such as countries, civil society and cooperants, will contribute to sustainable development.

Options for a GST outcome:

Parties could:

- Promote concessional financing to deliver transformative climate adaptation actions by innovative financial mechanisms such as non-debt instruments, and philanthropic funding.
- Call for MDBs, IFIs, climate funds, and bilateral agencies to work with governments and businesses to incentivize vehicles for long-term adaptation solutions, including via blended finance. Promote interlinkages between adaptation and mitigation when setting up adaptation measures to generate co-benefits in both areas.
- Further call upon MDBs and DFIs to increase the share of climate finance provided in the form of grants and highly concessional instruments, especially for the design, implementation and monitoring of climate projects that do not generate returns for the private sector to engage.

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| Signal/high level ask | Urge tying fossil fuel subsidies reform to broader economy-wide just transition plans, and provide support to developing countries to implement it, by: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Carrying out comprehensive research on the economic sectors and population likely to be affected by fossil fuel subsidy reform, including existing levels of subsidy support and the distributional impacts of withdrawing it. |
| | <ul style="list-style-type: none"> • Gradually phasing out fossil fuel subsidies to enable households and firms to adjust over time. |
| | <ul style="list-style-type: none"> • Conducting effective public communication and stakeholder engagement campaigns to secure buy-in across society and different sectors. |
| | <ul style="list-style-type: none"> • Using part of the savings from phased-out fossil fuel subsidies to strengthen efforts toward Just Energy Transitions. |

Impact

- Globally, fossil fuel subsidies amounted to US \$5.9 trillion or 6.8 percent of GDP in 2020 and are expected to increase to 7.4 percent of GDP in 2025. According to the IPCC, removing fossil fuel subsidies could reduce emissions by 1–10 percent by 2030 while improving public revenue and macroeconomic performance.



Feasibility

- While results have varied strongly, numerous countries across the globe have led the way in fossil fuel subsidy reform, including Indonesia, Chile, Iran, France, and Ghana, garnering valuable experience for similar efforts elsewhere. Methodologies for the analysis of energy subsidies and their impacts of households have been tried and tested, such as the Energy Sector Management Assistance Programme (**ESMAP**) Energy Subsidy Reform Assessment Framework.

A selection of key existing initiatives

- In 2009, the **G20 Pittsburgh Summit** agreed “to phase out and rationalize over the medium-term inefficient fossil fuel subsidies while providing targeted support for the poorest.”
- At COP26 in 2021, 197 countries agreed to accelerate efforts to phase down inefficient fossil fuel subsidies. 34 countries and 5 public finance institutions also signed the **Statement on International Public Support for the Clean Energy Transition**, committing to end new direct international public support for unabated fossil fuels by the end of 2022 and shifting it into clean energy.
- In 2022, **G7 Climate and Energy Ministers** made a similar commitment, reinforcing and building from the G20’s 2009 Pittsburgh Summit commitment, to phase out inefficient fossil fuel subsidies while providing targeted support for the poorest.
- Alliances between academia and civil society are emerging to document fossil fuel subsidies worldwide and keep national governments accountable, grouped under umbrella initiatives as the **Energy Policy Tracker**, which includes the Stockholm Environment Institute, the International Institute for Sustainable Development, and the Institute for Global Environmental Strategies, OilChange International, the Overseas Development Institute and Columbia University.

Barriers

- The absence of public support for subsidy reform is in part due to a lack of confidence in the ability of governments to shift the resulting budgetary savings to programs that would compensate the poor and middle class for the higher energy prices they face. It is thus critical for stakeholders to develop society-wide dialogues and communications campaigns, to convey the environmental and distributional benefits of subsidy reform to a larger audience, to better grasp and assess the differentiated impacts of reform at a local level, and to co-design implementation strategies with local governments and the citizenry. Moreover, the high degree of volatility of fossil fuel price generates uncertainty; the decline in the market price of fossil fuels—especially coal—may help facilitate the timely removal of subsidies, since its impact will be felt less by consumers. Nevertheless, some fossil fuel prices have spiked in the recent past in the wake of Russia’s invasion of Ukraine. At the same time, a fossil fuel subsidy reform is also likely to be more cost-effective than alternative policies, such as subsidies for clean technologies.



Sustainable Development Goals

- **SDG 7 Affordable and clean energy:** Fossil fuel subsidy reform can free up funds to provide targeted assistance for the poorest households and free up financing sources for a just transition through “swapping” or reallocating some of the savings from subsidy reform to fund the clean energy transition, generating social and economic benefits.

