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气候变化框架公约

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关于预期国家自主贡献总合效果的更新报告

秘书处的综合报告

概要

本文件是 189 个缔约方在 2016 年 4 月 4 日之前通报的 161 项预期国家自主贡献(自主贡献)总合效果的综合报告，提供了执行这些自主贡献后 2025 年和 2030 年温室气体排放总量的估计数，并与 1990 年、2000 年和 2010 年的排放水平，以及以下情况对应的排放轨迹作了比较：(1) 缔约方通报的 2020 年之前时期的行动；(2) 保持全球平均升温幅度不超过工业化前水平 2℃，限制在 1.5℃。本文件提出并讨论了意味着有机会在更长期加强应对气候变化行动的趋势。此外，本文件还汇总了 137 个缔约方通报的自主贡献中与适应相关的信息。

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目录

一. 概要

A. 任务和方法

1. 《公约》缔约方会议(缔约方会议)第 1/CP.21 号决定第 19 段请秘书处更新依照第 1/CP.20 号决定第 16 (b)段编写的综合报告，以便纳入缔约方在 2016 年 4 月 4 日前在预期国家自主贡献(自主贡献)中通报的所有信息。

2. 本文件载有以上第 1 段所述更新信息，包括对 189 个缔约方在 2016 年 4 月 4 日前通报的 161 项自主贡献中所载资料的汇编和综合报告。更新报告的范围在以下第 80 段作了概述。网上技术附件载有进一步的详细信息，介绍了本文件所载定量评估使用的方法。[1]

3. 本文件提供了执行自主贡献后 2025 年和 2030 年温室气体排放总量的估计数。这些估计数包括年度数值和累计数值。本文件还汇总了缔约方通报的自主贡献中适应部分的信息。

4. 鉴于并非所有缔约方都在 2016 年 4 月 4 日之前通报了自主贡献，而且并非所有自主贡献都涵盖所有气体和部门，因此这些自主贡献涵盖的总排放量估计数只是全球总排放量的一部分。[2] 为了得出某个年度全球排放量的估计数，使用了政府间气候变化专门委员会(气专委)的参考情景，用于估算 2030 年之前自主贡献未涵盖的排放量。选用的参考情景反映了缔约方通报的 2020 年之前时期的行动，并假设之后的气候政策保持不变(以下简称“自主贡献执行前轨迹”)。因此，基于国家自主贡献的 2025 年和 2030 年全球排放量是用执行预期国家自主贡献后的总排放量加上气专委参考情景下的剩余排放量得出的。[3] 鉴于缔约方在提交材料中使用的假设和规定的条件不同，再加上信息不足导致的不确定性，估计数用中位数表示，并注明相关区间。

5. 2025 年和 2030 年全球排放量的估计数结合以下历史排放水平以及预测的未来排放趋势进行讨论：

(a) 1990 年、2000 年和 2010 年的全球温室气体排放水平；

(b) 与自主贡献执行前轨迹对应的 2025 年和 2030 年全球温室气体排放水平；

[1] 可查阅：http://unfccc.int/focus/indc_portal/items/9240.php。

[2] 自主贡献也不包括国际空运和海运导致的排放量。对这类排放量的假设基于国际民用航空组织提出的 2020 年后碳中性增长目标(见 <http://www.icao.int/Meetings/a38/Documents/WP/wp430_en.pdf>)以及国际海事组织(海事组织)在《2014 年海事组织第三次温室气体研究》(见 <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas- Studies-2014.aspx>)中提出的二氧化碳排放预测情景的区间。

[3] 计算方法详见以下第二章 C 节。

(c) 保持全球平均升温幅度不超过工业化前水平 2℃的成本最低情景(以下简称“2℃情景”)对应的 2025 年和 2030 年全球温室气体排放水平；

(d) 保持全球平均升温幅度不超过工业化前水平 1.5℃的情景(以下简称：“1.5℃情景”)对应的 2025 年和 2030 年全球温室气体排放水平。

6. 最后，为了提供相关信息，说明通报的自主贡献在 2030 年之后产生的综合影响，还讨论了一些显示可在长期促进行动机遇的趋势。这些趋势是通过自主贡献所载信息查明的，讨论内容包括参与、政策和体制、合作、国情和力度等方面。

B. 通报的预期国家自主贡献概述

7. 截至 2016 年 4 月 4 日，**已收到 161 份自主贡献，涵盖 189 个《公约》缔约方**，[4] 包括一个区域经济一体化组织，[5] **缔约方数量达到《公约》缔约方总数的** 96%。通报自主贡献的缔约方占所有《公约》缔约方排放量的 99%。[6] 所有缔约方都提供了关于减缓方面贡献的信息。共有 137 个缔约方(占自主贡献的 83%)还在自主贡献中提供了适应方面的信息。

8. 虽然通报的自主贡献的结构和内容可能相异，但**大多数**[7] **缔约方明确按照第 1/CP.20 号决定第 14 段列出的要素提供了信息**。大多数缔约方还提供了补充信息，如关于市场化机制、执行其自主贡献所需的支持、应对措施及经济多样化的信息。

C. 通报的预期国家自主贡献信息汇总

9. **许多自主贡献是全国范围的：它们包括所有主要的国内温室气体排放或至少大多数重要排放源。若干自主贡献包含量化减排目标，形式多样**(见图 1)：

(a) 一些缔约方纳入了全经济范围减缓目标，提出了绝对减排目标，表述为将排放量降低到某个基准年水平以下，减排幅度从 9.8%至 75%不等。一些国家的自主贡献包含不与基准年挂钩的绝对目标，但是从总体上规定了排放量的最高绝对值(例如在未来某天之前实现碳中性)；

[4] 在 2016 年 4 月 4 日前提交自主贡献的缔约方的完整名单见以下脚注 31。

[5] 欧洲联盟及其成员国提交的自主贡献算作一份代表 29 个缔约方(欧洲联盟及其 28 个成员国)的自主贡献。

[6] 相比较而言，提交自主贡献的缔约方占全球排放量(包括国际航运和海运的排放量和非《公约》缔约方的排放量)的 95.7%。

[7] 本文件中使用以下限定词表示提交自主贡献及提及某一问题的缔约方的比例：“少数”指不到 10%；“一些”指 10%至 40%；“若干”指 40%至 70%；“许多”指 70%至 90%；“大多数”指 90%及以上。以下第一章 E 节使用这些限定词表示提交并阐述某个适应问题的自主贡献的百分比区间。

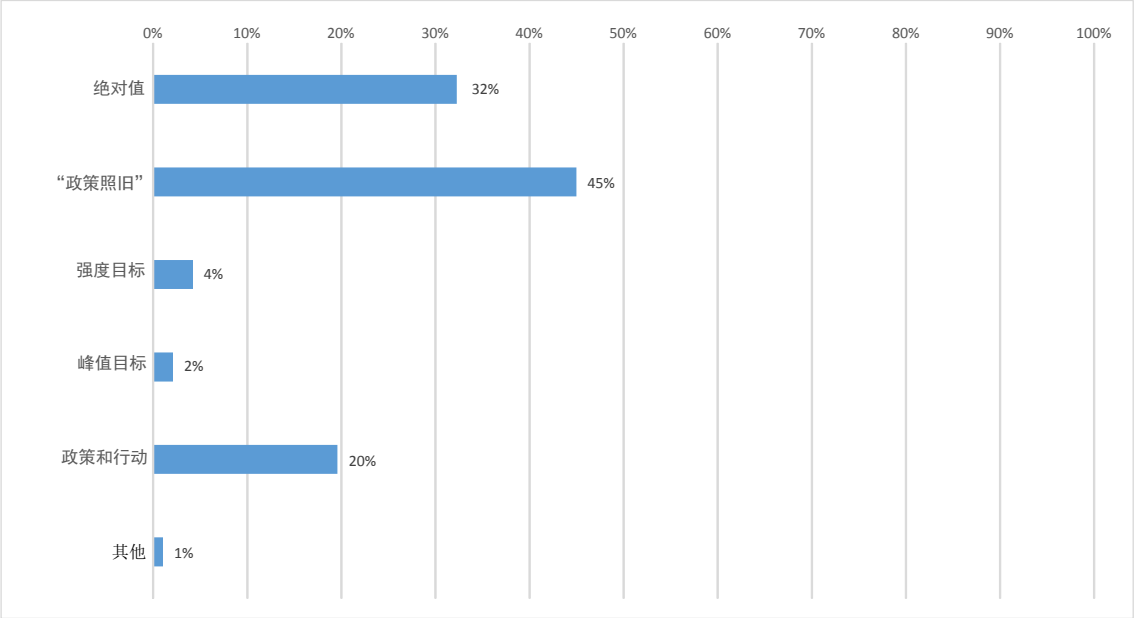
(b) 若干缔约方针对整个经济或具体部门提出了将排放量降低到“政策照旧”水平以下的相对目标，减排幅度从 1.0%至 80.6%不等；

(c) 少数缔约方提出了强度目标，即减少每单位国内生产总值的温室气体排放量或人均温室气体排放量，到 2025 年或 2030 年，相对于基准年(例如 2005 年或 2010 年)水平减少 10%至 45%不等，或降低到人均排放量的某个绝对水平；

(d) 少数缔约方规定了排放量预计达到峰值的年份或时间跨度(例如在 2030 年之前或更早)；

(e) 一些缔约方提供了温室气体低排放发展战略、计划和行动，包括以反映其特殊国情的适应行动的减缓收益形式体现的战略、计划和行动。

图 1
预期国家自主贡献中通报的减缓目标的类型



注：显示的百分比为 2016 年 4 月 4 日前提交自主贡献的缔约方的百分比。

10. **若干缔约方在自主贡献中列入了部门或分部门的量化目标**。若干缔约方使用能源结构中的比例、装机容量、发电量和普及率等指标，提出了可再生能源方面的目标，最高目标为 100%。

11. **若干缔约方提出了充分执行其自主贡献的条件**，例如：对在缔约方会议第二十一届会议期间完成工作的德班加强行动平台问题特设工作组(特设工作组)进程结果的期望、其他缔约方所作的努力、市场化机制的可获得性、更好地获得资金、技术转让和技术合作的机会，以及加强的能力建设支助。

12. **一些自主贡献既提出了更高的有条件的减缓贡献，也列入了无条件的贡献**。大多数有条件的减缓贡献涉及提供资金、技术或能力建设支助，将使相关无

条件贡献对应的努力水平提高一定的百分比。提高的百分比取决于缔约方选定的目标类型(例如相对于基准年、“政策照旧”情景或某个排放强度，排放量减少的百分比)，占额外减排量的 2%至 53%不等。

13. 此外，一些缔约方在自主贡献中表示，希望特设工作组的谈判结果能够提供满足以上第 11 段所述部分条件所需的明确解释。一些缔约方通报了暂定自主贡献，或表示保留根据特设工作组进程的结果修订其自主贡献的权利。

14. 除了设定 2025 年或 2030 年的减缓目标外，**一些缔约方还纳入了更长期的低排放发展展望**。相关目标包括到 2050 年，相对于“政策照旧”或基准年水平(例如 1990 年或 2000 年)减少 25%的温室气体排放量、在今后降低人均排放水平，或是在 2050 年或 2085 年之前实现碳中性。

15. 一些缔约方选择了 1990 年，一些选择了 2005 年，其他缔约方选择了 2000 年、2002 年、2006 年、2007 年、2008 年、2009 年、2010 年、2013 年、2014 年或 2015 年作为其贡献的参照点。若干缔约方说明了基准年的排放水平，或是为了说明相对于“政策照旧”情景表述的减缓目标，提供了“政策照旧”参考情景的信息。**大多数缔约方或是提出五年、或是提出十年的自主贡献执行期**。大多数自主贡献提到了直至 2030 年的执行时间表，一些自主贡献提到了直至 2025 年的执行时间表。少数自主贡献既通报了 2025 年，又通报了 2030 年的目标，其中一个具有指示性或临时性。少数缔约方提出了直至 2035 年或 2040 年的目标，另有一些缔约方结合另一个目标年份，提出了直至 2050 年的长期目标。此外，一些缔约方通报于 2020 年之前开始执行期，若干缔约方于 2020 年开始执行期，少数缔约方于 2021 年开始执行期。

16. 减缓目标的范围、涵盖部门和温室气体种类不尽相同。**许多目标涵盖气专委的大多数或所有部门**。若干缔约方尤其强调了运输和建筑，其他缔约方则提及海运和航空、采矿、石油工业燃除、溶剂和电力、旅游业及水管理。与缔约方目前在《公约》之下的报告情况相符，**大多数缔约方涵盖了二氧化碳(CO_2)的排放量，许多涵盖甲烷(CH_4)和一氧化二氮(N_2O)的排放量，还有一些也涵盖六氟化硫(SF_6)**、氢氟碳化物(HFCs)、全氟化碳(PFCs)和三氟化氮(NF_3)的排放量。少数自主贡献提到了其他气体或排放量，包括短期气候污染物(SLCFs)、黑碳或一氧化氮(NOX)、非甲烷挥发性有机化合物(NMVOCs)和二氧化硫(SO_2)。

17. 许多缔约方通报了估算和核算排放量和清除量的假设和方法，详细程度各异。许多缔约方介绍了它们使用气专委指南的情况。若干缔约方还就其使用的全球升温潜能值提供了信息。它们中大多数表示，采用了气专委第二次评估报告和第四次评估报告(包括提到第 24/CP.19 号决定的自主贡献)中的数值，少数缔约方采用了气专委第五次评估报告中的数值。一个缔约方称使用了全球温度潜能值。

18. **许多缔约方列入了与土地利用、土地利用的变化和林业相关的信息**。少数缔约方表示，可能需要为这方面的核算建立一个共同框架，该框架可以以《公

约》及其《京都议定书》之下的现有指南和经验为基础。不过，若干自主贡献提供的信息不全，没有说明土地利用、土地利用的变化和林业方面采用的假设和方法，给定量评估自主贡献的总合效果造成很大困难。

19. 关于今后的温室气体排放水平，若干缔约方家提供了基线、“政策照旧”情景或预测，其中大多数缔约方提到了对国内生产总值或人口等宏观经济变量的假设，或是提到了这两个变量的增长率，或是提到具体部门的变量，特别是能源部门。只有少数缔约方给出了具体数值，一些缔约方提到了数据来源，例如国家统计局或国际数据库。

20. **大多数缔约方提供了关于规划进程的信息，包括国内和国际层面的进程。**在这方面，缔约方通报了以下相关信息：现有和今后的体制安排、现有和计划的法律和政策、今后的优先执行领域，以及利害关系方参与等。

21. 大多数缔约方的自主贡献是在现有气候变化和/或发展战略、政策和法律的基础上制订或包含在这些战略、政策和法律当中。此外，**许多自主贡献已有现有国内法律作为后盾**。一些缔约方指出，其自主贡献的执行阶段将包括加强有关气候变化的法律和规章，以及进一步将相关目标纳入长期经济和社会发展规划。一些缔约方强调，有必要加强监测和评估气候变化相关目标所涉及的体制安排和行政程序。

22. 若干缔约方提供的信息指出了**采取行动应对气候变化的具体领域，除其他外，重点是可再生能源和能源效率、可持续运输、碳捕集和封存、森林养护和可持续管理，以及减少二氧化碳以外的气体**。缔约方强调，它们打算对能源系统和能耗模式进行转型，同时强调促进碳汇的必要性。在此背景下，若干缔约方提及一些具体措施，如可再生能源目标、促进绿色投资的财政计划、环境税、补贴改革、燃料经济和节能标准、电网现代化改造、低排放农业和废物管理方案，以及促进森林养护和减少毁林的措施。

23. 若干缔约方强调，它们的自主贡献经历了与国内利害关系方的磋商进程，以便提高认识并赢得各方对其自主贡献以及相关长期发展计划的支持。**缔约方强调，私营部门、学术界和民间社会等行为方的支持，以及相关部门的部委、区域和地方政府的支持对于提出现实的目标至关重要**。让利害关系方参与的做法包括：举行议会听证会、举办部门对话、开展研究合作、设立跨部门工作组、举办研讨会、举行专家组和技术同行审评、举行大规模公众磋商、设立各种信息交流平台、举办媒体、提高认识和教育宣传活动，以及征集书面材料，作为就自主贡献开展国内磋商进程的一部分。少数缔约方指出，它们仍计划就自主贡献所依据的总体国内气候政策举行磋商。

24. 若干自主贡献强调了应对气候变化的行动与发展优先事项，包括社会经济发展及消除贫困之间的联系。**一些缔约方强调了它们的发展与气候行动之间的协同增效，另一些缔约方列举了其应对气候变化行动产生的具体连带效益的实例**，其中包括：减少地方空气污染和因此产生的健康效益；促进获得能源及加强能源

安全；改善水质和水管理；社会进步，包括减少贫困、增加福利和创造就业；经济多样化；以及适应和减缓行动在建设抗御力方面的协同作用，特别是在农业和林业部门以及在粮食安全方面的协同作用。

25. 所有缔约方都阐述了其自主贡献如何公正且有力度，以及如何有助于实现《公约》目标。许多缔约方提供了信息，说明应在怎样的全球背景下了解其自主贡献，这些背景包括：在所有缔约方参与的情况下，以公正和公平的方式，全球共同做出努力；公平；共同但有区别的责任和各自的能力；认识到各国的国情和可持续发展的权利；对所有缔约方适用同样的规则，所有缔约方使用同样法律形式的承诺。一些缔约方指出，没有任何单一指标可以反应努力的公正性或全球的公平分配。

26. 许多缔约方在说明其自主贡献为何公平和有力度时提及它们的具体**国情**，包括社会、经济和地理因素，以及常常是这些因素相结合的情况。

27. 若干缔约方提供了信息，说明评估公正性的具体标准，包括责任、能力和历史责任、是否基于气候正义、排放比例、发展和/或技术能力、减缓潜力、减缓行动的支出、前进或超越当前努力的程度、以及与目标和全球目标的联系。许多缔约方直接或间接地结合自己过去、当前和今后在全球排放量中所占份额、人均排放量与全球平均值的比较，以及参照这些指标中的一项或多项指标的趋势，看待其责任。

28. 在解释自主贡献如何有力度时，许多缔约方**阐述了它们的贡献承诺如何大大超越其当前承诺**。在这方面，一些缔约方表示，它们的自主贡献意味着加快经济脱碳速度和/或多样化，使温室气体排放与经济增长脱钩，以及将排放量降低到“政策照旧”水平以下。缔约方在通报力度时，还采用了以下标准：人均排放量下降、排放量达到峰值的年份，以及将以往的期望目标转变为具有国内法律约束力的目标。少数缔约方还强调了它们对提供支助的贡献，包括为低排放技术的开发和传播提供支助，并提到了过去的减排成绩。

29. **在讨论其自主贡献如何有助于实现《公约》目标时**，若干缔约方表示，它们今后的预期排放水平将遵循保持全球平均升温幅度不超过 2℃对应的全球排放路径，一些缔约方提到了 1.5℃情景对应的全球排放路径。关于这一点，一些缔约方提到未来全球和国内的脱碳努力或达到具体的减排水平，如按照气专委的结论，发达国家到 2050 年时与 1990 年水平相比，减排 80%至 95%，或到 2050 年时与 1990 年水平相比，使全球排放量至少减少一半。

30. 通报自主贡献的若干缔约方表示，**它们计划使用或正在考虑使用**国际、区域或国内方案中的**市场化工具**，包括清洁发展机制。一些缔约方表示将利用市场工具实现其部分目标。一些缔约方强调，利用市场化机制对于减缓努力的成本效益以及加大力度至关重要。本文件所载对自主贡献总合效果的评估假定不会出现重复核算减排行动成果的情况。

31. **许多缔约方提供了有关其支助需要的信息**，它们强调，为了执行自主贡献和随着时间推移加大力度，有必要加强国际支持。一些缔约方纳入了充分执行其通报的自主贡献或实现其有条件目标的上限所需投资和资金支持的估计数额。

32. **一些缔约方通报了支持自主贡献执行的国内措施**，其中包括：为气候行动增加预算和预算支持；绿色采购方案；改革定价和税收制度；以及设立国家基金等。若干缔约方指出，有必要加强《公约》下旨在提供国际资金、技术和能力建设支助的现有体制安排。

33. **少数缔约方提供了信息，说明应对气候变化的国际政策的负面影响**，并指出了解这类应对政策、对其进行评估和处理其影响的重要性。少数缔约方提及为追求经济多样化采取的行动和制订的计划。最后，少数缔约方谈及其他问题，包括两性问题、人权，以及保护地球母亲的完整性这一特权。

D. 通报的预期国家自主贡献的总合效果

1. 预期国家自主贡献直至 2030 年的总合效果

34. 执行通报的自主贡献后，估计**全球总排放量**[8] **到 2025 年将达到** 55.0 (51.4-57.3)[9] **千兆吨二氧化碳当量，到 2030 年将达到** 56.2 (52.0-59.3)**千兆吨二氧化碳当量**。2025 年和 2030 年的全球排放量是用执行通报的自主贡献后的总排放量估计数(2025 年为 46.5 (44.3-48.9)千兆吨二氧化碳当量，2030 年为 48.0 (45.1-51.4)千兆吨二氧化碳当量)加上贡献预算未涵盖的排放量得出的。[10] 2011 年之后的全球累计二氧化碳排放量[11] 预计到 2025 年将达到 533.1 (509.6-557.2)千兆吨，到 2030 年将达到 738.8 (703.6-770.9)千兆吨。

35. 除了反映自主贡献总合效果的各种不确定性外，以上第 34 段所述这些区间还反映了无条件目标和有条件目标的影响。如果仅考虑自主贡献的无条件要素，则 2025 年的全球总排放量[12] 估计为 55.6 (53.1-57.3)千兆吨二氧化碳当量，2030 年估计为 57.9 (54.4-59.3)千兆吨二氧化碳当量；如果纳入自主贡献的有条件要素，则 2025 年的这一排放量 [12] 将降低为 54.1 (51.4-55.8)千兆吨二氧化碳当量，

[8] 除非另有说明，本文件中报告的排放量水平包含土地利用的变化所致排放量，采用了气专委第四次评估报告中时间跨度 100 年的全球升温潜能值。

[9] 除非另有说明，括号内表示 20%至 80%的区间，单个数值代表中位数。

[10] 2025 年和 2030 年自主贡献未涵盖的排放量估计数是利用气专委第五次评估报告情景(反映了《坎昆协议》下的 2020 年承诺)下相关国家、区域、部门和/或温室气体的排放增长率算出的。

[11] 2012-2025 年或 2012-2030 年全球化石、工业和土地利用变化所致排放量的总和。

[12] 全球总排放量包括自主贡献包括和未包括的排放量，其中纳入了国际运输所致排放量。

2030 年降低为 55.5 (52.0-57.0)千兆吨二氧化碳当量。本文件中对自主贡献总合效果的讨论是基于自主贡献中无条件和有条件要素都得到充分执行的假设。

36. **与 1990 年、2000 年和 2010 年的全球排放量相比，[13] 执行自主贡献后的全球总排放量预计将有所增加**，与 1990 年的全球排放水平相比，到 2025 年将增加 40% (33%-47%)，到 2030 年将增加 44% (34%-53%)；与 2000 年的全球排放水平相比，到 2025 年将增加 35% (28%-41%)，到 2030 年将增加 38% (29%-47%)；与 2010 年的全球排放水平相比，到 2025 年将增加 13% (7%-19%)，到 2030 年将增加 16% (8%-23%)。虽然这些数字显示，执行自主贡献后，全球排放量预计到 2025 年和 2030 年还将继续增长，但是增速有望大幅减缓，与 1990-2010 年期间 24%的增幅相比，2010-2030 年期间增长 16% (8%-23%)。

37. **考虑到自主贡献的效果，全球平均人均排放量与 1990 年和 2010 年相比，预计到 2025 年将分别下降 8%和 4%，到 2030 年分别下降 10%和 5%**。以上数字基于考虑自主贡献效果后对全球平均人均排放量的估算—2025 年人均 6.8 (6.4-7.2)吨二氧化碳当量，2030 年人均 6.7 (6.3-7.2)吨二氧化碳当量。[14] 但是，估计 2025 年和 2030 年的人均排放量分别比 2000 年的人均排放量约高出 2% (–3%-+7%)和 0% (–7%-+7%)。

38. **执行通报的自主贡献后，全球排放总量将大大低于自主贡献执行前轨迹的排放水平。**[15] 与执行自主贡献有关的全球温室气体排放水平预计将低于自主贡献执行前轨迹的排放水平，预计到 2025 年将降低 2.8 (0.0-6.0)千兆吨二氧化碳当量，到 2030 年将降低 3.3 (0.3-8.2)千兆吨二氧化碳当量。[16] 这些数字是与缔约方通报的 2020 年之前时期的行动对应的排放情景相比、自主贡献通过减少排放和增加各种汇的行动产生的总合效果的估计数。

[13] 历史年度排放量的时间序列来源于按气体分列的数据来源，以确保衡量标准的一致性，例如使用气专委第四次评估报告中的全球升温潜能值。这些按气体分列的数据来源包括：报告的《公约》附件一所列缔约方的《气候公约》温室气体清单数据，现有的国家信息通报数据或半年一次的更新报告数据，此外还有气专委第五次评估报告第三工作组用来估算历史排放数据的权威全球数据来源，包括国际能源署(能源署)和全球大气研究排放量数据库。

[14] 结合其他不确定因素，采用了联合国 2015 年低、高和中等人口的情景。根据中等人口的情景，全球人口到 2025 年预计将达到 80.4 亿，到 2030 年将达到 84.0 亿(见 2015 年对联合国 2012 年人口预测的修订，可查阅<http://esa.un.org/unpd/wpp/>)。

