

I. Reflections on discussions at TD1.1 and TD1.2

A. Introduction and context

1. We are encouraged by the depth and breadth of the inputs that participants from Parties and non-Party stakeholders have brought to TD1.1 and TD1.2. They have all collaborated in identifying critically important challenges and barriers to progress, while also sharing experience and knowledge of solutions and actions, as well as ideas for enhanced international cooperation to advance the successful implementation of the Paris Agreement. As explained in chapter II, participation in the technical dialogue process is generating a very rich basis upon which to build as we move to TD1.3 during the fifty-eighth sessions of the subsidiary bodies. We are very grateful for the constructive and creative engagement of Parties and non-Party stakeholders in this dialogue.

2. We also greatly appreciate the numerous written submissions by Parties and non-Party stakeholders: some updating previous submissions, others bringing in new voices, and all containing highly valuable information. Written submissions form part of the overall outputs of the GST, and we thank the secretariat for making them more accessible through improvements to the GST information portal. Making information usable is very important, and we thank participants for suggestions for including a technical annex to the overall factual synthesis report of the technical assessment phase of the GST, as we had noted in the closing plenary in Sharm el-Sheikh. The volume of information is very large, and we are exploring possibilities for a search engine to make information even more accessible and useful to Parties and non-Party stakeholders. We continue to follow a “learning by doing” approach and will continue to be guided by Parties as we make continuous improvements and evolve the dialogue process.

3. There has been significant yet inadequate collective progress towards achieving the purpose of the Paris Agreement and its long-term goals since it was adopted in 2015. While the remarkable speed with which the Paris Agreement entered into force in 2016 demonstrates a broad commitment, and Parties are making progress in implementation, we as a global community are not on track to meet its long-term goals. To make more progress, Parties need to realize the many opportunities and overcome challenges in increasing ambition in their NDCs, in an equitable manner. They also need to jointly develop and implement innovative forms of international cooperation.

4. The technical dialogue of the first GST is the first opportunity for Parties to take stock of collective progress and consider what more we can do together, and what each of us needs to do. The Paris Agreement specifically requires Parties to take into account the findings of the GST as they submit their next NDCs. The GST is a process to enable more collective action; that is, we assess collective progress, in the light of equity and the best available science, to inform greater levels of ambition. This process provides a unique opportunity for understanding collective undertakings to confront this unprecedented global challenge, to learn what is working and what challenges need to be overcome, and to provide the basis for all Parties to deliver enhanced action and support.

5. The first GST is taking place within an era of dramatic and widespread changes. Climate is one of several crises confronting our global community, which is also dealing with debt and inflation, wars, rising energy and food prices, disruptions to global supply chains, and recovering from the coronavirus disease 2019 pandemic. These global crises are compounding and challenging the ability of Parties and non-Party stakeholders to make progress on the aims of the Paris Agreement. While these crises cannot be ignored, neither can the opportunities for enhanced climate action.

The cost for low-emissions energy continues to fall globally and awareness of the impacts of climate change are greater than they have ever been. The success of the Paris Agreement will ultimately be defined by how the global community responds over the next decade to these opportunities and how we confront the real challenges ahead.

6. The unprecedented scale and pace required in the global transition to a low-GHG and climate-resilient future will require integrated and holistic solutions that promote the eradication of poverty, sustainable development for all, and the protection of natural resources and systems. The nature and scale of these transformations will require sustained effort over decades, building upon progress made in each cycle of NDCs and stocktakes. Equally, as financial flows are aligned to the goals of the Paris Agreement, support commensurate with the scale of the challenge will be required, together with enabling conditions for further and more rapid progress across countries and contexts. The importance of promoting equity and the clear call to action arising from the best available science mean that such global transitions will require sensitivity to local contexts and circumstances to ensure that no community is left behind, that adaptation is locally driven and supported by international solidarity, and that transitions are truly just.

7. Parties and non-Party stakeholders have explored these challenges across all topics in TD1.1 and TD1.2. We moved from discussion on “what” in June 2022 to “how” and “how to” in December. The focus for TD 1.3 must shift to “what next”. As we said in the closing plenary of TD1.2, we have gone broad and deep in exploring the topics under consideration by the technical assessment. In this report we are sharing with all participants our reflections, particularly on what we see as emerging messages. We have distilled the emerging messages that have arisen during TD1.1 and TD1.2 and organized them into clusters: mitigation, including response measures (section B, below); adaptation, including loss and damage (section C, below); means of implementation and support (section D, below); and integrated and holistic approaches (section E, below).

8. We hope that these reflections will be useful to Parties and non-Party stakeholders in preparing for our final meeting in June 2023. Our reflections are not “final” as they offer thoughts at this point during the process. They are intended to aid the discussion to help participants understand the extent of discussions so far and where we are headed. At TD1.3 we will listen to Parties and non-Party stakeholders on these emerging messages, so that we can include the findings in the overarching factual synthesis report. There will also be a final opportunity to raise any issues that still have not had sufficient attention or would benefit from further discussion. Before that, we will (1) arrange informal virtual consultations to hear initial thoughts on this summary report (planned for 12 April); (2) issue an information note with more detailed design of TD 1.3 (by end of April); and (3) hold another virtual informal consultation after publishing the information note (second week of May). Our collective aim should be for the TD to lay a strong science-based foundation for the political consideration of outputs.

B. Mitigation, including response measures

1. Emissions are not in line with modelled global mitigation pathways consistent with the temperature goal of the Paris Agreement, and there is a rapidly narrowing window to raise ambition and implement existing commitments to limit warming to 1.5 °C above pre-industrial levels.

9. The Paris Agreement, with near-universal participation, has led to a significant increase in commitments towards limiting global warming, leading to significant reductions in forecasts of future warming (see paragraph 102 below), although the

collective progress on mitigation remains inadequate towards the fulfilment of Article 2, paragraph.1(a),¹ of the Paris Agreement.

10. Gaps in collective progress can be identified on two fronts. First, the mitigation ambition in NDCs is not collectively sufficient to put us on track to achieve the global temperature goal. These “emissions gaps” are the difference between the emissions levels implied by the NDCs and the average emissions levels of global modelled mitigation pathways consistent with the given temperature limits. Second, “implementation gaps” refer to how far currently enacted policies and actions fall short of reaching the committed level of action. Action is needed across both gaps: increasing the ambition of NDCs as well as increasing the implementation of policies to achieve the stated commitments, and to make progress towards achieving the goals of the Paris Agreement.

11. In 2019, atmospheric CO₂ concentrations reached 410 ppmv which is higher than at any time in at least 2 million years. Global temperatures were around 1.1°C higher than the preindustrial average in 2011-2020. Trends in historical GHG emissions provide important information to understand where we are and can inform future action. Cumulative CO₂ emissions have continued to rise. Global GHG emissions in the decade up to 2020 were higher than ever before, although the rate of growth of emissions has slowed from the previous decade.

12. The best available science as reflected in the IPCC AR6 provides information on pathways consistent with the global temperature goal and Article 4.1² of the Paris Agreement. For a 50 per cent chance of limiting global warming to 1.5 °C with limited to no overshoot and a 67 per cent chance to remain below 2 °C, global GHG emissions need to peak between 2020 and at the latest before 2025. While global peaking of GHG emissions must occur as soon as possible, peaking will take longer for developing country Parties. Yet we have not reached global peaking of emissions.

13. All Parties need to undertake rapid reductions in GHG emissions in the decades after peaking. Limiting global warming to 1.5 °C (50 per cent probability) with limited or no overshoot implies a reduction of 43 per cent in global GHG emissions below 2019 levels by 2030 and a reduction of 60 per cent in global GHG emissions below 2019 by 2035. Net zero GHG emissions needs to be achieved globally in the early 2050s in order to stabilize the global average temperature over the long term to 1.5 °C. The basis of equity, the context of sustainable development and efforts to eradicate poverty inform consideration of these mitigation pathways.