Options for the outcome of the GST

Parties could:

- Consider, in the context of Decision 1.CP/26, following up on the implementation and plans to advance toward the phase-down of fossil fuels subsidies, including by identifying and promoting ways to ensure that the transition is and will be done in a just, fair and equitable manner without further delay.
- Take stock of progress in global fossil fuel subsidy phase-out since COP26, as well as on the impact these measures have had on economy, society, and overall climate change mitigation efforts.
- Encourage countries to redirect the freed-up funds toward investment in renewable energies, and response mechanisms, such as initiatives for social protection, skills training, development of labor market policies, and community development.

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| Signal/high level ask | Call for capacity building support to developing countries to create the necessary enabling environments to operationalize Article 2.1(c) of the Paris Agreement, by: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Promoting the establishment and implementation of monetary/financial policy and regulation (standards, plans, accounting systems, lending requirements), fiscal policy (taxation, levies, royalties, public procurement, price support or controls), information instruments (certification and labeling, transparency initiatives, disclosure requirements, taxonomies), public finance, and use of different financial instruments (loans, grants, guarantees, equity, insurance). • Fostering capacity building actions, such as training and education for government officials and stakeholders to understand and implement emissions reduction policies and programs; information and technology sharing to access to data and research to help developing countries identify best practices and strategies for reducing emissions, increase adaptive capacity; facilitate collaboration and networking between developing countries and other stakeholders to share experiences and best practices; and assist developing countries to measure, report, and verify their emissions, and build climate resilience. |



Impact

- Operationalizing Article 2.1(c) in the developing world can create a more favorable enabling environment for the deployment of public and private capital alike.
- It can also create awareness amongst different stakeholders of the financial and private sectors as to the benefits of investing in strong action on climate change that includes economic growth, innovation, improved public health, and job opportunities.
- It can further avoid entrenching economies in unsustainable, low-productive, and unequal paths, and unnecessary stranded assets.

Feasibility

- Financial policies and regulation are increasingly being put into place to achieve binding climate targets. The outputs of such planning processes are likely to look different between countries. Some may prefer an approach that pursues taxonomies for climate-consistent activities for adaptation and mitigation, while others may adopt existing taxonomies and focus on fiscal policy reform, such as phase-out of fossil fuel subsidies, and others will not use taxonomies at all. Estimates for total climate finance flows (including domestic and international primary investment globally) accounted for US \$632 billion annually, between 2019 and 2020. However, the estimated G20 budgetary transfers and tax expenditures, price supports, public finance and state-owned enterprise investments to fossil fuels was estimated to amount to US \$584 billion annually, between 2017 and 2019.

A selection of key existing initiatives

- Several countries have either begun to develop or completed their own taxonomies. Asian countries such as Indonesia, Sri Lanka, and Kazakhstan have completed their taxonomy documents. Latin American countries are also adapting taxonomies to fit their specific context: Colombia was the first country in the Americas to launch a green taxonomy, and other countries in the region are doing the same (e.g., Mexico, Peru, Chile). The Dominican Republic was the first country in the Caribbean to start developing a green taxonomy. The European Union also introduced its green taxonomy regulation in 2020.
- Development cooperation is playing a role in shifting finance flows, e.g., in supporting green budgeting and reform of climate and environmentally harmful subsidies and the introduction of carbon-pricing instruments.

Barriers

- A significant barrier is the lack of a common definition for climate finance, making it difficult to accurately track and report on finance flows. There is no internationally agreed definition of 'climate finance.' In determining the amounts to be reported as climate finance, entities rely on their operational definitions and differences can affect estimates of overall finance flows. This makes it challenging to accurately track, for example, climate finance objectives against the targets outlined in an NDC.



- Another barrier is the lack of resources for hiring or training to build relevant technical and financial capacity, competing priorities, inadequate access to information regarding what is needed to match local needs with the minimum requirements to access key sources of public and private finance.
- Additional barriers include the lack of an adequate tracking system for access and utilization of climate finance, including private finance flows. Such a system would enable the government and other stakeholders to make informed decisions regarding climate finance and investments, with a deeper analysis of trends and distributions.
- Other barriers include gaps in data on adaptation finance, especially quantitative data, making it difficult to assess compliance with the Paris Agreement.
- Yet another barrier is the lack of clarity on how to measure progress toward Article 2.1(c) of the Paris Agreement, as well as both perceived and real double standards in operationalizing Article 2.1(c).

