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气候变化框架公约

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第五十九届会议

2023年11月30日至12月6日，

阿拉伯联合酋长国

附属履行机构

第五十九届会议

2023年11月30日至12月6日，

阿拉伯联合酋长国

第一次全球盘点技术对话

联合召集人关于技术对话的综合报告

概要

这份关于第一次全球盘点技术对话的综合报告基于整个进程中收到的意见和技术对话三次会议期间进行的讨论，是一份总括性的事实资料，全面概述了技术对话期间的讨论情况，确定了需要采取进一步行动以弥合差距的关键领域，并探讨了《巴黎协定》执行过程中的挑战和障碍。该报告评估了在实现《巴黎协定》宗旨和长期目标方面取得的集体进展，并向缔约方通报了更新和加强行动和支持以及加强气候行动国际合作的潜在领域。



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简称和缩略语

AFOLU	农业、林业及其它土地利用
AR	政府间气候变化专门委员会评估报告
BA	气候资金流动两年期评估和概览
BTR	两年期透明度报告
CH ₄	甲烷
CMA	作为《巴黎协定》缔约方会议的《公约》缔约方会议
CO ₂	二氧化碳
CO ₂ eq	二氧化碳当量
COP	缔约方会议
GEF	全球环境基金
GGA	全球适应目标
GHG	温室气体
GST	全球盘点
INDC	预期国家自主贡献
IPCC	政府间气候变化专门委员会
LT-LEDS	长期低排放发展战略
NAP	国家适应计划
NDC	国家自主贡献
REDD+	减少毁林所致排放量；减少森林退化所致排放量；养护森林碳储存；可持续森林管理；以及加强森林碳储存(第 1/CP.16 号决定，第 70 段)
SB	附属机构届会
SCF	资金问题常设委员会
SDG	可持续发展目标
TD*	技术对话
过渡委员会	关于落实应对损失和损害的新供资安排及第 2/CP.27 号和第 2/CMA.4 号决定第 3 段所设基金问题的过渡委员会
TNA	技术需要评估
UNEP	联合国环境规划署

* TD1.1、TD1.2 和 TD1.3 是指第一次全球盘点技术对话的具体会议。

一. 内容提要

A. 背景¹

1. **主要结论 1:** 《巴黎协定》设定目标并向世界发出应对气候危机紧迫性的信号，自通过以来推动了近乎普遍的气候行动。虽然行动正在进行中，但各方面还需要采取更多行动。
2. 全球对《巴黎协定》有广泛的承诺，也支持协定在促进应对气候危机所需的合作行动中的核心作用，该协定鼓舞了全球减缓和适应行动和支持方面的重大进展。与《巴黎协定》通过前的预测相比，协定通过之后，引导各方作出贡献，大大降低了对未来全球变暖的预测，但整个世界尚未走上实现《巴黎协定》长期目标的轨道。第一次全球盘点技术对话的参与者指出了在讨论的所有主题中面临的挑战和障碍。讨论还强调了现有和新兴的机会以及创造性解决方案，以便弥合差距。现在是时候迅速加快行动和支持了，以便在这个关键的十年取得进展。
3. **主要结论 2:** 为了在可持续发展和消除贫困的背景下加强全球应对气候变化威胁的措施，各国政府需要支持系统转型，将气候抗御力和温室气体低排放发展路径纳入主流。非缔约方利益相关方需要采取可信、负责和透明的行动，以加强系统转型的力度。
4. 加快应对气候变化的行动对于实现可持续发展至关重要。可通过全社会办法以及综合的包容性决策，使促进气候抗御力和温室气体低排放发展的政策和措施相辅相成。在根据《巴黎协定》编制和通报新的和更新的国家自主贡献方面取得了进展。未来数十年要继续努力维持这一进展，以每个国家自主贡献周期和全球盘点取得的进展为基础。
5. 通过促进所有缔约方和非缔约方利益相关方，包括民间社会、私营部门、金融机构、城市和其他国家以下各级主管部门、地方社区和土著人民的行动，加强气候行动和支持。非缔约方利益相关方履行承诺并采取行动，可促使缔约方更加努力支持系统转型。需要确保严格的核算和问责，使各方的贡献具有信服力，跟踪环境完整性方面的进展情况并避免重复计算。非缔约方利益相关方的举措还应覆盖并支持那些通常被边缘化的利益相关方和群体，包括妇女、青年和土著人民，使每个人都能有效参与并为这些举措作出贡献。
6. **主要结论 3:** 系统转型会带来许多机会，但快速变化可能具有破坏性。注重包容性和公平性可以增强气候行动和支持方面的雄心。
7. 在本世纪中叶或前后实现净零排放并同时实施变革性适应措施，需要广泛且迅速地改变现有做法。精心设计的气候行动可以产生巨大的效益，通过采取全社会办法并了解当地情况，此类行动可以最大限度地减少干扰。公平有助于实现更大的雄心，并增加实现《巴黎协定》目标的可能性。那些受气候影响最严重的人应参与制定解决方案。
8. 关于主要结论 1-3 的更多信息，见下文第四章 A 节。