14. Although updated NDCs indicate some increase in mitigation ambition compared with the sum of NDCs submitted up to COP 26, these increases only partly offset emissions growth and are not yet in line with global modelled mitigation pathways limiting warming to 1.5 or 2 °C. The updated NDCs close the emissions gaps very partially, by 15–33 per cent. The UNFCCC synthesis report (FCCC/PA/CMA/2022/4) provides updated information based on latest available NDCs, up to 23 September 2022. The report estimates the median emissions gap to 1.5 °C (50 per cent probability) to be 23.9 Gt CO₂ eq, without conditional elements, and 20.3 Gt CO₂ eq, with implementation of conditional elements and support. For 2 °C (67 per cent probability), the respective emissions gaps are 16.0 and 12.5 Gt

¹ “Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”.

² “In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.”

CO₂ eq, respectively. Furthermore, analysis of these emissions gaps assumes mitigation actions in NDCs will be fully implemented and supported, and if either is not the case, the gaps would be even larger. Many Parties have set goals and communicated strategies aiming for net zero CO₂ or GHG emissions around or by 2050, yet in many cases near-term mitigation actions are not aligned with pathways to achieve these long-term targets.

2. Much more ambition is needed in domestic mitigation measures in NDCs to realize existing and emerging opportunities, in order to halve global emissions by 2030, reach net zero CO₂ emissions by 2050 globally, and promote equitable sharing of efforts across countries.

15. Although strengthening pledges demonstrates greater mitigation ambition, it is the implementation of mitigation measures that reduces emissions. Nearly all NDCs have effectively communicated domestic mitigation measures onto the international stage and, although mitigation measures in current NDCs are not collectively sufficiently ambitious, the Paris Agreement provides for the progression with Parties' successive NDCs to represent their highest possible ambition, informed by the GST.

16. There are now many opportunities for implementing more ambitious mitigation measures, in all sectors and systems. If fully implemented and supported, implementation of such opportunities can raise ambition to be sufficient to address the emissions gap and offer substantial potential to reduce net GHG emissions by 2030. Some mitigation options are more cost-effective than their high-emission alternatives, while many other mitigation options are available at relatively low cost. According to the contribution of Working Group III to the AR6, mitigation options costing USD 100 per t CO₂ eq or less (with estimated net emission reduction potential of 31–44 Gt CO₂ eq) could reduce global GHG emissions by at least half of the 2019 level by 2030, and options costing less than USD 20 per t CO₂ eq are estimated to make up more than half of this potential. Large contributions with costs of less than USD 20 per t CO₂ eq come from solar energy, wind energy, energy efficiency improvements in industry, reduced conversion of natural ecosystems, and methane emission reductions (coal mining, oil and gas). These costs are global averages and will, in reality, vary depending on national circumstances. How such opportunities are realized in different contexts is also a matter of equity.

17. Although these mitigation opportunities exist, there remain significant challenges for achieving mitigation at the required pace and scale. Creativity and innovation in policymaking and international cooperation are needed to overcome the barriers to climate action and to maximize the co-benefits that accrue from climate action. While large-scale and feasible mitigation options abound, in the short-term feasibility differs across sectors and regions. Most options face higher barriers if they are to be implemented rapidly at a large scale. However, a range of enabling conditions can help with implementing these actions, including strengthening policies and institutions, finance, technological innovation, and demand-side measures including behaviour change. These barriers and potential solutions were discussed extensively at TD1.2 and we hope knowledge on solutions will be further crystalized at TD1.3.

18. Non-Party stakeholders are increasingly seeking to align their actions and initiatives with the goals of the Paris Agreement. Some estimates for mitigation actions suggest that non-Party stakeholders could reduce emissions by up to 20 Gt CO₂ eq in 2030, although more rigorous accounting and accountability is needed to avoid double counting and other methodological challenges. While mitigation actions and relevant international cooperation by non-Party stakeholders have also accelerated since the adoption of the Paris Agreement, efforts are still far from being implemented at the scale needed.

19. Accelerating action on mitigating climate change impacts is crucial for sustainable development. However, mitigation options can result in some trade-offs. These trade-offs could be managed through policy design. For example, the SDGs can be used as a basis for evaluating mitigation measures. The 2022 NDC synthesis report found that 22 per cent of Parties clarified the alignment between their mitigation measures and efforts towards the SDGs, with energy supply measures contributing to achieving SDG 7 (affordable and clean energy) (11 per cent) and AFOLU measures contributing to achieving SDG 15 (life on land) (11 per cent) being the most frequently indicated measures.

20. Experiences with NDCs also suggest that more ambitious and detailed targets would enhance clarity and provide an improved basis for international cooperation. As Parties develop new NDCs in 2025, they should increase ambition and show progression in terms of quality, comprehensiveness, and transparency. Now that the Parties have gained experience of developing NDCs, implementing relevant policies and undertaking a GST, they are better placed, as they prepare their next NDCs, to increase ambition in achieving the global temperature goal and to provide information necessary to facilitate clarity, transparency and understanding of their NDCs. And as Parties provide more ambitious NDCs in the light of their national circumstances, they should consider strengthened targets covering a greater range of global emissions across sectors and gases in order to provide a better basis for global progress in limiting global warming and enhancing international cooperation and support. Experience to date, including in systemic capacity-building, can provide a basis for achieving this progression.

21. The NDC synthesis report noted that many Parties have communicated best practices for NDC preparation, such as institutionalizing climate policy development within joint planning frameworks; strengthening stakeholder capacity to participate more substantively in NDC preparation and implementation; designing planning and reporting systems for transparency and public scrutiny; incorporating experience and lessons learned from INDC preparation and implementation efforts; conducting extensive stakeholder consultations and peer review to enhance their understanding of the NDC; conducting a preliminary assessment of pre-2020 efforts to identify gaps and needs and develop an NDC road map; mainstreaming NDC goals in existing strategies, plans and policies to obtain political support and benefit from existing arrangements; partnering with regional and international organizations to develop a robust NDC; and establishing a scientific and quantitative system for analysing and assessing progress of implementation.

3. Achieving net zero CO₂ and GHG emissions requires systemic transformations across all sectors, phasing out high-emission systems and technologies while scaling up low- and zero-emission alternatives, and implementing both supply- and demand-side measures.

22. Achieving net zero emissions globally by 2050 requires radical transformation of all sectors of the economy. While the timing of achieving net zero emissions will vary by country, all countries need to adopt a whole-of-society approach, overcome challenges and increase the ambition of near-term actions while charting pathways to net zero CO₂ and GHG emissions.

23. Net zero CO₂ energy systems include electrification of end uses, phasing down fossil fuel use over time, using new fuels to electrify applications, increasing deployment of renewable energy, boosting energy efficiency and demand-side management, greater use of batteries (with growing concerns about transition minerals), low-emissions hydrogen, and other important technologies and methods. Protecting natural terrestrial and ocean carbon sinks and other CDR methods are needed to counterbalance residual emissions to reach net zero CO₂ emissions or net zero GHG emissions. Pursuing near-term non-CO₂ GHG reductions across sectors is necessary to achieve net zero emissions by the end of the century. Assessing and addressing the positive and negative impacts of response measures, including through

economic diversification and just transitions, within long-term development strategies can facilitate reaching net zero CO₂ emissions as well as net zero GHG emissions more equitably.

24. There are early signs of transformation and the necessary urgency among key stakeholders to accelerate uptake of these transformative opportunities. Yet investment in emissions-intensive activities by Parties and non-Party stakeholders also continues to grow globally. The contribution of Working Group III to the AR6 has projected that average annual (modelled) investment requirements for 2020–2030 in scenarios that limit warming to 2 °C or 1.5 °C are a factor of three to six greater than current levels, and total investment (public, private, domestic and international) in mitigation would need to increase across all sectors and regions. Dramatic increases in investments in low- and zero-carbon emission activities and technologies will be needed, including by non-Party stakeholders, as well as disinvestment from emissions-intensive activities and technologies.