Sustainable Development Goals

- **SDG 16 - Peace, Justice and Strong Institutions:** Capacity building efforts will help strengthen effective, accountable and transparent institutions at all levels, especially in developing countries.
- **SDG 17 - Partnerships for the Goals:** Supporting the operationalization of Article 2.1(c) at a national level will strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for implementing national plans to implement all the sustainable development goals, including through North-South, South-South, and triangular cooperation.

Options for an outcome at COP28

The GST must provide a clear signal as to how important it is to operationalize Article 2.1(c) as a whole and in particular to mandate the provision of capacity building support to developing countries so that they will be situated to optimally access sources of public and private capital for climate solutions, according to their national circumstances and needs. Any guidance on operationalizing Article 2.1(c) will need to allow for country-specific contexts, thus helping countries take ownership and determine how to finance their own low-carbon, resilient pathways.

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| Signal/high level ask | Call upon institutional investors and corporate actors to implement concrete plans for the understanding (2025), disclosure (2028) and management (2030) of climate-related financial risks and opportunities, including through: |
| High impact opportunities/solutions | <ul style="list-style-type: none"> • Reporting, publishing, and sharing information related to governance structures, strategies, risk management practices, metrics, and targets. |



- Accelerating efforts to manage climate-related financial risks and opportunities, including with a focus on addressing the financial impacts and implications of extreme weather events, gradual changes on climate and the transition to a low-carbon economy on revenues, expenditures, assets and liabilities, and capital and financing.

Impact

- The transition to a low-carbon economy, consistent with the objectives of the Paris Agreement, requires a radical shift of resource allocation and, thus, a seminal response by the private sector, including institutional investors and non-financial corporations. In addition, damage to assets serving as collateral creates losses that prompt banks to restrict their lending in certain regions, reducing the financing available for reconstruction in affected areas—even as insurers likewise pull back from markets with heightened vulnerability to climate impacts. By enhancing understanding about the financial implications of climate change and transitions to low-carbon economies among investors and companies, risks and opportunities will be more accurately priced, allowing for the more efficient allocation of capital in support of the necessary transition to a net zero emissions economy. With the benefit of mandatory climate risk disclosure, there will be increased awareness and understanding of climate-related risks and opportunities within companies, resulting in better risk management and more informed strategic planning.

Feasibility

- The Task Force on Climate-related Financial Disclosures (**TCFD**) reported the following advancements and maturity of disclosure practices from 2017 to 2022, based on over 1,400 large companies reports and TCFD surveys: The percentage of companies disclosing TCFD-aligned information continues to grow, but more urgent progress is needed. For 2021, 80 percent of companies disclosed in line with at least one of the 11 recommended disclosures; however, only 4 percent disclosed in line with all 11 recommended disclosures and only around 40 percent disclosed in line with at least five. The percentage of companies disclosing the TCFD recommendations in financial filings or annual reports has increased each year. 70 percent of companies implementing the TCFD recommendations disclosed climate-related information in financial filings or annual reports for 2021 compared to 45 percent for 2017.
- A majority of asset managers and asset owners report to their clients and beneficiaries. Over 60 percent of asset managers and over 75 percent of asset owners surveyed indicated they currently report climate-related information to their clients and beneficiaries, respectively. Nearly 50 percent of asset managers and 75 percent of asset owners reported information aligned with at least five of the 11 recommended disclosures. Investors and others use disclosures in decision-making and pricing.



A selection of key existing initiatives

- The **Financial Stability Board (FSB)** is an international body that designs recommendations related to the financial global system to promote international financial stability.
- The **Task-Force on Climate-related Financial Disclosures (TCFD)** is an FSB initiative that aims to improve and increase reporting of climate-related financial information to support informed capital allocation.
- **Glasgow Financial Alliance for Net Zero (GFANZ)** is a global coalition of financial institutions committed to accelerating and mainstreaming the decarbonization of the world economy and reaching net-zero emissions by 2050. GFANZ brings together representatives from the major finance sector net zero alliances and has released extensive net zero transition planning guidance for financial institutions.
- The **Network for Greening the Financial System (NGFS)** aims to accelerate the work of central banks and supervisors on climate and environmental risk and on scaling up green finance.
- The **Bank for International Settlements** which coordinates the Basel Committee on Banking Supervision (**BCBS**) is the primary global standard setter for the prudential regulation of banks and provides a forum for regular cooperation on banking supervisory matters.