¹ 本报告中的标题仅用于帮助浏览本文件。

B. 减缓，包括应对措施

9. 主要结论 4: 全球排放不符合与《巴黎协定》气温目标一致的全球模拟减缓路径，而且提高雄心并履行现有承诺以将气温升幅限制在工业化前水平以上 1.5°C 之内的时间窗口正在迅速缩小。

10. 《巴黎协定》的所有缔约方都通报了包括减缓目标和/或措施的国家自主贡献。越来越多的缔约方还通报了长期低排放发展战略。排放差距是指国家自主贡献所暗含的排放水平与全球模拟减缓路径(符合将气温升幅限制在 1.5°C 或 2°C 之内的目标)的平均排放水平之间的差距，而执行差距是指目前已实施的政策和行动离实现既定目标的差距。根据当前的国家自主贡献，要在 2030 年将气温升幅限制在 1.5°C 之内，估计排放差距有 20.3-23.9 吉吨二氧化碳当量。²

11. 需要采取行动，提高国家自主贡献的减缓雄心，并加强实施措施以实现目标。温室气体排放的历史趋势和当前趋势提供了重要信息，有助于了解当前的情况、其形成的原因以及如何指导未来的行动。

12. 在巴黎举行的缔约方会议第二十一届会议上，缔约方同意尽快实现全球温室气体排放峰值，并认识到发展中国家缔约方需要更长的时间才能达到峰值。根据气专委第六次评估报告，全球温室气体排放需要在 2020 年至 2025 年之间达到峰值，才能将气温升幅限制在《巴黎协定》的气温目标范围内。发达国家和一些发展中国家的排放量已经达到峰值，但全球排放量尚未达到峰值。所有缔约方都需要在达到峰值后的几十年内迅速大幅减少温室气体排放量。³

13. 主要结论 5: 在实施国内减缓措施和制定更雄心勃勃的国家自主贡献目标方面，需要更多的行动和支持，以实现不同背景下的现有机会和新兴机会，从而在 2030 年之前将全球温室气体排放量比 2019 年减少 43%，并在 2035 年之前进一步减少 60%，最终在 2050 年之前实现全球二氧化碳零排放。

14. 需要采取紧急行动并提供支持，在所有部门和系统中实现机会，加速实施国内减缓措施。现在有足够的具有成本效益的机会来解决 2030 年的排放差距，但要以所需的速度和规模利用这些机会，仍然存在重大挑战，包括在获得支持和提供支持方面。如果得到充分执行和支持，实现这些机会可以提高雄心，在 2030 年之前大幅减少温室气体净排放量。在政策制定和国际合作方面的创意和创新至关重要。