Systems transformation in energy

25. Transformation of global energy systems is at the core of the challenge and opportunity of achieving net zero emissions by 2050. Energy system mitigation measures could account for 74 per cent of total global mitigation in reaching net zero GHG emissions. The IPCC AR6 projections showed that actions towards limiting global warming to 1.5 °C will reduce use of coal by 67–82 per cent, while oil and gas consumption fall more slowly; coal is hardly used for electricity generation by 2050 in such global modelling mitigation pathways, although IPCC AR6 does not prescribe pathways for any single country. A broad portfolio of options (e.g. integrating systems, coupling sectors, energy storage, smart grids, demand-side management, sustainable biofuels, and electrolytic hydrogen and derivatives) will ultimately be needed to accommodate large shares of renewables in energy systems. Demand-side measures are as important as supply-side transitions, as a part of the net zero energy system transformation.

26. A rapid reduction of the world economy's reliance on fossil fuels towards clean energy is central for just transitions to net zero emissions. In an energy road map for net zero emissions, unabated use of fossil fuels for energy accounts for 5 per cent of total energy supply in 2050: adding fossil fuel use with carbon capture, utilization and storage and for non-energy uses would raise this to close to 20 per cent. For comparison, in 2018 coal-fired power generation was the single largest source of energy-related CO₂ emissions globally, accounting for 10 Gt CO₂, and the latest NDC synthesis report noted that only 9 per cent of Parties indicated phasing down of unabated coal power generation in their latest NDCs. In addition, the removal of fossil fuel subsidies is a key strategy for addressing structural economic barriers that can perpetuate inertia to change and prevent cost-effective low-carbon alternatives from being adopted at scale.

27. Many mitigation actions can have broader benefits and help achieve other SDGs. We heard during TD1.2 that the limited amount of fossil fuels that can be burned without exceeding 1.5 °C might best be spent where it has the greatest welfare benefit. Developmental benefits of other mitigation actions include significant benefits to health, for example through lowered air pollution, greater mobility and healthy diets. Increased financing for clean energy can help provide energy access for underserved populations.

28. It would be useful to examine in more detail during TD1.3 the implications of global energy mixes by fuel in 2030/2035/2050 and the implied time frames for fossil fuels phase-out, as well as the relative importance of various financial and economic policy instruments, including subsidy reforms, while noting that differing contexts and circumstances will significantly define the pace of mitigation within regions. For example, energy poor regions with relatively poor renewable energy potential may need to rely on fossil fuels for longer, while the pace in other regions will depend on

the economics of decommissioning and replacing existing emissions-intensive infrastructure with low-carbon alternatives or installing abatement measures.

Systems transformations in industry, transport, buildings and other sectors.

29. Reducing industrial emissions, which make up about a quarter of global emissions, will require demand management, energy efficiency, electrification, innovation in hard-to-abate subsectors, and greater circularity. Ambitious implementation of such measures can reduce emissions, save costs and deliver co-benefits. The share of emissions from cities is estimated to be 67–72 per cent of global emissions, when using consumption-based accounting that includes indirect emissions outside urban areas. Reducing emissions from cities will involve smart urban planning, making cities more compact, walkable, and efficient. Local authorities and other actors may take measures to co-locate housing and jobs, increase electrification and transitions to low-carbon energy sources while increasing resilience through, for example, planting more trees. Buildings currently account for roughly 6 per cent of global GHG emissions. Both existing and yet-to-be-built buildings can be net zero emissions by mid-century if they use low-carbon construction materials, reduce demand, and implement mitigation options in design, construction, use and retrofits. Transportation currently contributes about 15 per cent of global GHG emissions. Phasing out internal combustion engines and using electric vehicles offers the greatest mitigation potential in the sector. In addition, demand-side interventions, such as shifting transport modes (e.g. walking and public transport), will be essential in the context of rethinking mobility. Shipping, aviation and freight transportation will require alternative low-carbon fuels and other solutions.

Systems transformations in agriculture, forestry and land use.

30. In 2019 AFOLU accounted for 13 Gt CO₂ eq to the global GHG emissions (22 per cent). Around half of total net AFOLU emissions result from land-use change: predominantly CO₂ from deforestation. Despite a decline in deforestation since 2000, the rate remains high, with 95 per cent of global deforestation occurring in the tropics but incentivized by consumers globally. Halting and reversing deforestation can provide adaptation and mitigation benefits in the near term across all forested regions. Setting zero net deforestation targets and adopting policies to conserve and restore land carbon stocks and protect natural ecosystems will result in large-scale CO₂ absorption and have further co-benefits. Land carbon accounting and incentive systems, such as REDD+ and payment for forest-based ecosystem services are increasingly implemented by governments as an effective approach for incentivizing forest conservation and restoration at different scales. In the agriculture sector, demand-side measures such as shifting to sustainable healthy diets and reducing food loss/waste, and intensification of sustainable agriculture, can reduce emissions and free up land for reforestation and ecosystem restoration. All of these options can have multiple synergies with the SDGs.

International cooperation and initiatives

31. Given the depth, breadth and pace of mitigation action required, an “all of economy, all of society” approach is needed. A wide range of actors, including businesses, cities and other non-state actors have taken on mitigation commitments and actions. Meanwhile, international cooperation takes many forms, and a rapidly growing number of initiatives have been launched, some focused on systemic transformations and many on specific sectors. The IPCC AR6 reported on initiatives focusing on energy efficiency, buildings, transport, renewable energy, forestry, non-CO₂ emissions and agriculture, as well as multi-sectoral initiatives, assessing key actors, scale, mitigation targets, membership, and mitigation potential. However, it is important not to depict these efforts as additional to action within national NDCs,

unless this is clearly established, and rigorous accounting is needed to avoid potential overlaps across and within initiatives.

4. Increasing the consideration of equity can enable greater ambition in mitigation, with tailored approaches addressing different contexts and the impacts of response measures.

32. There are many ways to consider equity (as reflected within the articles of the Paris Agreement) in mitigation, including equitable allocation of carbon space; increasing capacity and availability of options for change; minimizing costs while promoting development, the need for support across finance, technology and capacity-building for developing countries; including stakeholders in decision-making; averting loss and damage to the most vulnerable; enabling just transitions to net zero emissions; and generating criteria for benchmarking NDCs as fair and ambitious. Across all of these considerations, a common thread is that the equitable distribution and scale of action must align with, rather than detract from, the achievement of the Paris Agreement goals.

33. Given the scale of changes, all countries face potential challenges and opportunities. The transformation to low-emissions development will entail distributional consequences within and between countries. Such consequences include shifting of income and employment. While some jobs may be lost, low-emissions development can create opportunities for just transitions that enhance skills and create more jobs in advanced industries that last, with differences across countries and sectors. Global job creation is potentially 3.5 times greater than job losses. Integrated policy packages can improve the ability to address equity, gender equality and justice. Equally, adopting just transition principles and implementing them through collective and participatory decision-making processes is an effective way of integrating equity principles into policies at all scales. Just transitions are thus one way of addressing equity in mitigation.

34. Another way to operationalize equity in mitigation is for Parties to provide clearer information on fairness in their NDCs. All countries are expected to explain how their NDCs are fair and ambitious. The vast majority of countries (98 per cent) have already done so voluntarily, and such information becomes mandatory for second NDCs. However, there is no agreed definition of what is “fair” in the context of NDCs. Many different frameworks and criteria for assessing fairness and ambition exist, but none of them enjoy universal support. Many countries refer to equity in terms of shares of global emissions – whether a small share of total global emissions in absolute terms, per capita, in relation to GDP, or global averages, and several other benchmarks. However, a smaller set of principles of equity have been invoked in the context of a fair approach to effort sharing, including the right to promote sustainable development, inter- and intra-generational equity, harm prevention, precaution and common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

35. Informed approaches can address negative impacts of response measures and promote positive synergies, including through economic diversification. Just transitions need to create decent work and quality jobs. Just transition could be enabled by finding new and creative ways for countries to maximize the potential development outcomes of such transitions across a range of industrial and geographical areas and scales. Economic diversification is one of the strategies to address negative impacts of response measures and promote positive synergies. Options to that end include green industrialization, the greening of supply chains, diversifying to related and unrelated products, and the contribution of sectors such as aviation and shipping.

