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Technical dialogue of the first global stocktake

Synthesis report by the co-facilitators on the technical dialogue

Summary

This synthesis report on the technical dialogue of the first global stocktake is based on inputs received throughout the process and discussions held during each of the three meetings of the technical dialogue and serves as an overarching and factual resource that provides a comprehensive overview of discussions held during the technical dialogue, identifying key areas for further action to bridge gaps and addressing challenges and barriers in the implementation of the Paris Agreement. It provides an assessment of the collective progress towards achieving the purpose and long-term goals of the Paris Agreement and informs Parties about potential areas for updating and enhancing their action and support, as well as for enhancing international cooperation for climate action.



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Abbreviations and acronyms

AFOLU	agriculture, forestry and other land use
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BA	biennial assessment and overview of climate finance flows
BTR	biennial transparency report
CH ₄	methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COP	Conference of the Parties
GEF	Global Environment Facility
GGA	global goal on adaptation
GHG	greenhouse gas
GST	global stocktake
INDC	intended nationally determined contribution
IPCC	Intergovernmental Panel on Climate Change
LT-LEDS	long-term low-emission development strategy(ies)
NAP	national adaptation plan
NDC	nationally determined contribution
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SB	sessions of the subsidiary bodies
SCF	Standing Committee on Finance
SDG	Sustainable Development Goal
TD*	technical dialogue
Transitional Committee	transitional committee on the operationalization of the new funding arrangements for responding to loss and damage and the fund established in paragraph 3 of decisions 2/CP.27 and 2/CMA.4
TNA	technology needs assessment
UNEP	United Nations Environment Programme

* TD1.1, TD1.2 and TD1.3 refer to specific meetings of the technical dialogue of the first global stocktake.

I. Executive summary

A. Context¹

1. **Key finding 1: since its adoption, the Paris Agreement has driven near-universal climate action by setting goals and sending signals to the world regarding the urgency of responding to the climate crisis. While action is proceeding, much more is needed now on all fronts.**

2. There is broad global commitment to the Paris Agreement and its central role in catalysing the cooperative action needed to address the climate crisis, and it has inspired significant progress in global mitigation and adaptation action and support. Against forecasts made prior to its adoption, the Paris Agreement has led to contributions that significantly reduce forecasts of future warming, yet the world is not on track to meet the long-term goals of the Paris Agreement. Participants in the TD of the first GST noted challenges and barriers across all topics discussed thereunder. The discussions also highlighted existing and emerging opportunities and creative solutions for bridging gaps. Now is the time to rapidly accelerate action and support to make progress in this critical decade.

3. **Key finding 2: to strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty, governments need to support systems transformations that mainstream climate resilience and low GHG emissions development. Credible, accountable and transparent actions by non-Party stakeholders are needed to strengthen efforts for systems transformations.**

4. Accelerating action on climate change is crucial for achieving sustainable development. Policies and measures that promote climate resilience and low GHG emission development can be made mutually supportive through whole-of-society approaches and integrated, inclusive policymaking. Progress has been made under the Paris Agreement towards preparing and communicating new and updated NDCs. Efforts to continue this progress must be sustained over decades, building on progress made in every cycle of NDCs and in the GST.

5. Climate action and support are enhanced by catalysing action by all Parties and non-Party stakeholders, including civil society, the private sector, financial institutions, cities and other subnational authorities, local communities and Indigenous Peoples. The implementation of pledges and actions by non-Party stakeholders strengthens Parties' efforts to support systems transformations. Rigorous accounting and accountability are needed to lend credence to their contributions, track progress with environmental integrity and avoid double counting. Initiatives by non-Party stakeholders should also include and support stakeholders and groups that are often marginalized, including women, youth and Indigenous Peoples, so that everyone can effectively participate in and contribute to these efforts.

6. **Key finding 3: systems transformations open up many opportunities, but rapid change can be disruptive. A focus on inclusion and equity can increase ambition in climate action and support.**

7. Reaching net zero emissions by or around mid-century and implementing concurrent transformative adaptation requires broad and rapid changes in existing practices. Carefully designed climate action can generate significant benefits and can help to minimize disruptions by taking a whole-of-society approach informed by local context. Equity should enable greater ambition and increase the likelihood of meeting the goals of the Paris Agreement. Those most affected by climate impacts should be involved in crafting solutions.

8. For more information on key findings 1–3, see chapter IV.A below.

¹ The headings in this report are solely intended to assist in navigating the document.

B. Mitigation, including response measures

9. **Key finding 4: global 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 in order to limit warming to 1.5 °C above pre-industrial levels.**

10. All Parties to the Paris Agreement have communicated NDCs that include mitigation targets and/or measures. A growing number of Parties have also communicated LT-LEDS. Emissions gaps are the difference between the emission levels implied by the NDCs and the average emission levels of global modelled mitigation pathways consistent with limiting warming to 1.5 °C or 2 °C. Implementation gaps refer to how far currently enacted policies and actions fall short of reaching stated targets. Based on current NDCs, the gap to emissions consistent with limiting warming to 1.5 °C in 2030 is estimated to be 20.3–23.9 Gt CO₂ eq.²

11. Action is needed to increase both the mitigation ambition of NDCs and the implementation of measures to achieve their targets. Trends in historical and ongoing GHG emissions provide important information to understand the current situation, how it came to be, and how it can inform future action.

12. At COP 21 in Paris, Parties agreed to aim to reach global peaking of GHG emissions as soon as possible, recognizing that peaking will take longer for developing country Parties. According to the IPCC AR6, global GHG emissions need to peak between 2020 and 2025 to limit warming to the Paris Agreement temperature goal. Emissions have peaked in developed and some developing countries, but global emissions have not yet peaked. All Parties need to undertake rapid and deep reductions in GHG emissions in the decades after peaking.³

13. **Key finding 5: much more ambition in action and support is needed in implementing domestic mitigation measures and setting more ambitious targets in NDCs to realize existing and emerging opportunities across contexts, in order to reduce global GHG emissions by 43 per cent by 2030 and further by 60 per cent by 2035 compared with 2019 levels and reach net zero CO₂ emissions by 2050 globally.**

14. **Urgent action and support are needed to ramp up implementation of domestic mitigation measures by realizing opportunities across all sectors and systems.** There are now sufficient cost-effective opportunities to address the 2030 emissions gap, yet significant challenges, including access to and availability of support, remain in harnessing these opportunities at the required pace and scale. If fully implemented and supported, realizing such opportunities can raise ambition to substantially reduce net GHG emissions by 2030. Creativity and innovation in policymaking and international cooperation is essential.

15. **More ambitious mitigation targets in NDCs are needed to reduce emissions more rapidly, and to align with each country's LT-LEDS towards just transitions to net zero emissions by or around 2050, while enhanced transparency can help track progress.** The Paris Agreement provides for the progression, including by stating the expectation that each Party's successive NDCs will represent its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances, and will be informed by the outcomes of the GST. Progression may involve, among other options, more rapid reductions through adopting more stringent targets and more comprehensive forms of targets. The Paris Agreement stipulates that developed country Parties should continue taking the lead by undertaking absolute economy-wide emission reduction targets and that developing country Parties should continue enhancing their mitigation efforts and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances. As Parties formulate and communicate their LT-LEDS that chart just transitions towards net zero emissions by or around mid-century, tailored to different national circumstances, they should begin to implement concrete measures to shift to such pathways.

16. **Mitigation measures that successfully deliver on other sustainable development goals can be scaled up and replicated across different contexts.** The sustainable

² FCCC/PA/CMA/2022/4.

³ See paras. 97–98 below.

development benefits of implementing mitigation measures are very important in broadening and deepening these measures, in particular when they also address poverty eradication.

17. **Key finding 6: achieving net zero CO₂ and GHG emissions requires systems transformations across all sectors and contexts, including scaling up renewable energy while phasing out all unabated fossil fuels, ending deforestation, reducing non-CO₂ emissions and implementing both supply- and demand-side measures.**

18. While the timing of achieving net zero emissions will vary by country, all countries need to adopt a whole-of-society approach to charting pathways to net zero CO₂ or GHG emissions. Many mitigation actions can have co-benefits and help to achieve SDGs.

19. **Scaling up renewable energy and phasing out all unabated fossil fuels are indispensable elements of just energy transitions to net zero emissions.** Electrification, energy efficiency and demand-side management, as well as energy storage, are also important elements in net zero energy systems.⁴

20. **Measures to implement systems transformations in industry, transport, buildings and other sectors must rapidly reduce process and energy emissions.** Ambitious implementation of measures to address GHG emissions from industry, transport, buildings and other sectors can reduce emissions in those sectors and across their supply chains while reducing costs and delivering co-benefits.

21. **Halting and reversing deforestation and degradation and improving agricultural practices are critical to reducing emissions and conserving and enhancing carbon sinks.** Halting and reversing deforestation by 2030 and restoring and protecting natural ecosystems will result in large-scale CO₂ absorption and co-benefits. Demand-side measures in agriculture and intensification of sustainable agriculture, without further land expansion, are essential and catalyse widespread sustainable development benefits.

22. **More effective international cooperation and credible initiatives can contribute to bridging emissions and implementation gaps.** A rigorous “all of economy, all of society” approach is needed across all systems and sectors. In addition, more effective international cooperation involving non-Party stakeholders is critically important in supporting countries’ efforts to accelerate progress.

23. **Key finding 7: just transitions can support more robust and equitable mitigation outcomes, with tailored approaches addressing different contexts.**

24. The concept of equity is complex and multidimensional. In discussions at the first TD, diverse views were expressed on dimensions of equity in mitigation. A common thread was that equity should align with an upward spiral of ambition in implementing the Paris Agreement.⁵

25. Just transition principles can be adopted and implemented through collective and participatory decision-making processes to reduce the disruptive consequences of rapid systems transformations.

26. **Key finding 8: economic diversification is a key strategy to address the impacts of response measures, with various options that can be applied in different contexts.**

27. Informed approaches can address negative impacts of response measures and promote positive synergies within LT-LEDS, including through economic diversification. Economic diversification is one of the strategies to address negative impacts of response measures and promote positive synergies. Opportunities for such diversification include green industrialization, the greening of supply chains and diversifying to related and unrelated products.

28. For more information on key findings 4–8, see chapter IV.B below.

⁴ See paras. 116–121 below.

⁵ See para. 132 below.

C. Adaptation, including loss and damage

29. **Key finding 9: as climate change threatens all countries, communities and people 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 from disasters.**

30. Collective progress on adaptation and loss and damage must undergo a step change in fulfilling the ambition set out in the Paris Agreement. There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all. Losses and damages to human and natural systems have already been observed. Climate impacts are eroding past human development gains and, without sufficient adaptation action, will impede the ability to make such gains in the future. Adaptation is the responsibility of all governments, at all levels, yet capacity to recover is undermined by repeated extreme climate events.

31. **Key finding 10: collectively, there is increasing ambition in plans and commitments for adaptation action and support, but most observed adaptation efforts are fragmented, incremental, sector-specific and unequally distributed across regions.**

32. **Adaptation planning is the first step in an iterative cycle to enable moving swiftly from understanding risks to more ambitious and effective adaptation action and support, the implementation of which must now be accelerated to increase adaptive capacity, support greater resilience gains and reduce vulnerability.** Parties and non-Party stakeholders need to put in place durable, long-term reforms that integrate climate change risks into all aspects of planning, decision-making and implementation. Across the adaptation cycle, progress is being made in mainstreaming climate-related risks in decision-making. However, sustained and enhanced action is needed to fully implement NAPs and planning processes over time towards implementing durable changes that reduce risks equitably for the most vulnerable. Each iteration of the adaptation cycle presents opportunities to understand progress and strengthen efforts on the basis of experience. Each stage of the adaptation cycle also provides opportunities to recognize the efforts of developing countries internationally and to explore enhanced and accelerated international cooperation on adaptation action.

33. **Transparent reporting on adaptation can facilitate and enhance understanding, implementation and international cooperation.** Parties have submitted adaptation communications as a component of, or in conjunction with, NAPs, NDCs or national communications that outline their experience and national efforts in building resilience, including priorities, implementation, and support needs, plans and actions. There is extensive action and support on adaptation well beyond what has been reflected in submitted adaptation communications. Parties should consider reflecting their progress in mainstreaming the adaptation cycle to undertake more ambitious adaptation actions when periodically updating these communications. Work on NAPs is proceeding and many governments are mainstreaming adaptation and resilience in their NAPs and planning processes. In comparison with previous NDCs, more of the NDCs submitted in 2022 contained adaptation information, and Parties are able to also voluntarily include information on climate impacts and adaptation progress in BTRs.

34. Diverse methodologies and indicators can be drawn upon to inform the understanding of progress towards the GGA. Their continued development is essential to monitoring and evaluating efforts across adaptation planning and implementation. In drawing on these developments and defining the framework of the GGA, a more comprehensive assessment of collective progress towards the GGA should be possible during the second GST.

35. **Adaptation efforts by developing countries are being recognized and will receive further recognition during high-level events at CMA 5.** The adaptation efforts of developing country Parties have been recognized in various ways.⁶

⁶ See para. 150 below.

36. **Key finding 11: when adaptation is informed and driven by local contexts, populations and priorities, both the adequacy and the effectiveness of adaptation action and support are enhanced, and this can also promote transformational adaptation.**

37. Transformational approaches to adaptation generate new options for adapting to the impacts and risks of climate change by changing the fundamental attributes of systems.

38. **There are opportunities for adaptation across systems and sectors, many of which have been mainstreamed into existing development priorities and processes.** Good practices are well documented across a wide range of sectors and themes, addressing a wide range of hazards, and are available to help guide adaptation action (see figure 2). The scientific literature points to various adaptation options and good practices for adapting to specific hazards related to climate change, as well as options for international cooperation.⁷

39. **A fundamental starting point for enhanced adaptation action is the dissemination of climate information through climate services to meet local needs and priorities.** Such climate services provide actionable climate information and predictions to inform policies on, planning of and implementation of adaptation action. These services improve responses to projected risks and scenarios, promote social inclusion and avoid shifting risks to other actors or reinforcing existing vulnerabilities.⁸

40. **International cooperation can help share experiences in realizing opportunities and overcoming barriers to and challenges in the implementation of adaptation plans and promote learning from good practices across various contexts.** International cooperation and initiatives, including among non-Party stakeholders working on adaptation, can enhance and support systems transformations involving communities, local authorities, civil society and businesses. Partnerships with traditionally marginalized groups, including women, youth, Indigenous Peoples and local communities, and ethnic and other minority groups, are vitally important.

41. **Key finding 12: averting, minimizing and addressing loss and damage requires urgent action across climate and development policies to manage risks comprehensively and provide support to impacted communities.**

42. Limiting warming to the Paris Agreement global temperature goal would significantly reduce the risks and impacts of climate change compared with higher warming levels. Impacts will increase for every fraction of a degree 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. Greater understanding is needed of how to avoid and respond to tipping points and more knowledge, understanding, support, policy and action are needed to comprehensively manage risks and avert, minimize and address loss and damage.

43. **Key finding 13: support for adaptation and funding arrangements for averting, minimizing and addressing loss and damage need to be rapidly scaled up from expanded and innovative sources, and financial flows need to be made consistent with climate-resilient development to meet urgent and increasing needs.**

44. Assessment of collective progress on adaptation has revealed an urgent need to rapidly scale up finance for adaptation, to meet the growing needs and priorities of developing countries.⁹

45. In considering the consistency of finance flows with climate resilient development and shifting away from actions that lead to maladaptation, the amount and effectiveness of funding going to adaptation needs ongoing attention.¹⁰

46. For more information on key findings 9–13, see chapter IV.C below.

⁷ See para. 156 below.