15. 需要在国家自主贡献中制定更雄心勃勃的减排目标，更快地减少排放，并与国家的长期低排放发展战略保持一致，以期在 2050 年或其前后实现向净零排放的公正转型，同时提高透明度有助于跟踪进展情况。《巴黎协定》规定了这一进程，包括希望各缔约方的后续国家自主贡献将代表其最高目标，反映其共同但有区别的责任和各自的能力，考虑到不同的国情，并将参考全球盘点的结果。该进程可能主要涉及采用更严格的目标和更全面的目标形式，以更迅速地减少温室气体。《巴黎协定》规定，发达国家缔约方应当继续带头，努力实现全经济范围绝对减排目标，发展中国家缔约方应当继续加强减缓努力，应鼓励它们根据不同的国情，逐渐实现全经济范围减排或限排目标。鉴于缔约方根据不同国情制定和

² FCCC/PA/CMA/2022/4.

³ 见下文第 97-98 段。

通报其长期低排放发展战略，该战略规划了到本世纪中叶或前后向净零排放的公正转型，所以缔约方应开始采取具体措施，转向此类路径。

16. 如果减缓措施成功实现了其他可持续发展目标，可将其推广和复制到不同情境下。实施减缓措施带来的可持续发展效益对于扩大和深化这些措施非常重要，特别是如果这些措施还能消除贫困。

17. 主要结论 6: 要实现二氧化碳和温室气体净零排放，就需要在所有部门和背景下进行系统转型，包括扩大可再生能源的规模，同时逐步淘汰所有未加装减排设施的化石燃料，结束毁林，减少非二氧化碳排放，并实施供给侧和需求侧两方面措施。

18. 虽然实现净零排放的时间因国家而异，但所有国家都需要采取全社会办法来绘制路径以实现二氧化碳或温室气体净零排放。许多减缓行动可以带来协同效益，有助于实现可持续发展目标。

19. 扩大可再生能源规模以及逐步淘汰所有未加装减排设施的化石燃料是向净零排放的公正能源转型不可或缺的要素。电气化、能源效率和需求侧管理以及能源储存也是净零能源系统的重要要素。⁴

20. 在工业、交通、建筑和其他部门实施系统转型的措施必须迅速减少工艺和能源排放。在工业、运输、建筑和其他部门实施雄心勃勃的措施，解决温室气体排放问题，可以减少这些部门及其整个供应链的排放，同时降低成本并带来协同效益。

21. 停止和逆转毁林和退化以及改进农业做法对于减少排放、保护和加强碳汇至关重要。到 2030 年停止和逆转毁林，恢复和保护自然生态系统，将导致大规模二氧化碳吸收和协同效益。在农业领域采取需求侧措施以及可持续农业集约化至关重要，不需要进一步扩张土地，还可以催化广泛的可持续发展效益。

22. 更有效的国际合作和可信的举措有助于缩小排放和执行方面的差距。需要在所有系统和部门采取严格的“全经济、全社会”办法。此外，在非缔约方利益相关方的参与下开展更有效的国际合作，对于支持各国加快进展至关重要。

23. 主要结论 7: 公正转型可以支持更稳健和公平的减缓成果，并针对不同情况采取量身定制的办法。

24. 公平的概念是复杂且多维的。在第一次技术对话的讨论中，参与者就减缓措施中的公平问题表达了不同意见。一个共同的思路是，公平应该与执行《巴黎协定》的雄心螺旋式上升趋势保持一致。⁵

25. 可以通过集体性和参与式决策进程采纳和实施公正转型原则，以减少快速的系统转型带来的破坏性后果。

26. 主要结论 8: 经济多样化是处理应对措施所产生影响的一项关键战略，有各种备选办法可应用于不同情况。

⁴ 见下文第 116-121 段。

⁵ 见下文第 132 段。

27. 明智的方针可以处理应对措施负面影响，并促进长期低排放发展战略内部的积极协同作用，包括通过经济多样化来实现。经济多样化是处理应对措施负面影响以及促进积极协同作用的战略之一。这种多样化的机会包括绿色工业化、供应链绿色化以及发展相关和不相关产品。