C. Adaptation, including loss and damage

36. Collective progress on adaptation must undergo a step change in fulfilling the ambition laid out in Article 2, paragraph 1(b)³ and Article 7, paragraph 1⁴, of the Paris Agreement. The ability to adapt to adverse impacts has grown, but it is not yet sufficient to protect communities and ecosystems from increasingly frequent and intense impacts. Evidence from inputs to the TD by organizations supporting adaptation action shows that countries are making modest progress on enhancing adaptive capacity, strengthening resilience and reducing vulnerability; however, their ability to systematically monitor progress towards these aims is limited. Given inadequate progress on mitigation and adaptation, there is greater risk of loss and damage, which is already being observed.

1. **As climate change threatens all countries and communities around the world, increased adaptation action as well as enhanced efforts to avert, minimize and address loss and damage are urgently needed to reduce and respond to increasing impacts, particularly for those who are least prepared for change and least able to recover after disasters.**

37. Increasing impacts as well as loss and damage are being observed and, with projections of increased warming, risks are being compounded and cascading across systems. These impacts will become dramatically worse as temperatures increase further, resulting in some cases in loss and damage. Every 0.1 °C increase of global warming matters. An adequate adaptation response needs to be ensured in the context of the temperature goal referred to in Article 2, paragraph 1(a), of the Paris Agreement. Current and future impacts are expected to be significant and widespread, and are already eroding past development gains and, without adaptation action, will impede the ability for human development gains to be made in the future.

38. A growing body of literature and experiences demonstrates that with adaptation and climate resilient development, the impacts of climate change can be reduced, particularly when these impacts are taken into account within national and local plans and planning processes, yet the design of existing and planned infrastructure, for example, has not often taken into account climate risks. Equally, the costs and barriers to adaptation are significant and, in many cases, growing. Even with adaptation, the residual risks for loss and damage will remain and need to be managed comprehensively. Of great concern is that the capacity of some governments to recover from recent events has been exceeded, and the compounding impacts of repeated events leave very limited residual response capacity. At current global warming levels, loss and damage to human and natural systems has already been observed including, for example, damage to infrastructure, reductions of crop production, heat-induced labour productivity losses, losses due to tropical cyclones, and irreversible losses of species.

39. Adaptation is the responsibility of all governments, at all levels, and each has a role in promoting approaches to develop and utilize climate information relevant to local conditions to enable adaptation action. The most recent IPCC reports (AR6) highlight climate-resilient development, which integrates efforts to build resilience to climate change impacts alongside efforts to reduce GHG emissions and shift development pathways towards increased sustainability. There is acknowledgement in the context of Article 7, paragraph 2, of the Paris Agreement that adaptation is a

³ “Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production”.

⁴ “Parties hereby establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2.”

global challenge faced by all, with local, subnational, national, regional and international dimensions. The Paris Agreement affirms the importance of support for and international cooperation on adaptation efforts, taking into account the needs of developing country Parties.

2. Collectively, there is increasing ambition in plans and commitments for adaptation, but there also remains an implementation gap, in that plans are implemented inadequately, unevenly and incrementally.

Adaptation planning and implementation

40. Many governments are coming forward with diverse portfolios of adaptation actions, policies, and goals, tailored to the national and local adaptation needs. There is extensive action on adaptation reflected in NAPs – well beyond what has been officially communicated.

41. Some 139 developing countries have embarked on the formulation of NAPs although progress on developing and implementing NAPs has been slow, especially among LDCs. Yet there is only modest progress on adaptation and risk management because the implementation of NAPs is at an early stage with limited demonstrable progress. Concerningly, efforts are failing to keep pace with increasing climate impacts and risks and plans on paper are not necessarily being implemented in practice. In addition, there is increased evidence of maladaptation across many sectors and regions as well as broader development decisions that are driving increases in climate-related risks.

42. Parties and non-Party stakeholders need to put in place durable, long-term reforms that integrate climate change risks into all aspects of planning and decision-making. The adaptation cycle can be broken down into an iterative approach for developing durable adaptation actions:

(a) Risk assessment: assessments of climate change induced risks, impacts and vulnerabilities lay the foundation for the planning and subsequent implementation of actions to adapt to these risks and impacts. Of the 80 per cent of Parties that included an adaptation component in their NDCs, 91 per cent describe key climatic changes and how these impacts affect vulnerable sectors and groups (FCCC/PA/CMA/2022/4);

(b) Planning process/mainstreaming: planning for actions that respond and reduce assessed risks from climate change are developed through an inclusive process and instituted in a policy or practice. As of 31 August 2022, at least 84 per cent of Parties have at least one adaptation planning instrument (a plan, strategy, law or policy) in place;⁵

(c) Implementation of adaptation actions: adaptation plans are put into practice either proactively or retroactively in response to climate change impacts. Progress on implementation is taking place across all sectors and regions, but is unevenly distributed with observed adaptation gaps (IPCC AR6 WGII contribution);

(d) Monitoring, evaluating, and learning from progress: adaptation efforts are monitored and evaluated for their effectiveness in reducing risks of climate-related impacts. While monitoring and evaluation of, and learning from, adaptation progress is fundamental for effective, iterative adaptation, the implementation of monitoring and evaluation is currently limited (IPCC AR6 WGII contribution). Indeed, as of August 2021, only around a quarter of countries had a monitoring and evaluation system in place;⁶

⁵ UNEP 2022: Adaptation Gap Report available at <https://www.unep.org/resources/adaptation-gap-report-2022>.

⁶ UNEP 2021: Adaptation Gap Report available at <https://www.unep.org/resources/adaptation-gap-report-2021>.

(e) Iterations: based on information from the monitoring and evaluation phase, further adjustments are needed to the planning processes based on lessons learned.

43. Across the adaptation cycle, progress is being made in mainstreaming climate-related risks into decision-making, but sustained and enhanced action is needed to fully implement NAPs and processes over time towards durable changes that reduce risks equitably. Nevertheless, each stage of the adaptation planning cycle presents opportunities to understand progress, recognize the efforts of developing countries and develop further insights into the role of international cooperation in accelerating and enhancing adaptation action. 57 Parties have submitted adaptation communications that outline their experiences and national efforts on building resilience, including priorities, implementation and support needs, plans and actions.

44. While the adaptation cycle aims to mainstream understanding of the impacts of climate change into policy and planning processes to reduce risks, there remains a residual level of risk for loss and damage. Averting, minimising and addressing loss and damage in the context of sustainable development requires actions across the spectrum of climate policies and sustainable development. There is an urgent need for more knowledge, understanding, support, policy and actions to comprehensively address risks and loss and damage. Doing so comprehensively also requires development policies and actions that reduce vulnerabilities (through poverty eradication, education, biodiversity protection, etc.) and decrease exposures (access to land, infrastructure, etc.). These efforts are also closely related to efforts on disaster recovery post-impact from slow-onset and extreme events and should take into account the extent of economic and non-economic loss and damage. Comprehensive risk management approaches minimize risks to the extent possible, offer opportunities for transferring that risk through climate risk pools and insurance programs, and internalize the risk and respond should an impact occur. There are also significant barriers to access of support for impacted communities, and a need to raise awareness of available sources of support and mobilize resources and technical assistance to those impacted. The Executive Committee for the Warsaw International Mechanism has developed knowledge products and tools for comprehensive risk management and the Santiago Network was recently operationalized to catalyze demand-driven technical assistance to developing countries on approaches to avert, minimize and address loss and damage.

Adaptation and transparency

45. Chapter IV of the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement (decision 18/CMA.1, annex) provides a modality for Parties to voluntarily provide information on their efforts across each stage of the adaptation cycle, and to have this information voluntarily reviewed by the technical expert review teams with the goal of improving reporting. In addition, reports of the Adaptation Committee present diverse methodologies and indicators that can be drawn upon to inform the monitoring and evaluation stage adaptation planning. Nevertheless, there is a need to provide clearer guidance on methodologies and metrics/indicators that are applicable in particular circumstances, including capacity-building on how to use indicators within planning and implementation.