[15] 这 22 个轨迹是气专委第五次评估报告情景数据库中情景的一个子集，特别是 450 ppm 情景以及按照 AMPERE 项目的设计推迟到 2030 年开始协调减排的情况下短期高目标的执行。

[16] 以上给出的是减少的中位数和 20%-80%区间，执行自主贡献后，平均排放量到 2025 年将比参考情景减少 2.9 千兆吨二氧化碳当量，到 2030 年将减少 3.9 千兆吨二氧化碳当量。

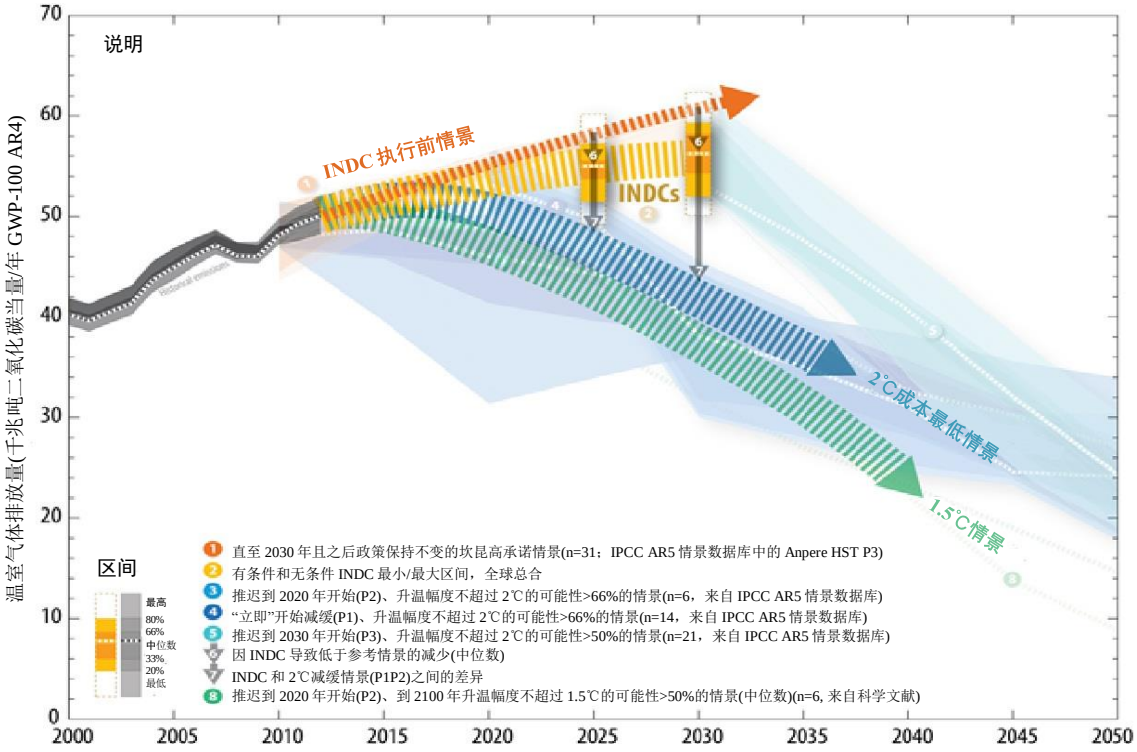
39. 执行自主贡献后，与成本最低的 2℃情景对应的排放水平相比，[17] 温室气体排放总量预计到 2025 年将增加 8.7 (4.5-13.3)千兆吨二氧化碳当量(19%, 9%-30%区间)，到 2030 年将增加 15.2 (10.1-21.1)千兆吨二氧化碳当量(36%，24%-60%区间)。

40. 图 2 比较了执行自主贡献后 2025 年和 2030 年的全球排放水平与自主贡献执行前情景以及 2℃情景的排放水平，以图示显示出 1.5℃情景路径。与缔约方通报的 2020 年之前时期的行动对应的温室气体参考情景来自第三工作组向第五次评估报告提供的材料(红色部分)。执行自主贡献后的预计排放总量显示为一个较宽的区间，这是因为缔约方在提交材料中作出的假设和规定的条件不同，以及信息不足导致的不确定性(黄色竖条)。保持全球平均升温幅度不超过 2℃的成本最低轨迹对应的减缓情景以蓝色显示，从现在开始加强全球减缓行动的情景以深蓝色显示，2020 年之前开始的情景以天蓝色显示，假定推迟到 2030 年以后开始的情景以蓝绿色显示。在这些假设情景中，如果推迟加强全球减缓行动，那么 2030-2050 年期间的减排速度幅度更大。科学文献中全球平均升温幅度低于 1.5℃的减缓情景以绿色显示。

[17] 限制全球平均升温幅度不超过工业化前水平 2℃的情景出自气专委第五次评估报告的情景数据库。自 2010 年起遵循成本最低排放轨迹(所谓的“P1 情景”)、升温幅度不超过 2℃的可能性高于 66%的情景对应 2025 年的排放量为 44.3 (38.2-46.6)千兆吨二氧化碳当量，2030 年的排放量为 42.7 (38.3-43.6)千兆吨二氧化碳当量。自 2020 年起遵循经济最优排放轨迹(所谓的“P2 情景”)、升温幅度不超过 2℃的可能性高于 66%的情景对应 2025 年的排放量为 49.7 (46.2-51.6)千兆吨二氧化碳当量，2030 年的排放量为 38.1 (30.3-45.0)千兆吨二氧化碳当量。鉴于 P1 情景下的排放量与 2015 年的排放量相似，并鉴于 P1 和 P2 情景直至 2030 年具有相似性，本文件比较了执行自主贡献后的排放水平与 P1 和 P2 情景合集的排放水平。单独与 P2 情景相比时，2025 年的差别较小，为 4.8(1.6-8.2)千兆吨二氧化碳当量，2030 年相差较大，为 17.0 (10.0-25.6)千兆吨二氧化碳当量。

图 2

执行预期国家自主贡献后 2025 年和 2030 年的全球排放水平与其他情景下排放水平的比较



资料来源：政府间气候变化专门委员会(气专委)第五次评估报告情景数据库、科学文献中的 1.5℃情景(见脚注 19)、气专委历史排放量数据库以及预期国家自主贡献量化数据。

缩略语：AR4 = 政府间气候变化专门委员会第四次评估报告、GWP = 全球升温潜能值、INDC(s) = 自主贡献、IPCC AR5 = 政府间气候变化专门委员会第五次评估报告、n = 情景数量。

41. 执行自主贡献后，全球年度总排放量估计数到 2025 年和 2030 年未进入成本最低的 2℃情景范围(见图 2)。然而，通过将排放量降低到自主贡献执行前轨迹之下，自主贡献有助于降低直至 2100 年以及之后的预期温度水平。此温度水平在很大程度上取决于对社会经济驱动因素、技术进步以及缔约方在自主贡献所述时间跨度之后(即 2025 年和 2030 年之后)所采取行动的假设。作出这类假设不属于本文件的范围，因此，此处没有讨论自主贡献对全球平均升温幅度的总合影响。

42. 即便缔约方直到 2030 年才开始加强减缓行动，超出自主贡献设想的行动水平，仍然有可能保持全球平均升温幅度不超过 2℃。不过，气专委第五次评估报告中的情景表明，与从现在或 2020 年开始的成本最低情景相比，只有大大提高每年的减排幅度和成本才有可能实现上述目标。因此，**在 2025 年和 2030 年之后，将需要作出比自主贡献所述努力大得多的减排努力**，才能保持升温幅度不超过工业化前水平 2℃。

43. 假定自 2030 年起以成本最低的方式在自主贡献对应的排放水平基础上开始减排、使排放量回到 2℃情景之下的水平，2030 年至 2050 年期间的平均年度减排幅度估计为 3.3% (2.8%-3.9%)。这样的减排幅度几乎是假定自 2010 年或 2020 年开始加强减缓行动的成本最低情景的两倍，后者在同期只需要 1.6% (0.8%-2.0%)的年度减排幅度。

44. 鉴于温室气体长期存在于大气中，累计排放量决定了对气候系统的影响，若早年排放量较高(与成本最低 2℃情景相比)，之后将需要有幅度更大、成本更高的减排，才能以同样的几率保持全球平均升温幅度不超过同样的水平。气专委第五次评估报告显示，与按有可能(>66%)的概率保持全球平均升温幅度不超过工业化前水平 2℃对应的 2011 年以来全球累计总排放量为 1,000 千兆吨二氧化碳。考虑到自主贡献的总合效果，全球累计二氧化碳排放量预计到 2025 年将达到 1,000 千兆吨二氧化碳的 53% (51%-56%)，到 2030 年将达到这一数字的 74% (70%-77%)。[18]

45. 与 1.5℃情景对应的估计排放水平相比，[19] 执行自主贡献后的总合排放水平估计 2025 年将高出 16.1 (10.7-20.6)千兆吨二氧化碳当量(42%，26%-59%区间)，2030 年将高出 22.6 (17.8-27.5)千兆吨二氧化碳当量(67%，49%-90%区间)(见图 12)。这意味着，执行自主贡献后 2030 年的排放水平在考虑于 2010 至 2020 年之间开始全球减排的 1.5℃情景下与在 2℃情景下的情况相差甚远。然而，如果只考虑在 2020 年开始全球减排的情景(见图 12 和第 229 段)，则 2030 年的 1.5℃和 2℃情景的差异不会如此明显。在发表本文件时，文献中尚没有将升温幅度定在 1.5℃以下、考虑执行自主贡献后 2030 年全球排放水平的情景。但是，应当指出，气专委受邀于 2018 年就较工业化前水平全球升温 1.5℃的影响与有关的全球温室气体排放路径提交一份特别报告，应结合该报告对本文件的结论进行审查。

46. 根据气专委第五次评估报告，与按 50%概率保持全球平均升温幅度不超过工业化前水平 1.5℃对应的 2011 年以来全球累计总排放量为 550 千兆吨二氧化

[18] 气专委第五次评估报告(见综合报告表 2.2,可查阅：<http://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf>)显示，以 50%的概率保持全球平均升温幅度不超过 2℃对应的 2011 年以来累计二氧化碳排放量为 1,300 千兆吨二氧化碳。考虑到自主贡献的总合效果，全球累计二氧化碳排放量预计到 2025 年将达到 1,300 千兆吨二氧化碳的 41% (39%-43%)，到 2030 年将达到这一数字的 57%(54%-59%)。

[19] Luderer G, Pietzcker RC, Bertram C, Kriegler E, Meinshausen M, Edenhofer O. 2013. Economic mitigation challenges: how further delay closes the door for achieving climate targets. *Environmental Research Letters* 8:034033); Rogelj J, McCollum DL, O'Neill BC and Riahi K. 2013. 2020 emissions levels required to limit warming to below 2 ℃. *Nature Climate Change*. 3(4): pp.405–412; Rogelj J, McCollum DL, Reisinger A, Meinshausen M and Riahi K. 2013. Probabilistic cost estimates for climate change mitigation. *Nature*. 493(7430): pp.79–83; and Rogelj J, Luderer G, Pietzcker RC, Kriegler E, Schaeffer M, Krey V, Riahi K. 2015. Energy system transformations for limiting end-of-century warming to below 1.5 ℃. *Nature Climate Change*. 5(6): pp.519–527.

碳。考虑到自主贡献的总合效果，全球累计二氧化碳排放量预计到 2025 年将达到与升温幅度低于 1.5℃对应的累计排放量的 97% (93%-101%)，到 2030 年将达到 134% (128%-140%)。应根据以上第 45 段所述气专委特别报告中提供的信息，对这些结论进行审查。

2. 预期国家自主贡献带来的中长期机会

47. 减排努力是否足以限制全球平均升温幅度不超过工业化前水平 2℃或 1.5℃，在很大程度上取决于执行通报的自主贡献将导致的重要经济驱动因素的长期变化，以及缔约方在 2030 年之前和之后加大力度的决心。下文第 48 至 58 段大致介绍了自主贡献带来的可为今后加大力度提供机会的趋势。

参与

48. **自主贡献显示，越来越多的国家开始采取气候行动，这些行动通常具有全国性质，涉及许多部门和温室气体。**尤为重要的是，越来越多的缔约方从基于项目、方案或部门的行动转为实施全经济范围的政策和目标。共有 61 个缔约方针对 2020 年之前的时期提出了绝对目标、以及基于“政策照旧”情景、强度或峰值年的量化目标，但是有 155 个缔约方在其国家自主贡献中通报了这类目标。

49. 此外，大多数缔约方提供了推动明确、透明以及对其自主贡献的理解的信息。从提供的信息中可以看出各国国情和能力的差异，但是与就 2020 年之前时期的行动通报的信息相比，自主贡献通报的信息在数据一致性、完整性和质量上有很大进步。

50. **提交自主贡献的缔约方数量之多、所涉行动范围之广，清楚地说明缔约方在国内采取行动应对气候变化的决心越来越大，这方面的国家能力也越来越强。**不过，提交的自主贡献仍然存在数据不足和信息质量方面的问题，说明需要进一步努力，加强许多国家规划、执行和监测气候变化相关行动的能力。

政策和体制

51. **自主贡献所载信息显示，为低排放和气候适应型发展引入国家政策及相关工具的趋势明显且越来越强。**许多自主贡献已经得到了现行国内法律或政策的支持，若干自主贡献促成了建立相关政策框架的国内进程。此外，许多自主贡献还经历了公众磋商和广大利害关系方的参与，以展示应对气候变化行动的发展效益，并赢得人们对这类行动的支持。

52. 缔约方提供的信息突出显示，**气候变化在国内政治议程中变得越来越重要**，这在很多情况下归功于部委之间的协调安排，以及将气候变化问题纳入国家和部门发展优先事项的趋势日益加强。与此同时，若干缔约方还努力确保私营部门、民间社会及其他非政府行为方认识到应对气候变化的国家行动的重要性，并为这类行动提供支持。

53. 邀请缔约方通报其自主贡献影响了国内的政治和体制进程，这些进程可以为今后加强行动奠定基础。虽然自主贡献可能在一些国家充当了巩固和加强气候相关政策的催化剂，但是在许多国家，它们是发起这类政策的动力。总体而言，可以说，与拟定自主贡献有关的政策制定工作以及社会接受情况为今后加强行动奠定了基础。不过，这类强化行动的时机和范围取决于政府的决心。关于这一点，许多缔约方提及以《巴黎协定》作为一项共同行动框架，并作为促进最有需要的国家提高能力的一种手段。

合作和支持

54. **自主贡献显示，缔约方越来越有兴趣加强合作，通过多边应对共同实现气候变化相关目标，并在今后加大力度**。特别是，缔约方强调需要为一般的气候行动加强资金、技术转让和能力建设方面的支助，作为建立扶持型环境和扩大行动的方式。一些缔约方提到了制订和实施政策、经济工具及市场化工具方面的机会。

55. 一些自主贡献所载信息显示，需要发现、探索和落实就应对气候变化开展合作的进一步机会。关于这一点，缔约方提到《巴黎协定》需要促进和推动合作，包括通过加强《公约》之下的现有机制和工具或通过建立新的机制和工具促进和推动合作。

国情和力度

56. **所有缔约方在自主贡献中提出的气候行动的力度都比通报的 2020 年之前时期的力度大。缔约方强烈认识到为实现《公约》目标加强全球行动的必要性，以及在多边层面上这样做的承诺。**为此，许多缔约方提到将全球平均升温幅度不超过工业化前水平 2℃的目标作为指引国家和全球力度的基准。许多缔约方表达了实现这一目标的决心，并承认只有通过共同努力才可能实现该目标。

57. 正如以上第 36 段所述，虽然与 2020 年之前时期相比，自主贡献所载行动将带来相当大的减排量，但是执行自主贡献后的全球总排放量在 2025 年和 2030 年仍然未进入 2℃情景范围。不过，自主贡献显示，缔约方采取行动减少排放、提高经济的气候抗御力的决心越来越大，一些缔约方已经提出了在长期将净排放量降低到零的目标。国家的决心使缔约方能够根据国情安排它们的努力，若干缔约方已经认识到相关的可持续发展和社会经济连带效益。不过，仍然需要在 2030 年之前和之后加大和加紧努力。

58. 缔约方在自主贡献中作出的说明传达了每个国家应实施自身战略的愿景，并反映出需要使不同国情下作出的努力符合保持全球升温度幅度不超过 2℃所需的努力。应当在缔约方结合《公约》之下的任何议定目标审议当前和今后努力的过程中处理这一问题。

E. 预期国家自主贡献中的适应部分

59. **共有 137 个缔约方在自主贡献中纳入了适应部分。**秘书处收到了 54 个非洲国家、42 个亚太国家、30 个拉丁美洲和加勒比国家、七个东欧国家和两个西欧及其他国家提交的与适应相关的内容。

60. 缔约方强调了它们**根据《巴黎协定》加强国家适应努力的共同决心。**一些缔约方强调，适应工作是它们应对气候变化的主要优先事项，特别是因为它们认为这与国家发展、可持续性和安全密切相关。

61. 虽然自主贡献内容各异，每个都有一些特有的特征，但是许多适应部分都包含以下要素：

(a) 适应部分应考虑的国情；

(b) 指引适应部分的长期目标和/或愿景；

(c) 影响和脆弱性评估；

(d) 法律和监管框架、战略、方案和计划，它们为适应行动提供了依据或信息；

(e) 计划或正在具体领域和/或部门实施的措施或行动；

(f) 因气候影响导致的支出、损失和/或损害；

(g) 执行手段；

(h) 对适应行动的监测和评估；

(i) 减缓和适应之间的协同作用。

62. 本文件概述了重点信息，明确了新出现的趋势，并通过具体例子展示了适应部分的不同要素，从而为自主贡献中的适应部分提供了一个概览。因为使用这一评估方法存在不确定性，所以尚不可能评估适应部分的总合效果。

63. 所有自主贡献都包含关于地理特征、人口动态和社会经济状况的信息，反映了缔约方国情的多样性。许多缔约方称，它们在适应方面的工作受长期发展愿望以及全球气候目标的指引，包括保持全球平均升温幅度不超过工业化前水平 2℃或 1.5℃的目标，一些缔约方将其作为界定适应工作的参照点。在很多情况下，缔约方实施国内长期目标和/或愿景的时间跨度在 2030 年之前。

64. **自主贡献的所有适应部分都包含关于主要影响和脆弱性的信息。**缔约方特别报告了观察到的变化或对未来变化的预测、最容易受影响的部门或地理区域、高风险影响以及极端事件的影响导致的成本。关于气候灾害，大多数缔约方提出的主要关切问题是洪水、海平面上升以及干旱或荒漠化。

65. 提供的信息明确显示，**缔约方正在开始全面规划和实施适应行动，并加强和扩大现有努力。大多数缔约方提到制定全国范围的适应计划和战略。**若干缔

约方表示，它们正在开展拟定和实施国家适应计划的进程，其中大多数预计将在 2020 年之前制定国家适应计划。这类全国努力往往还伴随着几乎所有主要经济部门和领域的具体政策、措施和举措，水、农业、卫生、生态系统、林业和基础设施被称为重中之重。一些缔约方打算采取具有区域或全球影响的行动，因为它们将涉及跨界问题。

66. 若干缔约方将承认需要**让有关利害关系方**，包括弱势群体**参与适应行动的计划和实施**列为议程的重点。此外，许多缔约方强调，需要在开展适应行动时考虑性别问题。

67. **若干缔约方报告了与气候变异和变化的过往和预计影响有关的支出、损失和/或损害，其中一些还量化了预计的这类支出、损失和/或损害，**表现为绝对支出、国内生产总值的年度损失、或是截至某一年度或特定阈值－例如海平面上升的具体数值－的土地或农产量损失的百分比。一些缔约方详细介绍了气候变化影响导致的预计费用，以及计划采取的适应措施如何有望降低成本，同时留下一些残余损失，这为投资于适应行动和减少灾害风险提供了明确的经济理由。

68. **大多数缔约方介绍了为实施计划的适应行动**提供支助所需要的执行手段(例如资金、技术和能力建设)，包括有关支助需要以及预计的国内和国际支助的信息。一些缔约方量化了适应行动的资金需要，自主贡献整个期间需要 1 亿美元至超过 2,000 亿美元不等，每年需要约 1,000 万美元至 30 亿美元不等。一些缔约方提供了不同减缓情景的预计适应费用，明确显示了适应需要取决于减缓力度。

69. 一些缔约方强调，它们正在并将继续在国内支持下开展适应行动，这明确表明了**各国已经为适应活动投入了大量资源**。许多缔约方强调，需要得到国际社会依据《公约》提供的资金、技术转让和能力建设形式的支助，因为这类支助将决定缔约方捍卫发展收益、完成它们的减缓行动，以及将国内资源用于发展目的而非适应活动的能力。

70. 除国内努力和国际支助外，一些适应方面的内容还包括新形式的合作，例如南南合作和三方合作，缔约方宣称，它们愿意通过这类活动为其他国家的适应努力提供支持。

71. 注意到气候变化行动需要纵观全局的方针，**若干缔约方阐述了适应与减缓之间的协同增效，作为其低排放、气候适应型发展总体战略，包括经济多样化努力的一部分。**通过优先采取那些能够带来大量减缓连带效应的适应措施，正在项目和部门层面上、在国家、区域或地方一级的计划或体制框架内，以及在城市和农村背景下寻求协同增效。

72. 鉴于气候变化及其影响的复杂性和长期性要求将适应行动设计为一个持续、灵活的进程，并接受定期审议，若干缔约方介绍了它们将如何监测和评估打算采取的适应行动以及提供和得到的支持。

73. 关于监测和评估适应行动，**一些缔约方强调，它们已确定或将确定适应和脆弱性的定量和定性指标，以便衡量进展**。至于监测和评估国内和国际上提供和得到的支持，尤其是资金支持，一些缔约方正在建立气候融资系统，以便确定、分配和监测气候支出，以及在国家预算范围内提高人们对适应措施的知晓程度。

74. 总体而言，**自主贡献中的适应部分具有代表性地概述了缔约方今后几十年打算如何在迄今为止取得进展的基础上，在国家一级开展适应行动，以及应对气候变化影响导致的支出、损失和损害**。缔约方通报的加强适应行动的举措范围之广，说明适应行动关系到社会和经济活动的所有领域，以及缔约方有强烈的兴趣在进行减缓努力的同时继续加强适应工作。

II. Aggregate effect of the communicated intended nationally determined contributions

[English only]

A. Mandate and background

75. COP 21 represented a major milestone in the strengthening of the international response to the threat of climate change. The political momentum of the UNFCCC process culminated in the adoption of the Paris Agreement and the participation of over 96 per cent of Parties to the Convention in communicating their INDCs.[20]

76. COP 19 invited all Parties to initiate or intensify domestic preparations for their INDCs, without prejudice to the legal nature of the contributions, in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties towards achieving the objective of the Convention as set out in its Article 2, and to communicate those INDCs to the secretariat well in advance of COP 21 in a manner that facilitated the clarity, transparency and understanding of them.[21] That invitation was reiterated at COP 20.[22]

77. COP 20 agreed that each Party's INDC would represent a progression beyond the current undertaking of that Party,[23] and that the least developed countries (LDCs) and small island developing States could communicate information on strategies, plans and actions for low GHG emission development reflecting their special circumstances.[24] All Parties were invited to consider communicating their undertakings in adaptation planning or to consider including an adaptation component in their INDCs.[25]

78. COP 20 also agreed that the information to be provided by Parties communicating their INDCs, in order to facilitate clarity, transparency and understanding, might include, as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods of implementation, scope and coverage, planning processes, assumptions and methodological approaches, including those for estimating and accounting for anthropogenic GHG emissions and, as appropriate, removals, as well as information on how the Party considers that its INDC is fair and ambitious, in the light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2.[26]

79. In response to a request from the COP,[27] the secretariat prepared a synthesis report on the aggregate effect of the INDCs communicated by Parties by 1 October 2015 on the basis of the information contained in 119 INDCs presented by 147 Parties.[28] In view of the developments that took place after 1 October 2015, COP 21 requested the secretariat to

[20] It should be noted that Article 4, paragraph 2, of the Paris Agreement requests each Party to prepare, communicate and maintain successive nationally determined contributions that it intends to achieve.
[21] Decision 1/CP.19, paragraph 2(b).
[22] Decision 1/CP.20, paragraph 9.
[23] Decision 1/CP.20, paragraph 10.
[24] Decision 1/CP.20, paragraph 11.
[25] Decision 1/CP.20, paragraph 12.
[26] Decision 1/CP.20, paragraph 14.
[27] Decision 1/CP.20, paragraph 16(b).
[28] FCCC/CP/2015/7.

update that synthesis report so as to cover all the information communicated by Parties in their INDCs by 4 April 2016.[29]

80. This document provides the update referred to in paragraph 79 above by:

(a) Incorporating the information contained in the 42 INDCs received between 1 October 2015 and 4 April 2016, as well as that in the 5 INDCs revised during that period, including as regards adaptation;

(b) Recalculating the aggregate effect of the INDCs using the approach and methods described in chapter II.C below;

(c) Providing additional details on the aggregate effect of the achievement of conditional and unconditional components of the INDCs;

(d) Including a discussion on the aggregate effect of the INDCs in relation to 1.5 ℃ scenarios.