28. 关于主要结论 4-8 的更多信息，见下文第四章 B 节。

C. 适应，包括损失和损害

29. 主要结论 9: 由于气候变化威胁到世界各地的所有国家、社区和人民，迫切需要增加适应行动，并加强努力以避免、尽量减轻和处理损失和损害，以减少和应对日益严重的影响，特别是那些对变化的准备最不充分、最难从灾难中恢复的人遭受的影响。

30. 在适应和损失与损害方面的集体进展必须出现巨大跃升，才能实现《巴黎协定》所设定的目标。让所有人拥有宜居和可持续未来的机会之窗正在迅速关闭。已经看到了人类和自然系统遭受的损失和破坏。气候影响正在侵蚀过去的人类发展成果，如果不采取充分的适应行动，将阻碍未来取得此类成果的能力。适应是各级政府的责任，但反复发生的极端气候事件削弱了恢复能力。

31. 主要结论 10: 总体而言，关于适应行动和支持的计划和承诺越来越雄心勃勃，但大部分适应努力都是分散的、渐进的、针对特定部门的，并且在各区域分布不均。

32. 适应规划是迭代周期的第一步，以便能够迅速从理解风险转向更雄心勃勃和更有效的适应行动和支持，现在必须加快落实这些行动和支持，以提高适应能力，支持实现更大的抗御力，并减少脆弱性。缔约方和非缔约方利益相关方需要进行持久、长期的改革，将气候变化风险纳入规划、决策和执行的各个方面。在整个适应周期，作决策时应考虑气候相关风险，这方面一直在取得进展。然而，随着时间的推移，需要采取持续和强化的行动来全面实施国家适应计划和规划流程，以落实持久的变革，公平地减轻最弱势群体的风险。适应周期的每一次迭代都是了解进展情况和基于经验加强努力的机会。适应周期的每个阶段也提供了机会，以便在国际上承认发展中国家的努力，并探讨加强和加快适应行动方面的国际合作。

33. 关于适应的透明报告可促进和加强理解、执行和国际合作。缔约方提交了适应信息通报，作为国家适应计划、国家自主贡献或国家信息通报的组成部分，或与这些文件一起提交，适应信息通报概述了缔约方在建设抗御力方面的经验和国家作出的努力，包括优先事项、执行情况以及支助需求、计划和行动。在适应方面有着广泛的行动和支持，远远超出了所提交的适应信息通报所反映的范围。各方应考虑在定期更新这些信息通报时，反映适应周期主流化的进展，以便采取更加雄心勃勃的适应行动。关于国家适应计划的工作正在进行，许多政府正在将适应和抗御力纳入国家适应计划和规划进程。与以往的国家适应计划相比，2022 年提交的国家适应计划中有更多计划包含了适应信息，缔约方也能够自愿在两年期透明度报告中纳入有关气候影响和适应进展的信息。

34. 可以利用各种方法和指标来了解全球适应目标的进展情况。这些方法和指标的持续发展对于监测和评估适应规划和执行工作至关重要。利用这些发展并确定

全球适应目标框架，在第二次全球盘点期间，应该可以对全球适应目标的集体进展情况进行更全面的评估。

35. 发展中国家的适应努力正在得到认可，并将在《协定》/《公约》缔约方会议第五届会议高级别活动中得到进一步认可。发展中国家缔约方的适应努力通过各种方式得到了认可。⁶