Recognition of adaptation efforts by developing countries

46. Article 7, paragraph 14(a), of the Paris Agreement specifically calls for the GST to recognize the adaptation efforts of developing country Parties. The CMA decided⁷ that the adaptation efforts of developing countries will be recognized in various ways. As inputs to the GST, the CMA requested that the secretariat include information on the efforts of developing country Parties in the synthesis report on the

⁷ Decision 11/CMA.1, section II.

state of adaptation efforts, experience and priorities and also to prepare a report starting in 2020 and every two years thereafter on specific adaptation themes, focusing on relevant lessons learned and good practices in developing country Parties. The CMA further decided that the adaptation efforts of developing country Parties will be recognized during the high-level events of the GST as guided by the high-level committee and further information is expected on how such high-level recognition will be implemented. The CMA also requested that the secretariat prepare a report summarizing the recognition of efforts by developing country Parties, drawing on the inputs to the GST and the discussions at the high-level events.

3. When adaptation is informed and driven by local contexts and priorities, both the adequacy and the effectiveness of adaptation action and support can be enhanced and can promote transformational adaptation.

47. In order to understand the risks faced and to be able to adjust accordingly, decision makers at all levels must continually evaluate the country's particular climate change hazards, exposure and vulnerability. There is no single endpoint where a community can be declared fully resilient, because the contexts and risks for a community change over time. Adaptation planning and implementation entails a continuous process with iterations building on previous actions and experiences, and managing new risks as they are identified, as well as exchanging best practices with other countries and subnational governments.

48. Accordingly, there is no single process or procedure to measure progress in terms of adequacy and/or effectiveness of adaptation and support for adaptation. The adequacy of adaptation actions can be measured in stages and by the degree to which adaptation results in resilience that is sustained over time.

49. In contrast, the amount of international financial support for adaptation can be measured, although the adequacy of such support is limited compared with the scale of needs. Realigning financial flows away from maladaptation towards mainstreaming adaptation into decision-making is also a critical component in scaling up finance for adaptation to effectively support iterative and sustained adaptation actions. Adaptation efforts and support for adaptation can be undermined, or made less effective, through other decisions and circumstances that affect vulnerability and exposure to climate hazards. This underscores the need for systemic capacity-building and comprehensive risk management approaches where the risks from climate change are incorporated in decision-making at all levels.

50. There are abundant opportunities for sectoral adaptation, many of which can be integrated within existing investment or development priorities and processes. Good practices are well documented across a wide range of sectors, addressing a wide range of hazards, and are available to help guide adaptation action. The scientific literature points to various adaptation options and good practices for adapting to specific hazards related to climate change. For example, to adapt to increasing prevalence of drought and dryness, actions range from improvements in water use efficiency to the provision of crop insurance, both of which can bolster resilience; whereas for addressing sea level rise, managing and restoring coastal habitats and ecosystems, providing alternative livelihoods for coastal populations, and enhanced floodwater management are examples of good practices. There are also approaches identified that extend across hazards and sectors, such as advancing ecosystem-based adaptation, nature-based solutions and EWS. In many cases, the options identified and prioritized by Parties broadly correspond to those identified in the scientific literature, although there are gaps and opportunities for further action.

51. A fundamental starting point for enhanced adaptation action is the dissemination of climate information through "climate services" to enable informed adaptation. The knowledge base of observed and projected impacts and risks generated by climate hazards, exposure and vulnerability has increased, with impacts attributed to climate change and key risks identified. Promotion of climate services

needs to be driven by user needs and ambitions rather than by external priorities. There is great need for the expansion of these efforts to reach communities that have historically not had access to climate information. This includes information on assessing and tracking risks, and ways to manage such risks. EWS can help in integrating data collection and are critical for developing risk profiles to support decision-making and help understand transboundary risks more clearly. All countries should have EWS, and some will need support in establishing or enhancing such systems, particularly SIDS and LDCs. National disaster loss databases are being established and strengthened under the Sendai Framework, and this work can improve the collection and utilization of disaster risk data, and support decision-making in many countries, as well as contributing to a composite global picture of the adverse impacts of climate change. Dissemination of top-down information from global systems to local users should be complemented by enhanced information collection to inventory events as well as implementing adaptation efforts from the bottom up. Such information is important in monitoring, evaluation and learning systems.

52. There is evidence and practical examples of locally led climate-resilient development that incorporate the risks of climate change across natural and human systems into adaptation needs assessments and planning. For example, NAPs are increasingly inclusive in terms of disadvantaged groups or people. More adaptation planning and implementation based on local engagement and locally determined priorities that also promotes procedural equity is needed to ensure an adequate response to projected risks and scenarios.

53. Climate change has a greater impact on the world's most vulnerable communities and social groups, whether in developed or developing countries, and exacerbates existing inequalities. For example, women often face higher risks and greater burdens from the impacts of climate change in situations of poverty and due to existing roles, responsibilities and cultural norms. Climate-resilient development is only facilitated by governments at all levels working with communities, civil society, educational bodies, scientific and other institutions, media, investors and businesses; and by developing partnerships with traditionally marginalized groups, including women, youth, indigenous peoples and local communities as well as ethnic and other minority groups. The success of adaptation actions and efforts to address loss and damage critically depends on engagement and support of all levels of government and all relevant stakeholders. Working together, effective adaptation actions can reduce climate risks, which are documented for specific contexts, sectors and regions and cut across systems, while paying attention to integrated, multi-sectoral solutions that address social inequities and differentiate responses based on climate risk.

54. International cooperation can help share experiences in realizing opportunities and overcoming barriers and challenges to implementation of adaptation plans (including NAPs in developing countries) and promote learning from good practices in various contexts. The IPCC and other international scientific bodies provide robust assessments of climate impacts and responses.⁸ Such activities can help shift financial flows towards climate-resilient development and transformational adaptation. International cooperation should also support disaster recovery, including short-term humanitarian response and longer-term recovery where communities are supported in building back better to increase resilience to the impacts of climate change after disasters. A key role for international cooperation is to support capacity-building in order to prepare and implement adaptation plans and to recover from climate-related losses and damages. International initiatives, including non-state actors working on adaptation, can enhance and support systemic transformations. A wide range of

⁸ Decision 3/CMA.4, para. 21: "Invites the Intergovernmental Panel on Climate Change to consider updating its 1994 technical guidelines for assessing climate change impacts and adaptation as part of its seventh assessment cycle, as appropriate."

actors, including communities, local authorities, civil society and many others can help identify activities that require international cooperation and support.

55. More discussion on collective progress towards the global goal on adaptation is needed within the technical assessment phase of the GST, including on efforts across the adaptation cycle, and opportunities and challenges in addressing adaptation within sectors and across contexts. The ongoing Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation aims to inform the first GST. Discussions at TD 1.3 can draw on lessons from that work programme, including the emerging framework for the global goal on adaptation.

4. Support for adaptation and funding arrangements for averting, minimizing and addressing loss and damage can be rapidly scaled up from expanded and innovative sources, and financial flows can be aligned with climate-resilient development to meet needs in different contexts.

56. Across contexts, finance is a critical enabler of adaptation action, yet finance availability and access are limited in almost all cases. Assessment of collective progress on adaptation finds an urgent need to rapidly scaling up finance for adaptation to meet growing needs, in terms of both the amount of funding available and the speed with which funds flow.

57. Public support and finance play a critical role in building the capacities and knowledge needed to develop enabling conditions for building resilience and away from actions that increase exposures and vulnerabilities. Many adaptation actions affect public goods and are not readily commodified and traded, although their impacts on economic development are clear. For example, public financing for infrastructure should consider climate risks and avoid funding infrastructure that increases risks from climate change. While the share of adaptation finance as a percentage of total spend on mitigation and adaptation has increased, it was still only just over a quarter of total finance flows on average in 2019–2020. With increasing flows of climate finance, the amount and effectiveness going to adaptation needs ongoing attention.

58. Public finance for adaptation needs to grow from current levels but, given the breadth and scale of action needed to address the rising risks from climate change, broader financial flows from both the public and private sectors must be aligned with climate-resilient development priorities and needs, and away from maladaptive trends that increase exposure and vulnerability to climate change risks. Such an alignment of financial flows can be enabled by mainstreaming adaptation and including considerations of loss and damage into decision-making and planning at all levels. Mainstreaming climate-resilient development into national and subnational governance and policymaking is necessary for the effective use of limited public finance for adaptation.