⁸ See paras. 157–161 below.

⁹ See para. I.D.48488 below.

¹⁰ See para. 522 below.

D. Means of implementation and support and finance flows

47. The Paris Agreement recognizes finance, technology and capacity-building under its Articles 9, 10 and 11 respectively as critical levers of enabling climate action. It further recognizes in Article 2, paragraph 1(c), that making financial flows consistent with a pathway towards low GHG emissions and climate-resilient development will also be critical. Scaling up climate ambition also requires transforming the international financial system.

48. **Key finding 14: scaled-up mobilization of support for climate action in developing countries entails strategically deploying international public finance, which remains a prime enabler for action, and continuing to enhance effectiveness, including access, ownership and impacts.**

49. **Rapidly scaling up the mobilization of support for climate action in developing countries is necessary to meet urgent needs.** Climate finance from developed to developing countries has increased since the adoption of the Paris Agreement. Several reports point to the increases and shortfalls in the mobilization and provision of such finance.¹¹ Accelerated action is required to scale up climate finance from a wide variety of sources, instruments and channels, noting the significant role of public funds. Public finance alone is not sufficient to address the gap between financing needs and current finance flows, particularly in developing countries. While remaining smaller, the share of adaptation in mobilized climate finance increased – from 20 per cent in 2017–2018 to 28 per cent in 2019–2020 – and grew at a higher rate than mitigation finance.

50. **Access to climate finance in developing countries needs to be enhanced.** Simplified and improved access to climate finance can allow for the more rapid deployment of urgently needed finance while also better serving local needs. Multilateral development banks and other international financial institutions have potential to evolve and strengthen their roles, mitigate financial risks, lower investment costs, enhance access to finance and address debt sustainability.

51. **Directing climate finance towards meaningful activities and continuing to strengthen monitoring, evaluation, and learning can more effectively meet needs, particularly in developing countries.** Enhancing and tracking the effectiveness of climate finance across aspects of access, ownership and impact are important considerations in making progress towards meeting support needs and delivering desired outcomes.

52. **Key finding 15: making financial flows – international and domestic, public and private – consistent with a pathway towards low GHG emissions and climate-resilient development entails creating opportunities to unlock trillions of dollars and shift investments to climate action across scales.**

53. Efforts must be pursued on all fronts towards meeting investment needs, including by making financial flows consistent with a pathway towards low GHG emissions and climate-resilient development. While public finance may be deployed to incentivize high-impact investments and to crowd-in private sector finance, global and domestic capital markets are likely to be the primary source of capital for scaling up mitigation and adaptation. While public finance will continue to have a key role to play in financing adaptation, increased private sector engagement is needed to make financial flows consistent with climate-resilient development.

54. **Opportunities for financing mitigation and adaptation can be enhanced by enabling conditions and overcoming constraints.** The policy and broader enabling environment, as well as the availability of effective instruments for de-risking investments and creating pipelines of investable products for adaptation and mitigation, present an important opportunity for delivering finance at the scale needed. Further actions are required to mitigate risks, lower investment costs, and enhance access.

55. **It is essential to unlock and redeploy trillions of dollars to meet global investment needs, including by rapidly shifting finance flows globally to support a pathway towards low GHG emissions and climate-resilient development.** Significant finance flows continue

¹¹ See paras. 183–185 below.

being directed, including through subsidies, towards investments in high-emissions activities and infrastructure that lack resilience. Shifting these flows is critical to making rapid and durable progress towards achieving the Paris Agreement goals.

56. **A systematic approach to shifting finance flows is needed to support effective climate action at the required scale and speed.** The scale of investments required to achieve the goals of the Paris Agreement highlights the need to transform the financial system and its structures and processes, as well maximize the effectiveness of international cooperative initiatives on climate finance.

57. **Key finding 16: existing cleaner technologies need to be rapidly deployed, together with accelerated innovation, development and transfer of new technologies, to support the needs of developing countries.**

58. More effective and strategic international cooperation on technology development and transfer and innovation would enable rapid systems transformations that are aligned with achieving the goals of the Paris Agreement. Intensive efforts to support cooperation and innovation are essential throughout the technology cycle and across all sectors and locations. Reductions in costs and increased access to finance for some key technologies should enable greater deployment in all geographic areas, particularly in developing countries. Continuing to drive down the average cost of capital for such technologies and reducing unit costs for other key technologies for just energy and other sectoral transitions will be deciding factors for whether the goals of the Paris Agreement are met. Stronger enabling environments will be needed, ensuring inclusive multi-stakeholder engagement and access to financial support and capacity-building.

59. Collaborative approaches to climate technology research, development and demonstration are crucial for deploying mature climate technologies and developing emerging technologies on a large scale. Such approaches can include investments in technology development and transfer through joint research and development programmes and capacity-building. Research and development required to achieve net zero CO₂ emissions by 2050, particularly in “hard to abate” sectors, is vital. Research is also needed to understand the role of technology and innovation in supporting transformational adaptation.

60. **Key finding 17: capacity-building is foundational to achieving broad-ranging and sustained climate action and requires effective country-led and needs-based cooperation to ensure capacities are enhanced and retained over time at all levels.**

61. Capacity limitations present barriers across all dimensions of climate policy, including mitigation, adaptation, enabling and using technology and finance, and averting, minimizing and addressing loss and damage. To be effective, capacity-building needs to be systemic by investing in the existing underlying social and economic systems. Capacities, including skilled human and institutional capacities, need to be retained over time.

62. Strategic capacity-building support to developing countries needs to be scaled up to address locally determined needs, including on the basis of Indigenous and other traditional knowledge systems. Making international cooperation on capacity-building more effective and impactful is key. Greater coherence and coordination of support, including across the United Nations system, will help to ensure that needs are being met and will enhance effectiveness.

63. For more information on key findings 14–17, see chapter IV.D below.

E. Way forward

64. The first TD has been based on the best available science, drawing on the findings of the AR6 and other knowledge sources, with extensive involvement of experts. During the TD it became clear that many actionable solutions and creative suggestions to overcome challenges identified during the input and technical phases of the GST are ready to be implemented. Information gaps also emerged that the scientific community might address in the years ahead in order to better inform the next GST and work programmes and other processes under the Paris Agreement. The information generated from the first GST can

inform ongoing processes and work programmes under the Paris Agreement, and those efforts can in turn inform assessments of collective progress under future GSTs. As Parties prepare their next NDCs, they may draw on the rich technical information drawn from the input and technical assessment phases of the first GST.

65. The first GST is taking place within an era of dramatic and widespread changes. Since its adoption, the Paris Agreement has inspired near-universal climate action, yet the global community is not on track towards achieving the long-term goals of the Paris Agreement, despite progress made. The Paris Agreement, through its design and the GST, provides the basis for further ambition in enhancing action and support to respond to the climate crisis. The first GST comes at a critical moment for accelerating collective progress. As the technical findings presented in this report show, much more action, on all fronts and by all actors, is needed now to meet the long-term goals of the Paris Agreement.

66. For more information, see chapter V below.

[English only]

II. Introduction

A. Mandate

67. Article 14 of the Paris Agreement provides that the CMA shall periodically take stock of the implementation of the Paris Agreement to assess collective progress towards achieving its purpose and long-term goals, referred to as the GST, and decision 19/CMA.1 laid out the modalities and sources of input of the GST, including that the GST will be conducted with the assistance of the subsidiary bodies.¹² CMA 3 welcomed the start of the first GST,¹³ and the consideration of outputs will take place at CMA 5.

68. The TD facilitated expert consideration of inputs from the sources identified for the GST.¹⁴ CMA 1¹⁵ decided the TD would:

(a) Undertake its work through a focused exchange of views, information and ideas in in-session round tables, workshops or other activities;

(b) Organize its work in line with taking stock of the implementation of the Paris Agreement to assess the collective progress towards achieving its purpose and long-term goals, including under Article 2, paragraph 1(a–c), in the thematic areas of mitigation, adaptation and means of implementation and support, noting, in this context, that the GST may take into account, as appropriate, efforts related to its work that:

(i) Address the social and economic consequences and impacts of response measures;

(ii) Avert, minimize and address loss and damage associated with the adverse effects of climate change;

(c) Be facilitated by two co-facilitators, who will be responsible for conducting the dialogue and for preparing a factual synthesis report and other outputs of the technical assessment, with the assistance of the secretariat.

69. Prior to the start of the first TD, the Chairs of the subsidiary bodies:

(a) Prepared a non-paper and, after consulting with Parties, revised it,¹⁶ aiming to assist Parties and non-Party stakeholders in preparing for the first GST, and including guiding questions for the information collection and preparation component of the first GST;

(b) Issued a call for inputs for the first GST;

¹² Decision 19/CMA.1, para. 4.

¹³ Decision 1/CMA.3, para. 76.

¹⁴ See decision 19/CMA.1, paras. 36–37.

¹⁵ Decision 19/CMA.1, para. 6.

¹⁶ Available at <https://unfccc.int/documents/274746>.

(c) Prepared guiding questions for the technical assessment component of the first GST and revised them¹⁷ on the basis of the views expressed by Parties on this matter at informal consultations held in October 2021.

B. Scope of the report

70. This synthesis report has been prepared by the co-facilitators on the basis of the inputs received throughout the technical assessment and the discussions held during each of the three meetings of the TD. The report provides a comprehensive overview of the discussions held during the TD and identifies key areas for further action to address challenges in the implementation of the Paris Agreement. It provides insights into collective progress towards achieving the purpose and long-term goals of the Paris Agreement and informs Parties about potential areas for updating and enhancing their action and support, as well as for enhancing international cooperation for climate action.

C. Possible action by the subsidiary bodies

71. The subsidiary bodies may wish to consider this report as part of their deliberations on the conclusion of the first GST.

III. Summary of the process for the technical dialogue of the first global stocktake

72. As part of the technical assessment component of the first GST, three meetings of the TD were held in conjunction with SB 56, SB 57 and SB 58, and a summary report on each meeting was prepared by the co-facilitators.¹⁸ Building on the approach taken at TD1.1 and adopting a learning-by-doing approach, the TD served to facilitate the expert consideration of inputs into the GST through focused exchanges of views, information and ideas at in-session round tables, workshops and other relevant activities.

73. The work of the TD was organized in the thematic areas of mitigation, adaptation, and means of implementation and support. The findings on the topics presented in chapter IV below have no hierarchy, and the numbering and wording of subchapters are solely used for ease of reference. The TD considered efforts related to the social and economic consequences and impacts of response measures and to averting, minimizing and addressing loss and damage associated with the adverse effects of climate change (see annex I for a better understanding of the sources of specific information used in preparing key findings and supporting information). The TD was a Party-driven process, with observer organizations and other non-Party stakeholders participating (see annex II for details on the approach taken to the TD).

74. The arc of discussions during the TD included laying the information base, including on well-known gaps and on what is being done at TD1.1 and identifying how to bridge gaps and shift the focus to implementation at TD1.2, and concluded with focused discussions on next steps, including how Parties and non-Party stakeholders could make further progress in their collective efforts towards achieving the Paris Agreement goals at TD1.3.

¹⁷ Available at https://unfccc.int/sites/default/files/resource/Draft%20GST1_TA%20Guiding%20Questions.pdf.

¹⁸ Available at <https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogue-of-the-first-global-stocktake#Relevant-documents>.

IV. Findings of the technical dialogue on the first global stocktake under the Paris Agreement

A. Context

75. **Key finding 1: since its adoption, the Paris Agreement has driven near-universal climate action by setting goals and sending signals to the world regarding the urgency of responding to the climate crisis. While action is proceeding, much more is needed now on all fronts.**

76. The rapid entry into force of the Paris Agreement in 2016 demonstrated broad global commitment to its purpose. Since its adoption, Parties have adopted policies and taken action aligned with the goals of the Paris Agreement. While Parties are making progress in implementation, the global community is not yet on track to meet the long-term goals of the Paris Agreement.

77. However, significant progress has been made since the entry into force of the Convention almost 30 years ago, as evidenced by the significant shifts in projections of global temperature increase in 2100. At the adoption of the Cancun Agreements in 2010 the expected global temperature increase in 2100 was 3.7–4.8 °C.¹⁹ In 2015, with the adoption of the Paris Agreement and commitments made through INDCs, the expected global temperature increase reduced to 3.0–3.2 °C.²⁰

78. Further progress was made under the Paris Agreement, as updated NDCs and long-term plans were announced. By COP 26 a global temperature increase of 2.6–2.7 °C was expected in 2100.²¹ 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. Announcements at COP 27 indicated expected temperatures were reduced further to 2.4–2.6 °C with the possibility of reaching 1.7–2.1 °C when taking into account the full implementation of long-term net zero targets.²²

79. After six IPCC assessment cycles, global awareness of the impacts of climate change has never been higher and the need for integrating climate adaptation into decision-making has never been clearer. Support and finance for climate action have increased significantly in the past decade, and the growing awareness of the risks of climate change have led to significant efforts to scale up support for climate action in developing countries. Through the GST process, 137 non-Party stakeholders have submitted information on their actions to support the goals of the Paris Agreement. At this early stage, the Paris Agreement has enhanced efforts concerning climate change mitigation and adaptation and facilitated the provision of support to where it is most needed.

80. The window to keep limiting warming to 1.5 °C within reach is closing rapidly, and progress is still inadequate based on the best available science. Global emissions to date are not in line with modelled global mitigation pathways consistent with the global temperature goal of the Paris Agreement nor are they aligned with longer-term emission reduction goals. Impacts of climate change are increasing and threaten all countries, yet adaptation efforts to date have focused on planning and have not yet driven the broad changes necessary to

¹⁹ See p.20 in IPCC. 2018. *IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. V Masson-Delmotte, P Zhai, H-O Pörtner, et al. (eds.). Geneva: World Meteorological Organization. Available at <https://www.ipcc.ch/sr15/>.

²⁰ See p.4 of the executive summary in UNEP. 2015. *The Emissions Gap Report 2015*. Nairobi: UNEP. Available at <https://wedocs.unep.org/handle/20.500.11822/7450>.

²¹ See p.XII of the executive summary in UNEP. 2021. *Emissions Gap Report 2021: The Heat Is On – A World of Climate Promises Not Yet Delivered*. Nairobi: UNEP. Available at https://wedocs.unep.org/bitstream/handle/20.500.11822/36991/EGR21_ESEN.pdf.

²² See key messages in UNEP. 2022. *Emissions Gap Report 2022: The Closing Window – Climate crisis calls for rapid transformation of societies*. Nairobi: UNEP. Available at <https://www.unep.org/resources/emissions-gap-report-2022>.

enhance adaptive capacity, strengthen resilience and reduce vulnerability. Losses and damages are already being experienced. Finance – international and domestic, public and private – needs to be urgently scaled up and made more effective, and much finance still flows to activities that increase GHG emissions and vulnerabilities to climate change.

81. In short, much more action and support are needed to make urgent progress on the long-term goals set in the Paris Agreement. The Paris Agreement sets out a framework for cooperation and action that has already begun to catalyse efforts around the world by many actors. This catalytic role will continue to be vital in the years ahead, as the imperative to deliver systems transformations becomes ever more urgent.

82. Key finding 2: to strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty, governments need to support systems transformations that mainstream climate resilience and low GHG emissions development. Credible, accountable and transparent actions by non-Party stakeholders are needed to strengthen efforts for systems transformations.