36. 主要结论 11: 当适应活动受到当地情况、人口和优先事项的影响和驱动时，适应行动和支持的充分性和有效性都会得到增强，这也可以促进变革性适应。

37. 变革性的适应方法通过改变系统的基本属性，为适应气候变化的影响和风险提供了新的选择。

38. 各系统和各部门都有适应的机会，其中许多已被纳入现有发展优先事项和进程中。在广泛的领域和主题中都有妥善记录的良好做法，涵盖了各种危害，可帮助指导适应行动(见图 2)。科学文献指出了针对气候变化相关特定危害的各种适应方案和良好做法，以及国际合作的方案。⁷

39. 加强适应行动的一个基本出发点是通过气候服务传播气候信息，以满足当地的需求和优先事项。这种气候服务提供可付诸行动的气候信息和预测，为适应行动的政策、规划和执行提供信息。这些服务可改善对预计风险和情景的应对措施，促进社会包容，避免将风险转移给其他行为体或加剧现有的脆弱性。⁸

40. 国际合作有助于分享在实施适应计划过程中实现机遇、克服障碍和挑战的经验，并促进学习不同背景下的良好做法。国际合作和举措，包括从事适应工作的非缔约方利益相关方之间的合作和举措，可以对涉及社区、地方当局、民间社会和企业的系统转型给予强化和支持。与传统上被边缘化的群体，包括妇女、青年、土著人民和地方社区以及族裔和其他少数群体建立伙伴关系至关重要。

41. 主要结论 12: 要避免、尽量减轻和处理损失和损害，就需要在气候和发展政策方面采取紧急行动，以全面管理风险并为受影响社区提供支持。

42. 与较大的气温升幅相比，将气温升幅限制在《巴黎协定》全球气温目标范围内将大幅降低气候变化的风险和影响。全球气温每出现些微上升，其影响就会增加。预计的影响将超过适应的硬性极限，主要是在自然系统中。气温上升超过 1.5°C，一些影响将是不可逆转的。需要更多地了解如何避免和应对临界点，需要更多的知识、理解、支持、政策和行动来全面管理风险，避免、尽量减轻和解决损失和损害。

43. 主要结论 13: 需要扩大来源并开发新的来源，以迅速拓展对适应的支持以及为避免、尽量减轻和解决损失和损害而作出的供资安排，并且资金流动需要与气候适应型发展保持一致，以满足紧迫和日益增加的需求。

44. 对适应方面集体进展的评估表明，迫切需要迅速增加适应资金，以满足发展中国家日益增长的需求和优先事项。⁹

⁶ 见下文第 150 段。

⁷ 见下文第 156 段。

⁸ 见下文第 157-161 段。

⁹ 见下文 I.D.48488 段。

45. 在考虑资金流与气候适应型发展的一致性以及摒弃导致适应不良的行动时，需要持续关注用于适应的资金额度和有效性。¹⁰

46. 关于主要结论 9-13 的更多信息，见下文第四章 C 节。

D. 执行和支持手段以及资金流动

47. 《巴黎协定》第九条、第十条和第十一条分别将资金、技术和能力建设视为扶持气候行动的关键杠杆。第二条第一款(三)项进一步承认，使资金流动符合温室气体低排放和气候适应型发展的路径也至关重要。提高气候雄心还需要改革国际金融体系。

48. 主要结论 14: 扩大调动对发展中国家气候行动的支持，需要战略性地部署国际公共资金，这仍然是行动的主要推动力，还需要继续提高有效性，包括获取、所有权和影响。

49. 为满足迫切需求，有必要迅速加大对发展中国家气候行动的支持力度。自《巴黎协定》通过以来，发达国家向发展中国家提供的气候融资有所增加。有几份报告指出了在调动和提供这种资金方面的增长和短缺情况。¹¹ 需要加快行动，从多种来源、工具和渠道扩大气候融资规模，同时要注意到公共资金的重要作用。仅靠公共资金不足以解决融资需求与当前资金流量之间的差距，特别是在发展中国家。尽管适应融资规模相对较小，但在调动的气候融资中所占份额有所增加，从 2017-2018 年的 20% 增加到 2019-2020 年的 28%，并且增速快于减缓融资。