81. Chapter II.B below provides an overview of the communicated INDCs, including their coverage and key components. Chapter II.C presents the approach and methods used for assessing the aggregate effect of the INDCs, as well as key challenges and assumptions adopted; chapter II.D provides a synthesis of the information contained in the INDCs; and chapter II.E presents the aggregate effect of the INDCs, with the exception of information relating to the adaptation component of the INDCs. Chapter II.F focuses on the adaptation component of the INDCs. An online technical annex contains further detailed information on the methodology used for the quantitative assessment presented in this document.[30]

B. Overview of the communicated intended nationally determined contributions

82. As at 4 April 2016, 161 INDCs had been communicated to the secretariat, covering 189 Parties to the Convention,[31] including one regional economic integration organization,[32]

[29] Decision 1/CP.21, paragraph 19.

[30] Available at <http://unfccc.int/focus/indc_portal/items/9240.php>.

[31] Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia (Plurinational State of), Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Burundi, Cambodia, Cameroon, Cabo Verde, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Cuba, Democratic Republic of the Congo, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Iceland, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Latvia and the European Commission on behalf of the European Union and its member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland) acting jointly, Lebanon, Lesotho, Liberia, Liechtenstein, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Monaco, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, New Zealand, Niger, Nigeria, Niue, Norway, Oman, Pakistan, Palau, Papua New Guinea, Paraguay, Peru, Philippines, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, Sudan,

representing 96 per cent of Parties to the Convention and covering 95.7 per cent of global emissions in 2010. If only emissions from countries (e.g. excluding emissions from international aviation and maritime transport) are taken into account, then the Parties that have communicated INDCs represent 98.2 per cent of total global emissions. Those Parties even represent 99.0 per cent of total global emissions if emissions from international aviation and maritime transport as well as from countries that are not Parties to the Convention are excluded from the global total.[33]

83. The communicated INDCs vary in their form, structure and content, reflecting different national circumstances. Most Parties included information on their plans to reduce GHG emissions or enhance sinks, in the form of either mitigation targets, strategies, plans and actions for low GHG emission development, or mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans. A synthesis of that information is presented in chapter II.D below. A total of 134 Parties, accounting for 83 per cent of the INDCs, included an adaptation component in their INDCs (see chapter II.F below).

84. Most[34] Parties explicitly addressed the information elements listed in decision 1/CP.20, paragraph 14, in their INDCs. Some Parties provided information on all of those elements. A summary of the information Parties provided in their INDCs in accordance with decision 1/CP.20, paragraph 14, is provided in chapter II.D below.

85. In addition to providing the information outlined in decision 1/CP.20, several INDCs contain information relating to the use of market mechanisms; many contain information on the means of implementation necessary for the implementation of the INDCs; and a few contain information on other issues, including economic diversification and response measures (see paras. 180–188 below).

C. Approach and methods

86. The following is a brief overview of the approach, methods, challenges and assumptions involved in the preparation of this document, with the exception of those related to the adaptation component of the INDCs, which are discussed in chapter II.F below. Further information and details on methodology and related assumptions have been compiled in the online technical annex.

Suriname, Swaziland, Switzerland, Tajikistan, Thailand, the former Yugoslav Republic of Macedonia, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Republic of Tanzania, United States of America, Uruguay, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Yemen, Zambia and Zimbabwe.

[32] The INDC of the European Union and its member States is counted as one INDC representing 29 Parties (the European Union and its 28 member States).

[33] A database developed for the preparation of this document is the source of this information. Countries that are not Parties to the Convention are estimated to have represented 0.9 per cent of global emissions in 2010, with international aviation and maritime transport representing 2.5 per cent. Only CO_2 emissions are taken into account for international aviation and maritime transport emissions.

[34] In this document, the following qualifiers are applied depending on the percentage of Parties that submitted INDCs and mentioned the issue in question: “a few” for less than 10 per cent; “some” for 10–40 per cent; “several” for 40–70 per cent; “many” for 70–90 per cent; and “most” for 90 per cent and above. These qualifiers are used in chapter II.F below to indicate the percentage range of the submitted INDCs that elaborate on a certain adaptation issue.

1. Approach

87. In response to the mandate referred to in paragraph 79 above, this document provides a synthesis of the information submitted by Parties in their INDCs, which has been structured following the information elements listed in decision 1/CP.20, paragraph 14.

88. With a view to evaluating the aggregate effect of the communicated INDCs, this document provides estimates of the aggregate emission levels in 2025 and 2030 for the sectors and gases covered by the INDCs resulting from their achievement. The emission levels were calculated in both annual and cumulative terms (i.e. cumulative emissions from 2011 to 2025 and from 2011 to 2030). The estimates are presented as median values and associated ranges, owing to the various assumptions and conditions specified by Parties in their submissions and the uncertainties associated with gaps in information.

89. It should be noted that the estimates depend on, among other things, the share of emissions that is covered by the INDCs. As noted in chapter II.B above, the INDCs communicated to date cover most, but not all, Parties to the Convention and not all Parties that have communicated INDCs included all gases and sectors. Therefore, the aggregate emission levels of the Parties, gases and sectors covered by the INDCs cover approximately 88 per cent of global emissions.[35]

90. The estimates of the global levels of emissions in 2025 and 2030 resulting from the implementation of the communicated INDCs were calculated using IPCC scenarios. Those scenarios were also used to obtain estimates of emissions in 2025 and 2030 not covered by the INDCs by extracting from them the emission growth rates of relevant countries, regions, sectors and gases. The global levels of emissions in 2025 and 2030 were estimated by adding the estimated aggregate emission levels of the sectors and gases covered by the INDCs that result from the implementation of the communicated INDCs in 2025 and 2030 to the levels of emissions not covered by the INDCs from IPCC scenarios for the same years. The method used to estimate the global levels of emissions in 2025 and 2030 resulting from the implementation of the communicated INDCs is further explained in paragraphs 94–101 below.

91. The estimated global levels of emissions in 2025 and 2030 associated with the implementation of the INDCs are discussed in relation to:

(a) The global levels of emissions in 1990, 2000 and 2010;

(b) The global emission levels in 2025 and 2030 corresponding to pre-INDC trajectories consistent with action communicated by Parties for 2020 or earlier;

(c) The global emission levels in 2025 and 2030 corresponding to least-cost scenarios consistent with holding the global average temperature rise below 2 ℃ above pre-industrial levels (hereinafter referred to as 2 ℃ scenarios);

(d) The global emission levels in 2025 and 2030 corresponding to least-cost scenarios consistent with holding or returning the global average temperature rise to below 1.5 ℃ above pre-industrial levels by 2100 (hereinafter referred to as 1.5 ℃ scenarios).[36]

92. Finally, with a view to providing information on the aggregate effect of the implementation of the INDCs beyond 2030, identified trends that could provide

[35] This percentage refers to the share of global emissions (including emissions from international aviation and maritime transport and emissions from countries that are not Parties to the Convention) in 2010 of the sectors and gases covered by the communicated INDCs.

[36] Further information on the 1.5 ℃ scenarios can be found in the online technical annex available at <http://unfccc.int/focus/indc_portal/items/9240.php>.

opportunities for enhanced action in the longer term are discussed. Using the information contained in the INDCs, such trends are discussed with regard to participation, policies and institutions, cooperation, national circumstances and ambition.

93. In accordance with the mandate for its preparation, this document does not present or analyse any individual INDC. It focuses on the effect of the implementation of the INDCs in aggregate. Furthermore, it represents a single study of the INDCs rather than an overview of the outcomes of multiple studies conducted by other institutions. For the purpose of this document, the following ground rules have been applied:

(a) The document is based on the information communicated by Parties in their INDCs. The use of additional information is described in paragraph 101 below;

(b) The analysis is focused on the sectors and gases covered by the INDCs. GHG emissions that do not fall within the scope of the INDCs were only assessed at the aggregate global level using IPCC scenarios, as explained in paragraphs 102 and 103 below;

(c) Likewise, the report does not include in its analysis the effect of any other policy or target not communicated by Parties in their INDCs;

(d) Information is aggregated and not presented at any national or regional level;

(e) No assumptions have been made on the likelihood of the INDCs being fully implemented or exceeded. In preparing this document, the secretariat assumed that Parties will achieve the level of emissions implied in their INDCs.

2. Methods

94. As noted in paragraph 91 above, the estimates of global emissions in 2025 and 2030 associated with the implementation of the communicated INDCs were derived by adding the estimated aggregate emissions resulting from the implementation of the INDCs to the estimated global aggregate emissions not covered by the INDCs. In the context of this document, methods were used:

(a) To estimate the aggregate levels of emissions resulting from the implementation of the communicated INDCs in 2025 and 2030;

(b) To estimate the levels of the emissions not covered by the INDCs in 2025 and 2030 using IPCC reference scenarios.[37]

95. The aggregate levels of emissions in 2025 and 2030 resulting from the implementation of the communicated INDCs were estimated by adding up the expected levels of emissions in the same year communicated in each individual INDC. The resulting emission levels are expressed as median values with an associated range (20^{th} to 80^{th} percentile), owing to the uncertainties underlying the aggregation of the INDCs as well as the conditions expressed by Parties in their submissions.

96. Regarding the conditions expressed by Parties in their submissions, this document presents estimates of the expected aggregate levels of emissions in 2025 and 2030 for three scenarios:

[37] Such estimates are based on global emission figures for 2025 and 2030 for the countries, sectors and gases not covered by the communicated INDCs derived from IPCC scenarios in the AR5 scenario database that reflect the 2020 pledges under the Cancun Agreements. The specific scenarios used for the sector-, gas-, country- and region-specific growth rates of emissions until 2025 and 2030 are from the so-called P3 set of scenarios, specifically the AMPERE 'HST' subset (number=22), which investigated climate policies implemented to meet the 2020 pledges under the Cancun Agreements and kept climate policies constant thereafter until 2030.

(a) The full range of implementation of both the unconditional and conditional components of the INDCs;[38]

(b) The implementation of the unconditional components of the INDCs: Parties with INDCs are assumed to implement only the unconditional components of their targets and Parties that have only a conditional target, or have not submitted an INDC, are assumed to follow their current policy trajectory;

(c) The implementation of the conditional components of the INDCs: Parties with INDCs are assumed to implement the conditional components of their targets; Parties that have only an unconditional target are assumed to implement that; and Parties without an INDC are assumed to follow their current policy trajectory.

97. Further discussion of the aggregate effect of the implementation of the communicated INDCs in this document is based on the assumption of the full range of implementation of both the unconditional and conditional components of the INDCs.

98. Whenever a Party included in its INDC an expected level of emissions in 2025 or 2030, that figure was used in the calculation of the aggregate level. In the absence of such a figure, the method used for quantifying that level differed, depending on the type of INDC, as follows:

(a) For absolute economy-wide emission reduction targets relative to a base year, the estimated level of emissions in the target year (2025 or 2030) was calculated directly by subtracting from the level of emissions in the base year the percentage specified by the Party for that target year;

(b) For emission reductions below BAU level, the estimated level of emissions in the target year was calculated by subtracting from the expected level of emissions in the target year the percentage reduction specified by the Party for that year;

(c) For intensity targets (e.g. targets expressed as a percentage reduction in the relationship between emissions and GDP), the estimated level of emissions in the target year was calculated by, firstly, subtracting from the intensity in the reference year the percentage specified by the Party for that target year and, secondly, by multiplying the resulting intensity by the expected level of GDP in the target year, as communicated by the Party, if available;

(d) For emission peaking targets, historical emission growth rates were projected linearly towards zero in the year of peaking to obtain an estimate of maximum emissions;[39]

(e) For Parties that used a combination of any of the above and for which sectors and gases may overlap, expected levels of emissions in 2025 and 2030 were estimated individually. The target that resulted in the lowest emission levels was used in the calculation of aggregate emissions;

(f) This document does not contain a quantification of the effect of other types of INDC, including mitigation co-benefits of adaptation actions and policies and measures, unless official estimates of emissions in 2025 and 2030 were provided by the Party concerned.

[38] In cases where Parties stated a range of conditional and/or unconditional targets, individual country ranges for the purpose of calculating a global aggregate were assumed to stretch from the lower emission end of the conditional range to the higher emission end of the unconditional range.

[39] Whenever necessary, multiple initial growth rates were used. The secretariat ensured that the estimates were consistent with national expert assessments.

99. Most Parties indicated a time frame of up to either 2025 or 2030 in their INDCs. For Parties that applied a time frame of up to 2030, the level of emissions in 2025 was estimated using linear interpolation between the latest available emission level and the estimated level of emissions in 2030 resulting from the implementation of their INDC. If the Party in question had previously communicated a target with a time frame of up to 2020 (e.g. action communicated in the context of the pre-2020 period), the level of expected emissions in 2020 pursuant to that target was used in the interpolation alongside the current level of emissions. In that case, both emission levels for 2025 were aggregated to achieve the global emission level in order to reflect the uncertainty inherent to the quantification.

100. For Parties that applied a time frame of up to 2025, their estimated level of emissions in 2030 resulting from the implementation of their INDC was calculated as follows:

(a) If the Party provided a long-term trajectory or target, that information was used to interpolate emissions from the expected emission level in 2025 resulting from the implementation of its INDC to the level specified by the long-term trajectory or target;

(b) If the Party did not provide a long-term trajectory, linear extrapolation from the estimated emission level in 2025 was used to estimate the emission level in 2030 using an average change in emissions until 2025 on the basis of available historical data and, if available, of actions communicated for up to 2020 or earlier.

101. In applying the methods specified above, the targets communicated by each Party as part of its INDC took precedence. That information was complemented, as necessary, by data contained in the latest official inventories, national communications, biennial update reports and biennial reports. Any remaining data gaps were addressed by using a set of scientific global data sets.[40]

102. As noted in paragraph 89 above, the estimated level of emissions communicated in each INDC for the target years (2025 and 2030) includes only the sectors and gases specified by each Party in its INDC. As a result, the aggregate level of emissions resulting from the implementation of the communicated INDCs is a partial estimate that excludes Parties that did not communicate INDCs as well as the sectors and gases that each Party chose not to include in its INDC. In order to discuss that partial estimate in the global context, total global emissions in 2025 and 2030 were estimated as described in paragraph 91 above.

103. To derive the level of the emissions not covered by the communicated INDCs, global emission scenarios[41] were adjusted to remove the reference emissions strictly

[40] For a consistent aggregation of emissions, a gas-by-gas data basis was necessary to allow conversion from different metrics, such as GWPs from the IPCC Second Assessment Report or AR5 into GWPs from the AR4, which were used consistently for the aggregation presented in this document. This is part of the reason why, in some cases, complementary data sets were necessary in order to arrive at an estimate of the aggregate effect of the INDCs. The primary complementary source of gas-by-gas data on the emissions of Parties not included in Annex I to the Convention was the AR5 historical emission database (as shown in figure SPM.1 of the contribution of Working Group II to the AR5), which is a composite database including sources such as the International Energy Agency, the Emission Database for Global Atmospheric Research and Houghton RA, van der Werf GR, DeFries RS, Hansen MC, House JI, Le Qu é é C, Pongratz J and Ramankutty N. 2012. Carbon emissions from land use and land-cover change. *Biogeosciences*. 9: pp. 5125–5142 in combination with data from the Food and Agriculture Organization of the United Nations, the Carbon Dioxide Information Analysis Center and others.

[41] The scenarios were taken from the AR5 scenario database, available at <https://secure.iiasa.ac.at/web-apps/ene/AR5DB/dsd?Action=htmlpage&page=about>.

associated with the INDCs by extracting any relevant gas-, sector-, country- or region-specific growth rate. Additional details on this are available in the technical web-based annex.

104. Cumulative CO_2 emissions were calculated by assuming the same growth rates in CO_2 and non-CO_2 emissions as projected in the IPCC reference scenarios, starting from the last available year of historical emission data in the underlying emission database. The resulting share of CO_2 emissions was then applied to the linearly estimated trajectory of GHG emissions between the last historical data point and estimated emission levels for 2020, 2025 and 2030. Consistent with the report of IPCC Working Group I,[42] future carbon emissions were then summed for the cumulative emission estimate, starting after 2011.

105. The results presented in chapter II.E below correspond to a 60 per cent range from the 20th to the 80th percentile across the set of a total of 304 emission estimates for 2025 and 2030, with 152 being different implementations of the high and 152 being different implementations of the low emission estimates. Those estimates are taken from the respective ends of any communicated INDC target ranges. The high end aggregates all unconditional INDC targets (or the upper ends of any unconditional ranges) or, if a Party did not communicate an unconditional INDC target, the reference scenario. The low end aggregates all conditional INDC targets (or the lower ends of any conditional ranges) or, if a Party did not communicate a conditional INDC target, all unconditional INDC targets (or the lower ends of any unconditional ranges).

3. Key challenges and assumptions

106. The approach and methods described above include a number of uncertainties linked to data availability and quality.

107. One key challenge relates to the different ways in which Parties have chosen to express their INDCs, including time frames and reference years as well as the sectors and gases covered.

108. Further challenges relate to the methodologies used for estimating and projecting GHG emissions as well as to the quality, clarity and completeness of the data used (see chapter II.D below). The latter includes, for example: missing information on metrics, such as GWP values applied; lack of gas-by-gas emission data to be able to aggregate emissions with the same consistent metrics; missing or incomplete data on the BAU scenario and expected future values for GDP or population; lack of clarity on approaches to the accounting of the LULUCF sector; missing information on the application of conditions in the target year; and lack of information on the use of international market-based mechanisms and how double counting was avoided.

109. The above-listed challenges were addressed by applying a consistent approach, as follows:

(a) Uncertainties arising from the different ways in which Parties have chosen to express their INDCs were addressed by applying the method described in paragraph 98 above;

(b) As noted in chapter II.C.1 above, the analysis is based on data included by Parties in their INDCs. Challenges related to missing data were addressed as described in paragraph 100 above;

[42] *Climate Change 2013: The Physical Science Basis*. Available at <http://www.ipcc.ch/report/ar5/wg1/>.

(c) Differences in the coverage of sectors and emissions were addressed by limiting the country-level analysis to the GHG emissions covered by the INDCs;

(d) Uncertainties linked to conditions specified by Parties in their INDCs were addressed by estimating unconditional and conditional emission reduction levels and expressing the result as a range.

110. A major area of uncertainty relates to the approaches used for estimating, projecting and accounting emissions and removals from the LULUCF sector. The results presented in this document are dependent upon the high sensitivity of the methods used to estimate global emissions to how emissions and removals from that sector were considered. For example, some Parties intend to follow specific accounting rules, while others take a full carbon accounting approach (i.e. include LULUCF net emissions or removals like emissions from any other sector).[43]

111. This document takes those divergent treatments of the LULUCF sector into account when estimating global emission levels. For example, a relative target below a historical base year was applied to the total national emissions including LULUCF emissions if the country stated its intention to account for the LULUCF sector as any other sector. To the extent quantifiable with the available data sources, exceptions were taken into account, for example reported wildfire-related (and approximate estimates for insect-related) emissions were subtracted for the base year if emissions related to natural disturbances were intended not to be counted up to 2025 or 2030. In the absence of other methods to estimate LULUCF-related accounting for some Parties, if applicable a (discounted) continuation of credits or debits from the first commitment period under the Kyoto Protocol was assumed (see the online technical annex for more details). Where available, reported projections 'with existing measures' formed the basis for LULUCF-related emission and removal estimates in the future, unless the Party specified LULUCF projections in its INDC. Alternatively, the last available historical data points were assumed to remain constant.

112. There is a definitional difference between the UNFCCC guidance on estimating anthropogenic GHG emissions and removals from the LULUCF sector on the one side and the land-use change related emissions that are part of the global emission estimates of the IPCC[44] and scenarios in the AR5 scenario database on the other. In order to be able to compare estimated global emission levels with estimates from the AR5 and AR5 scenarios, the underlying calculations undertaken for this assessment take into account LULUCF emissions and removals as indicated by Parties with regard to their effect on the other sectors in the total national emissions by 2025 and 2030. In order to arrive at global total emission estimates in line with the global emission estimates of the IPCC, a range of global land-use change emission scenarios in line with the pledges under the Cancun Agreements was assumed for the timeline up to 2025 and 2030.[45] This enables the comparison of the

[43] A few Parties specified how natural disturbances and harvested wood products are to be accounted for.

[44] See, for example, figure SPM.1 contained in the contribution of Working Group III to the AR5.

[45] Specifically, global land-use change emissions in the past up to 2013 follow the Houghton et al. data set used in the contribution of Working Group III to the AR5 and are merged with the land-use change emissions that are part of the P3 AMPERE HST scenarios from the AR5 scenario database. The estimated change in LULUCF emissions between current levels and 2025 or 2030 (a change of –1.0 Gt CO_2 by 2025 compared with 2005 and a change of –1.1 Gt CO_2 by 2030 compared with 2005) pursuant to the information in Parties' INDCs, inventories and reference level projections is within the range spanned by the change of emissions in the applied land-use change emission scenarios, which supports the validity of this aggregation step in order to yield global emission estimates that are comparable with the AR5 scenarios.

aggregate emission estimates presented in this document with the emission levels provided by the IPCC.[46]

113. It should be noted that, in addition to the conditions stated by Parties in their INDCs, the uncertainty related to the accounting of LULUCF emissions and projections of LULUCF emissions and removals is a factor contributing to the need to express the estimated aggregate emissions in 2025 and 2030 as a range. The change in the aggregate LULUCF emissions and projections is within the range of the AR5 reference scenarios' change in land-use change emissions from current levels to 2025 and 2030. This qualitatively supports the chosen approach described in paragraph 112 above of how the global emission estimates presented in this document were made consistent with those in AR5 scenarios.

114. Emissions from international transport also have to be included in order to estimate total global anthropogenic emission estimates and in order to achieve comparability with emission scenarios from the AR5 scenario database and scientific literature. For the assessment presented in this document, the International Civil Aviation Organization 2013 target of carbon-neutral growth from 2020 was used[47] (i.e. the plateauing of international aviation CO_2 emissions from 2020). The level of CO_2 emissions from international aviation in 2020 is estimated to range between 0.68 and 0.76 Gt CO_2 or between 52 per cent and 68 per cent above the 2010 level.[48] For maritime transport emissions, a low and a high scenario to span the range of mitigation scenarios presented by the International Maritime Organization (IMO) were used. Specifically, scenario 5 (1.19 Gt CO_2 emissions in 2030) from the *Third IMO 2014 GHG study*[49] was used as a higher-bound scenario, assuming a 2.9 per cent reduction below a high-growth baseline. As the lower bound, scenario 3 (0.94 Gt CO_2 emissions in 2030) was used, which assumes a similar 2.9 per cent reduction, but below a low-growth baseline.

115. As regards the use of international market-based mechanisms, the present analysis assumes that any international offset will lead to additional emission reductions abroad. In other words, it is assumed that emission reductions in the context of the implementation of one INDC are not counted twice in the context of implementing another one.

D. Synthesis of the information in the communicated intended nationally determined contributions

116. This chapter provides a synthesis of the information communicated by Parties in their INDCs, except for the information in the adaptation component.[50] It is structured in accordance with the information elements listed in decision 1/CP.20, paragraph 14, as described in paragraph 78 above, with a slightly changed order to allow for technical information relevant to the quantitative analysis to be presented together.

[46] As footnote 41 above.

[47] See <http://www.icao.int/Meetings/a38/Documents/WP/wp430_en.pdf>.

[48] See <http://www.icao.int/Meetings/a38/Documents/WP/wp026_en.pdf>.

[49] Available at <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx>.

[50] A synthesis of the information communicated by Parties in their adaptation components is contained in chapter II.F below.

1. Types and targets of intended nationally determined contributions

117. All of the INDCs contain information on mitigation targets or on strategies, plans and actions for low GHG emission development within a specified time frame or implementation period (see figure 3).

118. Many of the INDCs are national in scope; they address all major national GHG emissions or at least the most significant sources; and take a variety of forms:

(a) Some Parties included economy-wide mitigation targets, with absolute emission reduction targets expressed as an emission reduction below the level in a specified base year, ranging from a 9.8 to a 75.0 per cent emission reduction below the respective base year level. A few of the INDCs contain absolute targets that are not linked to a base year but establish an overall maximum absolute limit on emissions (e.g. carbon neutrality by a future date or a specified amount of GHGs to be emitted over a period of time);

(b) Several Parties included relative targets for reducing emissions below BAU level, either for the whole economy or for specific sectors, ranging from 1.0 to 80.6 per cent;

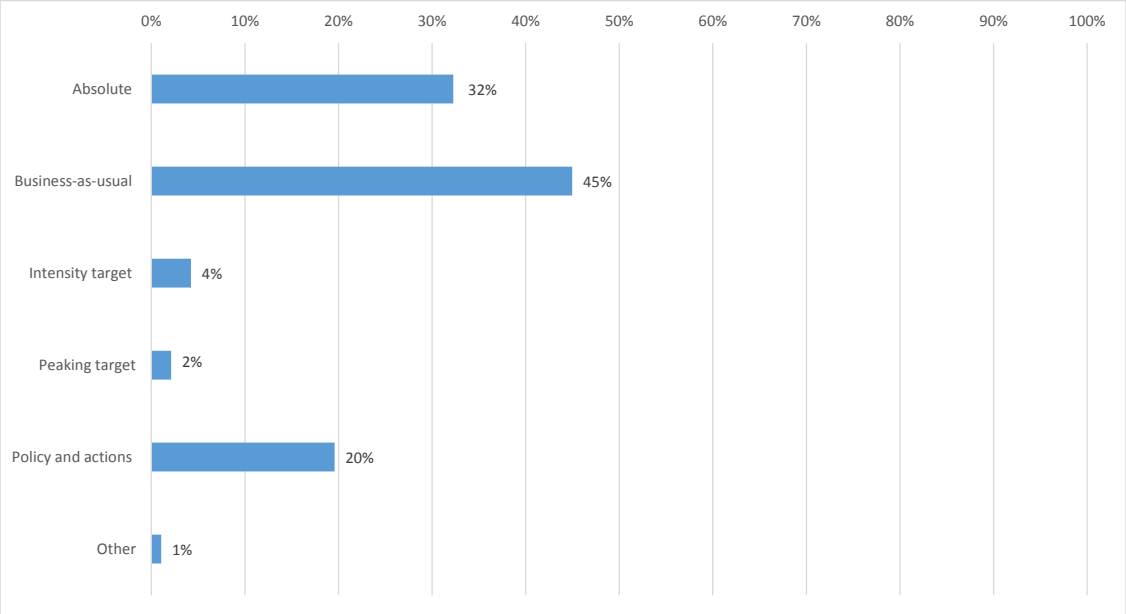
(c) A few Parties included intensity targets, with reductions in GHG emissions per unit of GDP or per capita, ranging from 10 to 45 per cent relative to the level in a base year (e.g. 2005 or 2010) or to the absolute level of per capita emissions by 2025 or 2030;

(d) A few Parties specified mitigation contributions through to the year or time frame in which their emissions are expected to peak (e.g. by 2030 or earlier);

(e) Some Parties included strategies, plans and actions for low GHG emission development reflecting their special circumstances.