Barriers

- The market and, in some cases, regulators are requiring more comprehensive information, particularly on potential business impacts, and on doing so, companies may incur the risk of disclosing potentially commercially sensitive information.
- Data and methodologies for assessing climate-related metrics over extended time horizons and across diverse global value chains are still relatively immature compared to traditional financial metrics and there is considerable uncertainty in the underlying assumptions. Therefore, there is a need for the standardization of methodologies used by companies to quantify risks and opportunities, particularly within the oil and gas industry.
- Lack of resources to procure the needed data to develop the assessment of climate risks, increasing the costs associated with these processes, lack of regulatory mandate and shortage of in-house capabilities.

Sustainable Development Goals

- **SDG 8 - Decent work and economic growth:** Understanding, disclosure and management of these risks and opportunities, would progressively improve global resource efficiency and decouple economic growth from environmental degradation (Target 8.4).
- **SDG 13 - Climate action:** Disclosure of climate-related financial risks through investors and corporate actors would contribute to the understanding on how to integrate climate change measures into national policies, strategies, and planning (Target 13.2).
- **SDG 16 - Peace, Justice and Strong Institutions:** Develop effective, accountable, and transparent institutions at all levels (Target 16.6).
- **SDG 17 - Partnerships for the Goals:** The more transparency related to financial risks associated with climate change, the easier it will be the creation of networks and



relationships between the institutional and private sectors due to the identification of common climate threats. Therefore, the enabling conditions for strengthening domestic resource mobilization (Target 17.1) could emerge.

Options for a GST Outcome:

COP26 and COP27 have opened a door to provide general orientation to MDBs and IFIs in relation to their alignment to the Paris Agreement, however, there are several other stakeholders in the financial sector which need to be involved in its transformation. Parties could:

- Call on governments/regulators to adopt mandatory climate risk disclosure and to call on institutional investors & corporates to adopt and disclose net zero transition plans.

Example technical annex for mitigation¹⁴⁹

| Solution | Increasing the share of renewable energy sources in global electricity generation |
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| Global target | <ul style="list-style-type: none"> Triple renewable energy capacity by 2030, including increasing the share of renewable energy sources in global electricity generation to at least two-thirds by 2030 with the aim of full decarbonization by 2050, while reducing the share of fossil sources. |
| High impact opportunities for action | <ul style="list-style-type: none"> Expanding and upgrading the electricity grids to enable the integration of increasing amounts of renewable energy sources Incentivizing the deployment of renewable energy technologies and/or setting renewable energy targets or mandates as national contribution to the global target based on national circumstances Ending investments in new fossil fuel-based generation capacity and phasing down existing fossil fuel-based energy generation capacity, in a just and equitable manner, including by pricing or capping emissions from the electricity sector Addressing regulatory barriers to the deployment, scale up, and use of renewable energy technologies, including grid infrastructure and storage. |
| Impact | <ul style="list-style-type: none"> Deploying wind and solar energy in particular offer substantial potential and could reduce net emissions by about 8 GtCO₂eq in 2030 relative to a baseline that reflects current (2015–19) policies. Accommodating the electrification of major portions of the economy, the decarbonisation of the power sector is a prerequisite for the decarbonization of the transport, industry, and buildings sectors. |
| Feasibility | <ul style="list-style-type: none"> Renewables and energy storage technologies are generally mature, available, and quickly decreasing in cost. Their scaled-up deployment, along with targeted and scaled-up efforts to enhance energy efficiency, can accelerate the transformation of the electricity sector. While appropriate renewable energy technologies will be highly context-specific, key technologies (e.g., solar, wind) have become price competitive with fossil fuel-based electricity generation in many geographies and will become increasingly feasible over time. |
| Challenges and barriers | <ul style="list-style-type: none"> Regulatory hurdles, high upfront capital costs (particularly in developing countries), perceived investment risks (higher risks for investors in new markets), the amount of land required, and the need for public acceptance. Lack of accessible support for electricity sector transition in developing countries. Negative social impacts of plant shutdowns, such as the loss of jobs and livelihoods. The need for clean firm power (i.e., clean power sources that can be dispatched as needed) to complement large-scale deployment of wind and solar resources, energy storage, and expanded transmission infrastructure. |

¹⁴⁹ For illustrative purposes, using the information in section A above, set out here is an example of what a technical annex to the technical dialogue synthesis report could look like for mitigation. This could also be done for adaptation, loss & damage, and means of implementation.