83. The unprecedented scale and pace inherent to the global transition to a low GHG emissions and climate-resilient future urgently require the consideration of integrated and holistic solutions that promote the eradication of poverty, sustainable development, and the protection of natural resources and systems. Efforts must be sustained over decades, building on progress in each cycle of NDCs and GSTs. 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.

84. Long-term strategies for climate-resilient and low-emission development can be made mutually supportive through whole-of-society approaches and integrated, inclusive policymaking. The AR6 identifies multiple enabling conditions for climate action, 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. The contribution of Working Groups I, II and III to the AR6 also identifies constraints to taking climate action, including poverty, inequity and injustice; economic, institutional, social and capacity barriers; siloed responses; lack of finance, and barriers to finance and technology; and trade-offs with SDGs. 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. Finding creative ways to overcome barriers and challenges within national contexts requires dedicated attention by policymakers and other actors.

85. The demonstrable implementation of commitments and actions by non-Party stakeholders can strengthen Parties' efforts for systems transformations. Rigorous accounting and accountability are needed to lend credence to non-Party stakeholders' contributions. Non-Party stakeholders increasingly support Parties in implementing the Paris Agreement and in enabling Parties to implement national plans by aligning their activities with the goals of the Paris Agreement. Climate action and support are enhanced by catalysing action by all Parties and non-Party stakeholders, including civil society, the private sector, financial institutions, cities and other subnational authorities, local communities and Indigenous Peoples. Such inclusive cooperation across all fronts contributes to ambitious and equitable outcomes and is required to fully achieve the Paris Agreement goals. Initiatives by Parties and non-Party stakeholders can strengthen efforts aimed at facilitating systems transformations, investing in the transition from high to low GHG emissions and achieving climate-resilient development. Non-Party stakeholders should endeavour to include and support stakeholders who are often marginalized, including women, youth and Indigenous Peoples, so they can all effectively participate in and contribute to these initiatives.

86. The need to rigorously track progress in implementing actions and commitments that have been made through non-Party stakeholder initiatives is deemed essential to understanding collective progress. Greater transparency is required on the progress of these initiatives in delivering on their climate actions. Non-Party stakeholders should use good practices in rigorous accounting to promote understanding of the contribution of their actions. In addition, increasing the accountability of non-Party stakeholders on whether their actions

and announcements have resulted in measurable change will lend credibility to announcements. While recognizing the contributions by non-Party stakeholders can increase their ambition and implementation, careful analysis is needed across Party and non-Party stakeholder actions to ensure environmental integrity and avoid double counting.

87. Key finding 3: systems transformations generate many opportunities, but rapid change can be disruptive. A focus on inclusion and equity can increase ambition in climate action and support.

88. Systems transformations present an unprecedented opportunity for developing socially and economically while reducing impacts on the natural environment. However, they will entail broad, rapid and often disruptive action. As noted in the AR6, lifetime emissions from existing and planned fossil fuel infrastructure will exceed estimates for keeping limiting global warming to 1.5 °C within reach, yet reaching net zero CO₂ emissions by mid-century will require a transformation of energy systems to clean energy sources. The impacts of climate change are also likely to become more disruptive, and transformative adaptation can include broad changes in existing practices. Such disruptions can be minimized by taking a whole-of-society approach, which is also informed by local context. Carefully designed climate action can generate significant social and economic progress and benefits, including in health, education and employment.

89. Increasing the consideration of equity can enable greater ambition in climate action and support and increase the likelihood of meeting the long-term goals of the Paris Agreement. Dimensions of equity include just transitions, strengthening resilience, sustainable development, environmental protection, poverty eradication and human rights. Historical, current and changing contexts within and across nations remain potent factors in the ability to make progress towards climate goals. The global nature of the transformation needed 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 affect everyone equally.

90. Inclusivity matters and those most affected by climate impacts should be involved in crafting solutions. Throughout the TD, participants emphasized the importance of inclusivity and collaboration, and emphasized that including all stakeholders from the outset is vital for more impactful climate action and support. The benefits of social inclusion extend beyond climate change to include conservation, poverty reduction and achieving the SDGs.

91. Approaches to climate action that are aligned with a country's human rights obligations would make marginalized groups part of the solutions.

B. Mitigation, including response measures

92. Key finding 4: global 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 in order to limit warming to 1.5 °C above pre-industrial levels.

93. Implementation of the Paris Agreement, with its 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 paras. 77–78 above). While all Parties to the Paris Agreement have communicated NDCs that include mitigation targets and/or measures, collective progress on mitigation remains inadequate to date towards the fulfilment of the provisions in Article 2, paragraph 1(a), of the Paris Agreement to hold the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this will significantly reduce the risks and impacts of climate change. The Agreement's temperature goal has informed many Parties' new and updated NDCs as well as LT-LEDS. Non-Party stakeholders have also made efforts to contribute to this goal,

including by aiming for net zero emissions. Also, as at 23 September 2022, 53 LT-LEDS have been communicated, representing 62 Parties to the Paris Agreement.²³

94. Gaps in collective progress on mitigation can be identified on two fronts. First, the mitigation ambition of NDCs is not collectively sufficient to achieve the Paris Agreement temperature goal. Emissions gaps are the difference between the emission levels implied by the NDCs and the average emission levels of global modelled mitigation pathways consistent with limiting warming to 1.5 °C or 2 °C. Second, implementation gaps refer to how much currently enacted policies and actions fall short of reaching stated targets and pledges. Action is needed across both gaps to increase the ambition of NDCs and the implementation of policies to achieve the stated targets, and to progress towards achieving the goals of the Paris Agreement.

95. In 2019, atmospheric CO₂ concentrations reached an annual average of 410 ppm, which is higher than at any time in at least 2 million years, while concentrations of CH₄ were 1,860 ppb and of nitrous oxide were 332 ppb, which were higher than at any time in the last 800,000 years. Earth's global average surface temperature in 2011–2020 was around 1.1 °C higher than the pre-industrial average.

96. Trends in historical and ongoing GHG emissions provide important information to understand the current situation, how it came to be, and how it can inform future action.²⁴ Historical cumulative net CO₂ emissions from 1850 to 2019 were 2,400 ± 240 Gt CO₂, of which 58 per cent occurred between 1850 and 1989, and about 42 per cent occurred between 1990 and 2019. Average annual GHG emissions between 2010 and 2019 were higher than in any previous decade on record, but the rate of growth between 2010 and 2019 (1.3 per cent per year) was lower than that between 2000 and 2009 (2.1 per cent per year).

97. The best available science as reflected in the AR6 provides information on pathways consistent with the global temperature goal and Article 4, paragraph 1, of the Paris Agreement. Global GHG emissions are projected to peak between 2020 and at the latest before 2025 in global modelled pathways that limit warming to 1.5°C (>50 per cent) with no or limited overshoot and in those that limit warming to 2°C (>67 per cent) and assume immediate action. Global peaking of emissions has not yet been reached but, while global peaking of GHG emissions should occur as soon as possible, peaking will take longer for developing country Parties.

98. All Parties need to undertake rapid and deep 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 around 43, 60 and 84 per cent in global GHG emissions below the 2019 level by 2030, 2035 and 2050 respectively, as assessed by the IPCC (see figure 1).²⁵ In these scenarios, the median time frame for reaching net zero CO₂ emissions globally is in the early 2050s, and net zero GHG emissions by the early 2070s.²⁶ The basis of equity, the context of sustainable development and efforts to eradicate poverty inform consideration of these mitigation pathways.

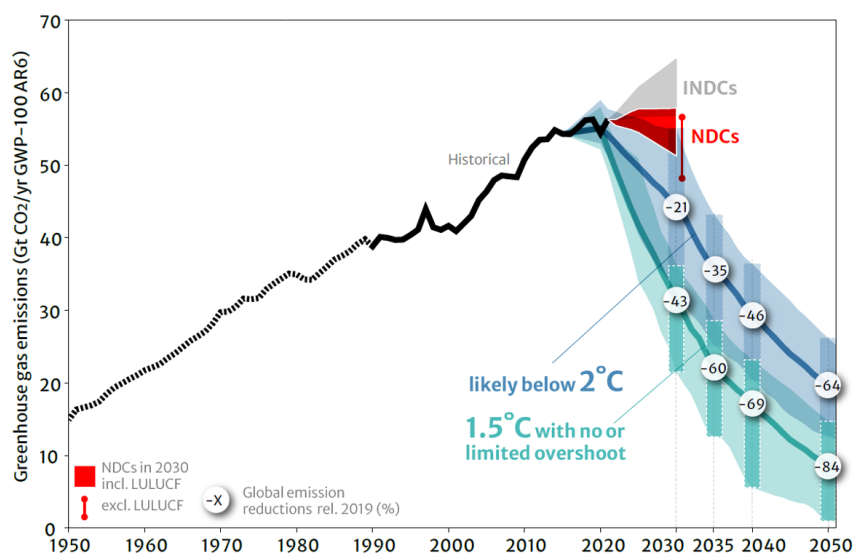
²³ See https://unfccc.int/sites/default/files/resource/GST_SR_23c_Addendum_Final_02230417.pdf.

²⁴ Differing views expressed by participants on pre-2020 emissions and regional contributions to historical emissions are captured in the summary reports on TD1.

²⁵ See table SPM.1 in IPCC. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. PR Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg3/>.

²⁶ See table SPM.2 in IPCC. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by PR Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press, 2022. Available at <https://www.ipcc.ch/report/ar6/wg3>.

Figure 1
Historical emissions from 1950, projected emissions in 2030 based on nationally determined contributions, and emission reductions required by the Sixth Assessment Report of the Intergovernmental Panel on Climate Change



		Reductions from 2019 emission levels (%)			
		2030	2035	2040	2050
Limit warming to 1.5°C (>50%) with no or limited overshoot	GHG	43 [34-60]	60 [49-77]	69 [58-90]	84 [73-98]
	CO ₂	48 [36-69]	65 [50-96]	80 [61-109]	99 [79-119]
Limit warming to 2°C (>67%)	GHG	21 [1-42]	35 [22-55]	46 [34-63]	64 [53-77]
	CO ₂	22 [1-44]	37 [21-59]	51 [36-70]	73 [55-90]

Sources: Upper panel: Historical data from the IPCC for 1950–1989 and from the 2022 NDC synthesis report for 1990–2020; 2030 projections from NDCs; and the reduction scenarios from the AR6 Synthesis Report (IPCC, 2023. *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Core Writing Team, H Lee, and J Romero (eds.). Geneva: IPCC. Available at <https://www.ipcc.ch/report/ar6/syr/>). Lower panel: table SPM.5 in the AR6 Synthesis Report.

Abbreviation: LULUCF = land use, land-use change and forestry.

99. New and updated NDCs submitted before COP 26 indicate an increase in mitigation ambition compared with previous INDCs; however, this increase only partly offsets emissions growth and is not yet in line with global modelled mitigation pathways that limit warming to 1.5 or 2 °C. These NDCs close the emissions gaps only partially, by 15–33 per cent. A total of 169 Parties updated 142 NDCs, and 74 per cent of these Parties strengthened commitments to reduce or limit emissions for 2025 and/or 2030. Parties were requested to revisit and strengthen the 2030 targets in the NDCs as necessary to align with the Paris Agreement temperature goal, taking into account different national circumstances.²⁷

100. The 2022 NDC synthesis report provides updated information based on the latest available NDCs, up to 23 September 2022.²⁸ The report indicates the median emissions gap to 1.5 °C (>50 per cent probability) in 2030 is 23.9 Gt CO₂ eq without conditional elements and 20.3 Gt CO₂ eq with the implementation of conditional elements underpinned by support.²⁹ For a median emissions gap of 2 °C (>67 per cent probability), the respective emissions gaps in 2030 are 16.0 and 12.5 Gt CO₂ eq, without and with conditional elements and support respectively. 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.

²⁷ See decision 1/CMA.3, para. 29.

²⁸ FCCC/PA/CMA/2022/4.

²⁹ See document FCCC/PA/CMA/2022/4, para. 16.

101. **Key finding 5: much more ambition in action and support is needed in implementing domestic mitigation measures and setting more ambitious targets in NDCs to realize existing and emerging opportunities across contexts, in order to reduce global GHG emissions by 43 per cent by 2030 and further by 60 per cent by 2035 compared with 2019 levels, and reach net zero CO₂ emissions by 2050 globally.**

102. **Urgent action and support are needed to ramp up implementation of domestic mitigation measures by realizing opportunities across all sectors and systems.** Urgently implementing domestic mitigation measures is key to reducing emissions and following through on ambitious pledges. There are many opportunities for implementing more ambitious mitigation measures in all sectors and systems (see para. 112 below). If fully implemented and supported, realizing such opportunities can raise ambition to sufficiently address the emissions gap and can offer substantial potential to reduce net GHG emissions by 2030.

103. 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 an 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 comprise 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 CH₄ emission reductions (from coal mining, and oil and gas operations).³⁰

104. There remain significant challenges associated with capturing these opportunities and 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 can accrue from climate action. While large-scale and feasible mitigation options exist, feasibility in the short term differs across sectors and regions. Most options face higher barriers if they are to be implemented rapidly on a large scale. However, a range of enabling conditions can help with implementing these actions, including strengthening policies and institutions, increased finance, technological innovation and transfer and demand-side measures including behaviour change.

105. **More ambitious mitigation targets in NDCs are needed to reduce emissions more rapidly and to align with each country's LT-LEDS towards just transitions to net zero emissions by or around 2050, while enhanced transparency can help track progress.** Through their NDCs, nearly all Parties have communicated domestic mitigation measures to achieve their mitigation targets. The nationally determined mitigation targets in NDCs range from absolute economy-wide emission reduction targets, economy-wide emission reduction and limitation targets and enhanced mitigation efforts to strategies, policies, plans and actions for low-emission development. In their NDCs, most Parties (90 per cent) provided quantified mitigation targets, expressed as clear numerical targets, while the rest (10 per cent) included strategies, policies, plans and actions. Most Parties (80 per cent) communicated economy-wide targets covering all or almost all sectors defined in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*,³¹ with an increasing number of Parties moving to absolute emission reduction targets in their new or updated NDCs.

106. Although mitigation measures communicated in current NDCs are not collectively sufficiently ambitious, the Paris Agreement provides for progression, including by stating the expectation that each Party's successive NDCs will represent its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances, and will be informed by the outcomes of the GST.

³⁰ See figure 4 in the summary report on TD1.3, available at https://unfccc.int/sites/default/files/resource/GST_TD1.3%20Summary%20Report_15_August_Final.pdf.

³¹ IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

Progression may involve, among other options, more rapid emission reductions through adopting more stringent targets and more comprehensive forms of targets. The Paris Agreement states that developed country Parties should continue taking the lead by undertaking absolute economy-wide emission reduction targets, and that developing country Parties should continue enhancing their mitigation efforts and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.

107. As Parties formulate and communicate their LT-LEDS that chart just transitions towards net zero emissions by or around mid-century, tailored to different national circumstances, they should begin to implement concrete measures to shift to such pathways. Many Parties have set goals and communicated strategies aiming for either net zero CO₂ or GHG emissions around or by 2050, yet in many cases mitigation ambition in NDCs is not aligned with pathways to achieve LT-LEDS.

108. Various perspectives and technical information on how Parties can deliver new mitigation targets in NDCs in 2025 in line with the Paris Agreement temperature goal are covered extensively in the summary reports on the meetings of the TD and in inputs submitted to the GST. These also identified a number of good practices, opportunities, barriers and challenges in relation to implementing measures that achieve mitigation targets in NDCs. This information can be relevant to discussions under the consideration of outputs phase of the first GST, during which Parties may decide to provide more specific guidance on the next round of NDCs.