119. A few Parties provided information on mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans, mostly in combination with other targets.

Figure 3
Types of mitigation target communicated in the intended nationally determined contributions



Note: Percentage as shown indicates the percentage of Parties that have submitted an INDC within the set time frame of 4 April 2016.

120. Several Parties communicated in their INDCs specific mitigation targets for individual sectors or subsectors to support and/or underpin their overall mitigation target. Several Parties communicated a quantified target for renewable energy expressed as a percentage of different indicators, such as share in the energy matrix, installed capacity, penetration and generation; such targets included ratios of up to 100 per cent. Further, some Parties communicated quantified targets for forestry and/or land-use change expressed either as hectares, cubic metres of biomass or tonnes of carbon resulting from activities such as reforestation, sustainable forest management and forest conservation.

121. Several Parties identified conditions for the full implementation of their INDCs, such as: expectations concerning the results of the ADP process; the level of effort undertaken by other Parties; the availability of market-based mechanisms; and access to enhanced financial resources, technology transfer and technical cooperation as well as enhanced capacity-building support.

122. A few Parties provided information on specific conditions, such as: the establishment of an effective set of accounting rules and guidelines for estimating GHG emissions and removals, including from the LULUCF sector; the availability of economic instruments, including international, regional and bilateral market-based instruments; the costs of technology; and the absorbing capacity of forests.

123. Some of the INDCs include an enhanced conditional mitigation component alongside an unconditional one. Most of those conditional components relate to the provision of finance, technology or capacity-building support and translate into a percentage increase in the level of effort associated with the unconditional component. Such percentage increase is specific to the type of target selected by the Party (e.g. percentage reduction in emissions against a base year, BAU or emission intensity level) and ranges from 2 to around 53 per cent of additional emission reductions.

124. Furthermore, some Parties stated in their INDCs the expectation that negotiations under the ADP will provide the clarity required for meeting some of the conditions referred to in paragraphs 121 and 122 above. Some Parties indicated that they reserve the right to revise their INDCs in the light of the outcome of the ADP process.

125. Given that the emission reductions communicated by some Parties are dependent upon the fulfilment of certain conditions, the emission levels of those Parties can be expressed as a range depending on whether the unconditional or conditional component of the respective INDCs is implemented. In this document, aggregate emission levels for 2025 and 2030 are generally expressed on the assumption of the full range of implementation of both the unconditional and conditional components that Parties communicated in their INDCs. Where appropriate, aggregate emission levels for 2025 and 2030 are assessed assuming that only the unconditional components of the INDCs are implemented, or alternatively assuming that the conditional components of the INDCs are implemented (and only where no conditional component exists is the unconditional component assumed to be implemented).

126. In addition to communicating information on mitigation targets or strategies, plans and actions for the near to medium terms, some Parties included information on long-term mitigation strategies for the period up to and beyond 2050. In many of those INDCs, the near- to medium-term mitigation contribution is embedded in the long-term development strategy, aiming at greater ambition over time. The long-term goals communicated in the INDCs range from a 25 per cent GHG emission reduction by 2050 below BAU level, through emission reductions or per capita emission reductions by 2050 below a specific base year level (e.g. 1990 or 2000), to achieving carbon neutrality or the transition to a low-emission society by 2050 or 2085.

2. Information on the reference point (including, as appropriate, a base year)

127. Information on the reference point indicates a specific year (base year) or time frame when the emission levels or emission intensity levels serve as reference to set a mitigation target for the future. Information on the base year applies to absolute emission reductions or intensity-based mitigation objectives rather than to the objectives expressed as reductions below BAU level or as a peaking year, although a few Parties indicated a reference year for their BAU projections.

128. Many Parties provided information on the reference point. Some Parties chose 1990 as a base year, some chose 2005 and others referred in their INDCs to 2000, 2002, 2006, 2007, 2008, 2009, 2010, 2013, 2014 or 2015. Several Parties specified the level of their emissions for the reference point and/or the specific source of the emission data for the reference point, such as a national inventory or other report submitted to the UNFCCC. Several Parties that expressed their mitigation objectives as a reduction below BAU level provided information on the reference emission scenarios.

3. Time frames and/or periods of implementation

129. Time frame and/or period of implementation refers to a time period in the future during which an objective included in an INDC is to be achieved. Depending on their national circumstances, Parties communicated a single year or a period.

130. Most Parties communicated information on time frame and/or period of implementation in their INDCs. Most Parties communicated either a 5- or 10-year time frame for the implementation of their INDC. Most of the communicated INDCs refer to a period of implementation of up to 2030, while some Parties specified a period of up to 2025. A few of the INDCs communicated targets for both 2025 and 2030, one of which is indicative or interim. A few Parties indicated a target for 2035 or 2040. Some Parties

mentioned a long-term target for 2050 in conjunction with another target year. Furthermore, some Parties communicated an implementation period starting before 2020, several on starting in 2020 and a few starting in 2021.

4. Scope and coverage

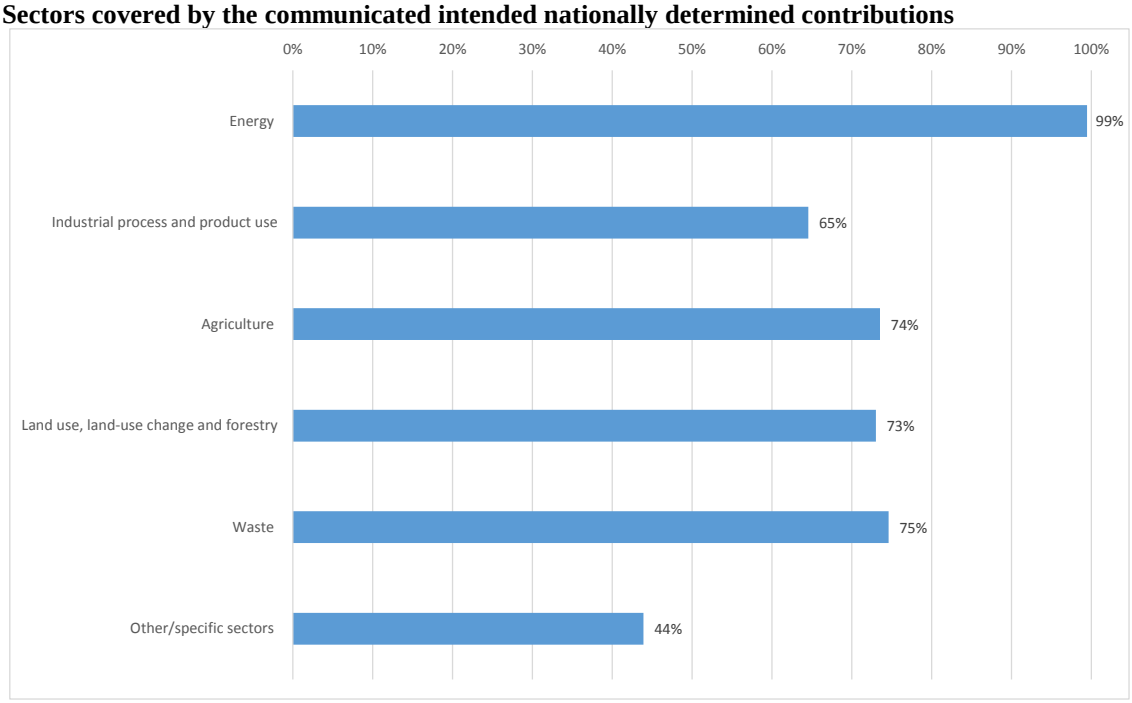
131. Information on the scope and coverage of the INDCs refers to the sectors and gases that are included in the mitigation targets or strategies, plans and actions. This information provides the basis for determining whether the INDCs cover total GHG emissions or a subset thereof.

132. Many of the communicated INDCs cover most or all sectors in line with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) and hence are 'economy-wide'(see figure 4).

133. Several Parties provided information on the coverage of specific sectors that are of national importance and often form a subset of one or several of the IPCC sectors, such as the transport and/or building sector, while others mentioned shipping and aviation, oil industry flaring, solvents and electric power, mining, tourism and water management.

134. Some Parties highlighted their mitigation actions in the forest sector, in particular their implementation of the activities referred to in decision 1/CP.16, paragraph 70 (hereinafter referred to as REDD-plus activities).[51] Some of those Parties elaborated that their mitigation efforts in the forest sector will be coordinated through their existing REDD-plus initiatives.

Figure 4
Sectors covered by the communicated intended nationally determined contributions

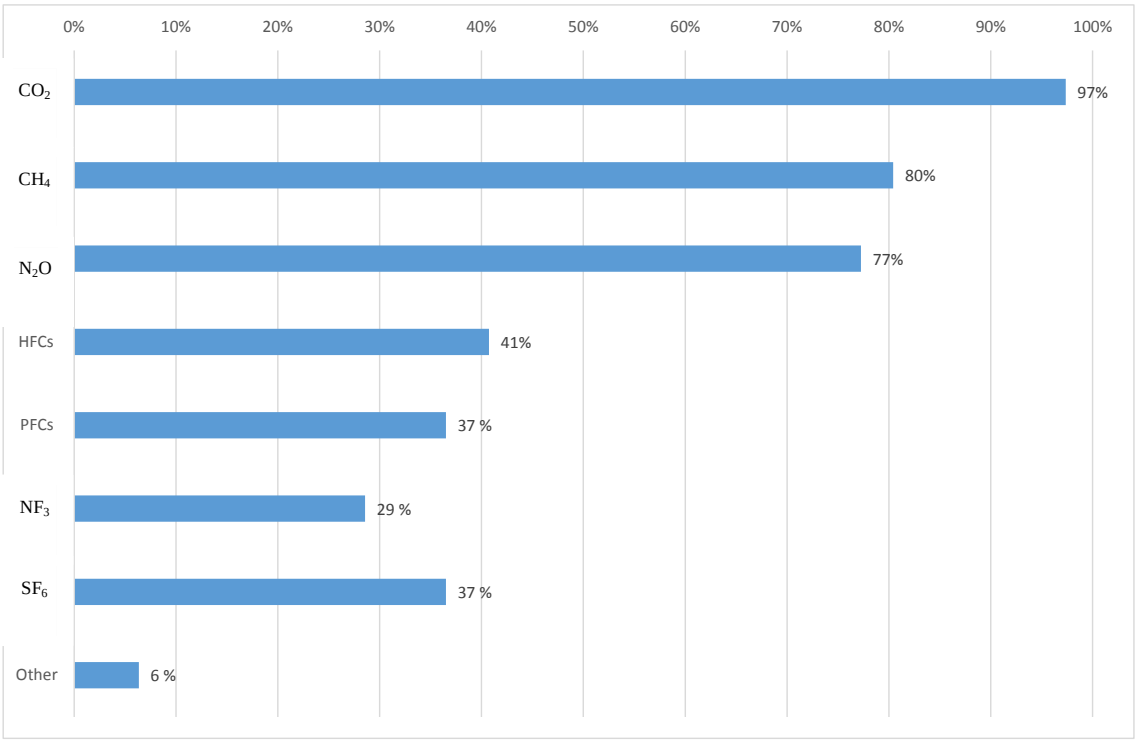


[51] In decision 1/CP.16, paragraph 70, the COP encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

Note: Percentages shown are percentages of the Parties that submitted intended nationally determined contributions by 4 April 2016.

135. The coverage of GHGs in the INDCs is influenced by national circumstances. In line with the reporting activities of Parties under the Convention, most Parties in their INDCs covered CO_2 and many covered CH_4 and N_2O emissions, while some also covered emissions of SF_6, HFCs, PFCs and NF_3. A few of the INDCs include additional gases or emissions, including SLCFs, black carbon or NOX, NMVOCs and SO_2. (see figure 5).

Figure 5
Gases covered by the intended nationally determined contributions



Note: Percentages shown are percentages of the Parties that submitted intended nationally determined contributions by 4 April 2016.

5. Assumptions and methodological approaches, including those used for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals

136. Many Parties communicated some information on the assumptions and methodological approaches used for estimating and accounting emissions and removals, with varying level of detail. Most of those assumptions and methodologies relate to the estimation and projection of GHG emissions and removals. The quality and quantity of the information varied greatly, depending primarily on the communicated mitigation target and national capacity. Some Parties also provided information on the source of their data, including references to national studies, their GHG inventory and national communications.

Reporting guidelines

137. Parties use guidelines prepared by the IPCC to prepare and communicate their national GHG inventories, including: the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*; the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance); the IPCC *Good Practice Guidance for Land Use, Land-Use*

Change and Forestry (hereinafter referred to as the IPCC good practice guidance for LULUCF); and the 2006 IPCC Guidelines.

138. Many Parties referred in their INDCs to the standard methods and procedures contained in the different IPCC guidelines. Some Parties mentioned the use of the *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* as well as the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*.

Global warming potentials and other metrics

139. GWPs are used to aggregate emissions of the different GHGs into a single national total. Several Parties communicated in their INDCs information on GWPs. Several of those INDCs considered GWPs on a 100-year timescale in accordance with either the IPCC Second Assessment Report (including the INDCs that refer to decision 17/CP.8) or the AR4 (including the INDCs that refer to decision 24/CP.19). A few Parties used GWP values published in the AR5 and one Party used GWP values and also global temperature potentials to describe its mitigation targets.[52]

Land use, land-use change and forestry

140. Many Parties included emissions and removals from LULUCF or specific mitigation actions targeting them in their INDCs. Some Parties mentioned actions in the LULUCF sector among the priority areas in the implementation of their INDCs.

141. Some Parties included in their INDCs information specific to LULUCF accounting. Several of them did not include comprehensive information on the assumptions and methods used in the accounting of emissions and removals from LULUCF. This presents a major challenge in the assessment of the aggregate effect as it represents a major area of uncertainty.

142. Several Parties stated their intention to account for LULUCF, covering all emissions and removals from all pools and gases, using a net-net approach, or they listed a number of activities, namely afforestation, reforestation, revegetation, wetland restoration, reducing emissions from deforestation and forest degradation.

143. A few Parties indicated that they are switching to a comprehensive land-based approach but that the actual approach for quantifying LULUCF is still to be defined. A few Parties explained that the decision on whether LULUCF would be included, and on any related methods, would be made at a later stage once better information on mitigation potential is available.

144. A few Parties stated that they will make use of specific provisions for LULUCF in order to address specific issues, such as how to address the inclusion of harvested wood products, the exclusion of emissions from natural disturbances, permanence, land-use flexibility, legacy and non-anthropogenic effects.

145. A few Parties indicated that a common framework for accounting for LULUCF may be desirable, which could be based on existing guidance and experience under the Convention and its Kyoto Protocol. Most of those Parties are of the view that such a framework should be comprehensive and should ensure transparency and environmental integrity. Finally, one Party indicated that reference scenarios or levels used in the

[52] One Party used GWPs for black carbon described in Bond et al. 2013. Bounding the role of black carbon in the climate system: A scientific assessment. *Journal Of Geophysical Research Atmosphere*. 118(11): pp. 5380–5552.

accounting of LULUCF should, when based on a projection, be subject to a technical assessment process.

Future greenhouse gas emission levels

146. For mitigation targets other than economy-wide absolute emission reductions, information on expected GHG emissions in the future is required to assess the aggregate effect of the implementation of the INDCs. Several Parties provided a quantitative baseline, BAU scenario or projections of emissions for 2025 and/or 2030. A few Parties indicated that they will provide related information once it becomes available.

147. Several Parties provided information on the assumptions used to develop a BAU scenario or to project GHG emissions. Most of those Parties referred to macroeconomic variables such as GDP or population or to growth rates of those two variables. Other Parties mentioned the use of sector-specific variables, in particular for the energy sector, such as future demand for energy or electricity, electrification rates, efficiency and grid loss, as well as activity data for other sectors. A few only provided values for those variables and some referred to sources of data such as national statistics or international databases.

148. Some Parties mentioned the use of models to estimate future emissions, such as the Long-range Energy Alternatives Planning system or the Greenhouse Gas Costing Model. A few indicated the development of scenarios to estimate future emissions under BAU and different levels of mitigation effort and on the basis of the implementation of a series of mitigation measures. Other Parties mentioned the use of ad hoc models, the climate justice index or regional climate models.

6. Planning processes

149. Most of the INDCs communicated by Parties contain information on planning processes, at both the national and international level. In this context, Parties communicated information on existing and future institutional arrangements, existing and planned legislation and policies, priority areas for future implementation and stakeholder engagement.

Institutional arrangements

150. Institutional arrangements, including institutional structures and processes, were indicated by many Parties to be a key element of their overall national climate change planning process.

151. Many Parties in their INDCs communicated that, as a result of the implementation of their current climate policies, they can draw upon already established institutions and instruments to implement their INDCs. Some Parties highlighted that they are strengthening existing institutions and their capacity in response to the challenges of implementing their INDCs and the transition towards low-emission development by broadening their scope and equipping them with additional mandates and/or resources. Such institutions include domestic laws and regulations related to climate change, implemented policies and measures to address climate change and national, regional or local administration related to climate change. Some Parties communicated information referring to their established domestic measurement, reporting and verification systems. Some Parties have established institutions to provide capacity-building and information-sharing platforms related to their INDCs at the national and regional levels.

Existing legislation and policies

152. While the level of ambition and degree of advancement of national climate policies vary, most Parties' INDCs build on and/or are embedded in existing climate change and/or development strategies, policies and legislation, owing to ongoing national sustainable

development or climate change processes as well as experience with implementing the Convention and its Kyoto Protocol.

153. Most of the INDCs are already backed up by existing domestic legislation or policies. Many Parties in this context elaborated on their: national climate change policies and strategies; national development plans and strategies; national green growth and sustainable development policies and related sectoral policies (e.g. energy, renewable energy, transport, agricultural and forestry policy); international commitments under the Kyoto Protocol and the Doha Amendment; existing domestic regulations and laws; and performance to date. A few of the INDCs identify a lack of sufficient legislation and policies that would be needed for their implementation and resulting capacity-building requirements.

154. Several Parties noted that the implementation of their INDCs will involve strengthening laws and regulations on climate change and further integrating related objectives into long-term economic and social development plans as well as the improvement of the overall administration, performance evaluation and accountability system on climate change and low-emission development targets. In some cases, this will require revisions to the existing legal and policy frameworks. Some Parties highlighted specific laws and policies that need to be revised or enhanced during the implementation of their INDCs. Several Parties specified that their INDC as a whole or the revisions to existing policies will be subject to approval by their national parliament.

155. Several Parties provided information on processes for creating new legislation and policies, triggered by the preparation of their INDCs, including: the mainstreaming of climate change related policies into development strategies; the establishment of national carbon pricing instruments; energy efficiency policies and targets; emission standards; and incentives for low-carbon technologies; while some Parties provided information acknowledging that new institutions will be created to facilitate the implementation of their INDCs.

Priority areas for future implementation

156. On the basis of their national circumstances and development priorities, several Parties outlined priority areas with high mitigation potential relevant to the implementation of their INDCs, often linked to the transformation of the existing energy system and the expansion of carbon sinks.

157. Renewable energy was highlighted in several INDCs. Related actions are aimed at increasing the share of and improving access to clean energy, such as feed-in tariffs, investment programmes for renewable energy generation and the improvement of the grid infrastructure to make it fit for renewable energy sources. Several Parties communicated quantified renewable energy targets, with some aiming to achieve 100 per cent renewable energy supply.

158. Actions to achieve energy efficiency, highlighted in several INDCs, include: energy efficiency standards; the modernization of energy generation and transmission infrastructure; the promotion of smart grids; efficiency improvements in industrial processes and the building sector; and energy conservation standards. Some Parties communicated quantitative energy efficiency targets. Sustainable transport was highlighted by several Parties in the context of enhancing energy efficiency through measures such as improving public transport, expanding the fleet of electric and biofuel vehicles, limiting the import of inefficient vehicles and using fuel efficiency standards.

159. In several INDCs, Parties provided information on their plans to implement policies and measures to reduce methane and other non-CO_2 gases by: improving crop and livestock production; promoting low-carbon agriculture; reducing fugitive emissions; recovering

methane emissions; and establishing waste management and recycling programmes and waste-to-energy facilities. Furthermore, some INDCs highlight measures to promote the conservation and sustainable management of forests, increase forest cover and reduce the drivers of deforestation. Some Parties particularly highlighted the importance of REDD-plus activities in this context. A few Parties mentioned carbon capture and storage as their priority area for national climate policy efforts, as a research and development priority to be strengthened or as actions to be promoted and encouraged.

160. In providing information on their priority areas for future work, several Parties highlighted the link between the actions to address climate change presented in their INDCs and their development priorities, including social and economic development as well as poverty eradication. In this context, Parties highlighted the need to further integrate climate change related objectives into national economic and social development plans.

161. Some Parties highlighted additional priority areas relating to the implementation of their INDCs, such as: the development of long-term low-emission development strategies and the decoupling of economic growth from GHG emissions; the systematic assessment of possible sources of funding; the enhancement of relevant research and development agendas; the promotion of a low-emission lifestyle; the protection of biodiversity; and the development of a climate change resilient society and economy.

162. Some Parties included specific policies in their INDCs that provide the potential for scaling up and further development in the context of their implementation. Some examples of current policies include: comprehensive national legally binding climate change and energy legislation; national climate change strategies; carbon taxes or levies on CO_2 emissions; domestic and regional emissions trading schemes; GHG emission inventories and registries; and controlling GHG emissions in urbanized zones and cities.

163. In addition to priority areas with high mitigation potential relevant to the implementation of their INDCs, some Parties indicated their intention to improve the existing system or establish a new system for the measurement, reporting and verification of emissions as a precursor to the full implementation of their INDCs. Examples of planned measures include: establishing effective systems for collecting, processing, reporting and archiving required data and information; improving statistical indicator systems and accounting systems for emissions; further developing analytical capabilities; personnel training and capacity-building; improving the quality of data; and establishing reporting mechanisms at the national, subnational and entity levels.

164. Several Parties highlighted in particular the link between the actions to address climate change presented in their INDCs and their development priorities, including social and economic development as well as poverty eradication. Some Parties highlighted synergies between their development and climate priorities and several Parties noted specific co-benefits of action to address climate change, including: reduced local air pollution and resulting health benefits; improved access to energy and enhanced energy security; improved water quality and management; social progress, including poverty reduction, increased well-being and job creation; economic diversification; and synergies between adaptation and mitigation actions towards building resilience, in particular in agriculture and forestry, as well as relating to food security.

Stakeholder engagement

165. Many Parties referred in their INDCs to the importance of national consultation and interdisciplinary coordination to ensure strong alignment with socioeconomic development objectives and buy-in from all relevant stakeholders.

166. Many Parties stated the high political priority of developing and communicating an INDC. Several Parties mentioned that their INDC has been approved at the highest political

level, for example by the national parliament, the cabinet of ministers or the president. Furthermore, the importance of national, subnational and regional cooperative action undertaken both by the government and non-state actors was noted by several Parties. Several Parties specifically highlighted that several government levels share responsibility for action and for establishing coordinating mechanisms in relation to climate change. Some Parties specifically noted that initiatives undertaken by cities and subnational governments will be an important driver for the implementation of their INDC.

167. Several Parties emphasized that their INDC has been subject to national stakeholder consultation with a view to raising awareness and securing buy-in. Parties highlighted that support from actors such as the private sector, academia and civil society, as well as from relevant sectoral ministries and regional and local governments, is critical for identifying realistic targets. Some Parties still plan to hold consultations on the overall national climate policy underlying their INDC and on specific measures that allow emission reductions, with a few already having specified the target time frame for them to take place.

168. The preparation of the INDCs has led to the establishment of new institutional arrangements and consultation processes, in some cases involving not only sectoral ministries, businesses, environmental non-governmental organizations, academia and local governments, but also the general public. Some Parties have put in place new processes to engage relevant public and private actors, such as parliamentary hearings, sectoral dialogues, research cooperation, cross-cutting working groups, workshops, expert teams and technical peer review, large-scale public consultations, different platforms for information exchange, media, awareness-raising and education campaigns and the invitation for written submissions as part of the national consultation process on the INDC.

7. Fairness, ambition and contribution to the objective of the Convention

Fairness

169. Most Parties provided information on how they consider their INDC to be fair and ambitious in the light of their national circumstances.