59. These efforts can help build enabling conditions that help align investments – domestic and international – and should take into account evolving climate risks. A greater focus on systemic capacity development, beyond mobilizing resources, is needed to create the demand for including adaptation and resilience-building into investment and development plans, as well as to build the technical capacity to support recovery after losses and damages occur. This capacity must be built in a sustainable way within national and subnational institutions. These efforts, particularly when focused on vulnerable and disadvantaged communities, can also raise awareness of available sources of support and thereby increase the mobilization of support to those most in need.

60. A variety of approaches can increase the effectiveness of support for adaptation. Standardized approaches to grant funding can enhance the ability of developing countries, including those with limited capacity, to gain access to needed funds with the urgency required to adapt. Financial institutions' procedures for providing adaptation finance should prioritize the timely provision of funds to those

that need them the most while also ensuring that the support is used most effectively. Technology, innovation and technical assistance are increasingly important needs for building capacity on and tracking loss and damage, while international cooperation on technology development and transfer remains important.

61. Ongoing discussions by Parties, including through a Transitional Committee established in Sharm el-Sheikh are focusing on new funding arrangements for assisting developing countries that are particularly vulnerable to the adverse effects of climate change, in responding to loss and damage, and a fund for responding to loss and damage, as well as on existing efforts, including on climate risk pooling, EWS, and support for humanitarian response and disaster risk reduction. These discussions are indicating a wide range of relevant sources for support to efforts related to averting, minimizing and addressing loss and damage. The establishment of the Santiago Network also provides opportunities for enhancing the technical capacities of developing countries in responding to loss and damage. Against the reality that the capacities of some governments are already being exceeded, it is essential to develop a common understanding between donors and recipients of the activities needed to avert, minimize and address loss and damage for which finance is required to unlock collective progress on this issue.

D. Means of implementation and support

62. Our reflections on the means of implementation and support comprise three parts: finance, technology and capacity-building. In addition to reflections specific to each, it is important to note that these three parts function together as multiple levers of support. Capacity, technology and finance need to work together for implementing actions across mitigation, adaptation and loss and damage. Funding for technologies may support mitigation or adaptation, or both. Implementation of technologies without the requisite institutional and human capacity will not be effective. In the light of the need to dramatically scale and speed up climate action in all sectors and geographies, a more strategic, coherent and integrated approach is required to ensure the mobilization of and access to finance, technology and capacity-building support needed.

1. Scaling up and aligning global financial flows for climate action in line with the Paris Agreement goals entails unlocking trillions of dollars to support the global transition, critically through the strategic use of public international finance which remains a prime enabler for action in developing countries.

63. There is progress in mobilizing funding and in aligning public and private financial flows, yet critical gaps remain: public funding remains inadequate to address the needs of developing countries while private investment and broader financial flows are not shifting fast enough to support to lowering GHG emissions and increasing climate-resilient development. Implementation and ambition in terms of both making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development⁹ and providing and mobilizing scaled-up financial resources from a wide variety of sources, instruments and channels,¹⁰ are below estimates of the finance and investments needed for mitigation and adaptation commensurate with limiting global warming to the Paris Agreement temperature goal, and for adaptation consistent with projected temperature outcomes at that or higher global warming levels.

64. Assessments by the SCF¹¹ show the general increasing trends in global flows of finance for climate action, reaching an annual average of USD 803 billion in 2019–

⁹ Article 2, para. 1(c), of the Paris Agreement: “Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.”

¹⁰ Article 9, paras. 3–4, of the Paris Agreement; decision 19/CMA.1, para. 36(d).

¹¹ <https://unfccc.int/topics/climate-finance/resources/biennial-assessment-and-overview-of->

2020, which is 31–32 per cent of the annual investment needed to follow global modelling mitigation pathways consistent with the 2 °C or 1.5 °C global temperature rise. The growth in flows of finance are being driven by an increasing number of mitigation actions in buildings and infrastructure and in sustainable transport, as well as by growth in adaptation finance. However, existing flows are small in comparison with the overall needs of developing countries. The SCF reports that most finance flows go to mitigation, with the share for adaptation increasing from 20 per cent (USD 6.4 billion) in 2017–2018 to 28 per cent (USD 8.9 billion) by 2019–2020. Many investments still support infrastructure that locks-in high emissions (e.g. USD 892 billion annual average investment in fossil fuels, plus USD 450 billion in subsidies in 2019–2020) or is not designed for resilience to climate impacts.

65. The SCF assessment also highlights increasing public climate finance flows from developed to developing countries. However, the collective goal of developed countries jointly mobilizing USD 100 billion per year by 2020 to address the needs of developing countries in the context of meaningful mitigation action and transparency on implementation was not fully met in 2020. Since then, the OECD report series¹² noted mobilization of USD 83.3 billion in 2020. Information obtained from bottom-up needs assessments from developing country Parties highlights the need, when mobilizing additional climate finance, to support efforts to pursue ambitious adaptation and mitigation pathways. The SCF has highlighted the limitations on assessing collective progress on climate finance and continues to identify specific actions required to address methodological and data limitations, as well as the need for enhanced reporting on climate finance. Developing countries should identify activities to be funded more clearly and improve costing of needs in relation to mitigation and adaptation as well as for averting, minimizing and addressing loss and damage. Furthermore, considering recent trends of increasing proportions of funding being allocated for adaptation, expanding the envelope of total finance could achieve greater balance between mitigation and adaptation funding. Funding arrangements to support efforts related to averting, minimizing and addressing loss and damage will also need to be enhanced and scaled up to meet rising needs.

66. There is a need to address the significant funding and investment gaps and misaligned flows that remain. Through the NDCs, NAPs and adaptation communications submitted, Parties have indicated actions and priorities for which financial investments and support are needed. The policy and broader enabling environment, as well as the availability of effective instruments for de-risking investments and create pipelines of investable products for adaptation and mitigation, require greater attention, particularly in developing countries. In order to close finance gaps, private and public, domestic and international climate finance will need to fund activities towards mitigation and adaptation aligned with the goals of the Paris Agreement and to halt and repurpose funds activities that are not aligned.

67. Global and domestic capital markets are likely to be the primary source for scaling up investment in mitigation, while public finance may be deployed to high-impact investments and to crowd-in private sector finance. In terms of mitigation, scaling up green investments, shifting incentives away from high-emission activities and financing transitions are needed, globally; how this will be applied will differ by context. Access to capital is much more expensive in developing countries, reflecting perceived cross-border investment risks and international capital market inefficiencies. Debt and the costs of servicing debt take up a large share of some developing country budgets. Governance and monetary reforms more broadly can enable additional financial flows.

68. The scale of investment required towards development pathways consistent with the goals of the Paris Agreement highlights the need for a transformation of the

[climate-finance-flows](#)

¹² <https://www.oecd.org/climate-change/finance-usd-100-billion-goal>.

financial system and its structures and processes, through engaging governments, central banks, commercial banks, institutional investors and other financial actors. For example, the need for fundamental reforms to MDBs and other IFIs has been identified for increasing concessional finance and scaling up action on mitigation and adaptation in line with achieving the objectives of the Paris Agreement.

69. Momentum behind more fundamental and impactful reforms of public financial institutions or possible new institutional arrangements is growing and more significant actions are beginning to make these institutions more aligned with achieving the goals of the Paris Agreement and more capable of addressing climate change in the context of sustainable development through options such as new mandates to existing institutions, innovative instruments and financing of just transitions across diverse contexts.

2. Achieving systemic transformations in pursuit of the 1.5 °C degree goal requires rapid deployment and adoption of cleaner technologies and accelerated innovation and development of new technologies, with growing access to these supported by appropriate enabling frameworks and international cooperation.