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| Key existing organizations and initiatives | <ul style="list-style-type: none"> • International organizations, including: IRENA; IEA; UNEP; UNDP; World Bank; regional development banks; GCF • International cooperative initiatives, including: Power Breakthrough/Breakthrough Agenda; Just Energy Transition Partnerships; Energy Transition Accelerator; SEforALL; Powering Past Coal Alliance; Mission Innovation’s Green Powered Future Mission (GPFM); Global Power System Transformation Consortium (GPST); Green Grids Initiative (GGI) |
| Means of implementation and support | <ul style="list-style-type: none"> • Tripling the proportion of finance and investments in renewable energy by 2030 (see MOI section in submission) • Enhance local capacity to replicate technologies and adjust them to local conditions, supporting further innovation, including regarding advanced batteries and storage, and strengthening institutional and policy capacity around electricity markets and grids |
| SDGs & socio-economic co-benefits | <ul style="list-style-type: none"> • Renewable energy policies should be integrated with various other policies, e.g., energy policy, industrial policy, national development plans • Co-benefits of Increasing shares of renewable energy in electricity generation has co-benefits, e.g., significant public health and air quality improvement; renewable energy jobs (12.7 million today to 38.2 million in 2030); creation of industries along value chain to create indirect, induced jobs. • As renewable energy technologies are deployed, efforts must be taken to expand energy access and mitigate the effects on vulnerable populations of policy measures that reflect the costs of fossil fuel pollution. |
| Progress indicators | <ul style="list-style-type: none"> • Increase in share of renewable energy in overall installed capacity (MW renewable energy / MW total) and total power generation (MWh renewable energy / MWh total)¹⁵⁰ • Decrease of carbon intensity of the energy mix for electricity generation (kg CO₂ / MWh) • Decrease in share of fossil power in overall installed capacity (MW Fossil energy / MW total) and total power generation (MWh Fossil energy / MWh total) • Decrease the amount of TonCO₂eq from electricity production by fuel • Investments in renewable generation and flexible power grids |

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| Solution | Reducing methane emissions from the fossil fuel sector |
| Global target | <ul style="list-style-type: none"> • Reduce methane emissions from the fossil fuel sector by 75 percent by 2030. |
| High impact opportunities for action | <ul style="list-style-type: none"> • Setting standards for equipment technology, leak detection and repair, and flaring and venting. • Measuring and reporting methane emissions. • Regulating upstream emissions, including by pricing emissions or setting performance or procurement standards. |
| Impact | <ul style="list-style-type: none"> • Reductions of methane emissions across all sectors can deliver 0.25 degree C of avoided temperature rise by 2050; the oil and gas sector offer the largest share of low- and negative-cost reduction opportunities. |

¹⁵⁰ Can also be tracked for specific renewable sources, such as wind, power, biofuels, geothermal

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| | <ul style="list-style-type: none"> • Reductions of methane emissions would lower peak warming and reduce the likelihood of overshooting warming limits; it is the fastest way to slow the rate of global warming in the near term. |
| Feasibility | <ul style="list-style-type: none"> • 50–80 percent of oil and gas sector methane emissions could be abated at less than US \$50 per ton of CO₂eq using currently available technologies. • A new wave of technologies holds promise for remote monitoring of methane, which could help improve inventory data. |
| Challenges and barriers | <ul style="list-style-type: none"> • Depends on accurate characterization of emission sources—existing inventory methodologies do not fully capture methane emissions. • Lack of infrastructure may prevent captured gas from being brought to market, especially where gas is co-produced with oil. • Lack of incentives and technical expertise for abatement, including in contexts where the environmental costs of emissions are not considered. • Difficult-to-quantify costs of refining business operations and worker training, institutional inertia. |
| Key existing organizations and initiatives | <ul style="list-style-type: none"> • International organizations, including: IEA, World Bank, regional development banks and GCF • International cooperative initiatives, including: Global Methane Hub, Climate and Clean Air Coalition; Global Methane Pledge; Global Decarbonization Alliance (GDA) |
| Means of implementation and support | <ul style="list-style-type: none"> • While more than USD 110 billion of methane abatement finance is estimated to be needed annually, finance needs in the fossil fuel sector are minimal/modest (less than USD 100 million) • R&D and investment to support new technologies for remote monitoring of methane to help improve inventory data and clean technology alternatives to coal in some key industrial applications (e.g., steel, cement) • Capacity building for improved methane inventories using newly available measurement-based methane data, consistent with IPCC guidelines. |
| SDGs & socio-economic co-benefits | <ul style="list-style-type: none"> • Reducing methane emissions by 30 percent below 2020 levels by 2030 could avoid roughly 6 million premature deaths per year due to ozone exposure and about 1,600 billion lost work hours per year due to heat exposure. • Reducing methane emissions by 30 percent below 2020 levels by 2030 is estimated to avoid approximately 580 million tons of yield losses to wheat, corn, rice, and soybeans per year. |
| Progress indicators | <ul style="list-style-type: none"> • CH₄ emissions from fossil fuels/in the energy sector (and relevant subsectors) relative to 2019/2020 (current CH₄ emissions in energy sector / CH₄ emissions in energy sector in 2019/2020). • CH₄ emissions in oil and gas production as share of production (% per unit of production). • CH₄ emissions in gas distribution as share of volume of gas distributed (% or permille). |