170. In setting the framework for the discussion on fairness and ambition, many Parties provided information on the global context in which their INDC and related actions should be viewed, namely in the context of: a shared global effort to be undertaken in a fair and equitable manner; the principles of equity and common but differentiated responsibilities and respective capabilities; historical responsibilities, including based on climate justice; the need for taking into account Parties' national circumstances; the recognition that all countries need to act and cooperate to address climate change; the application of the same legal form and rules to all Parties; and the recognition that fairness considerations include various aspects and national circumstances, as no single indicator can accurately reflect fairness or a globally equitable distribution of Parties' efforts.

171. Many of the INDCs refer to specific national circumstances when outlining why they are fair and ambitious. National circumstances relevant to determining the fairness and ambition of the INDCs communicated by Parties include social, economic and geographical factors, such as considerations related to: the need for poverty eradication and the improvement of living standards; population structure and urban density; the impacts of local or regional conflicts; economic development and the current industrial structure (e.g. share of energy-intense or energy-efficient industries; or if it is a fossil fuel producing or exporting country); energy mix and related limitations; economic diversification processes; dependence on the global supply chain for food and energy security; sensitivity to the volatility of regional and global developments; the size and geography of the country; climatic conditions; natural resource endowment, including for renewable energy; and vulnerability to climate change impacts, including dependency on climate-sensitive sectors

such as agriculture, tourism and water. In this context, most of these Parties highlighted their special status as an LDC or small island developing State.

172. In providing information on how they consider their INDC to be fair and ambitious, many Parties viewed responsibility directly or indirectly in the context of their past, current and future share in the global emissions and per capita emissions in comparison with global averages, as well as of the trends in one or several of those indicators. Further, several Parties provided information on specific criteria for evaluating fairness and ambition, including criteria relating to: responsibility and capability; share of emissions; development and/or technological capacity; mitigation potential; cost of mitigation actions; the degree of progression or stretching beyond the current level of effort; and the link to objectives and global goals.

Ambition

173. Many Parties placed ambition in the context of their national circumstances and fairness considerations. For many Parties, ambition corresponds to the size of their efforts to address climate change in relation to their national circumstances, capacity and responsibility. The interpretation of ambition varies from country to country and is manifested in narratives that explain Parties' level of efforts.

174. In explaining how their INDC is ambitious, some Parties elaborated on how their contribution represents a progression beyond their current undertakings, either in terms of scope and scale of emission reductions, the type of INDC and financial effort, or in comparison with the efforts of other Parties in similar circumstances and in terms of how the INDC links to the global objectives under the Convention (including temperature targets).

175. Some Parties communicated that their mitigation targets, mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans, or strategies, plans and actions for low GHG emission development imply an acceleration in the national rate of decarbonization and/or diversification of their economies and that the decoupling of GHG emissions from economic growth will be achieved, transitioning towards a low-carbon and climate-resilient development pathway. Several Parties provided information on ambition and progression by highlighting emission reductions below BAU level and/or substantial acceleration in the annual pace of emission reduction, in terms of both absolute and relative reductions. Some Parties noted that their mitigation targets, mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans, or strategies, plans and actions for low GHG emission development are in line with or go beyond the reduction requirements stated by the IPCC and/or relevant COP decisions for the global emission level or for specific groups of Parties.

176. Several Parties provided information on ambition by linking their INDC to the objective of the global transition towards a low-carbon economy, with some specifically referring in their INDC to the overall low-carbon transformation of the economy, the decarbonization of energy supply, increasing carbon sinks and the modernization and diversification of the economy. A few Parties highlighted their contribution to the provision of support, including for the development and diffusion of low-emission technologies, and referred to their past performance in reducing their emissions.

Contribution towards achieving the objective of the Convention

177. Most Parties communicated information on their contribution towards achieving the objective of the Convention together with information on fairness and ambition.

178. Several Parties indicated that their expected level of emissions in the future would fall within the scope of a global emission pathway that is consistent with the goal of keeping the global average temperature increase below 2 ℃, while some Parties referred to

1.5 ℃. In this context, some Parties referred to global and national decarbonization or to specific emission reduction levels in the future, such as an 80–95 per cent emission reduction by 2050 compared with the 1990 level for developed countries, or to global emissions being at least halved by 2050 compared with the 1990 level, in accordance with the findings of the IPCC.

179. Regarding the capacity to contribute to global mitigation actions towards achieving the objective of the Convention, considerations of several Parties include the overall level of socioeconomic development, GDP per capita, vulnerability to climate change, ability to invest in long-term mitigation measures, such as carbon-efficient technologies, and the support received from the international community that is framing the national capacity to prepare and implement the INDC. A few Parties considered the carbon intensity of their economy, the potential for cost-efficient mitigation and overall abatement costs, as well as past efforts (ensuring that first movers are recognized for past mitigation actions), in relation to their contribution towards achieving the objective of the Convention.

8. Additional information

180. Most Parties included in their INDCs information in addition to the elements specified in decision 1/CP.20, paragraph 14, including on the use of market-based mechanisms, support needs for the implementation of their INDCs, response measures and economic diversification.

Market-based mechanisms

181. Several Parties indicated their intention to use market-based mechanisms, with a few of those Parties identifying those instruments as a condition for the implementation of their INDCs. Those Parties explicitly noted plans to use carbon credits from international, regional or domestic schemes, including some Parties that expressed an interest in using the clean development mechanism. Moreover, some Parties stated either a general interest in market-based mechanisms or an intention to further explore their use.

182. Some of those Parties highlighted the role of market-based mechanisms in enhancing the cost-efficiency of mitigation efforts, thus creating opportunities to raise overall ambition. While almost no quantitative information was provided on the expected degree of use, some Parties indicated that they would use market-based mechanisms to meet only part of their mitigation targets.

183. Finally, some Parties stressed the need for principles and/or rules for governing the use of such mechanisms. Such rules would aim at preventing double counting of emissions, ensuring the environmental integrity of the credits generated and promoting sustainable development benefits.

Support needs for implementing intended nationally determined contributions

184. Many Parties provided information on support for their INDCs, including general support needs, domestic measures and views in relation to international support.

185. Information on support needs was included in many of the INDCs. The majority noted the need for enhanced international support in the form of finance, technology transfer and capacity-building for the implementation of the INDCs and for enhancing ambition over time. A few Parties mentioned opportunities for South–South cooperation, including through the promotion of mutual learning and international dialogue. A few Parties specifically referred to support being required in view of the lack of institutional capacity to plan and implement sector-specific actions or measures and to project and monitor GHG emissions. Some Parties identified the provision of international support as a condition for the full implementation of their INDCs. Others included a conditional

component in their INDCs related to the provision of support, alongside an unconditional component.

186. Some Parties included quantitative estimates of the domestic and/or international finance required for the full implementation of their INDCs or for achieving their conditional targets. Some Parties indicated only headline figures, while others included figures at the sectoral level or provided in tabular format a detailed list of intended actions and costs. Several Parties noted that they are still in the process of quantifying their financial needs or refining their current analysis.

187. Some Parties included information on planned measures to make available the domestic finance necessary for the implementation of their INDCs, including: the use of market instruments; increased budgetary support for climate action; the development of public–private partnerships; green procurement programmes; reformation of pricing and taxation regimes; improvement of green credit mechanisms; and establishment of national funds to channel and stimulate financial flows from different public and private sources.

188. With regard to international support, several Parties noted the need for enhancing existing institutional arrangements for delivering international financial, technology and capacity-building support, including mechanisms under the Convention, such as the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Adaptation Fund and the Technology Mechanism, and for increasing the scale of, and expanding access to, financial support for climate change action from bilateral and multilateral sources.

Response measures and economic diversification

189. A few Parties emphasized their special circumstance of being highly dependent upon fossil fuel production. Most of them identified a portfolio of actions and plans in pursuit of economic diversification with mitigation co-benefits, including: investing in clean energy technology, energy efficiency, carbon capture and storage, methane recovery and flare minimization; improving emission standards in the transportation sector; education; and sustainable tourism. They indicated that some of their identified actions and plans will result in less domestic fossil fuel consumption and thus yield mitigation co-benefits.

190. A few Parties included information on the adverse impacts of international policy responses to climate change. Some of them mentioned the importance of understanding such policy responses and assessing their impacts, and they stressed the need to take the necessary steps to increase resilience to those impacts. Given their special circumstance of being heavily reliant on hydrocarbons, most of those Parties included economic diversification as one of their strategies for building such resilience. In addition, some of them stated that international cooperation is important for them in addressing response measures.

Other

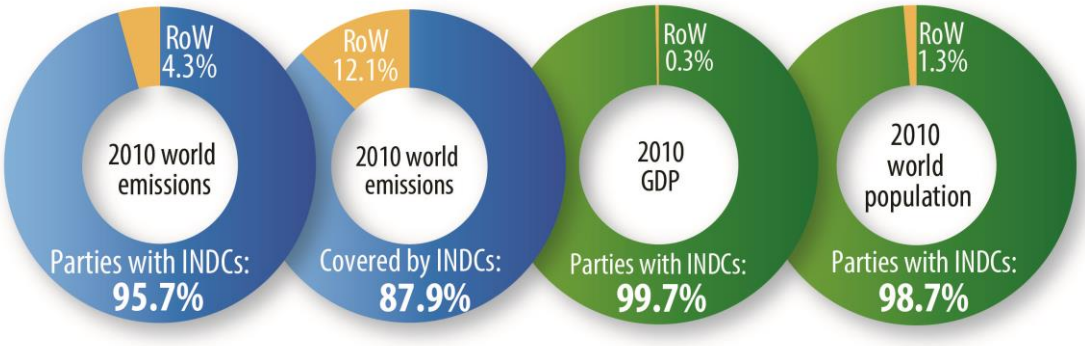
191. A few Parties referred in their INDCs to other issues, such as: innovation as a driver for green growth; gender; human rights, including the right to live free of poverty, and the full realization of economic, social and cultural rights; the need to protect vulnerable communities, including indigenous populations, traditional communities and workers in sectors affected by climate change; and the prerogative of living in harmony with nature and protecting the integrity of Mother Earth.

E. Aggregate effect of the communicated intended nationally determined contributions

1. Coverage by the intended nationally determined contributions of current emissions

192. The Parties that presented INDCs up to 4 April 2016 cover 99.0 per cent of the emissions of Parties to the Convention in 2010 and cover sectors and gases from which 87.9 per cent of global emissions in 2010 originated. The level of total national emissions of the Parties that put forward INDCs is higher, given that there are some sectors and gases not covered by the INDCs. The total emissions of Parties that submitted INDCs as a proportion of global emissions is 95.7 per cent.[53] The Parties that put forward INDCs represent 98.7 per cent of the world's population and 99.7 per cent of global GDP in 2010 (see figure 6).[54]

Figure 6
Coverage of the communicated intended nationally determined contributions as at 4 April 2016



Sources: (1) Aggregation of greenhouse gas emissions reported in the communicated intended nationally determined contributions; (2) Population data: 2015 revision of the United Nations World Population Prospects, available at <http://esa.un.org/unpd/wpp/>; (3) Gross domestic product (GDP) data: International Monetary Fund World Economic Outlook data, with GDP expressed in current USD, available at <https://www.imf.org/external/pubs/ft/weo/2015/01/weodata/index.aspx>.

Abbreviations: GDP = gross domestic product, INDCs = intended nationally determined contributions, RoW = rest of the world.

2. Expected aggregate emissions in 2025 and 2030

193. The estimated aggregate emission level for only the sectors and gases covered by the communicated INDCs and that results from their implementation, calculated applying the methods described in chapter II.C above, is expected to equal 46.5 (44.3 to 48.9)[55] Gt CO_2 eq in 2025 and 48.0 (45.1 to 51.4) Gt CO_2 eq in 2030.

[53] Total global emissions differ from the emissions of all Parties to the Convention owing to emissions from international aviation and maritime transport (2.5 per cent) and emissions from countries that are not Parties to the Convention (0.8 per cent).

[54] GDP in current USD according to the International Monetary Fund *World Economic Outlook 2015*. When using GDP adjusted for purchasing power parity in current USD, according to the International Monetary Fund *World Economic Outlook 2015* the share of Parties that communicated INDCs represents 90 per cent of the world's GDP in 2010.

[55] Unless otherwise stated, ranges indicate 20–80 per cent ranges and single values indicate medians.

194. The global levels of emissions in 2025 and 2030 were estimated by adding the estimated aggregate emission levels resulting from the implementation of the communicated INDCs to the levels of emissions not covered by the INDCs, in accordance with IPCC reference scenarios. Thus, the global emission level resulting from the implementation of the INDCs[56] is expected to amount to **55.0 (51.4 to 57.3) Gt CO_2 eq in 2025 and 56.2 (52.0 to 59.3) Gt CO_2 eq in 2030.**[57, 58]

195. These values assume the full range of implementation of both the unconditional and conditional components of the INDCs. In addition, many of the targets in the INDCs were stated as ranges, or alternatively the quantification underlying this document used in some cases a low and a high scenario, if the quantification was not unambiguous. The discussion of the aggregate effect of the implementation of the INDCs presented in chapters 3–6 below is based on these values.

196. If only the unconditional components of the INDCs are aggregated, the resulting global total emissions are projected to be 55.6 (53.1 to 57.3) Gt CO_2 eq in 2025 and 57.9 (54.4 to 59.3) Gt CO_2 eq in 2030. When aggregating all of the conditional components of the INDCs, the resulting estimated level of global emissions is equal to 54.1 (51.4 to 55.8) Gt CO_2 eq in 2025 and 55.5 (52.0 to 57.0) Gt CO_2 eq in 2030.

197. This comparison of the effect of the unconditional and conditional components of the INDCs demonstrates that global emission reductions of 1.5 Gt CO_2 eq in 2025 and 2.4 Gt CO_2 eq (medians) in 2030, additional to the reductions resulting from the implementation of the unconditional components of the INDCs, can be achieved if the conditions stated in the conditional components of the INDCs are satisfied.

198. Global cumulative CO_2 emissions resulting from the implementation of the communicated INDCs after 2011 are expected to reach 533.1 (509.6 to 557.2) Gt CO_2 in 2025 and 738.8 (703.6 to 770.9) Gt CO_2 in 2030.

3. Expected aggregate emissions in relation to emission levels in 1990, 2000 and 2010

199. The estimated level of global total emissions was 38.7 Gt CO_2 eq in 1990, 40.2 Gt CO_2 eq in 2000 and 48.1 Gt CO_2 eq in 2010.[59]

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[56] Reported emission levels in this document, unless otherwise indicated, include land-use change emissions and use GWP AR4 metric values with a 100-year time-horizon.

[57] These estimates are based on adding the assessed aggregate level of emissions covered by the INDCs and global emission figures for 2025 and 2030 for the countries, sectors and gases not covered by the INDCs derived from scenarios in the AR5 scenario database that reflect 2020 pledges under the Cancun Agreements. The quantification of the INDCs has been done separately for the lower and higher ends of any provided ranges, distinguishing as well into conditional and unconditional targets. In each of those cases, uncertainties related to estimating and accounting methodologies, data gaps and interpolation of 2025 values in the case of INDCs communicating targets for 2030 etc. were taken into account as previously discussed. If a Party provided only a single value of emission reduction (without a range), that single value is reflected in both distributions, possibly with a respective low and high quantification, if there was ambiguity around the appropriate estimated 2025 or 2030 emission level.

[58] In contrast to the given median values, the estimated average global emission level resulting from the implementation of the INDCs is 54.8 Gt CO_2 eq in 2025 and 56.3 Gt CO_2 eq in 2030, compared with average global emission levels of 54.8 Gt CO_2 eq in 2025 and 56.6 Gt CO_2 eq in 2030 reported in the synthesis report published on 30 October 2015 (FCCC/CP/2015/7).

[59] The contribution of Working Group III to the AR5 reported estimated emissions in 1990 at 38 Gt CO_2 eq, in 2000 at 40 Gt CO_2 eq and in 2010 at 49 Gt CO_2 eq (with uncertainty ranges) using GWPs from the IPCC Second Assessment Report for aggregation (see figure SPM.1 in the contribution of Working Group III to the AR5). For this document, 100-year GWPs from the AR4 were used, but

200. The global aggregate level of emissions resulting from the implementation of the communicated INDCs, assuming the full range of implementation of both unconditional and conditional components, is thus expected to increase as follows:

(a) In relation to 1990: by 40 (33–47) per cent by 2025 and by 44 (34–53) per cent by 2030;

(b) In relation to 2000: by 35 (28–41) per cent by 2025 and by 38 (29–47) per cent by 2030;

(c) In relation to 2010: by 13 (7–19) per cent by 2025 and by 16 (8–23) per cent by 2030.

201. If the ambition level of the announced INDC targets is maintained, targets not enhanced and those stated targets exactly met, rather than overachieved, global emissions are likely to increase until 2030. The rate of emission increase over the past two decades is however very unlikely to be repeated, with an expected increase of 16 (8–23) per cent in the period 2010–2030 compared with 24 per cent in the period 1990–2010, thus reflecting the impact of the implementation of the INDCs.

202. Global average per capita emissions are expected to be 6.8 (6.4 to 7.2) t CO_2 eq/capita in 2025 and 6.7 (6.3 to 7.2) t CO_2 eq/capita in 2030.[60]

203. Per capita emissions were equal to 7.4 t CO_2 eq/capita in 1990; 6.6 t CO_2 eq/capita in 2000; and 7.0 t CO_2 eq/capita in 2010. Thus, future global average per capita emissions show a slight decline of 8 and 4 per cent by 2025 and 10 and 5 per cent by 2030 compared with their historical levels in 1990 and 2010, respectively.[61] However, per capita emissions in 2025 and 2030 are expected to be approximately 2 (–3 to +7) per cent and equal to 0 (–7 to +7) per cent above, respectively, per capita emission levels in 2000. After a decade of decreasing global average per capita emissions from 1990 to 2000 and the recent increase from 2000 to 2010, the implementation of the communicated INDCs hence represents a turning point, namely a return to decreasing per capita emissions.

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global numbers are comparable with and within the uncertainty range of the contribution of Working Group III. In order to estimate historical emissions that are consistent and comparable with the provided emission estimates considering the INDCs, the historical emission estimates were derived from AR5 scenario estimates. The set of AR5 scenario estimates is not harmonized and exhibits slight variations in recent historical emissions between the scenarios. Specifically, historical emission estimates were derived by backwards extending AR5 scenarios on the basis of UNFCCC inventory data for Parties included in Annex I to the Convention, IPCC historical data for Parties not included in Annex I to the Convention, the Houghton et al. emissions used by the IPCC for land-use change emissions and any remainder emission differences in 2010. Those remainder emission differences between the bottom-up emission estimates and the IPCC scenarios in 2010 vary from scenario to scenario (–0.9 (–0.9 to 0) Gt CO_2 eq), but are small when compared with global emissions (–1.8 (–1.9 to 0) per cent). To capture the uncertainty, those remainder differences were backcasted proportionally and projected into the future by a range of four different methods: (1) keeping the remainder emissions constant or making them proportional to the other emissions at a (2) global, (3) regional or, where IPCC scenario information was available, (4) country level.

[60] The projections of per capita emissions assume three different population growth projections, namely the low, median and high ones according to the 2015 revision of the United Nations 2012 population projections (median: 8.04 billion by 2025 and 8.40 billion by 2030).

[61] The declines in per capita emissions are stated here as averages of the median values for the default case, which spans quantifications of conditional and unconditional INDCs. The 60 per cent uncertainty range is approximately +/–4 and +/–6 per cent around those median values for 2025 and 2030, respectively.

4. Expected aggregate emissions resulting from the implementation of the communicated intended nationally determined contributions in relation to trajectories consistent with actions communicated by Parties for 2020 or earlier

204. In this document, global emission levels resulting from the implementation of the communicated INDCs are compared with reference case scenarios similar to other 'with existing measures' scenarios. More precisely, the used reference scenarios could be called 'with existing pledges', as they capture the 2020 pledges under the Cancun Agreements, but are not necessarily 'with current policies' scenarios (hereinafter referred to as pre-INDC trajectories). Reference case scenarios from the AR5 scenario database[62] that are used in this document correspond to those that take into account actions communicated by Parties for 2020 or earlier and project emissions further until 2030 without additional climate policies for the 2020–2030 period.

205. Reflecting the assumptions underlying the pre-INDC trajectories, aggregate global emissions according to the scenarios referred to in paragraph 204 above are projected to reach 57.7 (57.7 to 58.5) Gt CO_2 eq in 2025 and 60.8 (60.7 to 60.8) Gt CO_2 eq in 2030.

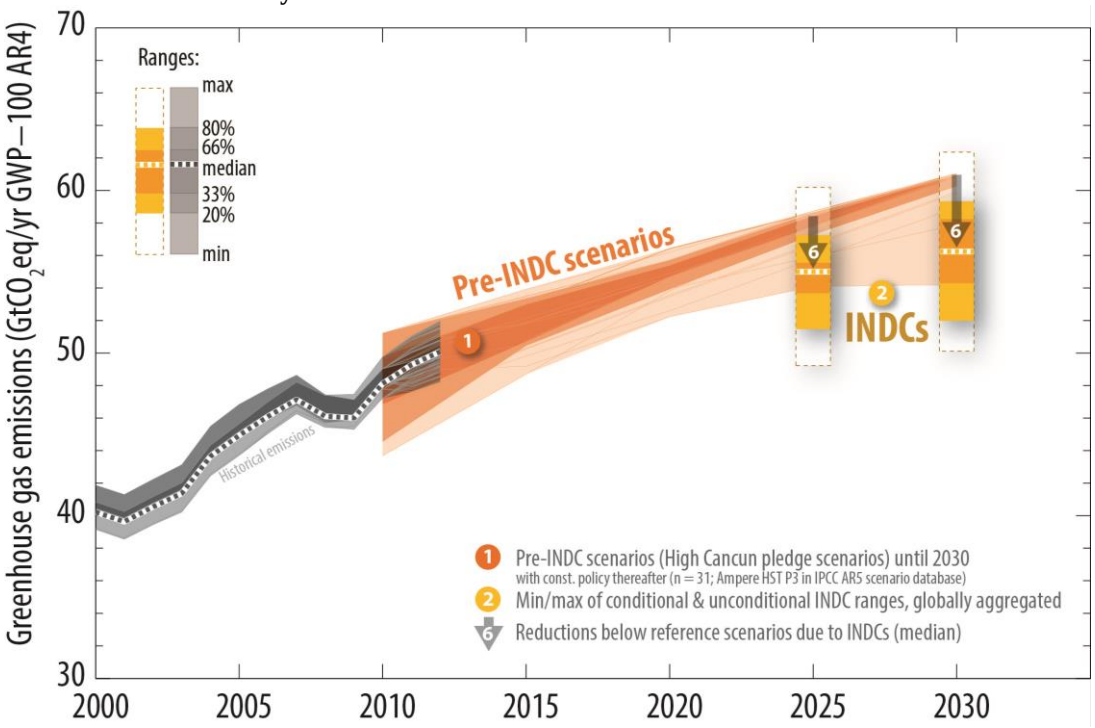
206. Discussion of the expected global level of aggregate emissions resulting from the implementation of the communicated INDCs in relation to trajectories consistent with the pre-INDC trajectories provides information on progress made in relation to action taken to reduce emissions and enhance sinks. In particular, it illustrates the aggregate effect of the implementation of the INDCs in addition to actions communicated for 2020 or earlier.

207. Figure 7 compares global emission levels resulting from the implementation of the communicated INDCs by 2025 and 2030 (yellow bars) with those consistent with pre-INDC trajectories (red).

[62] Specifically, this report uses 22 reference scenarios that are categorized as P3 scenarios in the AR5 scenario database and belong to the group of HST scenarios designed within the AMPERE project (see <https://secure.iiasa.ac.at/web-apps/ene/AMPEREDB/static/download/WP2_study_protocol.pdf>). This subset's emissions are only used until 2030, after which they assume the onset of global mitigation. Before 2030, these scenarios assume the implementation of the higher-emission end of the 2020 Cancun pledges and keep climate policies constant until 2030.

Figure 7

Global emission levels resulting from the implementation of the communicated intended nationally determined contributions by 2025 and 2030 in comparison with emission trajectories consistent with action communicated by Parties for 2020 or earlier



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Abbreviations: AR4 = Fourth Assessment Report of the Intergovernmental Panel on Climate Change, GWP = global warming potential, INDCs = intended nationally determined contributions, yr = year.

208. As illustrated in figure 8, global GHG emissions resulting from the implementation of the communicated INDCs are generally expected to be lower than the emission levels according to pre-INDC trajectories, by 2.8 (0.0 to 6.0) Gt CO_2 eq in 2025 and 3.3 (0.3 to 8.2) Gt CO_2 eq in 2030.[63, 64, 65]

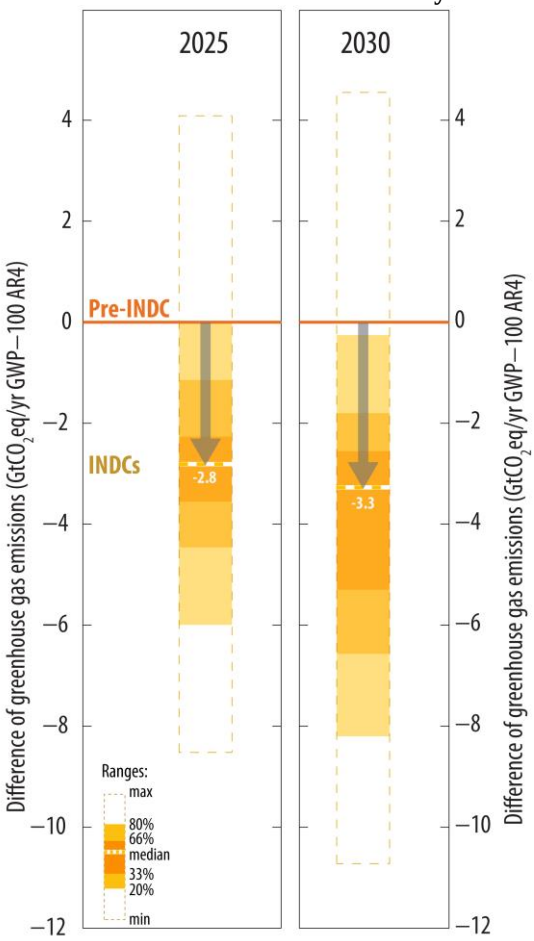
[63] In some instances, the estimated global emissions at the higher end of the INDC target range would theoretically result in higher global emissions than in the considered IPCC reference scenario. This can occur if communicated INDC target growth rates are above the IPCC reference scenario growth rates for the same sectors and gases.