109. Compared with those in the INDCs, the targets in the new or updated NDCs are generally more clearly defined in quantitative terms, with a larger share of targets communicated relative to a historical base year or quantified future reference level. Now that the Parties have experience developing NDCs and implementing relevant policies, and soon will have experience undertaking a GST, they are better placed, as they prepare their next NDCs, to provide the information necessary to facilitate clarity, transparency and understanding of their mitigation measures and targets in their NDC. Each country must provide information in its BTR on actions, policies and measures that support the implementation and achievement of its NDC under Article 4 of the Paris Agreement, focusing on those that have the most significant impact on GHG emissions or removals and those impacting key categories in its national GHG inventory.

110. The 2022 NDC synthesis report noted that Parties communicated good practices for NDC preparation, such as conducting a preliminary assessment of pre-2020 efforts to identify gaps and needs and develop an NDC road map; mainstreaming NDC mitigation targets in existing strategies, plans and policies to obtain political support and benefit from existing arrangements; communicating sectoral quantitative mitigation targets; including mitigation targets or mitigation co-benefits resulting from adaptation actions and/or economic diversification plans; and providing detailed information on key domestic mitigation measures for achieving the mitigation targets. Such good practices may be used by Parties, in a nationally determined manner, to increase ambition of their actions and support in their next NDCs.

111. **Mitigation measures that successfully deliver on other sustainable development goals can be scaled up and replicated across different contexts.** The sustainable development benefits of implementing mitigation measures are very important in broadening and deepening these measures, in particular when they also address poverty eradication.³² Accelerating action on mitigating climate change is crucial for actions on sustainable development, and these actions can be mutually supportive. 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 noted 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) and AFOLU measures contributing to achieving SDG 15 (life on land) being the most frequently indicated measures.

³² See figure 3 in the summary report on TD1.3.

112. **Key finding 6: achieving net zero CO₂ and GHG emissions requires systems transformations across all sectors and contexts, including scaling up renewable energy while phasing out all unabated fossil fuels, ending deforestation, reducing non-CO₂ emissions, and implementing both supply- and demand-side measures.**

113. Achieving net zero CO₂ emissions globally by mid-century requires radical decarbonization of all sectors of the economy, as countries design and implement systems transformations. 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 urgently increase the ambition of near-term actions while charting pathways to net zero CO₂ and GHG emissions, ensuring access to energy for all, including by making international and domestic financial flows consistent with pathways towards low GHG emissions.

114. Many mitigation actions can have co-benefits and help achieve SDGs. Developmental benefits of mitigation actions include significant benefits, for example through health benefits from lowered air pollution, energy access for underserved populations and jobs created.

115. Net zero CO₂ energy systems require the phasing out of all unabated fossil fuels over time, rapid scaling up of renewable energy, widespread electrification of end uses, use of clean fuels, including low-carbon hydrogen and ammonia, solutions for applications that are more challenging to electrify, and boosting energy efficiency gains and demand-side management. Reaching net zero emissions also requires curbing deforestation and protecting natural terrestrial and ocean-based sinks, restoring deforested and degraded lands, sustainably managing land, and shifting agricultural and food systems. While CO₂ removal cannot serve as a substitute for deep emissions reduction, methods of CO₂ removal can further reduce net CO₂ or GHG emissions in the near term, counterbalance residual emissions from hard-to-abate sectors, and achieve and sustain net-negative CO₂ or GHG emissions in the long term, given sufficient ambition. Also, rapid reductions of non-CO₂ GHG emissions would lower temperatures in the near term relative to scenarios with higher non-CO₂ GHG emissions and reduce the level of peak warming. Reducing these emissions would also lessen the amount of CO₂ removal required to achieve net zero GHG emissions.

116. **Scaling up renewable energy and phasing out all unabated fossil fuels are indispensable elements of just energy transitions to net zero emissions.** Energy system mitigation measures could account for 74 per cent of total global mitigation in reaching net zero GHG emissions. From 2010 to 2019, renewable energy trends were highly promising, with notable reductions in unit costs for solar energy (85 per cent), wind energy (55 per cent), and lithium-ion batteries (85 per cent), as highlighted by the AR6. This has resulted in a significant increase in their deployment, with solar and electric vehicles witnessing deployment growth rates of over 10 times and 100 times respectively, though rates, costs and benefits all vary widely across regions. Strengthening power grids and storage is critical to unlocking the potential for renewable energy sources and to providing clean power as transport industry and buildings electrify (see paras. 122–125 above).

117. Early signs of transformation and urgency among key stakeholders help 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 projected that average annual investment requirements for 2020–2030 in scenarios that limit warming to 2 °C or 1.5 °C are a factor of three to six times greater than current levels, and total investment (public and private, domestic and international) in mitigation would need to increase across all sectors and regions. Dramatic increases in investment 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.

118. The projections in the AR6 showed that actions towards limiting global warming to 1.5 °C require reducing use of unabated coal power by 67–82 per cent by 2030 from the 2019 level, while oil and gas consumption will fall more slowly. By 2050, coal should hardly be used for electricity generation globally, although global modelled pathways in the AR6 do not specify pathways for any single country. At the same time as the phasing out of all

unabated fossil fuels, low- and zero-carbon sources are scaled up and account for between 97–99 per cent of global electricity by 2050 in these pathways.

119. A rapid reduction of the world economy's reliance on fossil fuels towards clean energy is central for reaching global net zero CO₂ and GHG emissions. To achieve rapid reductions in emissions, the phase-out of unabated fossil fuels is required and should be undertaken responsibly, including through socially inclusive phase-out plans developed as part of just transitions. Before a full phase-out, fossil fuels will remain an important source for some, particularly those least able to afford to transition away from those fuels. Fossil fuels may remain important in hard-to-abate sectors and strategic industrial uses for a limited period. The timing of phase-outs will differ for different contexts and fuels, and the phase-out of any unabated coal power needs to be accelerated in this decade.

120. Carbon capture, usage and storage is an option for reducing emissions from large-scale fossil-based energy and industry sources, but wider deployment hinges on resolving geophysical, environmental-ecological, economic, technological, sociocultural and institutional challenges.

121. 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. Several developing countries have recently pursued just energy transition partnerships, which are promising examples of how international cooperation can support national efforts for just transitions while accounting for specific national contexts and are based on lessons learned; these partnerships could be models for action in additional developing countries.

122. **Measures to implement systems transformations in industry, transport, buildings and other sectors must rapidly reduce process and energy emissions.** Reducing industrial emissions, which make up about 25 per cent of global emissions, will require demand management, significantly increasing energy efficiency gains across all sectors, electrification, innovation in hard-to-abate subsectors, greater circularity and attention to emissions across supply chains. Ambitious implementation of such measures can also save costs and deliver co-benefits.

123. 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 to reduce and manage waste and making cities more compact, walkable and efficient. Local authorities and other actors may take measures to co-locate housing and jobs, as well as 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 energy demand and implement mitigation options in design, construction, use and retrofits. Subnational leaders and communities are central to waste management and should add measures that address CH₄ emissions in the treatment of solid waste and wastewater.

124. Transportation currently contributes about 15 per cent of global GHG emissions. Phasing out internal combustion engines and using electric vehicles offer the greatest mitigation potential in the sector. In addition, demand-side interventions, such as shifting transport modes (e.g. to walking and using public transport), will be essential in the context of rethinking mobility. Rapidly reducing emissions from international shipping, aviation and freight transportation will require more effective international cooperation on sustainable fuels, energy-efficient design, data analytics and other solutions.

125. Energy efficiency and demand-side management remain important ways of reducing emissions, often with cost savings over short payback periods. Energy conservation also deserves continued attention, especially in contexts with high energy consumption. Energy storage technologies and demand-side measures can help stabilize variability in renewable energy.

126. **Halting and reversing deforestation and degradation and improving agricultural practices are critical to reducing emissions and conserving and enhancing carbon sinks.**

In 2019 AFOLU accounted for 13 Gt CO₂ eq (22 per cent) of global GHG emissions. Around half of 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 and land degradation by 2030 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.

127. Large-scale commodity production remains the primary driver of deforestation and degradation and requires strengthening national policies, securing land tenure and increasing action by governments, financial institutions and companies. Land carbon accounting and incentive systems, such as REDD+ and payment for forest-based ecosystem services, are increasingly implemented by governments as an approach for incentivizing forest conservation and restoration at different scales.

128. In the agriculture sector, demand-side measures such as shifting to sustainable healthy diets, reducing food loss and waste, and intensifying sustainable agriculture without further land expansion can reduce emissions, halt deforestation and free up land for reforestation and ecosystem restoration. Actions in agricultural and food systems have sustainable development benefits, including increasing productivity sustainably, reducing food loss and waste and shifting to sustainable healthy diets. All these options can have multiple synergies with the SDGs.

129. **More effective international cooperation and credible initiatives can contribute to bridging implementation and emissions gaps.** 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-Party stakeholders, have taken on mitigation commitments and actions. Mitigation measures by non-Party stakeholders will be an important factor for success in achieving the Paris Agreement goals. While pledges for mitigation actions and relevant international cooperation by non-Party stakeholders have accelerated significantly in response to the Paris Agreement, efforts are still far from being pledged or implemented at the level needed. Some estimates for mitigation actions suggest that non-Party stakeholders could reduce emissions by up to 20 Gt CO₂ eq in 2030, although care needs to be taken in making assumptions explicit.

130. International cooperation takes many forms, and a rapidly growing number of initiatives have been launched, including some focused on systems transformations and many on specific sectors. The 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. On emissions from international transport, the International Maritime Organization has set a goal consistent with reaching net zero GHG emissions by or around 2050, and the International Civil Aviation Organization has set a goal consistent with reaching net zero CO₂ emissions by 2050. It remains important to understand whether and how these efforts are additional to action within NDCs, and rigorous accounting is needed to avoid potential overlaps across and within initiatives.

131. **Key finding 7: just transitions can support more robust and equitable mitigation outcomes, with tailored approaches addressing different contexts.**

132. In discussions at TD, diverse views were expressed on dimensions of equity in mitigation, including: all Parties joining the effort to reduce emissions; Parties explaining how their NDCs are fair and ambitious, in line with their national circumstances; changing historic, current and future contributions to emissions; ensuring equitable allocation of carbon space; ensuring availability of mitigation options and increasing capacity for implementing them; minimizing costs while promoting development; identifying the need for support across finance, technology and capacity-building for developing countries; including all stakeholders in decision-making; minimizing global warming to avert loss and damage; enabling just transitions to net zero emissions; and generating criteria for benchmarking NDCs as fair and ambitious. The concept of equity is complex and

multidimensional, encompassing both national and international dimensions, and includes considerations associated with differing national circumstances, capabilities and opportunities for action. A common thread across the discussions was that equity should align with an upward spiral of ambition in implementing the Paris Agreement.

133. Given the scale of changes, all countries face potential challenges and opportunities. The transformation to low-emission development will entail distributional consequences, including shifts of income and employment. Integrating broader considerations into policy development and implementation can improve the ability to address equity and gender equality. Just transition principles can also be adopted and implemented through collective and participatory decision-making processes to reduce the disruptive consequences of rapid systems transformations.

134. Another way to operationalize equity in mitigation issues is for Parties to provide clearer information on fairness in their NDCs.³³ All countries are expected to explain in their NDCs how their NDCs are fair and ambitious. The vast majority of countries (98 per cent) have already done so voluntarily, although such information is mandatory for second NDCs. Many different frameworks and criteria for assessing fairness and ambition exist, but none of them have 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 the gross domestic product, or global averages, and several other benchmarks including global pathways to net zero emissions. Approaches that not only focus on the costs of action, but also recognize the opportunities and co-benefits associated with low GHG emissions development can inform perceptions of fairness. When explaining how they consider their NDCs to be fair and ambitious in the light of their national circumstances, a few Parties included the following considerations: the right to promote sustainable development, inter- and intra-generational equity, harm prevention, precaution, and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

135. **Key finding 8: economic diversification is a key strategy to address the impacts of response measures, with various options that can be applied in different contexts.**

136. Informed approaches can address negative impacts of response measures and promote positive synergies within LT-LEDS, including through economic diversification.³⁴ Just transitions need to create decent work and quality jobs and protect the communities that depend on them. While some jobs may be lost in some industries, low-emission development can create opportunities for just transitions that enhance skills and create more durable jobs in other industries, with differences across countries and sectors. Global job creation resulting from just energy transitions will potentially be 3.5 times greater than job losses by 2030. 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 for addressing the negative impacts of response measures and promoting positive synergies. Opportunities for such diversification include green industrialization, the greening of supply chains, and diversifying to related and unrelated products.

C. Adaptation, including loss and damage

137. Collective progress on adaptation must undergo a step change in fulfilling the ambition laid out in Article 2, paragraph 1(b), and Article 7, paragraph 1, 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. Owing to climate-related and other factors, loss and

³³ See https://unfccc.int/sites/default/files/resource/GST_SR_23c_Addendum_Final_02230417.pdf.

³⁴ See the summary report on TD1.3, para. 53.

damage is already being observed and risks are growing, meaning that enhancing action and support for averting, minimizing and addressing loss and damage is urgently needed.

138. Key finding 9: as climate change threatens all countries, communities and people 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 from disasters.

139. Climate impacts are a threat to human well-being and to ecosystems. The window of opportunity to secure a liveable and sustainable future for all is rapidly closing. Increasing impacts from climate change are being observed, and risks are being compounded and cascading across systems with projections of increased warming. At current global warming levels, losses and damages to human and natural systems have already been observed, including for example damage to infrastructure, reductions in crop production, heat-induced labour productivity losses, losses due to tropical cyclones and losses of species. Every fraction of a degree of temperature increase closer to and beyond 1.5 °C will cause increases in multiple climate hazards and present greater risks to human systems and ecosystems. Climate impacts are already eroding past development gains and, without adaptation action, will impede the ability to make human development gains.

140. The GGA referred to in Article 7, paragraph 1, of the Paris Agreement, of enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change in the context of the temperature goal referred to in Article 2 of the Paris Agreement, provides grounds for implementing a variety of actions to respond to climate impacts. Adaptation is the responsibility of all governments at all levels, and each has a role to play in promoting approaches to develop and use climate information relevant to local conditions to enable adaptation action in their jurisdictions. Parties recognized in Article 7, paragraph 2, of the Paris Agreement that adaptation is a global challenge faced by all, with local, subnational, national, regional and international dimensions. An adequate adaptation response needs to be ensured in the context of the Paris Agreement temperature goal. The Paris Agreement affirms the importance of support for and international cooperation on adaptation efforts, taking into account the needs of developing country Parties.

141. The AR6 highlights 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. Efforts to promote climate-resilient development can enable progress towards the GGA, particularly when these efforts are included within national and local plans and planning processes. Yet the design of existing and planned infrastructure, for example, has rarely addressed climate risks, and, more broadly, the costs and barriers to adaptation are significant and, in many cases, growing.

142. Even with successful adaptation action, the residual risks for loss and damage will remain and comprehensive risk management approaches will need to be deployed broadly. And, of growing concern is that the capacity of some governments to recover from recent extreme events has been exceeded, and the compounding impacts of such events leave very limited residual response capacity.

143. Key finding 10: collectively, there is increasing ambition in plans and commitments for adaptation action and support, but most observed adaptation efforts are fragmented, incremental, sector-specific and unequally distributed across regions.