70. The uneven pace of global adoption of climate technologies reflects broader patterns of development, with developing countries historically having less access to opportunities to deploy technologies and possessing less capability to develop new technologies. Promoting international cooperation on technology development and transfer and innovation, between countries or regions and involving governments, the private sector, academia and research institutions and other stakeholders is crucial for knowledge-sharing, ownership, acceptance of technologies, and accelerating innovation.

71. Established processes and mechanisms on technology under the Convention, such as the Technology Mechanism, contribute to facilitating international cooperation on technology through capacity-building, knowledge-sharing, and technical and financial support to aid developing countries in their efforts to develop, adopt and deploy climate technologies. These processes and mechanisms represent the tip of the iceberg of what is needed if we are to achieve rapid systemic transformation that is aligned with achieving the goals of the Paris Agreement. Much more intensive efforts to support cooperation and innovation are essential throughout the technology cycle and across all sectors and geographies, building on existing platforms and including those that incubate small to medium-sized enterprises specializing in climate action and technology initiatives and accelerators of progress in key climate technology priorities.

72. Reductions in costs for some key technologies should enable greater deployment in all geographies, particularly in developing countries, while the need to continue to drive down costs is essential to displace high-emissions incumbent technologies. Technology development has already led to tremendous reductions in costs. The unit costs of some technologies have reduced by up to 80 per cent. Continuing to drive down these costs and those of other key technologies will be a deciding factor for whether the goals of the Paris Agreement are met.

73. Collaborative approaches to climate technology research, development and demonstration are crucial for deploying mature climate technologies and developing emerging technologies on a large scale. International collaboration, particularly in developing countries, can strengthen learning on successful climate technology initiatives, with the aim of increasing access to new and existing technologies and driving down costs. Collaborative approaches can also foster sharing of innovations in new technologies that are relevant to developing country contexts; facilitate flexible and evolving participation by countries in line with their national needs and capacities; stimulate private sector participation; and place technological research, development and demonstration in a broader ecosystem-level context (focusing on

technology hardware, software and orgware, i.e. the organizational concepts and regulations that underpin the uses of technologies). Such approaches can include investments in technology development and transfer through joint research and development programmes and capacity-building.

74. Enabling environments, such as appropriate policies, institutional arrangements, and regulatory frameworks, are needed to accelerate technology deployment, foster technological innovation (including endogenous innovation), and push innovations to the implementation stage, all the while ensuring inclusive multi-stakeholder engagement and access to financial support and capacity-building.

75. There is a need for further research and development of technologies in all sectors, but particularly in “hard to abate” sectors and in technologies that are required to achieve net zero emissions by 2050 and to address overshooting in emission pathways in pursuit of the 1.5 °C temperature goal. Equally, it is important to focus research on reducing emissions and strengthening resilience, while also enhancing economic competitiveness and diversification, particularly in developing countries.

3. Capacity-building is foundational to achieve broad-reaching and sustained climate action and requires country-led and needs-based effective cooperation to ensure capacities are enhanced and retained over time at all levels.

76. The fundamental challenge that climate change presents means the capacity to act and to cope must be strengthened in all countries, but particularly in developing countries, where the underlying institutional and foundational capacities are less developed, and the risks and vulnerabilities can be much greater.

77. Capacity-building invariably entails investing in the existing underlying social and economic systems, such as education and health. There is a need for developed countries to increase the level of support provided for strategic capacity-building to developing countries to address locally determined needs.

78. Progress on capacity-building underpins progress elsewhere. Indicators of progress on capacity-building are difficult to monitor (unlike others on dollars spent, emissions reduced, etc.), but emphasizing capacity-building within international cooperation can unlock greater progress in other areas.

79. Needs-based approaches to capacity-building involve taking a systematic approach to determining the priority capacities required to move forward in terms of implementing the key instruments of the Paris Agreement (e.g. NDCs, NAPs, LT-LEDS) and achieving the goals contained therein. Strengthening capacities, particularly at the institutional level, is a priority for developing countries. Country ownership of the development of capacity-building interventions is fundamental to ensure the actual and most pressing capacity needs and gaps are addressed. The need for capacity-building for accessing support is particularly evident, including for supporting the development and implementation of climate initiatives for mitigation and adaptation. Such support will also facilitate further private sector investment in solutions in developing countries.

80. There is also significant added value from engaging national and local actors in the provision of capacity-building support, for example through universities, research organizations, civil society organizations and even the private sector. Delivery of capacity-building through local actors and institutions can have the dual benefit of increasing institutional capacity while also increasing the skills base for specific aspects of climate action. Capacity-building based on indigenous and other traditional knowledge systems also presents opportunities for more sustainable avenues to long-term capacity development.

81. Greater coherence and coordination of support will help ensure that needs are being met and will enhance effectiveness. Making international cooperation on capacity-building more effective and impactful is key. It would be useful to further

elaborate upon the options for strengthening international cooperation on capacity-building at TD1.3.

E. Integrated and holistic approaches

1. The Convention and the Paris Agreement are processes that set norms which drive policy outcomes to increase international cooperation on climate, within and beyond the processes themselves.

82. The Convention and the Paris Agreement are the foundations of international cooperation on climate action across all topics. Significant progress has been made through the UNFCCC process, since its inception more than 30 years ago, as evidenced by the significant shifts in expectations of global temperature increase that has resulted from collective progress at major multilateral moments. At the adoption of the Cancun Agreements in 2010 the expected global temperature increase in 2100 was 3.7–4.8 °C.¹³ In 2015, with the adoption of the Paris Agreement and commitments made through INDCs, the expected global warming reduced to 3.0–3.2 °C.¹⁴ Further progress has been made under the Paris Agreement, as updated NDCs and long-term plans were announced. By COP 26 in 2021 a global temperature increase of 2.6–2.7 °C in 2100 was expected.¹⁵ The Glasgow Climate Pact urged Parties that had not yet communicated new or updated NDCs to do so as soon as possible and to revisit and strengthen their 2030 targets to align with the global temperature goal. With further announcements in 2022 (COP 27) expected temperatures were reduced further, to 2.4–2.6 °C¹⁶ with the possibility of 1.7–2.1 °C when taking into account the full implementation of long-term net zero targets¹⁷. Yet although this progress is significant, more needs to be done inside and outside the United Nations climate process to accelerate action and support.

83. Nevertheless, the catalytic role of the United Nations climate process will be vital in the years ahead, as ambitious and equitable climate action is increasingly integrated into major economic and social policy domains globally, and as the imperative to deliver transformative outcomes in all sectors becomes more apparent and urgent. The United Nations climate process provides an important platform for catalysing implementation, sets norms in terms of transparency and accountability, and is an essential basis for international cooperation among States and with non-State actors.

84. The GST can support Parties in building mutual trust and understanding to deliver increasing levels of ambition to achieve the global goals. The GST is also enhanced by drawing on the findings and outcomes from the ongoing work of the constituted bodies as they focused on particular elements of climate action as well as other processes and work programmes under the subsidiary bodies (e.g. the Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation, the mitigation work programme, the new collective quantified goal on climate finance, the Glasgow Dialogue, the just transition work programme). Conversely, the GST outputs (including the upcoming TD factual synthesis report) and outcome can inform these other processes and their outcomes and outputs, and hence accelerate implementation of climate action and support. Continued support and engagement in the activities of

¹³ IPCC. 2018: Climate Change 2014: Synthesis Report Summary for Policymakers, p.20. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf

¹⁴ UNEP. 2016: Emissions Gap Report 2016, p.Xvii. Available at <https://www.unep.org/resources/emissions-gap-report-2016>.

¹⁵ UNEP. 2021. Emissions Gap Report 2021, p.XXVI. Available at <https://www.unep.org/resources/emissions-gap-report-2021>.

¹⁶ UNEP. 2022. Emissions Gap Report 2022, p.XVI. Available at <https://www.unep.org/resources/emissions-gap-report-2022>

¹⁷ Ibid, p.XXI, table 4.5.

the constituted bodies and work programmes can enable more lasting and robust policy outcomes.