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| Solution | Halting and reversing land degradation, as well as biodiversity & ecosystem loss, including in particular forest loss |
| Global target | <ul style="list-style-type: none"> • Halt and reverse land degradation as well as biodiversity & ecosystem loss, including in particular forest loss, by 2030. |
| High impact opportunities for action | <ul style="list-style-type: none"> • Curbing and reversing deforestation and degradation, including by expanding conservation areas, instituting moratoria on forest conversion, securing tenure and protection of Indigenous territories, encouraging sustainable land-use practices, developing sustainable land-use and management plans, and decreasing pressure from the agricultural sector. • Implementing moratoria on products associated with deforestation and provide support for monitoring and verification of deforestation-related products. • Implementing the Kunming-Montreal Biodiversity framework • Implementing deep, rapid, and sustained reductions in global greenhouse gas emissions at their sources, while minimizing other ecosystem stressors different from climate change such as changes in land and sea use, direct exploitation of organisms, pollution, and invasion of alien species. |
| Impact | <ul style="list-style-type: none"> • Mitigation of up to 13.8 GtCO₂eq per year between 2020 and 2050: 50 percent from forests and other ecosystems, 35 percent from agriculture, and 15 percent from demand-side measures. • Emission reduction and/or sequestration of 7.3 GtCO₂eq per year. • 10 percent of the climate mitigation action needed by 2030 to deliver on the Paris Agreement |
| Feasibility | <ul style="list-style-type: none"> • Most mitigation options in forests and other natural ecosystems—and in the Agriculture, Forestry, and Other Land Use (AFOLU) sector more generally—are available and ready to be deployed. • The annual mitigation potential of 2.9 GtCO₂eq at less than US \$20 per tCO₂eq, increasing to 3.1 GtCO₂eq at less than US \$50 per tCO₂eq and 7.3 GtCO₂eq per year at less than US \$100 per tCO₂eq. • The IPCC undertook feasibility assessments for forest-based adaptation and for biodiversity management and ecosystem connectivity as adaptation options, concluding in both cases that there is robust evidence and medium agreement on their feasibility.¹⁵¹ |
| Challenges and barriers | <ul style="list-style-type: none"> • Insufficient access to finance, pressures from large-scale commodity production and extractive industries, commodity demand from developed countries, and lack of institutional capacity. • Insecure land rights, human rights violations, and violence against environmental defenders, particularly in countries with the highest deforestation rates. • Institutional fragmentation, under-resourcing of services, inadequate adaptation funding, uneven capability to manage uncertainties and conflicting values, and reactive governance across competing policy domains collectively lock in existing |

¹⁵¹ IPCC AR6 WGII Ch. 18 Cross-Chapter Box FEASIB.

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| | exposures and vulnerabilities, creating barriers and limits to adaptation, and undermine climate resilient development prospects. ¹⁵² |
| Key existing organizations and initiatives | <ul style="list-style-type: none"> • International organizations, including: FAO, OECD. • International cooperative initiatives, including: Land Use Breakthrough, Glasgow Leaders' Declaration on Forest and Land Use, Forests and Climate Leaders' Partnership, Green Gigaton Challenge, High Ambition Coalition for Nature and People |
| Means of implementation and support | <ul style="list-style-type: none"> • Large-scale incentive programs to conserve healthy, living forests, and to support the livelihoods of forest dependent communities. • Need to enhance access to funding (grants and other concessional finance) and build institutional capacity. • Scaling available funds, e.g., by instituting Debt-for-Climate and nature swaps, or conditioned debt forgiveness for developing countries, supported by redistributed Special Drawing Rights and other existing tools, in exchange for trackable and ambitious action in protecting key ecosystems and carbon sinks. • Innovative finance to move beyond and address potential risks associated with carbon market mechanisms, i.e., nature based solutions |
| SDGs & socio-economic co-benefits | <ul style="list-style-type: none"> • Conservation of natural ecosystems has especially high co-benefits and cost efficiency. • Conserving, managing, and restoring forests and other ecosystems have implications for mitigation, adaptation, food security, biodiversity, and ecosystem services. • Increasing resilience, preserving biodiversity, enhancing food security and human health, and safeguarding livelihoods. |
| Progress indicators | <ul style="list-style-type: none"> • Area of forest lost and land degraded per year (square kilometers or Mha) • Land areas deforested, afforested and reforested per year (square kilometers or Mha) • Land areas degraded and restored per year (square kilometers of Mha) • Land areas under protection (square kilometers or Mha, and % of total land area) • Mangrove loss per year (ha) • Mangrove reforestation per year (ha) • Extent of natural ecosystems • Areas under restoration • Coverage of protected areas and other effective area-based conservation measures • Number of countries that have adopted and implemented national disaster risk reduction strategies (Sendai Framework) addressing biodiversity |