144. **Adaptation planning is the first step in an iterative cycle to enable moving swiftly from understanding risks to more ambitious and effective adaptation action and support, the implementation of which must now be accelerated to increase adaptive capacity, support greater resilience gains and reduce vulnerability.** Parties and non-Party stakeholders need to put in place long-term reforms that integrate climate change risks into all aspects of planning, decision-making and implementation. The adaptation cycle can be broken down into an iterative approach for developing and implementing long-term 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 them. Of the 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;³⁵

(b) Planning process/mainstreaming: planning for actions that respond to and reduce assessed risks from climate change is developed through an inclusive process and instituted in a policy or practice. Financial and other support for the planned actions is identified and accessed. As at 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;³⁶

(c) Implementation of adaptation actions: adaptation plans are put into practice and support delivered where necessary. According to the contribution of Working Group II to the AR6,³⁷ progress on implementation is taking place across all sectors and regions, albeit unevenly, with observed adaptation gaps and growing support needs;

(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 according to the contribution of Working Group II to the AR6. Indeed, as at August 2021, only around 25 per cent of countries had a monitoring and evaluation system in place;³⁸

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

145. Across the adaptation cycle, progress is being made in mainstreaming climate-related risks in decision-making, but sustained and enhanced action is needed to fully implement NAPs and adaptation processes over time to integrate long-term changes that reduce risks equitably. Nevertheless, each stage of the adaptation 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. Implementation of adaptation action and support may take into consideration themes identified as possible elements in the framework for the GGA being developed under the Glasgow–Sharm el-Sheikh work programme on the GGA: water; food and agriculture; cities, settlements and key infrastructure; health; poverty and livelihoods; terrestrial and freshwater ecosystems, and oceans and coastal ecosystems; tangible cultural heritage; mountain regions; and biodiversity.

146. **Transparent reporting on adaptation can facilitate and enhance understanding, implementation and international cooperation.** Many governments are developing diverse portfolios of adaptation actions, policies and goals, tailored to national and local adaptation needs. A total of 60 Parties have submitted adaptation communications, 36 of which as stand-alone documents and 24 of which as a component of, or in conjunction with, NAPs (2), NDCs (19) or national communications (3) that outline their experience and national efforts on building resilience, including priorities, implementation and support needs, plans and actions. However, there is extensive action and support on adaptation beyond what has been reflected in submitted adaptation communications. Parties should consider reflecting their progress in mainstreaming the adaptation cycle to undertake more ambitious adaptation actions, when periodically updating these communications. The review of adaptation communication guidelines in 2025 will provide an opportunity for Parties to share their experience with adaptation communications and consider potential improvements to the technical information

³⁵ See document FCCC/PA/CMA/2022/4, para. 158.

³⁶ See UNEP. 2022. *Adaptation Gap Report 2022: Too Little, Too Slow – Climate Adaptation Failure Puts World at Risk*. Nairobi: UNEP. <https://www.unep.org/resources/adaptation-gap-report-2022>.

³⁷ IPCC. *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. H Pörtner, D Roberts, M Tignor, et al. (eds.). Cambridge: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg2/>.

³⁸ See UNEP. 2021. *Adaptation Gap Report 2021 – The Gathering Storm: Adapting to Climate Change in a Post-Pandemic World*. Nairobi: UNEP. Available at <https://www.unep.org/resources/adaptation-gap-report-2021>.

provided in these communications. Parties may wish to consider a more systematic approach to assessing such information ahead of the next GST.

147. In comparison with Parties' previous NDCs, more NDCs submitted in 2022 contained adaptation information, and all developing countries included adaptation in these NDCs. Most Parties (80 per cent) included an adaptation component in their NDCs, and 13 per cent of these were designated adaptation communications. The 2022 NDC synthesis report noted that most Parties included detailed information on adaptation in their NDCs, in particular on adaptation-related research, vulnerabilities, adaptation measures such as NAPs and sectoral actions, contingency measures, and monitoring and evaluation of adaptation. The adaptation components of the NDCs reflect an increased focus on national adaptation planning, in particular on the process to formulate and implement NAPs. The new or updated NDCs synthesized in the report include, in comparison with the same Parties' previous NDCs, more information on time-bound quantitative adaptation targets and the associated indicator frameworks, more specific links between adaptation efforts and efforts towards the SDGs, and more specific information on synergies and co-benefits between adaptation and mitigation.

148. A total of 140 developing countries have embarked on the process of formulating NAPs, although progress on formulating and implementing NAPs has been slow, especially among the least developed countries. To date, only 46 developing countries, including 20 least developed countries, have submitted NAPs. The process to formulate and implement NAPs is guided by the following principles: ensuring a continuous, progressive and iterative process that is not prescriptive; facilitating country-owned, country-driven action; following a gender-sensitive, participatory and transparent approach, taking into consideration vulnerable groups, communities and ecosystems; and being based on and guided by the best available science and traditional and Indigenous knowledge. The Least Developed Countries Expert Group developed technical guidelines for the process to formulate and implement NAPs, and these guidelines have been supplemented with resources, developed by the Least Developed Countries Expert Group and various other organizations, including tools, methodologies and guidance. Countries have highlighted their key climate hazards, vulnerabilities, and priority activities to be implemented in their NAPs and are increasingly making attempts to ensure that climate change is integrated into all development plans at the national, regional and local level while also linking the process to formulate and implement NAPs to the broader policy context, such as the SDGs and the Sendai Framework for Disaster Risk Reduction 2015–2030. Within their NAPs, countries are also placing a focus on considering gender and the vulnerability of women to climate impacts, as well as on meaningfully engaging Indigenous Peoples and local communities and their knowledge systems. NAPs most frequently cover the areas of agriculture, infrastructure and spatial planning, health, water resources, ecosystem services, forestry, fisheries, education, livestock, coastal zones and disaster risk reduction. Some NAPs also identify tourism, urban areas, mining and industry as priority areas for adaptation action. Concerningly, adaptation 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.

149. Chapter IV of the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement³⁹ 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 on to inform the monitoring and evaluation stage of adaptation planning. Nevertheless, there is a need for continued development of methodologies and metrics or indicators that are applicable in particular circumstances, including capacity-building, on how to use indicators within planning and implementation. Parties' ongoing discussions on reviewing collective progress

³⁹ Decision 18/CMA.1, annex.

towards achieving the GGA are proceeding and a more in-depth assessment should be possible during the second GST.

150. Adaptation efforts by developing countries are being recognized and will receive further recognition during high-level events at CMA 5. Article 7, paragraph 14(a), of the Paris Agreement calls for the GST to recognize the adaptation efforts of developing country Parties. The CMA decided that the adaptation efforts of developing country Parties will be recognized in various ways. As inputs to the GST, the CMA requested that the secretariat include information on the adaptation efforts of developing country Parties in the synthesis report on the state of adaptation efforts, experience and priorities for the GST and 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 decided that the adaptation efforts of developing country Parties will be recognized, guided by the high-level committee, during the high-level events of the GST. 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.⁴⁰

151. Key finding 11: when adaptation is informed and driven by local contexts, populations and priorities, both the adequacy and the effectiveness of adaptation action and support are enhanced, and this can also promote transformational adaptation.

152. To understand the risks faced and to be able to adjust accordingly, decision makers at all levels must continually evaluate a 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 entail a continuous process with iterations that build on previous actions and experience, in order to manage new risks as they are identified and exchange best practices with other national and subnational governments.

153. Transformational approaches to adaptation generate new options for adapting to the impacts and risks of climate change by changing the fundamental attributes of a system, including altered goals or values and addressing root causes of vulnerability. According to the contribution of Working Group II to the AR6, success in making adaptation more transformational depends on the availability of appropriate enabling environments, including experiential and niche learning, alignment of transformational change objectives with strategic priorities of governments and non-Party stakeholders, strong bottom-up governance grounded in local contexts, phased long-term programme support and appropriate financing.

154. There is no single procedure to measure progress in terms of adequacy or effectiveness of adaptation and support for adaptation. Over time, the adequacy and effectiveness of adaptation action can be measured in stages and by the degree to which adaptation results in resilience that is sustained. In contrast, the amount of reported international financial support for adaptation can be measured, as can the reported needs for adaptation support. Comparing these would likely show that the needs are greater than the level of support. In both cases, however, the actual amounts may be larger, as adaptation support and needs for support are difficult to distinguish from broader sustainable development support and needs. It is more difficult to measure how finance flows are made consistent with climate-resilient development, as they ultimately comprise decisions made by actors such as households, governments and international organizations. Shifting financial flows – domestic and international, public and private – away from maladaptation towards mainstreaming adaptation in decision-making is a critical component in scaling up finance for adaptation to effectively support iterative and sustained adaptation actions. Judging the adequacy of support for adaptation will also require an understanding of the effectiveness of that support.

155. 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, which underscores the need for systemic capacity-building and comprehensive risk management approaches where the risks from climate change are incorporated into decision-making at all levels.

⁴⁰ See decision 11/CMA.1, section II.

156. **There are opportunities for adaptation across systems and sectors, many of which have been mainstreamed into existing development priorities and processes.** Good practices in adaptation are well documented across a wide range of sectors and themes, addressing a wide range of hazards, and are available to help guide adaptation action (see the table below). 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 the 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 and for managing and restoring coastal habitats and ecosystems, providing alternative livelihoods for coastal populations and enhanced floodwater management are examples of good practice. Some approaches identified extend across hazards and sectors, such as advancing ecosystem-based adaptation or nature-based solutions and multi-hazard early warning systems. To be effective, these systems need to connect to early action in responding swiftly to extreme events on a local, national, regional and international scale. 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.

157. **A fundamental starting point for enhanced adaptation action is the dissemination of climate information through climate services to meet local needs and priorities.** Climate services provide actionable climate information and predictions to decision makers to inform policies, planning and implementation of adaptation. This includes information on assessing and tracking risks and ways to manage such risks. To be effective, climate services should be driven by user needs and priorities. For example, early warning systems can integrate data collection into developed risk profiles and help decision makers understand transboundary risks more clearly. Initiatives to expand access to early warning systems to new areas and strengthen existing system have been launched by the Secretary-General of the United Nations.

158. Climate services also help disseminate top-down information from global systems to local users. Such efforts could be complemented by enhanced information collection to catalogue impacts of extreme and slow onset events as well as the effectiveness of adaptation efforts across local and sublocal scales. Improving such databases over time and building accessible, user-driven climate services systems would strengthen implementation across the adaptation cycle. It could also help Parties report information on observed and potential impacts and on related approaches, methodologies and tools, and associated uncertainties and challenges under the enhanced transparency framework.

159. There are also efforts under way to capture information on the impacts of disasters and climate change. Under the Sendai Framework for Disaster Risk Reduction 2015–2030, for example, governments are establishing and strengthening national disaster loss databases to improve the collection and use of disaster risk data, as well as contribute to a composite global picture of impacts from disasters. Systematically inventorying the impacts of disasters and climate change can enable better understanding of risks and the effectiveness of adaptation measures.

160. Climate services inform adaptation planning and implementation based on local engagement and locally determined priorities, and improve the identification of action and support for responding to projected risks and scenarios, promote social inclusion and facilitate just resilience. Just resilience involves avoiding actions that simply shift risks to other actors or reinforce existing vulnerabilities. Durable and transformational adaptation is facilitated by governments at all levels working with communities, civil society, educational bodies, scientific and other institutions, media, investors and businesses. It is also important to develop partnerships with traditionally marginalized groups, including women, youth, Indigenous Peoples and local communities as well as ethnic and other minority groups.

Figure 2

Climate responses, adaptation actions and examples of good practices responding to climate hazards across systems and sectors as identified by the Intergovernmental Panel on Climate Change and by Parties

Themes, systems, and sectors	Climate responses and adaptation actions	Climate Hazards								Synergies with SDGs															
		Changes in temperature, including extreme heat	Flooding	Changes in precipitation Droughts and dryness	Cyclones and storms	Sea level rise	Changes in oceans: circulation, temperature, and chemistry	Changes in cryosphere: sea ice and glaciers																	
		Examples of good practices								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coastal zones	Coastal defence and hardening				Flood embankments, coastal polders	Sea wall construction, coastal embankments	Artificial reef projects																		
	Integrated coastal zone management		Planting wave-protection bamboo forests		Developing coastal disaster-prevention forests	Managing and restoring coastal habitats and ecosystems	Reducing coastal pollution to limit deoxygenation	Habitat protections																	
Terrestrial and ocean ecosystem services	Forest-based adaptation		Planting traditional tree and root crops																						
	Sustainable aquaculture and fisheries				Increasing disaster-resilient fishery areas	Reducing impacts from unsustainable aquaculture	Relocating fisheries and changing fish stocks	Opening/closure of different areas																	
Water	Biodiversity management and ecosystem connectivity			Green belts and reforestation	Enforcement of buffer zones for coastal areas and mangrove areas			Change in gear, timing of hunting, species switching																	
	Water use efficiency and water resource management		Improving water supply systems	Improving irrigation efficiency, water harvesting	Emergency water supply	Desalination plants																			
Food	Improved cropland management	Planting multiple species with different ripening periods, switching to heat-tolerant crops	Diversification of crops, using paddy fields and agricultural reservoirs as rainwater storage and for infiltration	Switching to drought-tolerant or low-water crop varieties	Garden relocations	Salt-tolerant food production		Shifting the timing of harvesting and the selection of harvest areas																	
	Efficient livestock systems	Heat-tolerant livestock breeds, providing cool areas for livestock grazing	Diversification of small ruminant rearing																						
Urban areas and infrastructure	Green infrastructure and ecosystem services	Infrastructure plan directed at urban cooling, including green roofs and parks	Engineered flood defences, e.g., dykes		Resign and fortify buildings, cyclone shelters, hurricane resistance building codes			Retrofitting and redesigning infrastructures to degrading permafrost conditions																	
	Sustainable land use and urban planning		Flood zone mapping and water retention areas		Urban stormwater management and urban drainage systems	Developing standards, regulations and guidelines for construction and flood protection																			
Energy	Improve water use efficiency		Emergency action plans for dam safety																						
	Resilient power systems		Emergency power sources		Electricity storage systems																				
Health and well-being	Health and health systems adaptation	Redesign/retrofit homes, schools, and health-care facilities, Reducing outdoor workers' heat exposure	Manage increases in vector-borne and waterborne diseases					Improving access to in-home water and sanitation services																	
	Planned relocation and resettlement	Human migration	Removal of buildings and resettlement of occupants		Resettlement policy frameworks	Relocating aquifers		Relocation of human settlements																	
	Disaster risk management	Heat preparedness plans, mapping heat hotspots	Flooding mapping and preparedness plans	Increasing the use of mobile pumping stations	Updating stormwater management plans, storing emergency food supplies	Hazard maps and models for sea level rise		Community-based monitoring programs																	
	Climate services, including Early Warning Systems	Heat warning services	Rainfall gauge networks	Drought contingency plans	Strengthening weather observation, emergency warning and monitoring systems	Marine monitoring and surveillance systems		Monitoring of sea ice																	
Livelihoods, economy, and sustainable development	Livelihood diversification		Documenting indigenous knowledge and practices		Diversification of coastal livelihoods																				
	Social safety nets	Credit Facilities, emergency relief measures	Drought funds, rebates, and tax measures	Debt instruments in which a disaster clause is embedded				Community freezers to increase food security																	
	Risk spreading and sharing	Discounted flood insurance for flood mitigation activities	Crop insurance	Reinsurance pool for cyclone damage																					

Source: Based on the contribution of Working Group II to the AR6; UNFCCC. 2022. *How developing countries are addressing hazards, focusing on relevant lessons learned and good practices. Synthesis report by the Adaptation Committee in the context of the recognition of adaptation efforts of developing countries.* Available at https://unfccc.int/sites/default/files/resource_ac_synthesis_report_hazards.pdf; and the synthesis report prepared by the secretariat on the technical assessment component of the first GST, available at <https://unfccc.int/sites/default/files/resource/Synthesis%20report%20on%20the%20state%20of%20adaptation%20efforts%2C%20experiences%20and%20priorities.pdf>.