85. Clear information and transparency are foundational elements of the Paris Agreement. Transparency can enable greater ambition by building trust and confidence that countries are doing what they pledged to do. Reporting should also respond to domestic information and policy needs and, in doing so, can provide an information base for national climate change policies. The first biennial transparency reports are due in 2024, and these and future reports will provide an enhanced information base for future GSTs. Furthermore, as Parties prepare their next NDCs, to be communicated in 2025, the information on clarity, transparency and understanding will include how a Party's preparation of its NDC has been informed by the outcomes of the GST.

86. While the focus of the GST and other processes is necessarily on Parties, the GST has been enhanced by engaging with a wide range of stakeholders from many different contexts. Other processes and bodies under the Paris Agreement could benefit from greater engagement with non-Party stakeholders to ensure that outcomes and products are based on real world experiences from a diversity of viewpoints (see paragraphs 114–115 below).

2. Governments should implement integrated policy packages that mainstream climate resilience and low GHG development and strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty.

87. Shifting to development pathways that are more climate resilient and result in low GHG emissions requires enabling conditions to be put in place in ways that respond to the relevant contexts. Each country charts its own pathway towards achieving the SDGs and the collective goals of the Paris Agreement with the result that transitions are context sensitive and the associated integrated policy packages differ to reflect this context and particular national circumstances. For example, synergies within policy responses for climate-resilient and low-emissions development should be undertaken in a manner that does not threaten food production, as stated in Article 2, paragraph 1(b), of the Paris Agreement.

88. The IPCC AR6 identifies global enabling conditions including political commitment and follow-through policies, social and international cooperation, ecosystem stewardship, inclusive governance, innovation, monitoring and evaluation, and rapidly scaled up access to adequate financial resources. Strengthening such enabling conditions should be done immediately, while understanding that some actions will yield results quickly and others set up transformational change, which takes time.

89. Further discussions on integrated policy solutions and opportunities to address particular contexts will be explored at TD1.3 with the aim to better understand how climate action and support can be enhanced to face real-world challenges and constraints

3. Systemic transformations open huge opportunities but are disruptive. A focus on inclusion and equity can increase ambition in climate action and support when it builds trust and solidarity into an upward spiral of ambition and climate action.

90. Systemic transformations will entail broad and rapid action and can present an unprecedented opportunity for developing socially and economically while reducing impacts on the natural environment. Currently, as the IPCC AR6 noted lifetime emissions from existing and planned fossil fuel infrastructure will exceed estimates for keeping 1.5 °C within reach. Shifting from this status quo and pursuing rapid change will inevitably be disruptive, and this underlines the need for solidarity and just transition at the international and national level. The impacts of climate change

are also likely to become more disruptive, and transformative adaptation can imply broad changes in existing practices. Carefully designed, climate action can generate significant social and economic progress and benefits, including health, education and employment.

91. Climate action should be informed by many dimensions of equity to enable ambition to increase the likelihood of meeting the goals of the Paris Agreement. Such dimensions include just transitions, sustainable development, environmental protection, poverty eradication and human rights. Current and historical contexts within and across nations remain potent factors in the ability to make progress on climate goals. The global nature of the necessary transformation means that no one will be able to avoid taking action and that no one should be left behind. Yet context matters: how actions are implemented, what are the constraints in capacity to act, and where support is needed must all be considered. Climate change affects everyone, but it does not impact everyone equally.

92. Inclusivity matters and those most affected by climate impacts should be involved in crafting solutions. Throughout the technical dialogue, participants have emphasized the importance of inclusivity and collaboration, and have underlined how including all stakeholders from the outset is vital for deeper, broader and faster climate actions, and support. Actors in civil society, businesses, youth, women, labour, media, indigenous peoples, and local communities can help to build consensus for effective adaptation in different contexts.

93. Governments should engage with vulnerable communities and social groups to reduce the risks stemming from climate change and to make them part of the solutions in taking mitigation and adaptation action. Such engagement can have benefits that go beyond climate change, such as environmental conservation, poverty reduction, and achieving the SDGs.

4. Non-Party stakeholder actions can strengthen efforts for systemic transformations.

94. Non-Party stakeholders can increasingly support Parties in implementing the Paris Agreement, and in enabling countries to implement national plans. Climate action and support can be further enhanced through catalysing action by all, including all levels of government, all actors in the private sector, all civil society organizations, and all of the constituencies of the United Nations system. Inclusive cooperation across all fronts contributes to ambitious and equitable outcomes. Initiatives by non-Party stakeholders can strengthen efforts for systemic transformations, investing and transitions from high- to low-emissions emissions and climate-resilient development. In order to do so across all contexts, initiatives by non-Party stakeholders should endeavour to also include and support stakeholders from LDCs, SIDS and other developing countries and indigenous peoples, so that they can all effectively participate in and contribute to these initiatives.

95. Participants have underlined the need for accountability and rigorous accounting on the status of actions and commitments that have been made through non-Party stakeholder initiatives. Greater transparency is required on the progress these initiatives are delivering on their climate actions, focusing on the growing number of international initiatives. Good practices in accounting should be utilized by non-Party stakeholder actions across all topics. There is an opportunity to address this need when following up and implementing the recommendations of the United Nations Secretary-General High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, while applying good practice similarly in international cooperation on adaptation, loss and damage, finance, innovation on cooperation and capacity.

5. While nations continue to pursue efforts to limit the global temperature increase to 1.5 °C above pre-industrial levels, and overshoot increases risks to people and planet, we need to plan pragmatically for scenarios of temporary overshoot.

96. The Paris Agreement global temperature goal is to hold the increase in global average temperature to well below 2 °C above pre-industrial levels and pursue efforts to limit the increase to 1.5 °C above pre-industrial levels. IPCC assessment reports tell us that average global surface temperatures will likely increase by more than 1.5 °C in the near term (2021–2040) without deep, rapid and sustained mitigation action. It remains possible that future, more ambitious emission reductions and actions to remove CO₂ from the atmosphere may allow for the return of temperatures to or below this threshold. Such a trajectory is termed an overshoot pathway in the IPCC and other scientific literature. Current emission reduction policies put us on track for warming of 2.2–3.5 °C by the end of the century, and there are relatively few modelled global mitigation pathways with an even chance of limiting warming to 1.5 °C with limited to no overshoot.

97. Limiting warming to the Paris Agreement global temperature goal “would significantly reduce the risks and impacts of climate change”, and the IPCC clearly points to the increased risks to human and natural systems of these overshoot pathways. Impacts will increase for every 0.1 °C of global warming. Projected impacts will exceed hard limits to adaptation, primarily in natural systems. Some impacts will be irreversible as temperatures increase beyond 1.5 °C. The scale and duration of overshoot matters: higher levels of warming before temperatures decrease will mean further costs related to more ambitious GHG emission reductions and enhanced removals of CO₂, adaptation planning, and responding to loss and damage, but work on understanding specific overshoot scenarios in policy and scientific discussions is only at the very early stages.

98. Managing the implications of a potential overshoot is important, given the implications for mitigation, adaptation, loss and damage, and means of implementation and support. Planning for temporary overshoot should not imply a lack of commitment to pursuing efforts to limit warming to 1.5 °C without overshoot. Indeed, many of the pragmatic near-term steps to prepare for overshoot are the same as those efforts to limit warming to 1.5 °C. The aim of limiting overshoot requires more ambitious near-term reductions by 2030, and steeper reductions after 2030. Collectively, we need to increase mitigation ambition with the aim of reaching net zero emissions by 2050 globally. For example, even in 1.5 °C scenarios with limited to no overshoot, some measures on CO₂ removal will likely be needed to balance the remaining residual emissions from hard-to-abate sectors.

99. Regarding adaptation, efforts on adaptation such as enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change will still need to become more transformative. More information is needed on which impacts are reversible and which are irreversible. Action needs to be taken to avoid tipping points, some of which have been raised in our dialogue, such as glacier melt, melting permafrost thaw (which risks releasing large amounts of methane), forest die-back and others. and greater adaptation needs will imply greater adaptation costs. Significantly, during the period of overshoot, managing risks of economic and non-economic loss and damage will be important. For overshoot scenarios, the costs and risks associated with large scale CO₂ removal will need to be weighed against the benefits from avoided adaptation and loss and damage costs associated with higher temperatures.