[64] The average (not median) reduction resulting from the INDCs below reference scenarios is 2.9 Gt CO_2 eq in 2025 and 3.9 Gt CO_2 eq in 2030. This is similar to or slightly higher than the average reduction of 2.9 Gt CO_2 eq in 2025 and 3.6 Gt CO_2 eq in 2030 reported in the synthesis report published on 30 October 2015 (FCCC/CP/2015/7).

[65] If all conditional components of the INDCs are implemented, the resulting global total emissions are expected to be even lower, by 3.7 (1.2 to 6.0) Gt CO_2 eq in 2025 and 5.3 (1.9 to 8.2) Gt CO_2 eq in 2030 compared with emissions consistent with pre-INDC trajectories, while considering only the unconditional components of the INDCs reduces the emission difference from pre-INDC trajectories to 2.1 (–0.4 to 4.3) Gt CO_2 eq in 2025 and 2.8 (–0.4 to 5.9) Gt CO_2 eq in 2030.

Figure 8

Difference between global emission levels resulting from the implementation of the communicated intended nationally determined contributions and emission trajectories consistent with action communicated by Parties for 2020 or earlier



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Note: Both bars indicate the percentiles over 304 individual scenarios, which sample across multiple choices, like lower or higher ends of communicated intended nationally determined contributions, different interpolation methods and different reference scenarios from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Abbreviations: AR4 = Fourth Assessment Report of the Intergovernmental Panel on Climate Change, GWP = global warming potential, INDCs = intended nationally determined contributions, yr = year.

209. Any emission reduction below the considered reference scenarios is a step towards achieving 2 ℃ scenarios. Thus, the percentage achievement of the full path can be measured as the percentage by which the global emission levels resulting from the implementation of the communicated INDCs are lower than the reference scenarios in comparison with the full difference between the reference and 2 ℃ scenarios. In this comparison, the implementation of the communicated INDCs is estimated to reduce the

emission difference between pre-INDC trajectories and 2 ℃ scenarios by 24 (0 to 51) per cent by 2025 and 18 (1 to 40) per cent by 2030.[66]

5. Expected aggregate emissions resulting from the implementation of the communicated intended nationally determined contributions in relation to least-cost 2 ℃ scenarios

210. Least-cost 2 ℃ scenarios were taken from the AR5 scenario database.[67] The scenarios that follow a least-cost emission trajectory from 2010 onwards exhibit on average a slight emission increase until 2015 (see figure 9) and many scenarios in that set could be considered as approximating a world in which mitigation action is being enhanced 'today'. A second set of scenarios implies an enhancement of least-cost global mitigation action by 2020, reaching on average even lower emissions by 2030 compared with in the first set of scenarios. Taking both groups of 2 ℃ scenarios together, emissions in 2025 tend to be between the 2000 and 2010 emission levels, namely at 45.4 (43.0 to 48.9) Gt CO_2 eq. By 2030, the emissions under the joint set of scenarios are at 42.5 (36.3 to 43.6) Gt CO_2 eq, close to the emission level in 2000. In comparison, considering only scenarios with an enhancement of global mitigation action by 2020 implies an emission levels in 2030 of 38.1 (30.3 to 45.0) Gt CO_2 eq, which is similar to emissions in 1990.

211. According to the AR5, global cumulative CO_2 emissions after 2011, for a likely chance of keeping global average temperature rise below 2 ℃, should be limited to less than 1,000 Gt CO_2.[68]

212. In general terms, aggregate emissions resulting from the implementation of the communicated INDCs do not fall within the range of least-cost 2 ℃ scenarios, as illustrated in figure 9.

213. The global temperature at the end of this century depends on both emissions up to 2030 and emissions in the post-2030 period. By lowering emissions below those consistent with pre-INDC trajectories, the INDCs contribute to lowering the expected temperature rise until and beyond 2100. However, temperature levels by the end of the century strongly depend on assumptions on socioeconomic drivers, technology development and action undertaken by Parties beyond the time frames stated in their INDCs (e.g. beyond 2025 and 2030).

[66] The provided reductions below reference scenarios, expressed as percentages of the full difference between reference scenarios and least-cost mitigation scenarios, take both the 2 ℃ mitigation scenarios into account that enhance mitigation in 2010 (P1 scenarios) and those that enhance mitigation in 2020 (P2 scenarios), as shown in figure 9. When taking into account only the 2 ℃ mitigation scenarios with an enhancement of global mitigation action by 2020 (P2), the respective percentages are 37 (0 to 78) per cent by 2025 and 18 (1 to 35) per cent by 2030.

[67] Scenarios consistent with limiting global average temperature rise below 2 ℃ above pre-industrial levels were taken from the AR5 scenario database. Scenarios that follow a least-cost emission trajectory from 2010 onwards (so-called P1 scenarios) with a greater than 66 per cent likelihood of temperature rise staying below 2 ℃ correspond to a range of 44.3 (38.2–46.6) Gt CO_2 eq emissions in 2025 and 42.7 (38.3–43.6) Gt CO_2 eq emissions in 2030. Scenarios that follow a least-cost emission trajectory from 2020 onwards (so-called P2 scenarios) with a greater than 66 per cent likelihood of temperature rise staying below 2 ℃ correspond to a range of 49.7 (46.2–51.6) Gt CO_2 eq emissions in 2025 and 38.1 (30.3–45.0) Gt CO_2 eq emissions in 2030. Given the similar emissions of P1 scenarios to current emissions in 2015 (see figure 9), and given the similarity between P1 and P2 scenarios by 2030, this document analyses the joint set of P1 and P2 mitigation scenarios in addition to separate considerations of P1 or P2 only.

[68] This figure relates to a 'likely chance'. For a 50 per cent probability of staying below 2 °C, the AR5 indicates 1,300 Gt CO_2 as the amount of cumulative CO_2 emissions after 2011.

214. If Parties do not enhance mitigation action until 2030, but assume mitigation action after 2030 that still aims at staying below a 2 ℃ temperature increase, scenarios from the AR5 scenario database indicate that this is possible, but only at substantially higher annual reduction rates compared with under the least-cost 2 ℃ scenarios. Thus, it can be concluded that greater reductions in the aggregate global emissions than those presented in the INDCs will be required for the period after 2025 and 2030 to hold the temperature rise below 2 ℃ above pre-industrial levels.

215. Reductions in GHG emissions compared with 2010 emission levels are on average 3.3 (2.8–3.9) per cent per annum for the 2030–2050 period in mitigation scenarios that approximately start from global emission levels resulting from the implementation of the INDCs by 2030. In comparison, under least-cost mitigation scenarios that enhance mitigation action by 2010 or 2020 annual reductions of only 1.6 (0.8–2.0) per cent in comparison with 2010 emission levels will suffice for the 2030–2050 period.

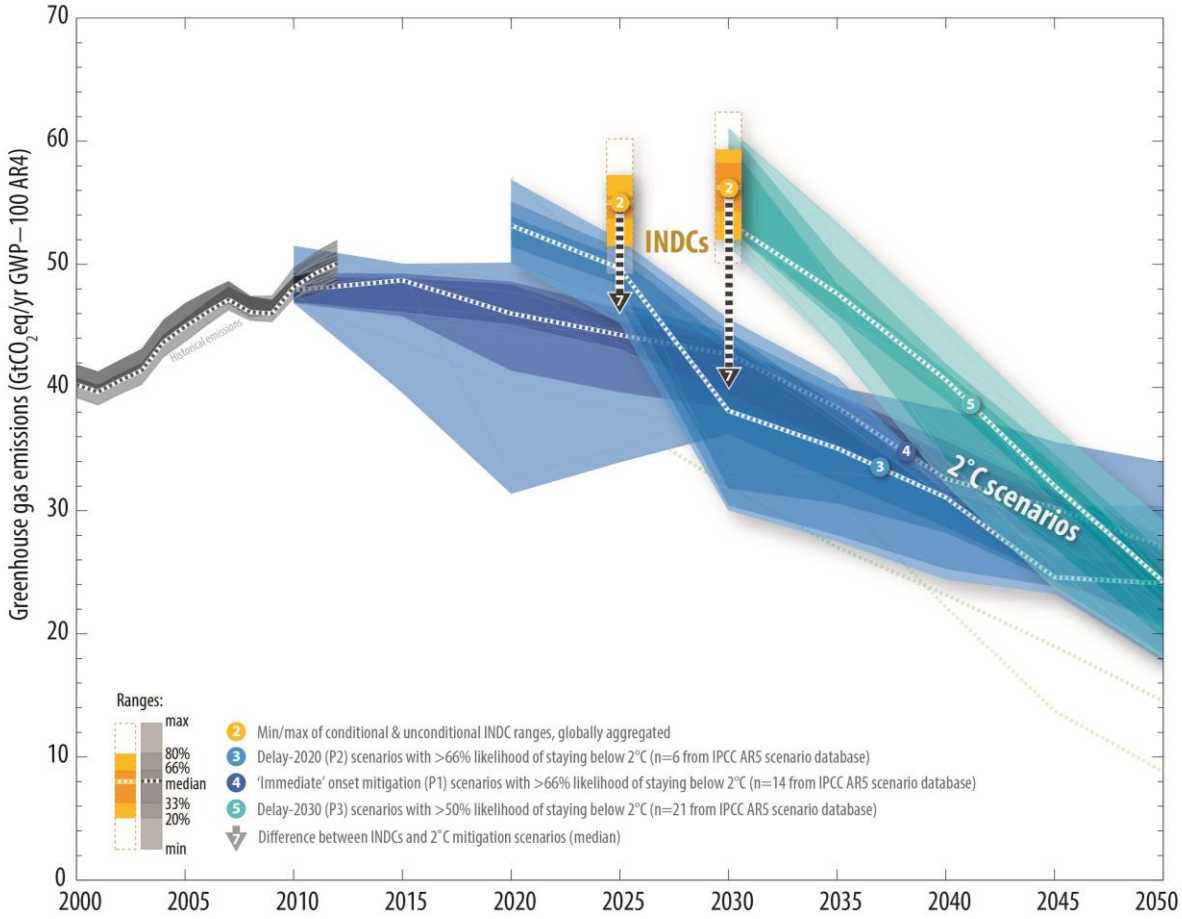
216. The assessment of end-of-century temperatures is possible under 'what-if' cases for the level of emissions beyond 2030. While this document draws a comparison between emission levels expected to result from the implementation of the INDCs in 2025 and 2030 and various IPCC scenarios, the use of climate models to estimate end-of-century temperatures resulting from specific post-2030 assumptions (like constant or linear extensions of emissions or assumed constant climate policies) is considered to be out of its scope.

217. The following discussion is therefore limited to a comparison of the level of global emissions resulting from the implementation of the communicated INDCs in 2025 and 2030 and GHG emission levels for the same years implied under the 2 ℃ scenarios.

218. The discussion provides only a snapshot comparison of the level of emissions in the individual years. Whether or not current efforts are enough to limit the temperature rise to 2 ℃ or whether exceeding the cumulative emission budget corresponding to that limit after 2030 can be compensated by net negative emissions can only be evaluated on the basis of information on action within and beyond the time frame covered by the INDCs, including all countries, gases and sectors as well as efforts to reduce emissions from 2030 onwards.

Figure 9

Estimated global emissions following the implementation of the communicated intended nationally determined contributions by 2025 and 2030 and 2 ℃ scenarios



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Abbreviations: AR4 = Fourth Assessment Report of the Intergovernmental Panel on Climate Change, GWP = global warming potential, INDC = intended nationally determined contribution, IPCC AR5 = Fifth Assessment Report of the Intergovernmental Panel on Climate Change, n = number of scenarios, yr = year.

219. Aggregate GHG emissions resulting from the implementation of the communicated INDCs are expected to be 8.7 (4.5 to 13.3) Gt CO_2 eq (19 per cent, range 9–30 per cent) and 15.2 (10.1 to 21.1) Gt CO_2 eq (36 per cent, range 24–60 per cent) above the level of emissions under the joint set[69] of 2 ℃ scenarios in 2025 and 2030, respectively (see figure 10).[70, 71]

[69] Considering both scenario groups with enhancement of mitigation action in 2010 (so-called P1 scenarios) and 2020 (so-called P2 scenarios), which keep the global mean temperature rise below 2 ℃ with at least a 66 per cent likelihood, as shown in figure 9.

[70] If only the conditional components of the INDCs are aggregated, the resulting aggregate emissions are expected to be 7.8 (4.0 to 12.0) Gt CO_2 eq in 2025 and 13.5 (10.0 to 19.7) Gt CO_2 eq in 2030 above the level of emissions under 2 ℃ scenarios, while considering only the unconditional components of the INDCs increases that difference to 9.5 (5.6 to 13.7) Gt CO_2 eq in 2025 and 15.9 (12.4 to 22.1) Gt CO_2 eq in 2030.

[71] The average (not median) difference in emissions resulting from the implementation of the INDCs above the level of emissions under 2 ℃ scenarios is 9.2 Gt CO_2 eq in 2025 and 16.0 Gt CO_2 eq in

220. The emission differences compared with least-cost trajectories can be read in at least three ways:

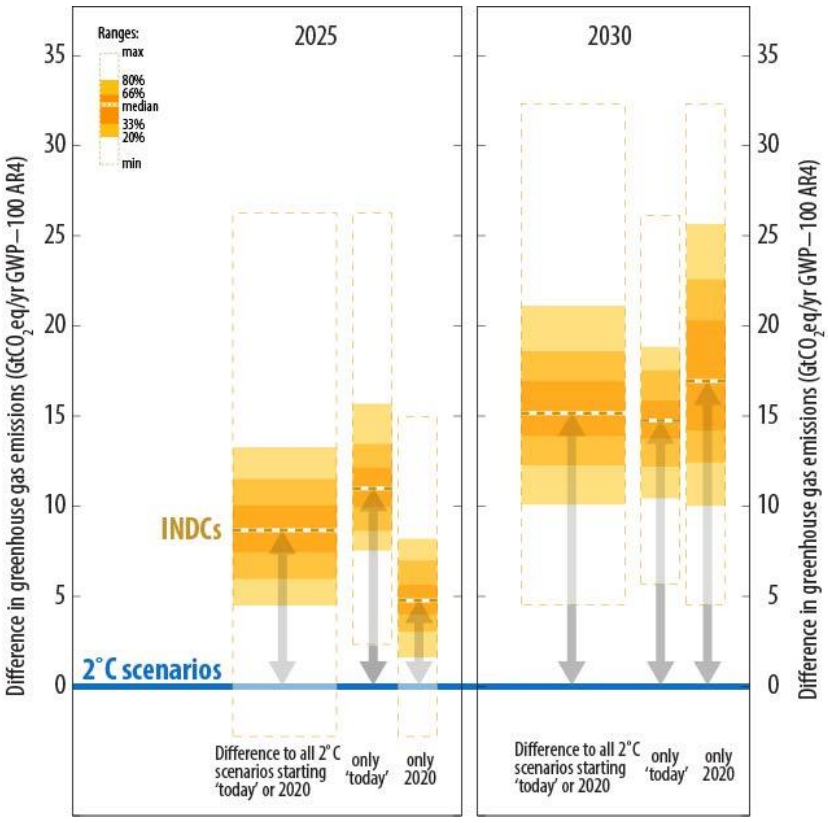
(a) They illustrate a difference that could be filled by either the implementation of enhanced INDCs or additional mitigation effort on top of that currently indicated in the INDCs;

(b) They indicate the additional effort that would have to be mastered after 2025 and 2030, as higher emissions in the near term would have to be offset by lower emissions in the long term in order to achieve the same climate targets with the same likelihood;

(c) They are an illustration of the higher costs that the world might face in the long term, given that least-cost emission trajectories indicate the cost-optimality of increased near-term mitigation action.

Figure 10

Aggregate global emissions due to the implementation of the communicated intended nationally determined contributions compared with emissions under least-cost 2 ℃ scenarios



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Note: This figure is based on a collective set of 7,296 differences resulting from all combinations of 48 considered Intergovernmental Panel on Climate Change 2 ℃ least-cost mitigation scenarios and 152 estimates of the global aggregate emission levels in accordance

2030, compared with the average difference of 9.0 Gt CO_2 eq in 2025 and 16.3 Gt CO_2 eq in 2030 according to the data set that served as the basis for the synthesis report published on 30 October 2015 (FCCC/CP/2015/7).

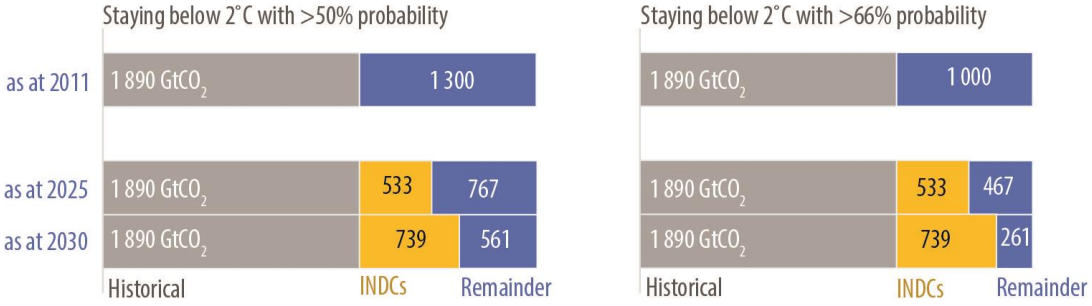
with the communicated intended nationally determined contributions and any related uncertainties or ranges.

Abbreviations: AR4 = Fourth Assessment Report of the Intergovernmental Panel on Climate Change. GWP = global warming potential, INDCs = intended nationally determined contributions, yr = year.

221. Given the fact that GHGs are long-lived in the atmosphere and cumulative emissions therefore determine the impact on the climate system, higher emissions in the early years (compared with least-cost trajectories) would necessitate lower and overall likely more costly reductions later on in order to keep global mean temperature below the same level with the same likelihood. Global cumulative CO_2 emissions resulting from the implementation of the communicated INDCs (see para. 198 above) are expected to reach 53 (51–56) per cent by 2025 and 74 (70–77)) per cent by 2030 of the global total cumulative CO_2 emissions consistent with 2 ℃ scenarios (see para. 210 above).

222. Figure 11 compares cumulative CO_2 emissions expected as a result of the implementation of the INDCs (medians) and cumulative CO_2 emissions in line with keeping the global average temperature rise relative to pre-industrial levels below certain levels. Shown are comparisons for keeping temperatures below 2 ℃ with 66 per cent (middle panel) or 50 per cent (right panel) likelihood. Historical (grey) and consistent future cumulative CO_2 emissions (blue) are taken from the contribution of Working Group I to the AR5.[72] The numbers shown relate to Gt CO_2 emissions after 2011. Whether exceeding the amount of cumulative emissions corresponding to a temperature rise of 2 ℃ can be compensated by net negative emissions beyond 2030 can only be evaluated on the basis of information on action beyond the time frame covered by the INDCs.

Figure 11
Comparison of cumulative CO_2 emissions under different scenarios



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Abbreviation: INDCs = intended nationally determined contributions.

6. Expected aggregate emissions resulting from the implementation of the communicated intended nationally determined contributions in relation to least-cost 1.5 ℃ scenarios

223. The following is a discussion of the aggregate effect of the INDCs in relation to 1.5 ℃ scenarios, as some INDCs provided information related to limiting global average temperature increase to 1.5 ℃ above pre-industrial levels. In addition, Article 2, paragraph 1(a), of the Paris Agreement contains the collective commitment to pursue "efforts to limit the temperature increase to 1.5 ℃ above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change".

[72] See a comparison with other cumulative CO_2 emission amounts in table 2.2 of the AR5 Synthesis Report.

224. Scenarios used in this document are taken from original scientific literature and not from an IPCC database, given that the AR5 database was predominantly compiled from model intercomparison exercises that did not envisage a 1.5 ℃ temperature goal. There are a large number of emission scenarios in the scientific literature of limiting or returning global temperature increase to below 1.5 ℃ by 2100 with at least a 50 per cent likelihood.[73] Unlike 2 ℃ scenarios, there are no scenarios of keeping warming below the 1.5 ℃ goal with at least a 66 per cent likelihood. It should be noted, however, that this discussion should be reviewed in the light of the invitation for the IPCC to provide a special report in 2018 on the impacts of global warming of 1.5 ℃ above pre-industrial levels and related global GHG emission pathways.

225. Under 1.5 ℃ scenarios, faster and deeper emission reductions over the course of the century are required compared with 2 ℃ scenarios. They imply an emission level of 14.2 Gt CO_2 eq (median) in 2050, compared with 25.5 Gt CO_2 eq in 2050 for 2 ℃ scenarios. They also envisage net zero global GHG emissions around 2075 (2070 to 2085) compared with around 2095 (2085 to beyond 2100) for 2 ℃ scenarios.

226. As is the case with 2 ℃ scenarios, this discussion provides only a snapshot comparison of the level of emissions under 1.5 ℃ scenarios in the years 2025 and 2030. Whether or not enhanced efforts until 2030 are enough to limit warming to a 1.5 ℃ temperature rise or whether exceeding the 1.5 ℃ cumulative emission budget can be compensated by net negative emissions after 2030 can only be evaluated on the basis of information on action beyond the time frame covered by the INDCs, including all countries, gases and sectors.

227. In the scenarios used for this document in which the 1.5 ℃ goal is reached by 2100 with at least 50 per cent likelihood, global emission reductions start between 2010 and 2020.[74] The emission levels in 2025 and 2030 under those scenarios are 38.4 (34.5 to 42.7) Gt CO_2 eq and 33.9 (29.6 to 37.3) Gt CO_2 eq, respectively. This is 7.0 and 8.6 Gt CO_2 eq lower in 2025 and 2030, respectively, than the emission levels under corresponding 2 ℃ scenarios.[75] Unlike 2 ℃ scenarios, there are currently no integrated assessment model scenarios in the scientific literature that delay until 2030 the start of global emission reductions that limit the temperature rise to 1.5 ℃ with a 50 per cent likelihood.

228. Aggregate GHG emissions resulting from the implementation of the communicated INDCs are expected to be 16.1 (10.7 to 20.6) Gt CO_2 eq in 2025 and 22.6 (17.8 to 27.5) Gt

[73] Luderer G, Pietzcker RC, Bertram C, Kriegler E, Meinshausen M, Edenhofer O. 2013. Economic mitigation challenges: how further delay closes the door for achieving climate targets. *Environmental Research Letters* 8:034033); Rogelj J, McCollum DL, O'Neill BC and Riahi K. 2013. 2020 emissions levels required to limit warming to below 2 ℃. *Nature Climate Change*. 3(4): pp.405–412; Rogelj J, McCollum DL, Reisinger A, Meinshausen M and Riahi K. 2013. Probabilistic cost estimates for climate change mitigation. *Nature*. 493(7430): pp.79–83; and Rogelj J, Luderer G, Pietzcker RC, Kriegler E, Schaeffer M, Krey V, Riahi K. 2015. Energy system transformations for limiting end-of-century warming to below 1.5 ℃. *Nature Climate Change*. 5(6): pp.519–527; and the online technical annex (see footnote 1).

[74] Consistent with the treatment of 2 ℃ scenarios, the analysis considers both scenario groups with enhancement of mitigation action in 2010 (so-called P1 scenarios) and 2020 (so-called P2 scenarios), which limit the global mean temperature rise to below 1.5 ℃ by 2100 with at least a 50 per cent likelihood.

[75] For P1 scenarios, the emission level in 2030 is 32.0 (29.0 to 36.0) Gt CO_2 eq, which is around 10.7 Gt CO_2 eq lower than the emission level in 2030 under corresponding 2 ℃ scenarios. For P2 scenarios, the 2030 emission level corresponding to 1.5 ℃ is 39.5 (37.4 to 41.2) Gt CO_2 eq, which is approximately the same (1.4 Gt CO_2 eq higher) as the emission level in 2030 under corresponding 2 ℃ scenarios.