161. Climate change greatly impacts the world's most vulnerable communities and social groups, whether in developed or developing countries, and exacerbates existing inequalities. There is a great need for climate services to reach communities that have historically not had access to climate information, such as women. Women often face higher risks and greater burdens from the impacts of climate change because they are in situations of poverty and owing to existing roles, responsibilities and cultural norms.

162. **International cooperation can help share experience in realizing opportunities and overcoming barriers and challenges to implementation of adaptation plans and promote learning from good practices across various contexts.** 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-Party stakeholders working on adaptation, can enhance and support systems transformations. A wide range of actors, including communities, local authorities, civil society and businesses, can help identify activities that require international cooperation and support. 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.

163. Discussions on collective progress towards the GGA took place within the technical assessment phase of the GST, including on efforts across the adaptation cycle, and on opportunities and challenges in addressing adaptation within sectors and across contexts. The Glasgow–Sharm el-Sheikh work programme on the GGA has informed the first GST.

164. **Key finding 12: averting, minimizing and addressing loss and damage requires urgent action across climate and development policies to manage risks comprehensively and provide support to impacted communities.**

165. Loss and damage has already been observed at current global warming levels and requires an urgent response. While the adaptation cycle aims to mainstream understanding of and action in response to the impacts of climate change in policy and planning processes to reduce risks, there remains a residual level of risk for loss and damage. Limiting warming to the Paris Agreement global temperature goal would significantly reduce the risks and impacts of climate change. Impacts will increase for every fraction of a degree 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. Near-term actions that limit global warming to close to 1.5 °C would substantially reduce projected loss and damage to human and natural systems, compared with higher warming levels, but cannot eliminate them all. More information is needed on which impacts are reversible and which are irreversible. In particular, more understanding is needed on how to avoid and respond to tipping points, such as glacier melt, melting permafrost (which also risks releasing large amounts of CH₄) and forest dieback.

166. Averting, minimizing, and addressing loss and damage requires action across the spectrum of climate policies and sustainable development. There is an urgent need for more knowledge, understanding, support, policy and action to comprehensively manage risks and avert, minimize, and address 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 to risks (access to land, infrastructure, etc.). These efforts are also closely related to efforts on disaster recovery from slow-onset and extreme events and should take into account measures to respond to both 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 programmes, internalize the risk and respond should an impact occur. There are also significant barriers to accessing 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 for Loss and Damage associated with Climate Change Impacts has developed knowledge products and tools for comprehensive risk management and the Santiago network for averting, minimizing and addressing loss and damage

associated with the adverse effects of climate change was recently established to catalyse demand-driven technical assistance, including of relevant organizations, bodies, networks and experts, for the implementation of relevant approaches to averting, minimizing and addressing loss and damage in developing countries that are particularly vulnerable to the adverse effects of climate change. There is a need to strengthen understanding of priority gaps in funding arrangements, which is directly relevant to the work of the Transitional Committee (see para. 173 below).

167. Key finding 13: support for adaptation and funding arrangements for averting, minimizing and addressing loss and damage need to be rapidly scaled up from expanded and innovative sources, and financial flows need to be made consistent with climate-resilient development to meet urgent and increasing needs.

168. Finance is a critical enabler of adaptation action across contexts and countries, yet finance availability and access are limited in almost all cases. Assessment of collective progress on adaptation shows an urgent need to rapidly scale up finance for adaptation to meet growing needs, in terms of both the amount of funding available and the speed with which funds flow. It is also critical that, over time, international and domestic public and private financial flows are made consistent with climate-resilient development pathways and shifted away from actions that lead to maladaptation.

169. Public support and finance play a critical role in building the capacities and knowledge needed to develop enabling conditions for building resilience and to move away from actions that increase exposure 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. The share of adaptation finance as a percentage of total spending on mitigation and adaptation has increased but is still below levels needed and significantly smaller than the share for mitigation.

170. 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 sector must be aligned with climate-resilient development priorities and needs, and not with 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 in national and subnational governance and policymaking is necessary for the effective use of limited public finance for adaptation.

171. With increasing flows of climate finance and in considering the consistency of existing flows with climate-resilient development, the amount and effectiveness of funding going to adaptation needs ongoing attention. These efforts can help build enabling conditions that help align investments – domestic and international, public and private – and should take into account evolving climate risks.

172. A variety of approaches can increase the effectiveness of financial support for adaptation. Various initiatives by multilateral financial institutions, such as the Green Climate Fund Productive Investment Initiative for Adaptation to Climate Change, Project Preparation Facility and Private Sector Facility, the GEF Challenge Program for Adaptation Innovation and the World Bank's Global Practice for Urban, Disaster Risk Management, Resilience and Land, are demonstrating effectiveness in building new partnerships, unearthing innovative ideas and catalysing private sector investment in adaptation. Overall, mainstreaming resilience in investments made by financial institutions, building an enabling environment for adaptation support by policymakers and other stakeholders, and promoting innovative measures that match national- and local-level policy and economic and social conditions can help increase the volume and effectiveness of both adaptation and support.

173. Ongoing discussions by Parties, including through the Transitional Committee, are focusing on the operationalization of funding arrangements, including a fund, for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage. Parties, together with non-Party stakeholders, are working on strengthening existing efforts, including on climate risk pooling, early warning systems,

and support for humanitarian response and disaster risk reduction. These discussions indicate a wide range of relevant sources, funds, processes and initiatives for supporting efforts related to averting, minimizing and addressing loss and damage. It is essential to develop a common understanding of the priority gaps in responding to loss and damage and of the areas where support is most effective. Financing gaps relate to aspects such as the speed, adequacy, delivery, access to and thematic coverage of funding. Other gaps may relate to the application of existing methodologies, poor data quality and availability, limited coordination and coherence across efforts, and limited capacity- and knowledge-building.

174. Technology, innovation and technical assistance are increasingly important needs for building capacity for averting, minimizing and addressing loss and damage, and international cooperation on technology development and transfer also remains important. The Santiago network also provides opportunities for enhancing the technical capacities of developing countries in responding to loss and damage.

175. 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.

D. Means of implementation and support and finance flows

176. The Paris Agreement recognizes finance, technology and capacity-building under Articles 9, 10 and 11 respectively as important levers for enabling climate action. It further recognizes in Article 2, paragraph 1(c), that making financial flows consistent with a pathway towards low GHG emissions and climate-resilient development will also be critical. During the three meetings of the first TD, all these topics were discussed at round tables and world café stations under the heading “Means of Implementation and Support”, which is one of the elements identified in Article 14 of the Paris Agreement, used to assess collective progress towards achieving the purpose of Paris Agreement and its long-term goals, and in decision 19/CMA.1, paragraph 6(b). Finance flows, means of implementation and support, and provision and mobilization of support are sources of input to the GST, as specified in decision 19/CMA.1, paragraph 36(d). This chapter reflects the discussions on these topics and does not take a view on the relationship between them.

177. Finance, technology, capacity-building and international cooperation are critical enablers for accelerated climate action. The AR6 found that, if climate goals are to be achieved, both adaptation and mitigation financing would need to increase many-fold. It is also important to recognize that, while finance, technology development and transfer, and capacity-building are important individually, they also function together as multiple levers for enabling climate action.

178. Means of implementation and support to developing countries are foundational to implementing more ambitious mitigation and adaptation actions and making progress in achieving the long-term goals of the Paris Agreement. International public finance remains a critical enabler for scaling up climate action in developing countries and requires urgent efforts to scale it up and strategically deploy it. Further efforts on enhancing the scale and effectiveness (including access, ownership, and impact) while ensuring alignment with the needs and priorities of developing countries are critical enablers for increasing ambition.

179. Finance flows cannot be shifted to make them consistent with a pathway towards low GHG emissions and climate-resilient development without addressing all flows – domestic and international, public and private – which involves shifting flows away from high GHG emissions infrastructure and activities and from maladaptation. While creating incentives to invest in climate action globally and across different national circumstances, it is imperative to unlock and shift the trillions of dollars required to accelerate climate action commensurate with limiting global warming to 1.5 °C.

180. Scaling up climate ambition requires the implementation of regulations and policies to incentivize international and domestic investments towards transforming the financial system. In this regard, a wide range of actors needs to engage in systematic reform efforts to improve the international finance architecture, which enhances access to finance to support effective climate action at the required scale and speed, provides access to capital and improves debt sustainability, in particular in developing countries.

181. **Key finding 14: scaled-up mobilization of support for climate action in developing countries entails strategically deploying international public finance, which remains a prime enabler for action, and continuing to enhance effectiveness, including access, ownership and impacts.**

182. Climate finance from developed to developing countries has increased since the adoption of the Paris Agreement. However, the needs and priorities of developing countries are growing for mitigation ambition, consistent with limiting global warming to the Paris Agreement temperature goal, and adaptation ambition that will make collective progress towards the GGA. Significant and continuous efforts to scale up public and private climate finance are required.

183. **Rapidly scaling up the mobilization of support for climate action in developing countries is necessary to meet urgent needs.** Several reports point to the increases and shortfalls in the mobilization and provision of finance from developed to developing countries. The fifth BA⁴¹ points to increases in public climate finance flows from developed to developing countries since the adoption of the Paris Agreement, from USD 30 billion in 2015 to USD 40.1 billion per year on average in 2019–2020, while multilateral development banks provided USD 45.9 billion per year on average in 2019–2020. However, the collective goal of developed countries to jointly mobilize USD 100 billion per year for the needs of developing countries in the context of meaningful mitigation action and transparency on implementation was not fully met in 2020.

184. Developed countries mobilized USD 83.3 billion in 2020.⁴² According to the fifth BA, mitigation finance constituted the largest share (57 per cent) of climate-specific financial support through bilateral, regional and other channels in 2019–2020. However, the share of adaptation finance continued to increase from 20 per cent in 2017–2018 to 28 per cent in 2019–2020 and grew at a higher rate than mitigation finance. The share of cross-cutting finance, which serves both mitigation and adaptation purposes, was 15 per cent 2019–2020. The same report highlights the limitations on assessing collective progress on climate finance and continues to identify specific actions and recommendations to address methodological and data limitations.

185. Financial support for adaptation continues to fall far behind mitigation investments and remains disproportional to the increasing need to enhance climate resilience globally, particularly in developing countries that are particularly vulnerable to the adverse effects of climate change.

186. Accelerated action is required to scale up climate finance from all sources. Public finance alone is not sufficient to address the gap between financing needs and current finance flows, particularly in developing countries. Actions are required to mitigate risks, lower investment costs and enhance access while also pursuing efforts to make all finance flows consistent with a pathway towards low GHG and climate-resilient development. Delivering climate finance at scale requires, inter alia, transforming financial systems, their architecture and processes; continuing to enhance access to finance; building capacity; reducing investment costs; and strengthening enabling conditions that encourage climate action.

187. The GST has highlighted the significant levels of investment requirements and needs in developing countries for climate action. The first report by the SCF on the determination

⁴¹ Available at <https://unfccc.int/topics/climate-finance/resources/biennial-assessment-and-overview-of-climate-finance-flows>.

⁴² See OECD. 2022. *Aggregate Trends of Climate Finance Provided and Mobilised by Developed Countries in 2013-2020*. Paris: OECD. Available at <https://www.oecd.org/environment/aggregate-trends-of-climate-finance-provided-and-mobilised-by-developed-countries-in-2013-2020-d28f963c-en.htm>.

of needs of developing countries identified 4,274 needs in developing country NDCs, out of which 1,782 across 78 NDCs were costed, cumulatively amounting to USD 5.8–5.9 trillion.⁴³ The report, drawing from national reports submitted by 153 Parties, notes that needs varied widely among countries and many needs remain uncostered. Of the costed needs, USD 502 billion was identified as requiring international sources of finance, and USD 112 billion as sourced domestically, while 89 per cent of costed needs lacked information on sources of finance. The needs based on national communications and biennial update reports provide different estimates, leading to a range of cost estimates. Enhanced capacity to assess needs is essential in developing countries through improved understanding of methodologies for costing needs.

188. Furthermore, achievement of robust and equitable mitigation and adaptation outcomes requires consideration of just transitions tailored to specific contexts. International cooperation to support domestic efforts in this regard can contribute to the achievement of such outcomes.

189. **Access to climate finance in developing countries needs to be enhanced.** Simplified and expeditious access to climate finance can allow for more rapid deployment of urgently needed finance while also better serving local needs, particularly in developing countries that are particularly vulnerable to the adverse effects of climate change. More standardized approaches to public funding, including grants, would enhance the ability of developing countries, including those with limited capacity, to access funds with the urgency required to adapt. The SCF recommends developed countries, other climate finance providers and recipients to enhance access to climate finance through addressing the barriers arising from the complex architecture of multilateral climate funds.

190. The costs of capital can often be high in developing countries, reflecting both real and perceived investment risks and pointing to the need to enhance the international financial architecture. Multilateral development banks and other international financial institutions have potential to evolve and strengthen their roles, including by expanding financial capacity and technical expertise, continuing to use a diversity of financial instruments, increasing their focus on adaptation and resilience and enhancing the mobilization of private finance, supported by innovative solutions.

191. Debt and the costs of servicing debt sometimes take up a large share of national budgets in some developing country, limiting fiscal space for investments in climate action and other sustainable development priorities. Continued efforts to promote effective solutions to debt sustainability are needed to enable enhanced climate ambition and action.

192. **Directing climate finance towards meaningful activities and continuing to strengthen monitoring, evaluation, and learning can more effectively meet needs, particularly in developing countries.** Enhancing the effectiveness (access, ownership and impact) of climate finance, as well as improving the tracking of effectiveness are important considerations in achieving effective support and delivering desired outcomes. The fifth BA highlights that multilateral climate funds are reporting growth in the impact of their projects, notably the reported expected and actual results from climate finance providers indicate an increase in portfolio-level emission reductions and number of beneficiaries reached. Impact reporting systems play a critical role in facilitating learning from climate finance by providing information on where interventions have succeeded or failed, and why. If climate finance providers have clear evidence that climate finance is leading to results, they can be more confident in allocating funding and reducing access barriers. From the recipient perspective, increased transparency and understanding regarding impacts can improve overall programming efforts and facilitate the selection of interventions that have the greatest climate and co-benefits in a given regional, country or sectoral context as well as increasing country ownership.

193. Robust methodologies for tracking and assessing climate outcomes are important in this regard. The fifth BA has documented challenges associated with measuring the impacts of climate change, such as limited reporting capacity of implementing entities and time lags between reporting on outcomes and impacts of projects. The fifth BA found that developing

⁴³ Available at <https://unfccc.int/topics/climate-finance/workstreams/needs-report>.

countries face challenges in reporting information on climate finance received owing to limited capacities and resources to track climate finance received. It also noted that overlaps in the definition of development and adaptation concepts have led to a diverse set of results areas being captured for finance supporting adaptation. Furthermore, while multilateral climate funds and multilateral development banks at the portfolio level are adept at reporting outputs, it is much harder to develop robust outcome indicators. In this sense, it is also very difficult to measure transformational change, though institutions such as the Green Climate Fund have begun to develop frameworks for doing so. Addressing gaps in knowledge on effectiveness across aspects of ownership, access, impacts and outcomes in relation to climate finance is necessary to facilitate transformational change on the ground.