¹⁵² IPCC AR6 WGII, Technical Summary, TS.E.5.1.

| Solution | Increasing the sales of electric vehicles (EVs) in leading markets |
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| Global target | <ul style="list-style-type: none"> Sales of zero-emission light-duty vehicles in leading markets reach 75 per cent by 2030 and 100 per cent by 2035.¹⁵³ |
| High impact opportunities for action | <ul style="list-style-type: none"> Increase climate finance, technology transfer and capacity building to support developing countries, both at the national and subnational level, in the transition to EVs, including for policy design, planning and investment in necessary infrastructure (e.g., grids, charging). Incentivizing a shift toward EVs through purchase subsidies or mandates, charging discounts, regulations that cap emissions or limit emissions intensity, and/or gas taxes that reflect the negative impacts of fossil fuel combustion. Investing in battery technology improvements and the coordinated expansion—and standardization—of charging infrastructure, especially on priority routes. Phasing out internal combustion engines and tightening of regulatory trajectories across key markets in a coordinated way. Providing alternatives to private vehicles by incentivizing modal shifts and expanding viable public transportation options, including by investing in electrified public transit. Implementing strong normative safeguards in mining operations for lithium, cobalt, and other critical minerals for renewable energy technologies. |
| Impact | <ul style="list-style-type: none"> Roughly 85 percent of CO2 emission reductions needed for 1.5 degree C can be achieved with existing and emerging transport policies and technologies for land transport; the other 15 percent driven by changes in behavior, especially urban passenger transport. EVs offer the largest decarbonization potential for land-based transport if they are powered by low-emissions electricity. Scaling solutions in this sector is critical to reduce emissions in developed countries and limit emissions growth in developing countries. |
| Feasibility | <ul style="list-style-type: none"> EVs are proven technology and are increasingly competitive with internal combustion engines, given the cost of batteries has fallen dramatically. Advances in battery technologies could facilitate the electrification of heavy-duty trucks. |
| Challenges and barriers | <ul style="list-style-type: none"> Lack of charging infrastructure and high up-front costs of some EVs (e.g., zero-emission trucks), especially in developing countries. Supply chain limitations, geopolitical risks, and negative environmental and social impacts associated with critical minerals used in batteries and found in a limited number of countries. Some policy options to shift toward EVs and away from internal combustion engines (e.g., gas taxes) could have regressive impacts on low-income populations. |
| Key existing organizations and initiatives | <ul style="list-style-type: none"> International organizations, including: UNEP, World Economic Forum (WEF), IEA, IRENA. International cooperative initiatives, including: Road Transport Breakthrough (part of Breakthrough Agenda), COP26 Declaration on Accelerating the Transition to |

¹⁵³ Based on Race to Zero, 2030 Breakthroughs, Upgrading Our Systems Together, <https://racetozero.unfccc.int/wp-content/uploads/2021/09/2030-breakthroughs-upgrading-our-systems-together.pdf> and Marrakech Partnership, Climate Action Pathway: https://unfccc.int/sites/default/files/resource/Transport_ActionTable_2.1.pdf.