50. 需要加强发展中国家获得气候融资的机会。简化和改进获得气候融资的途径，可以使急需的资金更快地投入使用，同时也能更好地满足当地的需求。多边开发银行和其他国际金融机构有潜力发展和加强自身的作用，减缓金融风险，降低投资成本，增加获得资金的机会并解决债务可持续性问题的。

51. 将气候融资用于有意义的活动并继续加强监测、评估和学习，可以更有效地满足需求，特别是在发展中国家。要在满足支助需求和交付预期成果方面取得进展，重要的考虑因素是加强和跟踪气候融资在获取、所有权和影响等方面的有效性。

52. 主要结论 15: 使国际和国内、公共和私人资金流动与实现温室气体低排放和气候适应型发展的路径保持一致，需要创造机会释放数万亿美元，并将投资转向各种规模的气候行动。

53. 必须在所有方面作出努力，以满足投资需求，包括使资金流动与实现温室气体低排放和气候适应型发展的路径保持一致。虽然可以利用公共资金来激励高影响力投资和吸引私营部门资金，但全球和国内资本市场可能是扩大减缓和适应规模的主要资本来源。虽然公共资金在为适应供资方面将继续发挥关键作用，但需要增加私营部门的参与，使资金流动与气候适应型发展保持一致。

¹⁰ 见下文第 522 段。

¹¹ 见下文第 183-185 段。

54. 通过创造条件和克服制约因素，可以增加减缓和适应方面的融资机会。要有政策和更广泛的有利环境，还要有用于降低投资风险以及为适应和减缓创造可投资产品管道的有效工具，这些可带来重要机会以提供所需资金规模。需要采取进一步行动，以减缓风险，降低投资成本，并增加获取资金的机会。

55. 必须释放和重新部署数万亿美元，以满足全球投资需求，包括通过在全球范围内迅速转变资金流向，以支持实现温室气体低排放和气候适应型发展的路径。大量资金继续被用于(包括通过补贴)投资高排放活动和缺乏复原力的基础设施。如果要在实现《巴黎协定》目标方面取得快速和持久的进展，转变这些资金流向至关重要。

56. 需要采取系统性方法来转变资金流向，以支持按所需规模和速度采取有效的气候行动。实现《巴黎协定》目标所需投资规模巨大，所以有必要改革金融体系及其结构和流程，也有必要使气候融资国际合作倡议的效力最大化。

57. 主要结论 16: 需要将现有清洁技术迅速投入使用，同时加快新技术的创新、开发和转让，以满足发展中国家的需求。

58. 在技术开发和转让以及创新方面进行更有效和更有战略意义的国际合作，将有助于实现快速的系统转型，从而有利于实现《巴黎协定》的目标。在整个技术周期以及所有部门和地点，大力支持合作和创新至关重要。一些关键技术的成本降低，而且获得资金的机会增大，应能在所有地点扩大应用，特别是在发展中国家。继续降低这些技术的平均资本成本，并降低能源和其他部门公平转型的其他关键技术的单位成本，是实现《巴黎协定》目标的决定性因素。需要更有力的扶持环境，确保包容性的多利益攸关方参与，并获得财政支持和能力建设。

59. 在气候技术研究、开发和示范方面的协作对于大规模应用成熟的气候技术和开发新兴技术至关重要。这种协作可包括通过联合研究和开发方案以及能力建设来大力投资技术开发和转让。要在 2050 年之前实现二氧化碳净零排放，研究和开发至关重要，特别是在“难以减排”的部门。要了解技术和创新在支持变革性适应方面的作用，也需要开展研究。

60. 主要结论 17: 能力建设是实现广泛和持续的气候行动的基础，需要国家主导的、基于需求的有效合作，以确保在各级增强能力并长期保持。

61. 能力限制给气候政策的各个方面带来了障碍，包括减缓、适应、支持和利用技术和资金，以及避免、尽量减轻和处理损失和损害。能力建设要取得成效，就必须对现有的基本社会和经济制度投入资源，使之具有系统性。需要长期保持能力，包括有技能的人员和机构能力。