194. Key finding 15: making finance flows – international and domestic, public and private – consistent with a pathway towards low GHG emissions and climate-resilient development entails creating opportunities to unlock trillions of dollars and shift investments to climate action across scales.

195. Article 2, paragraph 1(c), of the Paris Agreement includes the goal to make financial flows consistent with a pathway towards low GHG emissions and climate-resilient development. While the discussions among Parties and stakeholders on the scope of Article 2, paragraph 1(c), and its relationship with Article 9 is ongoing, it is becoming increasingly evident that efforts must be pursued on all fronts in order to meet investment needs. The TD discussed ongoing efforts across a growing number of public and private sector initiatives, including coalitions and practices that focus on the development and adoption of net zero emissions pathways, as well as efforts to integrate assessments of climate risk into operations and financial disclosures.

196. The AR6 states that there is sufficient global capital to close the global investment gaps but there are barriers to redirecting capital to climate action. The mobilization of private capital is relevant to achieving scale. A growing number of initiatives such as taxonomies and other tools encourage the participation of the private sector. These initiatives are often voluntary, and the participation and inclusion of more entities, and the promotion of efforts to increase accountability to avoid greenwashing, is needed. It is therefore important to recognize that the private sector operates differently in each country, and small and medium-sized enterprises in some countries may require support to transform their processes.

197. Global and domestic capital markets are likely to be the primary source for scaling up investment in mitigation and adaptation, while public finance may be deployed to high-impact investments and to crowd-in private sector finance. In terms of mitigation, increased efforts to scale up green investments, therefore shifting incentives away from high-emission activities and financing transitions, are needed in all countries. How such efforts will be carried out will differ by context. While public finance will continue to have a key role to play in financing adaptation, increased private sector engagement is needed to make financial flows consistent with climate-resilient development. Private sector engagement in adaptation could entail providing products and services to build climate resilience and investment to enhance the resilience of their operations and supply chains, investing in businesses that build climate resilience; and providing direct financing to private or public sector actors for implementing adaptation actions.⁴⁴

198. Climate change vulnerability has the potential to negatively impact credit ratings, restricting access to capital at the national, local, entity or project level. Adverse impacts of climate change, such as damage to infrastructure, population shifts due to forced displacement and rising social cost increase the risk of default on debt servicing for financial institutions, increasing the cost of capital.

199. Significant financial flows continue to be directed towards investments and subsidies in activities and infrastructure that have high emissions and lack resilience. The GST can play a role in exploring solutions, methodologies and tools to scale up investments in climate

⁴⁴ Adaptation Committee. 2022. *Synthesis report for the technical assessment component of the first global stocktake*. Bonn: UNFCCC. Available at https://unfccc.int/sites/default/files/resource/AC_SR_GST.pdf.

action, address support needs and make financial flows consistent with a pathway towards low GHG emissions and climate-resilient development.

200. **Opportunities for financing mitigation and adaptation can be enhanced by enabling conditions and overcoming constraints.** 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 creating pipelines of investable products for adaptation and mitigation, present an important opportunity for delivering finance at the scale needed.

201. Public finance can play a critical role in scaling up finance by deploying public interventions to crowd-in private sector finance. Actions are required to mitigate risks, lower investment costs and enhance access while also pursuing efforts to make all finance flows consistent with the goals of the Paris Agreement. While domestic and international private sector climate finance thrives on sector-specific support mechanisms, cross-cutting features of enabling environments including country-level good governance and institutional capacities have also proven to be significant drivers.

202. The fifth BA found that domestic regulators are beginning to implement policies to address climate risk at both the institutional and systemic levels. There has been an increase in multilateral coordination on climate finance policy measures, with a wide variety of initiatives now designed to mainstream climate risk assessment in policymaking at finance ministries and central banks. In 2021, there was a 16 per cent increase in the number of policy and regulatory measures for green finance compared with 2020, bringing the total to 648 measures registered in over 100 jurisdictions globally.⁴⁵ Policy measures include the creation of sustainable finance strategies, green budget taxonomies and sustainable finance taxonomies.

203. **It is essential to unlock and redeploy trillions of dollars to meet global investment needs, including by rapidly shifting financial flows globally to support a pathway towards low GHG emissions and climate-resilient development.** Global investment needs to meet the goals of the Paris Agreement are in the order of trillions of United States dollars. Accelerated action is required to scale up climate finance from all sources beyond the mobilization and provision of support from developed to developing countries. In order to close finance gaps, climate finance – private and public, domestic and international – will need to fund activities to support a pathway towards low GHG emissions and climate-resilient development, including shifting flows from activities that promote high emissions and maladaptive development.

204. Assessments by the SCF show the general increasing trends in global finance flows for climate action, reaching an annual average of USD 803 billion in 2019–2020, 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 finance flows is 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 overall investment needs. Many investments still support infrastructure that locks in high emissions or that is not designed for resilience to climate impacts. For instance, USD 892 billion was invested in fossil fuels annually on average, and a further USD 450 billion was provided as subsidies for fossil fuel annually on average in 2019–2020. Moreover, investments in climate action are not distributed equally across regions; thus, significant opportunity exists for scaling up investments in developing countries in particular.

205. **A systematic approach to shifting finance flows is needed to support effective climate action at the required scale and speed.** The scale of investment required to achieve the goals of the Paris Agreement highlights the need for a transformation of the financial system and its structures and processes through engaging a wide range of institutions, including governments, ministries of finance, central banks, commercial banks, institutional investors, and other financial and regulatory actors. Momentum is growing behind

⁴⁵ See pp.14–15 in document FCCC/CP/2022/8/Add.4–FCCC/PA/CMA/2022/7/Add.4.

fundamental and impactful improvements to public financial institutions, or possible new institutional arrangements, including to reduce existing structural inequalities and make them more capable of addressing climate change in the context of sustainable development and efforts to eradicate poverty. For example, the need for the multilateral development banks and other international financial institutions to evolve in the light of emerging global challenges has been identified to scale up action on mitigation and adaptation to meet the goals of the Paris Agreement. There is also significant interest in deploying innovative instruments such as debt-for-climate swaps, special drawing rights, blended finance or emission pricing mechanisms.

206. A growing number of private sector initiatives focus on developing net zero targets, transition plans and strategies as well as climate-related financial disclosures, including umbrella initiatives such as the Global Financial Alliance for Net Zero and a range of actor-based net zero alliances (Asset Owners Net Zero Alliance, Net Zero Banking Alliance, etc.) Similarly, initiatives such as the Coalition of Finance Ministers for Climate Action and the Network for the Greening of the Financial System have been pursuing efforts to address macroeconomic implications of climate change in the context of their mandates.

207. **Key finding 16: existing cleaner technologies need to be rapidly deployed, together with accelerated innovation, development and transfer of new technologies, to support the needs of developing countries.**

208. The uneven pace of the 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 are crucial for knowledge-sharing, ownership, acceptance of technologies and accelerating innovation.

209. The Technology Mechanism, comprising the Technology Executive Committee and the Climate Technology Centre and Network, facilitates international cooperation on technology development and transfer through capacity-building, knowledge-sharing, and technical and financial support to aid developing countries in their efforts to develop, adopt and deploy climate technologies. Parties continue to consider strengthened linkages between the Technology Mechanism and the Financial Mechanism to accelerate action on technology development and transfer, including on TNAs and technology action plans. More than 100 developing country Parties have completed at least one TNA, and almost 1,000 technology action plans and project ideas derived from TNAs have been developed to date, for many of which support is being sought.

210. However, more effective strategic technology cooperation would enable rapid systems transformation that is aligned with achieving the goals of the Paris Agreement. 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 as well as accelerators of progress in key climate technology priorities. Information on the global status of technology development and transfer is needed to better inform such efforts, under the Technology Mechanism and beyond it.

211. Reductions in costs and increased access to finance for some key technologies should enable greater deployment globally, particularly in developing countries. Technology development has already led to tremendous reductions in costs. The unit costs of some technologies have decreased by up to 80 per cent. Continuing to drive down the average cost of capital for such technologies and reducing unit costs for other key technologies for just energy and other sectoral transitions will be deciding factors for whether the goals of the Paris Agreement are met.

212. 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 promote learning through successful climate technology initiatives, with the aim of increasing access to new and existing technologies and driving down costs.

Collaborative approaches can also foster domestic data generation and ownership and innovation sharing 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, including national systems of innovation (focusing on technology hardware, software and orgware). Such approaches can include investments in technology development and transfer through joint research and development programmes and capacity-building.

213. 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, while ensuring inclusive multi-stakeholder engagement and access to financial support and capacity-building.

214. A need for further research and development of technologies exists in all sectors, but particularly in “hard to abate” sectors and in technologies that are required to achieve net zero CO₂ emissions by 2050 and to address overshooting in emission pathways pursuing efforts to limit the temperature increase to 1.5 °C. Research is also needed to understand the role of technology and innovation in supporting transformational adaptation.

215. Key finding 17: capacity-building is foundational to achieving broad-ranging and sustained climate action and requires effective country-led and needs-based cooperation to ensure capacities are enhanced and retained over time at all levels.

216. The fundamental challenges presented by climate change require the capacity to act to be strengthened in all countries, particularly in developing countries where the underlying institutional and foundational capacities are less developed and the risks and vulnerabilities can be much greater. Capacity limitations present barriers across all dimensions of climate action, including mitigation, adaptation, enabling and using technology and finance, and averting, minimizing, and addressing loss and damage.

217. To be effective, capacity-building needs to be systemic, which could include some modalities such as training, but invariably entails investing in the existing underlying social and economic systems, such as education and health, which will allow for the creation of sustained human and institutional capacities across all sectors in society. Capacities, including skilled human and institutional capacities, need to be retained over time. Developed countries need to increase the level of support provided for strategic capacity-building to developing countries to address locally determined needs.

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

219. Capacity-building is a systemic challenge. Needs-based approaches to capacity-building determine the priority capacities required to move forward in terms of implementing the key instruments of the Paris Agreement (e.g. NDCs, NAPs, LT-LEDS, BTRs) 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 ensuring 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 and the ability to develop plans to support the implementation of domestic mitigation measures in NDCs.

220. 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, which can include capacity-building support, for example, by universities, research organizations, civil society organizations and the private sector. Capacity-building based on Indigenous and other traditional knowledge systems also presents opportunities for more sustainable avenues to long-term capacity development.

221. 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 is key and requires coherent and consistent effort across multiple United Nations organizations and other intergovernmental organizations to support coordinated systemic capacity-building support that integrates across efforts related to mitigation, adaptation and averting, minimizing, and addressing loss and damage.

V. Way forward

222. The first GST is taking place in an era of dramatic and widespread changes. While multiple crises cannot be ignored, neither can the opportunities for enhanced climate action. Since its adoption, the Paris Agreement has inspired near-universal climate action, but the global community is not on track to meet the long-term goals set out in the Paris Agreement, despite the collective progress made. The Paris Agreement, through its GST, provides the basis for informing further ambition in enhancing action and support to respond to the climate crisis. The best available science has made clear that the window of opportunity for taking action is closing rapidly. The first GST comes at a critical moment for accelerating collective progress. As this report shows, much more action is needed now, on all fronts and by all actors, if the long-term goals of the Paris Agreement are to be met.

A. Good practices

223. The 2022 NDC synthesis report noted that many Parties have communicated good 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 in and lessons learned from INDC preparation and implementation efforts; submitting updated or new NDCs in 2020–2021; conducting extensive stakeholder consultations and peer review to enhance their understanding of NDCs; 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. As Parties prepare their next NDCs, they may draw on the rich technical information from the input and technical assessment phases of the GST.

224. The technical assessment phase of the first GST included discussions on good practices, challenges, opportunities and barriers across a range of topics. Many actionable solutions and creative suggestions for overcoming challenges were identified. Examples of good practices are documented in the summaries of the three meetings on the technical dialogue and the extensive inputs that have been received, including information on action already being undertaken by Parties and non-Party stakeholders to implement the Paris Agreement.

225. Some ways were proposed to make the good practices from the GST information portal more easily accessible, including through technical annexes and/or through an online searchable interface. Several examples of technical annexes were submitted and discussed, with a wide range of views among participants. Two groups of participants submitted further details on previous proposals: a compendium of illustrative adaptation actions and an example of a technical annex on mitigation.⁴⁶ A searchable interface was also developed by an independent organization and shared with participants.⁴⁷ It enables Parties and non-Party stakeholders to explore the rich content generated through the GST for themselves, finding good practices of most relevance to their interests and needs.

⁴⁶ See <https://unfccc.int/topics/global-stocktake/information-portal>.

⁴⁷ <https://gst1.org/>.

B. Information gaps

226. The TD has been based on the best available science, drawing on the findings of the AR6 and other knowledge sources, with extensive involvement of experts and facilitators, with a view to laying a strong scientific and technical basis for the consideration of outputs component of the GST. The active engagement of a wide range of participants from Parties and non-Party stakeholders in the TD has demonstrated the importance of strong scientific evidence and inclusion of diverse voices.

227. During a learning-by-doing process, the following information gaps emerged that the scientific community might address in the years ahead in order to better inform the next GST and work programmes and other processes under the Paris Agreement:

(a) Information gaps exist in relation to emissions scenarios in which the global warming temperature temporarily exceeds and then returns to below 1.5 °C above pre-industrial levels. Further research on such scenarios could determine the extent of CO₂ removal measures needed, improve understanding of potential economic and non-economic loss and damage during a period of overshoot and identify proactive adaptation options for managing that potential loss and damage;

(b) More information is needed on which climate change impacts are reversible and which are irreversible. In particular, more understanding is needed of how to avoid and respond to tipping points.

228. Reviewing overall progress in achieving the GGA during the TD included considering efforts across the adaptation cycle and opportunities and challenges related to making adaptation more transformational. Discussions under the Glasgow–Sharm el-Sheikh work programme on the GGA are ongoing with a view to developing a common understanding of the GGA, and focus on dimensions, themes, cross-cutting issues and sources of information for informing the framework for the GGA. Increasing understanding of progress in achieving the GGA and provision of information on adaptation in national reporting should enable a more comprehensive assessment of adaptation during the second GST.

C. Agreed next steps

229. At CMA 5, the first GST will conclude with the consideration of outputs phase. This will consist of a series of high-level events at CMA 5 as well as discussions by Parties in the joint contact group established by the subsidiary bodies. In line with decision 19/CMA.1, these discussions are expected to inform and deliver the political outcome of the GST, identify opportunities and challenges in relation to enhancing climate action, summarize key political messages and support and identify possible measures and good practices. The work under the input and technical phases of the first GST has brought to light critical information, research, experience and best practices that can inform these discussions at CMA 5.