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| | 100% Zero Emissions Cars and Vans, Accelerating to Zero Coalition, Zero Emission Government Fleet Declaration, EV30@30, EV100 |
| Means of implementation and support | <ul style="list-style-type: none"> Investment in supply chains; technology transfer of EVs, including battery technology, materials and key components of electric powertrains; battery technology improvements; manufacturing capacity of heavy-duty EVs; expansion and standardization of charging infrastructure, especially on priority routes; grid upgrades Increase climate finance in developing countries to promote EVs and investment in necessary infrastructure (grids, charging) Disincentivize second-hand internal combustion engine cars from being sold in developing countries. |
| SDGs & socio-economic co-benefits | <ul style="list-style-type: none"> Improved air quality and public health Jobs in energy transition-related sectors—including EVs—could reach 74.2 million in 2030 Potential for vehicle-to-grid solutions for consumers to store and sell back electricity Lower maintenance costs for consumers |
| Progress indicators | <ul style="list-style-type: none"> Carbon intensity of land-based passenger transport (g CO₂ /pkm) Decrease in GHG emissions (MtCO₂ eq) and fossil fuel consumption of transport sector. Share of electric/zero-emission vehicles in light-duty vehicle, bus, and medium- and heavy-duty vehicle sales (%) Share of electric/zero-emission vehicles in the light-duty vehicle, bus, and medium- and heavy-duty vehicle fleets (%) Average CO₂ emissions of newly registered light-duty vehicles, buses, and medium- and heavy-duty vehicles (g CO₂/km) Density of charging infrastructure (charging points per number of inhabitants/vehicles) |

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| Solution | Reducing the carbon intensity of building operations and minimizing embodied emissions |
| Global target | <ul style="list-style-type: none"> Reduce the carbon intensity of building operations, minimize embodied emissions, and increase the rate of building retrofits to 3.5 percent by 2040, aiming for all new and existing assets to be net zero across their life cycles by 2050. |
| High impact opportunities for action | <ul style="list-style-type: none"> Electrifying energy end-use in buildings and improving energy efficiency. Adopting green procurement policies or revising construction codes to require the purchase of low-carbon construction materials (e.g., low-carbon cement). Strengthening insulation and energy efficiency standards in building/construction codes (for new buildings and renovation). Install programs for subsidizing upfront investment costs. Utilizing innovative finance models that reduce up-front costs. |
| Impact | <ul style="list-style-type: none"> Global mitigation potential of existing solutions is at least 8.2 GtCO₂eq, or 61 percent, of global building emissions by 2050 compared to their baseline—with the largest potential available in developing countries. |

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| | <ul style="list-style-type: none"> Emission increases are outpacing efficiency improvements and the decarbonization of electricity and heating; adaptation measures could increase demand for energy and materials in this sector. |
| Feasibility | <ul style="list-style-type: none"> Key available decarbonization technologies that are already available foresee a significant cost reduction. Much of the mitigation potential of this sector remains untapped. |
| Challenges and barriers | <ul style="list-style-type: none"> High heterogeneity of the sector, with varying approaches required for individual buildings and differing heating and cooling needs across regions. Lack of institutional capacity and appropriate governance structures, with sometimes competing priorities of key actors (e.g., building owners vs. tenants). Limited incentives and high upfront investment costs. Lack of trained/skilled personnel (architects, engineers, contractors). |
| Key existing organizations and initiatives | <ul style="list-style-type: none"> International organizations, including: IEA International cooperative initiatives, including: Buildings Breakthrough, Global Alliance for Buildings and Construction (<i>GlobalABC</i>), C40 Net Zero Carbon Buildings Declaration, Zero Carbon Buildings for All, Net Zero Carbon Buildings Commitment |
| Means of implementation and support | <ul style="list-style-type: none"> Utilizing innovative finance models that reduce upfront costs. Reducing reliance on fossil fuels in buildings can make energy costs more affordable over time Innovative funding streams to deliver integrated services and more favorable financing. Innovative ways cities can raise revenue to dedicate to supporting low-resourced building owners Increase climate finance in developing countries to promote zero-carbon buildings and mitigate investment risk. |
| SDGs & socio-economic co-benefits | <ul style="list-style-type: none"> Up to 30 jobs could be created for every million dollars (USD) invested in building retrofits or new energy efficient buildings. Improved well-being, including by improving indoor air quality, reducing gender inequalities, and addressing energy poverty. Reduced energy costs. Reduced energy consumption. |
| Progress indicators | <ul style="list-style-type: none"> Energy intensity of building operations (% of 2015 levels, kJ per m2) Carbon intensity of building operations (kg CO2 per m2) Retrofitting rate of buildings (% of building stock per year) Share of zero or negative energy/emission buildings in all new buildings Share of zero or negative energy/emission buildings in all buildings Relative contribution of embodied emissions to life cycle GHG emissions of buildings (%) Absolute contribution of embodied emissions to life cycle GHG emissions of buildings |