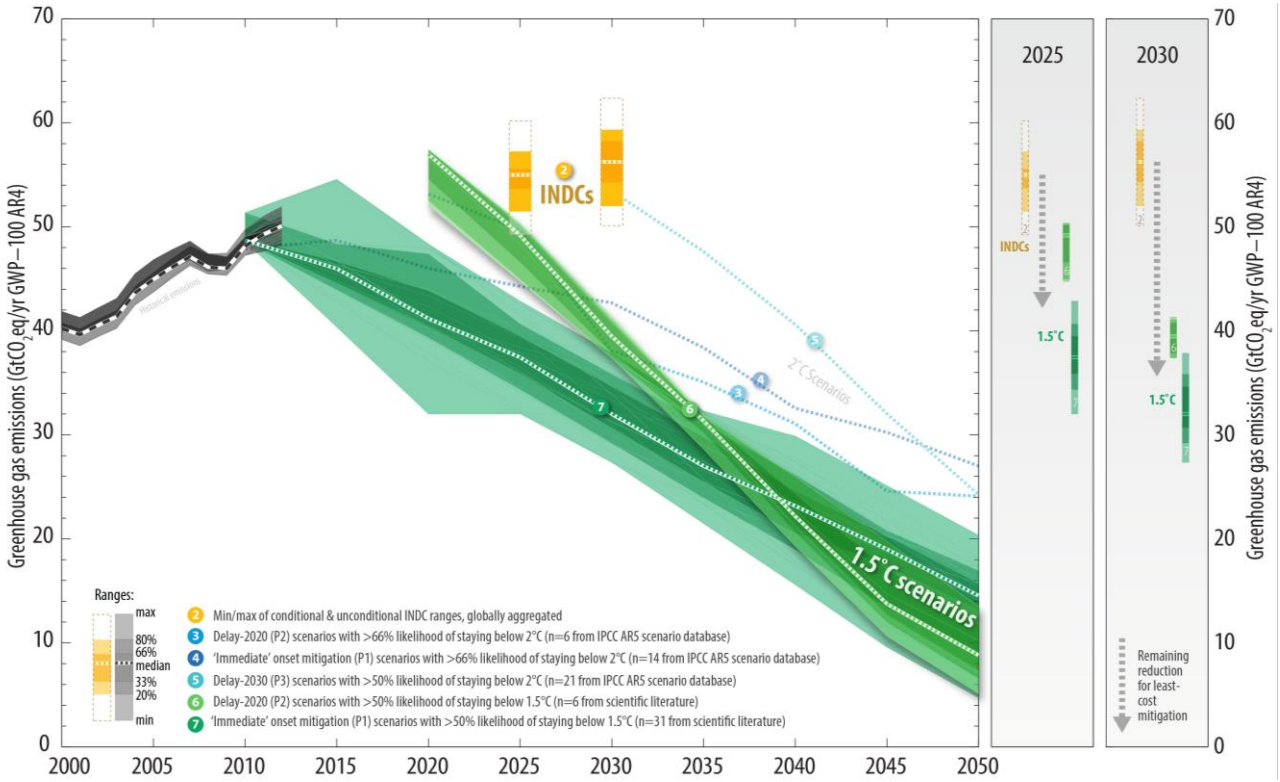
CO_2 eq in 2030 above the level of emissions under the 1.5 ℃ scenarios in which global emission reductions start between 2010 and 2020. This is 7.5 Gt CO_2 eq greater in both 2025 and 2030 than the difference from emissions under comparable 2 ℃ scenarios.[76] For 1.5 ℃ scenarios in which global emission reductions start between 2010 and 2020, the rate of emission reduction in the period 2030–2050 is estimated to be 2.9 (2.3 to 3.9) per cent per annum relative to the 2030 level, or 2.1 (1.5 to 2.6) per cent relative to the 2010 level. This is higher than the rate of emission reduction required in comparable 2 ℃ scenarios. If enhanced global emission reductions are delayed until 2030, the rate of reduction of emissions beyond 2030 required to achieve the 1.5 ℃ goal is likely to exceed that suggested in any available scenarios.

229. When considering only a subset of 1.5 ℃ and 2 ℃ mitigation scenarios, namely those in which global emission reductions start by 2020, initial reduction rates are found to be similar in the considered 1.5 ℃ and 2 ℃ scenarios (3.2 per cent per year in 1.5 ℃ scenarios and 3.0 per cent per year in 2 ℃ scenarios between 2020 and 2030, relative to the 2010 level). Also, emission levels in 2030 under both 1.5 ℃ and 2 ℃ scenarios are very similar (slightly below 40 Gt CO_2 eq). Under the 1.5 ℃ scenarios, however, after 2030 approximately the same reduction rates continue (3.1 per cent per year between 2030 and 2050 relative to the 2010 level), while the 2 ℃ scenarios exhibit lower reduction rates (1.4 per cent per year between 2030 and 2050 relative to the 2010 level) (see figure 12). This comparison might imply that the shorter-term challenges in terms of emission reduction are similar under both 2 ℃ and 1.5 ℃ scenarios in which global emission reductions start by 2020. However, the estimated continuation of necessary stronger reduction rates under 1.5 ℃ scenarios after 2030 might imply different near-term actions and choices related to socioeconomic drivers, technology development and deployment and cooperation by Parties that would allow the future emission reduction rates to be realized.

[76] For P1 scenarios, the gap between the emission levels implied in the INDCs and under 1.5 ℃ scenarios in 2030 is 23.8 (19.6 to 28.1) Gt CO_2 eq, which is 9 Gt CO_2 eq greater than under comparable 2 ℃ scenarios. For P2 scenarios, the gap is 17.1 (13.5 to 20.8) Gt CO_2 eq, which is approximately the same (0.1 Gt CO_2 eq higher) as for comparable 2 ℃ scenarios.

Figure 12

Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the communicated intended nationally determined contributions and 1.5 ℃ scenarios from scientific literature

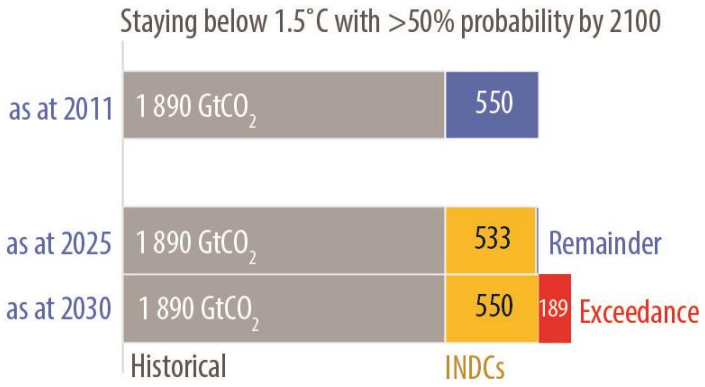


Sources: (1) Quantifications in the communicated intended nationally determined contributions; (2) 2 ℃ scenarios from the Intergovernmental Panel on Climate Change Fifth Assessment Report database; (3) 1.5 ℃ scenarios from scientific literature (i.e. Luderer et al. and Rogelj et al.)

Abbreviations: AR4 = Fourth Assessment Report of the Intergovernmental Panel on Climate Change, GWP = global warming potential, HST = high short-term target, INDCs = intended nationally determined contributions, IPCC AR5 = Fifth Assessment Report of the Intergovernmental Panel on Climate Change, n = number of scenarios, yr = year.

230. Similar to figure 11, figure 13 compares cumulative CO_2 emissions expected under the implementation of the INDCs (medians) and cumulative CO_2 emissions in line with keeping the global average temperature rise below 1.5 ℃. According to the AR5, global cumulative CO_2 emissions after 2011, for a 50 per cent chance of keeping global average temperature rise below 1.5 ℃, should be limited to less than 550 Gt CO_2. According to quantifications in the communicated INDCs of global emission levels in 2030, best-estimate cumulative emissions until 2025 are 533 Gt CO_2 eq and until 2030 are 739 Gt CO_2 eq (medians). This represents 97 (93–101) per cent by 2025 and 134 (128–140) per cent by 2030 of the global total cumulative CO_2 emissions consistent with 1.5 ℃ scenarios.

Figure 13
Cumulative CO_2 emissions consistent with the goal of keeping global average temperature rise below 1.5 ℃



Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation.

Abbreviation: INDCs = intended nationally determined contributions.

231. Global emission levels implied by the communicated INDCs in 2025 and 2030 are higher than the emission levels implied for 2025 and 2030 estimated under the joint set of least-cost 1.5 ℃ scenarios assessed in this document. Estimated cumulative CO_2 emissions considering the implementation of the communicated INDCs are expected to reach the amount of cumulative emissions estimated to be consistent with 1.5 ℃ scenarios by around 2025 and are further estimated to exceed it by 2030. When preparing this document, no scenarios were available in the scientific literature of limiting or returning global average temperature rise to below 1.5 ℃ by 2100 considering global emission levels in 2030 resulting from the implementation of the INDCs. It should be noted, however, that this statement should be reviewed in the light of the invitation to the IPCC to provide a special report in 2018 on the impacts of global warming of 1.5 ℃ above pre-industrial levels and related global GHG emission pathways.[77]

7. Opportunities for the medium and longer terms emerging from the intended nationally determined contributions

232. As already noted, the time frame for action indicated by Parties in their INDCs is up to either 2025 or 2030, with some Parties providing longer-term targets for low-emission development until and beyond 2050. The following is a general discussion of the effect of the implementation of the communicated INDCs beyond 2030. It does not intend to draw conclusions on possible temperature scenarios but rather reflects on trends emerging from the aggregation of the communicated INDCs that could provide opportunities for increased ambition.

233. The extent to which efforts to reduce emissions will be sufficient to limit the global average temperature rise to less than 2 ℃ or 1.5 ℃ above pre-industrial levels strongly depends on the long-term changes in the key economic drivers that will be modified by the

[77] The results are influenced by the number of available scenarios from different modelling groups and the share of scenarios within the P1 and P2 categories in the case of statistics on the P1–P2 joint group and are a representation of the current availability of scenarios, which will change as more 1.5 ℃ and 2 ℃ scenarios become available in the scientific literature.

implementation of the INDCs already and subsequently communicated, as well as on the determination of Parties to increase their level of ambition before and after 2030.

Participation

234. **The INDCs indicate a significant increase in the number of countries taking climate action, which is often of national character and covers multiple GHGs.** Parties responded actively to the invitation from the COP for them to communicate their INDCs. At the time of the adoption of the Cancun Agreements (decision 1/CP.16), 108 Parties submitted their quantified economy-wide emission reduction targets and nationally appropriate mitigation actions. In comparison, by 4 April 2016, 189 Parties had submitted their INDCs.

235. A large number of Parties communicated INDCs that are national in scope, using a variety of ways to express them. Of particular importance is the increase in the number of Parties that have moved from project-, programme- or sector-based actions towards economy-wide policies and objectives. Whereas in the pre-2020 period a total of 61 Parties presented absolute, BAU, intensity or peaking year based quantified targets, in their INDCs 155 Parties communicated such targets.

236. Most Parties provided information to facilitate the clarity, transparency and understanding of their INDCs, with many following the guidance contained in decision 1/CP.20, paragraph 14. This enabled many Parties to be explicit on the technical aspects of their contributions, such as scope, coverage, assumptions and methodologies. While there are gaps and issues of consistency and data quality, this information provided a basis for the evaluation contained in this document and constitutes a significant improvement compared with the sharing of information on the pre-2020 period, which occurred in many cases informally through the work programmes under the subsidiary bodies.

237. The high level of response of Parties as well as the presence of information communicated as part of the INDCs point towards an increase in national capacity to plan, develop and communicate mitigation actions in the form of targets, strategies and plans. The identified areas where data quality, transparency and completeness could be further improved indicate, however, that further efforts are needed to increase the capacity of many countries, including through enhanced cooperation, support and/or an enabling institutional environment.

Policies and institutions

238. **The INDCs show an increasing trend for introducing national policies and related instruments for low-emission and climate-resilient development.** One key driver for understanding the aggregate effect of the implementation of the INDCs in the longer term is the induced institutional, legislative and policy change at the national level. All Parties that communicated INDCs have already taken steps to develop a strong basis at the domestic level for the implementation of their INDCs and are planning on building on those efforts going forward.

239. The information communicated by Parties related to planning processes (see chapter II.D.6 above) shows that a large number of the INDCs were prepared by Parties on the basis of existing institutions, policies and legislative frameworks, with many being already backed up by national law. This information also suggests the need for strengthening and further developing national institutional arrangements, legislation, policies and measures for addressing climate change in the future.

240. In their INDCs, several Parties communicated that their preparation and finalization were underpinned by a number of national consultation and interdisciplinary coordination processes, many of which were established solely for the INDC preparation process. Such stakeholder engagement processes generally aim at fostering the understanding of the

INDCs on a political and societal level in order to ensure alignment with development objectives and enhance broad support across relevant stakeholder groups.

241. Information provided by Parties highlights the increasing prominence of climate change on national political agendas, where related action is mainstreamed in national and sectoral development priorities. At the same time, several Parties have made efforts to ensure that the private sector, civil society and other non-governmental actors recognize the importance of, and provide support for, national action to combat climate change.

242. National political and institutional processes have been partly influenced by the invitation for Parties to communicate their INDCs. While INDCs may have served as a catalyst for the consolidation and enhancement of climate-related policies in a few countries, in many it has represented an incentive to initiate them. In general, it can be argued that the realities of policy development and social acceptance related to the preparation of the INDCs provide the grounds for increased action in the future.

Cooperation and support

243. **The INDCs show the increasing interest of Parties in cooperating to achieve climate change goals and raise ambition in the future.** Several Parties referred to the enhanced cooperation required for the implementation of their INDCs, as well as it being an important driver of future ambition. They also referred to the need for enhanced cooperation to enable Parties to enhance domestic actions related to climate change and to address related challenges collectively in the future. Several countries may have to overcome a range of economic, technological and capacity-related barriers to achieve the objectives of their INDCs.

244. Some Parties indicated the general role of cooperation related to financial, technology transfer and capacity-building support for implementing domestic measures to achieve the objectives of their INDCs, while other Parties referred to specific areas, including sustainable energy, low-carbon agriculture, biofuels, forest monitoring systems, restoration and reforestation activities and sustainable transport.

245. The information communicated by Parties in their INDCs indicates a move towards enhanced international cooperation, including South–South cooperation, in order to drive the implementation of the INDCs as well as to raise the ambition of future action. Cooperation and partnerships are increasingly taking place among various stakeholders, including subnational governmental organizations, private-sector organizations, research centres, academia, technology funds and financing institutions.

246. Parties indicated in their INDCs the role that the bodies and arrangements under the Convention could play in fostering cooperation and support, including the Technology Mechanism, the Financial Mechanism, the Climate Technology Centre and Network, the GEF and the GCF.

National circumstances and ambition

247. **All Parties have raised the ambition of their climate action in relation to efforts communicated for the pre-2020 period.** Many Parties referred to the goal of limiting global average temperature rise below 2 ℃ or 1.5 ℃ above pre-industrial levels as a benchmark for national and aggregate ambition. They stressed the clarity provided by this goal to guide national and international efforts. Many Parties expressed their determination to achieve the goal and acknowledged that this would only be possible through collective efforts, including enhanced cooperation.

248. As previously noted, while significant progress has been made with regard to the pre-2020 period, global aggregate emission levels in 2025 and 2030 resulting from the implementation of the communicated INDCs do not fall within the scope of 2 ℃ or 1.5 ℃

scenarios. It has also already been stressed that the extent to which efforts to reduce emissions linked to the INDCs are sufficient to meet the temperature goal strongly depends on the long-term changes in the key economic drivers that will be induced by the implementation of the communicated INDCs, as well as on the determination of Parties to increase their level of ambition before and after 2030.

249. While it is beyond the scope of this document to discuss efforts beyond 2025 and 2030 and changes and factors mentioned in paragraph 228 above, the communicated INDCs signal the increasing determination of Parties to take action to reduce emissions and increase the resilience of their economies. National determination has enabled Parties to shape their efforts in line with their circumstances, with many already recognizing and realizing related socioeconomic co-benefits. Yet the need for sustained and longer-term action requires not only maintaining those trends after 2025 or 2030 but also some degree of acceleration and scaling up.

250. As noted in paragraph 163 above, most Parties provided information on how they consider their INDCs to be fair and ambitious and how they contribute towards achieving the objective of the Convention. The information contained in the communicated INDCs suggests that there is strong recognition among Parties of the need for enhanced global action in the context of the objective of the Convention to address climate change and the commitment to doing so through a multilateral response with all countries contributing their fair share. The understanding of what is considered fair and ambitious, however, varies depending on the particular national circumstances (see chapter II.D.7 above).

251. Related narratives convey the vision that each country has of its own efforts. Such information could potentially lead to a higher degree of understanding of how national circumstances and other factors determine the efforts of each country. At the same time, the narratives reveal the need to balance a wide variety of national circumstances with the information provided by science on the efforts required to keep global average temperature rise below any given level. This question should be addressed as Parties prepare further efforts beyond current time frames in the context of the Paris Agreement.

F. Adaptation component of the communicated intended nationally determined contributions

1. Background information

252. By 2 April 2016, 137 Parties, including 46 LDC Parties, had included an adaptation component in their INDCs. The secretariat received adaptation components from 54 African States, 42 Asia-Pacific States, 30 Latin American and Caribbean States, 7 Eastern European States and 2 Western European and other States. Some of them indicated that adaptation is their main priority in addressing climate change.

253. This chapter provides a concise overview of the adaptation component of the INDCs communicated by Parties in accordance with decision 1/CP.20, paragraph 12. It focuses on the elements of the adaptation component that featured in most INDCs:

(a) National circumstances informing the adaptation component;

(b) Long-term goals and/or vision guiding the adaptation component;

(c) Impact and vulnerability assessments;

(d) Legal and regulatory frameworks, strategies, programmes and plans that provide the basis for, or have informed, adaptation actions;

(e) Measures or actions planned or under implementation for different time frames, in particular for the shorter (2015–2020) and longer (2020–2030) terms;

(f) Costs, losses and/or damage due to climate impacts;

(g) Means of implementation;

(h) Monitoring and evaluation;

(i) Synergies between adaptation and mitigation.

254. The secretariat has synthesized the information submitted by Parties on each element with a focus on areas of information communicated by a critical mass of Parties. Additional examples and specific aspects of the adaptation component are highlighted throughout. For each information element, a number of emerging trends have been identified. It was not possible at this point to evaluate the aggregate effect of the adaptation components given the methodological uncertainties associated with such an evaluation.

2. Synthesis of the information communicated by Parties in the adaptation component of their intended nationally determined contributions

National circumstances informing the adaptation component

255. Most Parties provided information on their national circumstances, in particular on aspects that are particularly important for the adaptation component, including geography, population, political context and economic indicators. A few Parties stated that their INDC is subject to revision, taking into account future changes in their national circumstances.

256. Several Parties described their overall geographical characteristics, including the overall location and geography of the country as well as geographical factors that increase vulnerability, such as low elevation, small land area, insularity, landlocked nature and geographical discontinuity. In addition, Parties referred to key climatic zones, length of coastline, deserts, mountain chains and levels of forest coverage and biodiversity. Descriptions of the overall climate of the country were included in some INDCs, with references to indicators such as mean temperature, mean precipitation, arid- or semi-arid character and level of climate variability. Some Parties provided more specific parameters, such as estimated amount of land available for agriculture and/or livestock, overall land quality, estimated amount of available groundwater, proportion of protected land and rate of deforestation. One Party highlighted that the country's wide ranging climate creates a wide range of climate risks. Specific environmental developments were highlighted, including the disappearance of major water bodies, high deforestation rate and the rapid spread of desertification in past decades.

257. Some Parties described their population dynamics and considered how they relate to climate change and adaptation, referring to, for example, high population density or growth, high proportion of youth in the population and the need to adapt under the assumption that the population is likely to be significantly higher in 2030, as well as the proportion of the population living in rural and urban areas. In this context, a number of Parties reflected on how their national demographic realities create conditions for additional vulnerabilities. Others highlighted the challenges associated with concentrations of population or infrastructure in vulnerable areas such as low-lying coasts.

258. Most Parties described their overall economic situation and associated development challenges, with many using key economic parameters such as GDP, GDP growth and the Gini coefficient or their position in the Human Development Index to indicate their overall development status. They described their main national economic activities as well as the number of people engaged in those activities. Some drew attention to the multiple challenges of pursuing economic development and undertaking climate action under the limitations posed by their economic situation. Such limitations include dependence on climate-sensitive sectors such as agriculture and tourism. Dependence on exports of hydrocarbons or other resources or dependence on imported fuels, all of which create

exposure to fluctuations in global energy prices and demand, were referred to by a few Parties. Others referred to economic weaknesses due to, for example, the narrow focus of their economy, dependence on international aid or the location of economic activity and/or infrastructure in vulnerable areas. In addition, a few Parties drew attention to overall economic limitations created by economic sanctions, embargoes and restrictive trade regimes. One Party highlighted that the illegal export of charcoal from the country drives deforestation and land degradation and damages its pastoral economy.

259. In addition, Parties drew attention to various specific development indicators, including the proportion of people employed in vulnerable sectors, the proportion of people with access to electricity, sanitation, drinking water and basic services and health care, the number of people living in poverty or with lack of food security and the proportion of infants suffering malnutrition. Poor infrastructure and institutional capacity were highlighted as limiting factors.

260. Some Parties drew attention to successes and improvements in their development. A few highlighted that they have improved their development parameters, including lower infant mortality and unemployment, or have achieved, for example, the United Nations Millennium Development Goals.

261. Political stability was highlighted by some Parties. While a few Parties emphasized that they have recently stabilized a political crisis and are now focusing on development, others highlighted the priority of stabilizing an ongoing conflict, ensuring national security and territorial integrity, and providing humanitarian assistance to people in view of regional conflicts and/or the additional pressures brought on by absorbing large numbers of refugees. One Party highlighted that civil conflict has interrupted many development projects in the country.

262. Finally, Parties highlighted some key development setbacks, such as the Ebola outbreak in West Africa and major hurricanes in the Caribbean, illustrating how development gains can be fragile in the light of climate change impacts.

Long-term goals and/or vision guiding the adaptation component

263. Most Parties defined a long-term goal or vision to guide the adaptation component of their INDC. Their long-term goals or visions are aspirational, qualitative, quantitative or a combination of the three. Some goals and visions are enshrined in the constitution of a Party, while others are contained in national laws, strategies and plans.

264. Several goals and visions are climate-specific, but all of them are closely intertwined with development objectives such as poverty eradication, economic development or improvement of living standards, environmental sustainability, security and human rights. A few Parties referred to the United Nations Millennium Development Goals and subsequent Sustainable Development Goals in defining their national goals.

265. Some Parties articulated their vision in climate- or adaptation-specific terms, for example as the objective of mainstreaming adaptation into development or into planning for critical sectors. In sharing their long-term goals or visions, Parties emphasized specific elements, such as the need to reduce losses, the participation of all segments or sectors of the population and the consideration of related issues, such as the welfare of women, children, the elderly, people with disabilities and environmental refugees.

266. Others expressed their vision in broader and non-climate or adaptation-specific terms, such as a commitment to safeguarding security, territory and population, human rights and/or nature and biodiversity, as well as advancing development goals in the light of projected climate impacts. Several Parties, in particular the LDCs, mentioned that they aspire to become an emerging country with a middle-income economy by 2030. Others referred to their aspiration to diversify their economy. Another example of a broader

approach was the aim to create, by 2050, a prosperous, strong, democratic, culturally developed and harmonious modern socialist society.

267. A few Parties aligned their vision for adaptation with the goal of holding the increase in global average temperature below 2 ℃ or 1.5 ℃ above pre-industrial levels. One Party mentioned that its goal is to focus on initiatives necessary to ensure the achievement of mitigation targets. Another Party is seeking, among other things, to enhance collaboration at the national, regional and global levels.

268. References to Mother Earth, adaptation as a matter of survival and a nation suffering from the adverse impacts of climate change were included in the national visions and goals.

269. Most of the adaptation components indicated a time frame for the national long-term goals and/or vision, while others provided the year by which they/it will be achieved. In many cases, it is by 2030.

Impact and vulnerability assessments

270. Most Parties reflected on key impacts and vulnerabilities in their adaptation components. Depending on their national circumstances, Parties did this through different types of information, mainly on: (1) observed and projected changes and impacts, including high-risk impacts; and (2) the most vulnerable sectors and geographical and population segments of the country. In describing their vulnerabilities, Parties drew attention to their ongoing vulnerability studies, provided estimates of past socioeconomic costs and losses due to extreme weather events, and referred to links and interconnections between climate risks and non-climatic factors, such as food insecurity and rapid urbanization. Table 1 presents the main elements of impact and vulnerability assessments communicated by Parties, accompanied by some examples.

Table 1
Main elements of impact and vulnerability assessments communicated by Parties in the adaptation component of their intended nationally determined contributions

Main element	*National examples*
General description of non-climatic vulnerabilities	– Post-conflict fragility of the State – Poverty and low-skilled human resources – High prevalence of HIV/AIDS in adult population – Host country to displaced persons
Observed changes	– Average temperature increase of 0.26 °C per decade in 1951–2012 – Annual sea level rise of 1.43 mm – Loss of 50% of glacier surface
Projected changes	– National average temperature increase of 2.4–3.2 °C by 2080 – Sea level rise of 0.81 m by 2100 – Rainfall reduction of 30–50% by 2090
Vulnerable sectors	– Water: groundwater levels sinking by 2–7 m per year and possibly depleted by 2035–2050 – Agriculture: production could fall by 15–19% by 2050 – Health: risk of outbreaks
Vulnerable zones	– Arid- and semi-arid zones – Low-lying coastal areas and small islands – Mountains – River deltas

Main element	*National examples*
Vulnerable populations	– Rural populations – Poorest segments of society – Women, youth, the elderly and the disabled
Types of impact	– 52% increase in flood occurrence – Sea level rise of 1 m threatens 67% of sea ports, 50% of airports, 10% of tourism properties and 1% of major roads – Drought projected to affect 27% of country by 2030 – 12 out of 75 districts at risk of glacial lake outburst floods
Socioeconomic consequences of impacts	– Collapse of the productive apparatus of the country – Conflicts between pastoralist groups due to water scarcity – Cultural heritage at risk
Estimated costs of impacts	– Annual cost of extreme events in 2000–2012: USD 1.4 billion – Loss of gross domestic product due to drought and floods: 3% – Loss of 20 years of investment in road and water infrastructure at cost of USD 3.8 billion (equivalent of 70% of gross domestic product per year) due to one extreme event
Ongoing assessments	– Vulnerability study for 2012–2100 in seven key sectors – Development of tools for assessing vulnerability and risk (vulnerability mapping/adaptation information systems) – Estimation of costs of adaptation as well as support needs

271. In terms of observed changes, many Parties reported on the temperature increase in their territories, ranging from around 0.5 to 1.8 ℃ since the 1960s. Others referred to the rate of change per annum or per decade. Some Parties referred to observed sea level rise, ranging from 10 to 30 cm in the past 100 years or 1.4 to 3 mm per annum. One Party highlighted the global increase of 1.7 mm per annum in the period 1901–2010, while another Party stated that its coastline has moved by 1.2 m per year due to sea level rise of 1.43 mm per annum.