62. 需要扩大对发展中国家战略能力建设的支持，以满足当地确定的需求，包括以土著和其他传统知识体系为基础。关键是使能力建设方面的国际合作更加有效和更具影响力。加强支助(包括整个联合国系统的支助)的一致性和协调性，将有助于确保满足需求并提高成效。

63. 关于主要结论 14-17 的更多信息，见下文第四章 D 节。

E. 前进方向

64. 第一次技术对话基于现有最佳科学，借鉴了第六次评估报告的结论和其他知识来源，并有专家的广泛参与。在全球盘点的收集意见阶段和技术阶段确定了面临的挑战，在技术对话期间，针对这些挑战的许多可付诸行动的解决方案和创造性的建议显然已经准备好实施。科学界可能会在未来几年解决信息差距，以便更好地为下一次全球盘点以及《巴黎协定》下的工作方案和其他进程提供信息。第一次全球盘点产生的信息可以为《巴黎协定》下正在进行的进程和工作方案提供信息，而这些工作反过来又可以为未来全球盘点下的集体进展评估提供信息。缔约方在编写下一份国家自主贡献时，可利用从第一次全球盘点的收集意见阶段和技术评估阶段获得的丰富技术信息。

65. 第一次全球盘点之时正发生着深刻和广泛的变化。《巴黎协定》自通过以来，鼓舞了近乎普遍的气候行动，尽管取得了进展，但国际社会仍未走上实现《巴黎协定》长期目标的轨道。《巴黎协定》通过其设计和全球盘点，为进一步提升雄心以加强应对气候危机的行动和支持提供了基础。进行第一次全球盘点之时正是加速集体进展的关键时刻。正如本报告中的技术性结论所示，现在需要采取更多行动，涉及所有方面，所有行为体都应参与进来，以实现《巴黎协定》的长期目标。

66. 更多信息，见下文第五章。

[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;

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.

(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;

(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

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

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>.

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.

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

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>.

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 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

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.

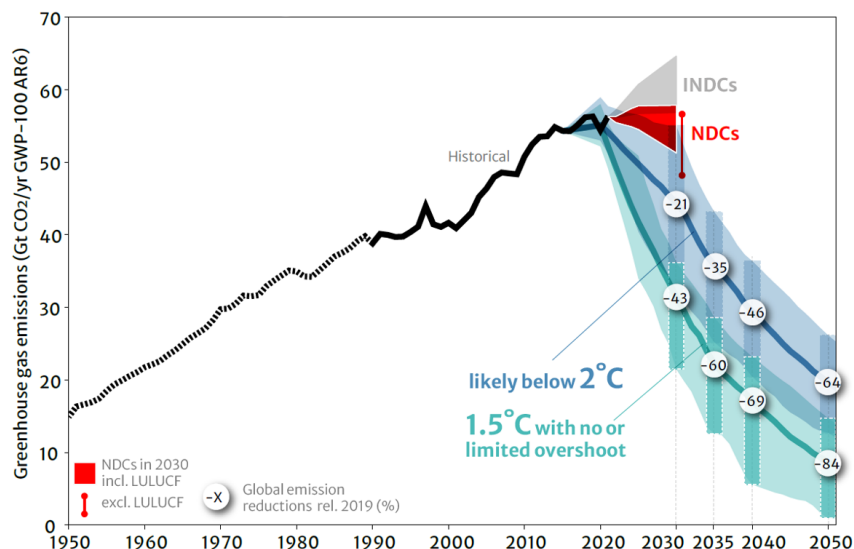
²⁵ See table SPM.1 in IPCC. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. PR Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available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

The basis of equity, the context of sustainable development and efforts to eradicate poverty inform consideration of these mitigation pathways.