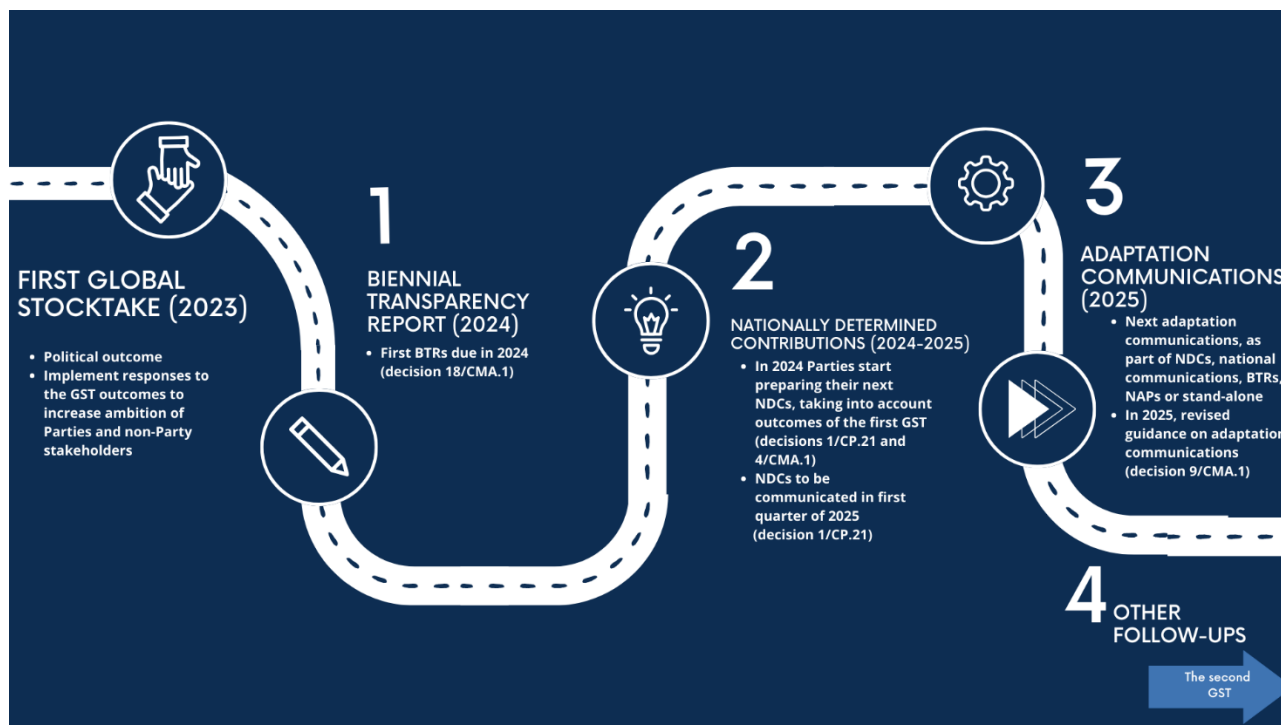
230. Some of the follow-up activities to the first GST that have already been agreed by Parties are illustrated in figure 3:

(a) The next round of NDCs, which are required by the Paris Agreement to be submitted every five years, will be prepared and then communicated by Parties by 2025, to be informed by the outcomes of the first GST;

(b) In 2024, after the first GST, Parties will submit their first BTR, which is a key step to enhance transparency and enable collective accountability;

(c) Parties may update their adaptation communication at any time and submit it as a component of or in conjunction with other communications or documents, including a NAP, an NDC or a national communication.

Figure 3
Follow-up activities to the first global stocktake



231. Under the CMA, other mandated activities of constituted bodies and under ongoing work programmes are relevant to matters identified through the TD, such as the Sharm el-Sheikh mitigation ambition and implementation work programme and the ad hoc work programme on the new collective quantified goal on climate finance, established for 2022–2024. In 2025, Parties will consider and potentially revise the guidance on adaptation communications. The GST outcomes and outputs (including this synthesis report) can inform these other processes.

Annex I

Traceable accounts

[English only]

1. This annex provides, for each subchapter in chapter IV of this document, some details that could assist readers in understanding the sources of specific information used in preparing key and supporting information.

I. Context

2. This topic was discussed at TD1.2 in response to calls from TD1.1 to consider integrated and holistic findings resulting from intersections among the thematic areas of the GST. The report of TD1.2 summarized focused exchanges on this matter (paras. 288–324), as well as initial emerging messages that emerged during TD1.1 and TD1.2 (paras. 102–119). The report on TD1.3 summarized further discussions on this matter (paras. 147–193). The three key findings are also supported by information from the synthesis reports prepared by the secretariat under the guidance of the co-facilitators, pursuant to decision 19/CMA.1, paragraph 23,¹ the AR6 and the UNEP *Emissions Gap Report 2022*.²

II. Mitigation, including response measures

3. This topic was discussed at all the meetings of the TD and was summarized as follows: in the report on TD1.1, paragraphs 24–28 (initial contributions by participants), 55–104 (round-table discussions), 242–280 (world café stations), 353–358 (comments by negotiating groups, Parties and non-Party stakeholders) and 387–394 (reflections); in the report on TD1.2, paragraphs 29–55 (reflections), 129–181 (round table and breakout groups), 328–349 and 426–466 (world café stations); and in the report on TD1.3, paragraphs 35–85 (round-table discussions and world café stations). The five key findings (4–8) are also supported by information from the synthesis reports prepared pursuant to decision 19/CMA.1, paragraph 23, the AR6 and the UNEP *Emissions Gap Report 2022*.

III. Adaptation including loss and damage

4. This topic was discussed at all the meetings of the TD and was summarized as follows: in the report on TD1.1, paragraphs 29–33 and 43 (initial contributions by participants), 105–175 (round-table discussions), 281–305 (world café stations), 359–361 (comments by negotiating groups, Parties and non-Party stakeholders) and 395–402 (reflections); in the report on TD1.2, paragraphs 56–81 (reflections), 182–248 (round table and breakout groups), 350–366 and 467–474 (world café stations); and in the report on TD1.3, paragraphs 86–107 (round-table discussions and world café stations). The five key findings (9–13) are also supported by information from the synthesis reports prepared pursuant to decision 19/CMA.1, paragraphs 23–24, the AR6 and the UNEP *Adaptation Gap Report 2022*.³

¹ See <https://unfccc.int/global-stocktake-secretariat-synthesis-reports-and-addendas>.

² UNEP. 2022. *Emissions Gap Report 2022: The Closing Window – Climate crisis calls for rapid transformation of societies*. Nairobi: UNEP. Available at <https://www.unep.org/resources/emissions-gap-report-2022>.

³ UNEP. 2022. *Adaptation Gap Report 2022: Too Little, Too Slow – Climate adaptation failure puts world at risk*. Nairobi: UNEP. Available at <https://www.unep.org/resources/adaptation-gap-report-2022>. Available at <https://www.unep.org/resources/adaptation-gap-report-2022>.

IV. Means of implementation and support and financial flows

5. This topic was discussed at all the meetings of the TD and was summarized as follows: in the report on TD1.1, paragraphs 34–39 (initial contributions by participants), 176–237 (round-table discussions), 306–332 (world café stations), 362–367 (comments by negotiating groups, Parties and non-Party stakeholders) and 403–414 (reflections); in the report on TD1.2, paragraphs 82–101 (reflections), 249–287 (round table and breakout groups), 367–425 (world café stations); and in the report on TD1.3, paragraphs 108–145 (round-table discussions and world café stations). The four key findings (14–17) are also supported by information from the synthesis reports prepared pursuant to decision 19/CMA.1, paragraphs 23–24, the AR6 and the fifth BA.

Annex II

Approach taken to the process of the technical dialogue of the first global stocktake

[English only]

1. In accordance with decision 19/CMA.1, paragraphs 9–10, the co-facilitators conducted the TD in a comprehensive, facilitative and efficient manner, and as a Party-driven, transparent process that allowed Parties to engage and hold discussions with each other, experts, accredited observer organizations and other non-Party stakeholders (see table 2 for an overview of relevant information).
2. All written inputs in the form of submissions were made fully accessible online to participants. The GST submissions and information portals were upgraded to improve on their functionality in the course of the TD. These submissions, representing over 170,000 pages, helped to inform the planning of, and fed into the discussions at, the meetings of the TD. They are reflected in the summary reports on each meeting and served as valuable resources for this synthesis report. They also functioned as the basis for the two poster sessions held at SB 57 and 58.
3. The co-facilitators prepared and made available, with the assistance of the secretariat, information notes to aid in participants' planning prior to, as well as summary reports following, each meeting of the TD. The co-facilitators also held informal consultations and webinars with Parties and non-Party stakeholders on these documents, including on emerging messages, to provide clarification and hear constructive feedback; taking into account views expressed by participants. Additionally, the co-facilitators made themselves available to Parties, groups of Parties and non-Party stakeholders during the sessions of the subsidiary bodies.
4. The TDs were organized in a variety of formats, including opening and closing plenaries, world cafés, round tables (TD1.2 included four breakout groups established per round table after an initial introduction by the co-facilitators) and focused exchanges¹ organized in four clusters: mitigation, including response measures; adaptation, including loss and damage; means of implementation and support; and integrated and holistic approaches. The co-facilitators were also committed to pioneering innovative forms of participant engagement and launched calls for poster sessions and creative spaces.² At TD1.3, the co-facilitators arranged for a demonstration session on a searchable interface/online GST tool.³ A total of 252 hours of meetings and discussions were held during the three meetings of the TD across all formats.
5. The arc of discussions included laying the information base at TD1.1, including on well-known gaps and discussions on what is being done; identifying how to bridge gaps and shift the focus to implementation at TD1.2; and concluding with focused discussions on what is next at TD1.3, including how Parties, observer organizations and other non-Party stakeholders could progress in their collective efforts towards the Paris Agreement goals and objectives using the emerging messages contained in the summary report on TD1.2.
6. The co-facilitators employed a learning-by-doing approach to the organization of the TD by building on the organization of work in each successive meeting, continuing with what worked well, and making improvements where the process could have worked better based

¹ In response to requests from Parties to discuss integrated and holistic approaches, two focused exchanges were organized at TD1.3 at SB 57. A round table was held on this thematic area at TD1.3.

² Submissions to the creative space held at TD1.2 and the two poster sessions held at TD1.2 and TD1.3 are available at <https://unfccc.int/global-stocktake-td12-creative-space>, <https://unfccc.int/global-stocktake-td12-poster-session> and <https://unfccc.int/event/gst-td-poster-session-respectively>.

³ Available at <https://gst1.org/>.

on many good suggestions by participants, and introduced norms for discussion that helped to foster an inclusive, transparent, robust and fruitful process throughout the TD.⁴

7. Invited speakers at TD meetings included the IPCC Chair, the UNFCCC Executive Secretary, the Chairs of the subsidiary bodies, and representatives of the COP 27 and incoming COP 28 Presidencies. In addition, a number of experts, facilitators and panel members were invited to support TD events and prepare presentations, prompts, and world café station notes to guide the discussions.⁵ Selection of experts, facilitators and panel members respected gender and geographical balance to the extent possible, while ensuring relevant expertise in the related fields. Participants at the round tables and focused exchanges included a mix of Parties, accredited observer organizations and other non-Party stakeholders. Parties self-selected within their negotiating groups, nominations were received from each constituency within accredited observer organizations, and the secretariat ran an expression of interest process for other non-Party stakeholders, where participants were proposed based on similar evaluation criteria as applied to the selection of experts. Participants were issued with secondary badges to facilitate easy identification and secure their seats at the round tables.

8. While the TD events were all held in-person, the plenaries, round-table discussions and focused exchanges were streamed to an online platform that was accessible to all registered participants. The world cafés were not streamed but dedicated notetakers captured the results of the discussions to inform the round tables and for inclusion in the TD summary reports. Opening, closing and reporting plenaries were webcast, and on-demand videos can be accessed on the UNFCCC website.⁶ Graphic artists recorded the results of the discussions at several events. Their artwork captures the salient aspects of these events in a universally understandable pictorial format.⁷

Table

Information relevant to the technical dialogue

<i>Information relevant to the TD</i>	<i>Links</i>
General	
GST web page	https://unfccc.int/topics/global-stocktake
Compilation of relevant mandates and provisions	https://unfccc.int/sites/default/files/resource/Mandates_%20Global%20stocktake_2022%20%28002%29%5B80%5D.pdf
Non-paper by the Chairs of the subsidiary bodies	https://unfccc.int/sites/default/files/resource/Non-paper%20on%20Preparing%20for%20GST1_0.pdf
Call for inputs for the first GST	https://unfccc.int/sites/default/files/resource/Call%20for%20inputs%20SB%20Chairs_GST_reminder_Feb23.pdf
Guiding questions for the technical assessment component of the first GST	https://unfccc.int/sites/default/files/resource/Draft%20GST1_TA%20Guiding%20Questions.pdf
GST information portal containing inputs to the GST	https://unfccc.int/topics/global-stocktake/information-portal
Synthesis reports and addenda for the technical assessment by the secretariat and constituted bodies and forums and other institutional arrangements serving the Paris Agreement	https://unfccc.int/global-stocktake-secretariat-synthesis-reports-and-addendas

⁴ See annex III in https://unfccc.int/sites/default/files/resource/GST_Technical_Dialogue_Information_Note.pdf.

⁵ All presentations, prompts and world café station notes are available at <https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogue-of-the-first-global-stocktake>.

⁶ See https://unfccc.int/SB58/schedule?access=All&field_event_has_webcast_value=1&amount-time=23%3A59%20h&field_start_datetime=&field_end_datetime=&search=&field_event_datetime_value_1=1.

⁷ See <https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogue-of-the-first-global-stocktake>. The pictorial format facilitates understanding but does not inform the synthesis report by the co-facilitators.

<i>Information relevant to the TD</i>	<i>Links</i>
Searchable interface/online GST tool	https://gst1.org/
GST events at regional climate weeks in 2022	https://unfccc.int/topics/global-stocktake/global-stocktake-governance-and-facilitation/the-global-stocktake-at-regional-climate-weeks-2022
TD1.1	
TD1.1 web page	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/technical-dialogue-11-td11-of-the-first-global-stocktake
Information note on TD1.1	https://unfccc.int/sites/default/files/resource/GST_Technical_Dialogue_Information_Note.pdf
Statements by Parties and non-Party stakeholders	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/technical-dialogue-11-td11-of-the-first-global-stocktake
Summary report on TD1.1	https://unfccc.int/sites/default/files/resource/GST%20TD1_1_srepor_t_26_09_2022_Final.pdf
TD1.2	
TD1.2 web page	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/second-meeting-of-the-technical-dialogue-td12-of-the-first-global-stocktake
Call for inputs for TD1.2	https://unfccc.int/sites/default/files/resource/message_to_parties_and%20observers_sb_chairs_call%20for%20inputs_first_gst.pdf
Information note on TD1.2	https://unfccc.int/sites/default/files/resource/GST%20TD1.2%20Information%20Note_20221007.pdf
Statements by Parties and non-Party stakeholders	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/second-meeting-of-the-technical-dialogue-td12-of-the-first-global-stocktake
Summary report on TD1.2	https://unfccc.int/sites/default/files/resource/TD1.2_GST_SummaryReport.pdf
TD1.3	
TD1.3 web page	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/third-meeting-of-the-technical-dialogue-td13-of-the-first-global-stocktake
Call for inputs for TD1.3	https://unfccc.int/sites/default/files/resource/message_to_parties_and%20observers_sb_chairs_call%20for%20inputs_first_gst.pdf
Information note on TD1.3	https://unfccc.int/sites/default/files/resource/GST%20TD1.3%20Information%20Note_0205.pdf
Statements by Parties and non-Party stakeholders	https://unfccc.int/topics/global-stocktake/components-of-the-gst/technical-dialogues-of-the-first-global-stocktake/third-meeting-of-the-technical-dialogue-td13-of-the-first-global-stocktake#Opening-plenary
Summary report on TD1.3	https://unfccc.int/sites/default/files/resource/GST_TD1.3%20Summary%20Report_15_August_Final.pdf