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

²⁷ See decision 1/CMA.3, para. 29.

²⁸ FCCC/PA/CMA/2022/4.

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

NDCs will be fully implemented and supported, and if either is not the case, the gaps would be even larger.

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

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>.

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 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

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

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.

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

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.

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 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

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>.

guidelines in 2025 will provide an opportunity for Parties to share their experience with adaptation communications and consider potential improvements to the technical information 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

³⁹ Decision 18/CMA.1, annex.

planning and implementation. Parties' ongoing discussions on reviewing collective progress 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

⁴⁰ See decision 11/CMA.1, section II.

comprehensive risk management approaches where the risks from climate change are incorporated into decision-making at all levels.

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.

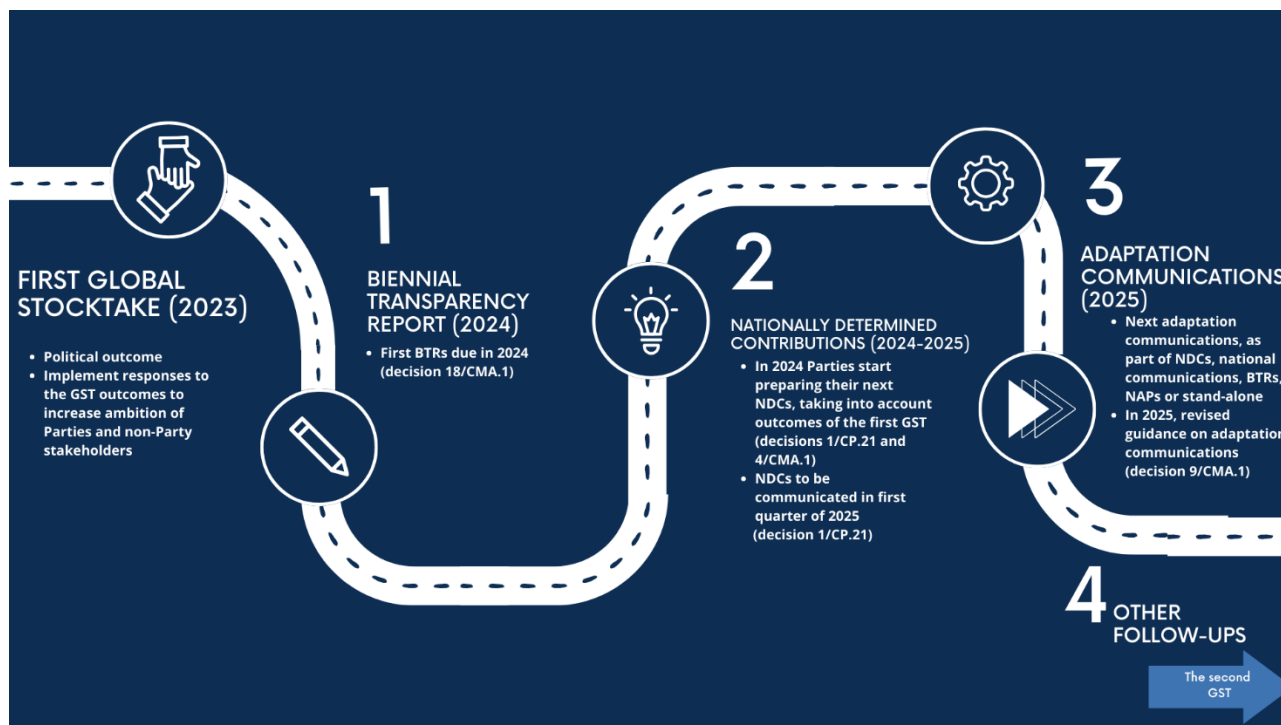
230. Some of the follow-up activities to the first GST that have already been agreed by Parties are illustrated in figure 3:

(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