272. Other observed changes highlighted by many Parties include: increased extreme weather, in particular floods and drought; changes, mostly negative, in rainfall patterns; and increased water scarcity. For instance, one Party reported that water availability per capita is now three times lower than in 1960, while another Party highlighted that annual maximum rainfall intensity in one hour increased from 80 mm in 1980 to 107 mm in 2012. One Party reported that some of the islands in its territory have disappeared under water, while another one highlighted the near-disappearance of Lake Chad.

273. Future projections were made for similar indicators. Parties drew on a variety of models and scenarios to estimate changes. Estimates of temperature increase are generally in the area of 1–2 ℃ by 2050 and 1–4.5 ℃ by 2100, depending on scenarios, baselines and regional differences. However, some estimates of national long-term temperature increase range as high as 5.8 and 7 ℃ by 2100.

274. Estimates of sea level rise range from 60 to 70 cm under a 2 ℃ scenario, as well as 0.81 m by 2100, depending on location and temperature scenarios. In terms of precipitation, projections include lower or more extreme seasonal precipitation. Some Parties highlighted regional and seasonal differences, with one Party projecting that rainfall will decrease in its

main agricultural regions in the spring, which is the main agricultural production season in the country.

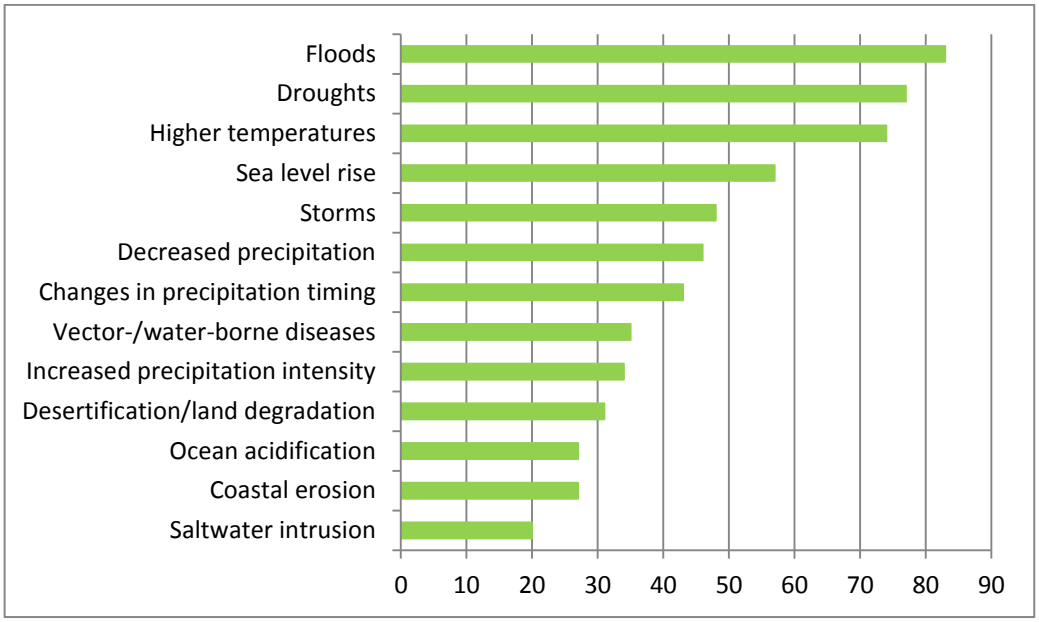
275. Most of the adaptation components contain a description of the key climate hazards faced by the countries. The three main sources of concern identified by Parties are flooding, droughts and higher temperatures. Many Parties highlighted extreme weather in its different forms such as stronger wind and rain, cyclones, typhoons, hurricanes, sea surges, sandstorms and heatwaves. Parties also referred to slow onset impacts, such as ocean acidification and coral bleaching, saltwater intrusion and changes in ocean circulation patterns. Desertification, erosion, landslides, vector-borne disease, as well as the high risk of glacial lake outburst floods, in particular in the Himalayan region, were mentioned. Key climate hazards identified by Parties are reflected in figure 14.

276. The vulnerable sectors most referred to by Parties are: water, agriculture, biodiversity and health. Forestry, energy, tourism, infrastructure and human settlements were also identified as vulnerable by a number of Parties, and wildlife was mentioned by at least three.

Figure 14

Key climate hazards identified in the adaptation component of the communicated intended nationally determined contributions

(number of Parties referring to a hazard)



277. In terms of vulnerable geographical zones, arid or semi-arid lands, coastal areas, river deltas, watersheds, atolls and other low-lying territories, isolated territories and mountain ranges were identified in the adaptation components, and some Parties identified specific regions of their countries that are most vulnerable. Two Parties indicated that they are at risk of losing significant amounts (ranging from 12 to 70 per cent) of economically important land in river deltas due to sea level rise.

278. Vulnerable communities were identified as being mostly composed of rural populations, in particular smallholders, women, youth and the elderly. Several Parties provided quantitative estimates of vulnerable people or communities, sometimes using specific indicators: one Party identified 319 municipalities as highly vulnerable; another Party categorized 72 of its 75 districts as highly vulnerable and identified specific risks for

each; one Party considered 115 of its 272 municipalities vulnerable; while another Party stated that 42 million people might be affected by sea level rise due to its long coastline.

279. In addition to climate impacts, Parties referred to the social, economic and political consequences of those climate change impacts. Many referred to the risk of fluctuations in food prices and other related risks, such as declining productivity of coral reef systems or reduced crops or fishing, as well as to water security challenges due to scarcity or contamination. For example, one Party stated that the flow of the Nile is projected to decrease by 20–30 per cent in the next 40 years, creating strong water supply concerns. Others are concerned about the loss of pastoral land and some fear that changes in precipitation and the growing season may disrupt their agricultural calendars. Others drew attention to specific threats to infrastructure and property. In this context, a few Parties referred to elements of social justice, highlighting that high-risk areas are often populated by the poorest and most marginalized segments of the population. A few Parties are recovering from conflicts and indicated that climate change poses an additional burden on their fragile state. Two Parties highlighted that water scarcity has triggered conflicts between nomadic peoples or pastoral communities.

280. In describing their vulnerabilities, a few Parties referred to their rank in the Human Development Index or in climate change vulnerability indices.

281. Transboundary aspects were mentioned, with Parties explaining how some national vulnerabilities have regional and even global effects. For instance, one Party explained that it is the home of four major rivers of West Africa, which are threatened by the impacts of climate change, and that its geographical situation could make it a shelter for neighbouring countries, in particular nomadic pastoralists, increasing the pressure on river basins already affected by drought and changing rainfall patterns. Two major food exporters reported on their contribution to global food security and the global risk induced by the vulnerability of their agriculture and livestock sectors.

282. Some Parties drew attention to ongoing vulnerability assessments. Parties are engaging in various types of activity, for example: developing guidance and tools to support the assessment of vulnerability and risk at the national level for a comprehensive and quantitative analysis of impacts; mapping regional vulnerabilities; developing an adaptation information system; and identifying vulnerabilities in key sectors (e.g. one Party is identifying vulnerabilities for 2021–2100 in seven key sectors with the aim of defining an adaptation action plan). In addition, a few Parties shared their intention to regularly update their climate vulnerability assessments on the basis of new climate information, while a few highlighted their limited capacity to undertake vulnerability assessments.

283. Some of the adaptation components provide assessments of the costs, losses and/or damage incurred either over a given period or due to a specific extreme event, mostly drought, floods or storms. Some Parties highlighted the overall costs of adaptation nationally, which were expressed mostly in financial terms. For example, one Party suffered losses of USD 48 million per annum in the period 1980–1999 and USD 1.4 billion per annum in the period 2000–2012, while another one referred to total losses of USD 6 billion due to extreme events in the period 2010–2011. A devastating hurricane in August 2015 was reported to have led to losses and damage amounting to USD 392.3 million for one Party.

284. Past costs, losses and/or damage due to climate impacts were also expressed by a few Parties as a percentage of their GDP. For example, one Party stated that floods and drought have caused economic losses worth an estimated 3 per cent of GDP; another indicated a loss of 35 per cent of GDP in 2010–2014; and another Party highlighted the loss of 8 per cent of its GDP and 48 per cent of the total value of health, housing and education due to a single hurricane. A few Parties indicated their spending on adaptation as a

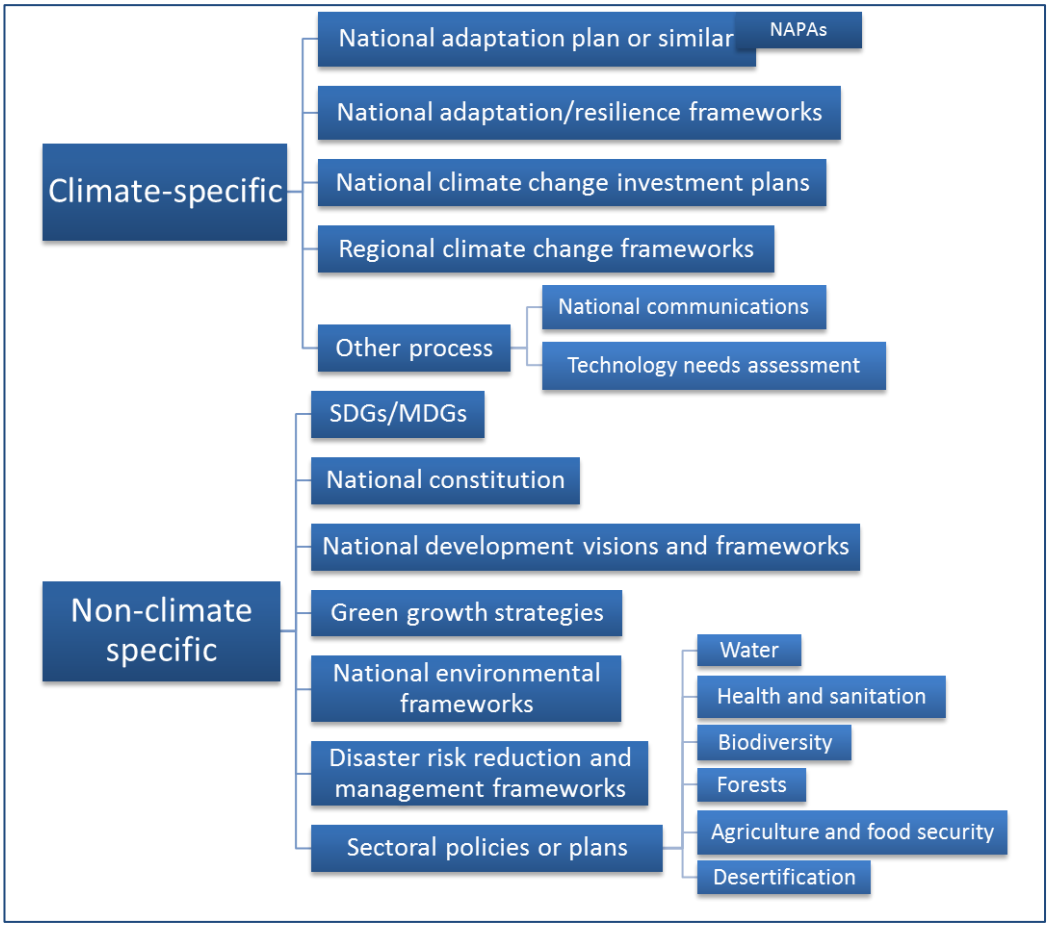
proportion of their national budget, ranging from 4.4 to 9.0 per cent. One Party estimated that that proportion could increase to 15 per cent in the future.

285. In addition, Parties expressed such costs, losses and/or damage in non-financial terms, in particular by providing information on the number of lives lost or people displaced by extreme events. One Party stated that 40,000 people were killed or displaced by floods and droughts in 2014, while another Party highlighted that 40 per cent of its population was affected by extreme events in the period 1982–2014. Other non-financial indicators include the size of areas flooded, number of houses destroyed, decrease in crop yield, drop in industrial production and number of roads affected.

Legal and regulatory frameworks, strategies, programmes and plans that provide the basis for, or have informed, adaptation actions

286. In their INDCs, Parties demonstrated that they have or are establishing national adaptation planning and implementation processes to enhance the impacts of their adaptation actions (for an overview, see figure 15). Coordination mechanisms were highlighted, some of which have been established at the highest political level with a legal mandate.

Figure 15
Frameworks informing the adaptation component of the communicated intended nationally determined contributions



Abbreviations: MDGs = United Nations Millennium Development Goals, NAPAs = national adaptation programmes of action, SDGs = Sustainable Development Goals.

287. Most Parties have committed to further advancing the implementation of their existing frameworks, strategies, programmes and plans in the future and to developing new ones, when deemed necessary, and have described those that guide their current and future work on adaptation, including in the context of implementing the adaptation component of their INDC. Various strategies, programmes and plans were presented, some of which are specific to climate change, some are specific to sectors of the economy and others are economy-wide. Despite the various frameworks and instruments used to enhance the enabling environment for addressing adaptation, the information communicated demonstrates the efforts of Parties to address adaptation in a coherent and programmatic manner.

288. There are references to instruments established under the Convention. For instance, many LDCs expressed their willingness to build upon the momentum created by the preparation and implementation of their national adaptation programmes of action to continue enhancing their adaptation actions, in particular as they embark on the process to formulate and implement NAPs.

289. In fact, several Parties, including the LDCs and non-LDC developing countries, indicated that they are conducting the process to formulate and implement NAPs and that they are developing a NAP to be ready by 2020 or sooner. Thus far, progress in the process to formulate and implement NAPs includes the development of road maps for some and the formulation of the NAP itself for a few others. One Party that is currently formulating its NAP already plans for it to be updated in 2021.

290. In addition, some Parties have embarked on adaptation planning and implementation processes that encompass many features of the NAP process. Some Parties mentioned having developed national or sectoral plans or national programmes that define their adaptation priorities. In addition, many Parties have integrated climate change adaptation into either their national plans and policies or some of their sectoral plans. Other Parties are in the process of doing so. For instance, one Party described how planning processes are undertaken at the subnational level by mandating decision makers to identify vulnerabilities and to define adaptation plans for their regions. Also, Parties reported on the opportunity to align national adaptation strategies with regional adaptation strategies and action plans.

291. Other instruments that were reported as contributing to the strengthening of the enabling environment for adaptation action in the medium and long terms include a national climate change communication strategy and seeking synergies with other environmental agreements.

292. The consideration of gender issues is seen by many Parties as imperative in establishing an enabling environment for adaptation. For example, one Party has established a climate change gender action plan.

Measures and actions, planned or under implementation

293. The frameworks described in paragraphs 286–292 above provide a basis for identifying and prioritizing adaptation measures and actions, which constitute the main element of the adaptation components communicated by Parties. The most common time-horizons defined for implementing the reported measures and actions are 2015–2020 and 2020–2030, but some Parties also provided information on their past and current initiatives. Most Parties derived the measures or actions presented in their adaptation component from their existing national strategies, plans or programmes, such as their national adaptation programmes of action, which were cited by many LDCs.

294. While all adaptation measures and actions identified contribute to the implementation of the national vision and goals, the decision to prioritize some of them was based on criteria such as: timing or urgency; efficacy; co-benefits, in particular poverty

reduction, sustainable development and mitigation; social inclusiveness; technological feasibility; and cost, including economic costs and benefits.

295. According to the adaptation components received, a lot of work has already been undertaken in addressing adaptation and the implementation of measures or actions is already happening in many countries. As such, Parties expressed their willingness to strengthen or upscale their existing efforts.

296. Most of the adaptation components identify priority areas or sectors and a set of associated specific actions. Several Parties reported measures of a cross-cutting nature. In addition, a few reported that they will take an integrated approach in implementing part or all of their adaptation measures and actions. For example, one Party intends to address adaptation by looking at the nexus of water, agriculture, energy and society. In some cases, quantitative targets and goals were included as part of the description of the actions and measures (see table 2).

Table 2
Examples of quantitative targets and goals included in the adaptation component of the communicated intended nationally determined contributions

Sector/area	*National examples*
Water	– Ensure full access to drinking water by 2025 – Increase water storage capacity from 596 m^3 to 3,997 m^3 in 2015–2030 – Increase desalination capacity by 50% from 2015 by 2025
Agriculture	– Convert 1 million ha grain fields to fruit plantations to protect against erosion – Increase the amount of irrigated land to 3.14 million ha – Reduce post-harvest crop losses to 1% through treatment and storage
Ecosystems and biodiversity	– Protect 20% of marine environments by 2020 – Regenerate 40% of degraded forests and rangelands – Establish 150,000 ha marine protected areas
Forestry	– Increase forest coverage to 20% by 2025 – Maintain 27% forest coverage – Achieve 0% deforestation rate by 2030
Disaster risk reduction	– Ensure that all buildings are prepared for extreme events by 2030 – Reduce the number of the most vulnerable municipalities by at least 50% – Relocate 30,000 households
Energy	– Ensure that hydropower generation remains at the same level regardless of climate change impacts – Increase the proportion of renewable energy to 79–81% by 2030
Other	– Ensure that 100% of national territory is covered by climate change adaptation plans by 2030 – Reduce moderate poverty to 13.4% by 2030 and eradicate extreme poverty by 2025

297. In addition, intended adaptation efforts were expressed as overall policy objectives, such as: integrating adaptation into development planning and implementation, including

'climate proofing' key development sectors and integrating adaptation into the national budget; strengthening institutional capacity; enforcing behavioural change; ensuring various types of resilience (economic, social and environmental); and preventing and resolving conflict.

298. Approaches to implementing adaptation described in the adaptation components include:

(a) Community-based adaptation;

(b) Ecosystem-based adaptation;

(c) Landscape approach to adaptation;

(d) Livelihood diversification;

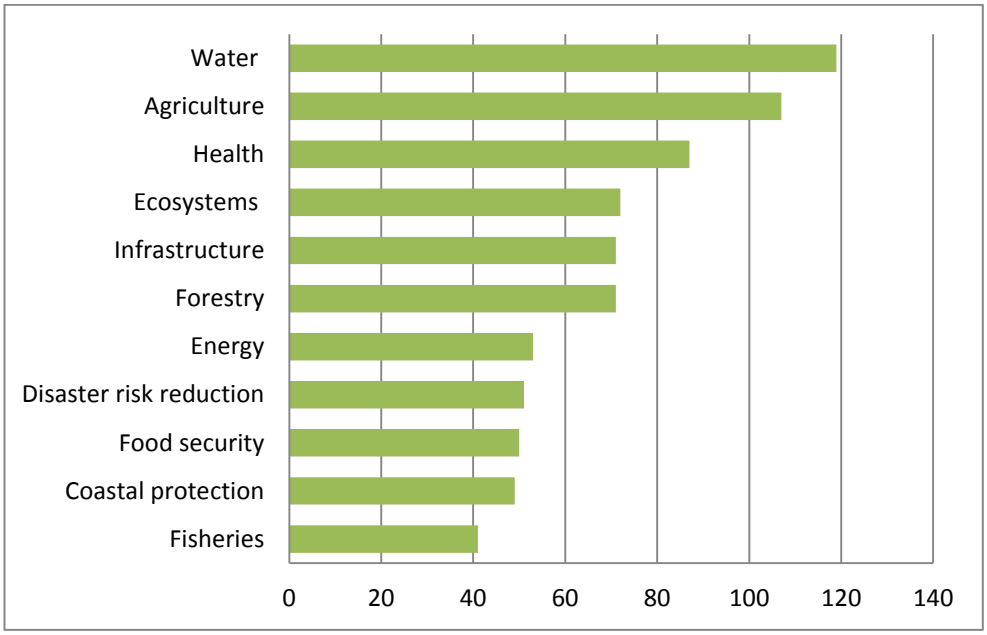
(e) Exploring synergies between adaptation and mitigation (see paras. 328 and 329 below).

299. In their adaptation components, Parties referred to actions in virtually every sector and area of the economy, as indicated in figure 16. The three priority areas were water, agriculture and health.

Figure 16

Priority areas and sectors for adaptation actions identified in the adaptation component of the communicated intended nationally determined contributions

(number of Parties referring to area or sector)



300. Water security is clearly a key development priority for most Parties. Various types of action related to the protection of water resources were included in the adaptation components, which generally aim at ensuring the security of water supply by saving water, enhancing the allocation of water and broadening the resource base. Parties highlighted many broader considerations, such as mainstreaming climate change adaptation in the water sector (e.g. by considering climate criteria in water management efforts), implementing a national water master plan, putting in place integrated water management systems or building a water-saving society. Parties outlined many specific water-saving measures and techniques, such as developing water-saving irrigation systems, using desalination (including with renewable energy), constructing water conservation facilities for farmlands,

building a man-made lake, constructing reservoirs for glacier meltwater harvesting, and watershed management. Some Parties outlined more specific techniques, such as digging wells, rainwater harvesting or substituting water withdrawal from aquifers with surface water. One Party emphasized that the issue of water resources cuts across other sectors (e.g. health, food security and energy).

301. Many Parties referred to actions in the agriculture sector and emphasized the importance of integrating adaptation into agriculture and food production and ensuring food security and sustainability of agriculture. Parties have introduced various programmes and policies, such as promoting sustainable agriculture and land and resource management, implementing integrated adaptation programmes for agriculture, developing climate criteria for agricultural programmes and adapting agricultural calendars. Others described specific agricultural methods for combating climate-related problems. For example, Parties described methods for pest management, including integrated pest management, introduction of heat-, drought- and disease-resistant crops, fodder types and livestock breeds and the distribution of medicine and vet services. Many referred to the importance of more diversified and resilient crops and livestock, for example by promoting native maize species and other improved crop varieties. Parties also referred to key agricultural improvements, such as enhanced irrigation systems, drought management and methods to reduce erosion. Other measures mentioned include affordable insurance, climate research, use of information and traditional knowledge and early warning systems.

302. Human health was commonly cited as a priority sector. A number of Parties are aiming to achieve: an overall integration of climate impacts and/or the identification of priority actions in the health sector; an enhanced understanding of climate–health connections and changing disease patterns; and enhanced management systems or contingency plans for public health to improve the adaptive capacity of public medical services. In terms of more specific measures to combat vector-borne diseases, Parties referred to, for example, protecting pregnant women and children under five against vector-borne diseases, suppressing mosquito populations and distributing test kits for vector-borne diseases. Other measures include early warning systems with epidemiological information, health surveillance programmes and contingency plans in the event of heatwaves.

303. Another priority area identified by many Parties was ecosystems, including in the context of biodiversity conservation. Many defined enhancing the resilience of or rehabilitating ecosystems as one of their objectives and they highlighted their national and/or regional biodiversity strategies and/or action plans. In terms of biodiversity, Parties identified some specific objectives and actions, including establishing biodiversity corridors, protecting moorlands and other ecosystems, increasing the conservation of species and recovering forest, coastal and marine ecosystems (in particular mangroves and corals) and tracking, monitoring and assessing impacts on biodiversity. Specific measures mentioned by Parties include preparing a biodiversity index and atlas or biodiversity centres, protecting wildlife species, establishing watering points for wildlife and stopping coastal mining.

304. DRR was addressed concomitantly to adaptation by several Parties and they reported on their current and future efforts relating to DRR, in particular against storms, floods, sea level rise and glacial lake outburst floods. Many provided information on their national and regional DRR strategies, policies, plans, platforms and frameworks. Specific measures highlighted by Parties include early warning systems, risk management institutions, hazard maps, building codes and other standards, infrastructure protection measures and contingency plans. Some Parties are developing insurance schemes, in particular to protect the most vulnerable communities and to incentivize climate-proof construction. A few Parties intend to resettle part of their population highly exposed to climate risk in safer

areas. In this context, one Party announced that it is preparing its people for emigration owing to its high vulnerability to sea level rise.

305. In line with emerging trends seen in national frameworks and policies as reported by Parties, some of the actions and measures seek to address transboundary issues. Most of such issues are regional and involve the management of shared river basins, but one Party mentioned its intention to contribute to the integration of climate change into regional transhumance plans. A few Parties referred to regional cooperation, in particular in the area of DRR. Transboundary issues with a global scope were reported. For instance, a few Parties highlighted that sectors of their economies, for example food production, contribute to ensuring global security, and one Party is studying the impacts of climate change on major food exporters in order to understand the risks to food imports.

306. There is recognition that progress has already been made by many Parties in addressing adaptation. For example, one Party indicated that it has made great strides in reducing vulnerability in the tourism, agriculture and ecosystem management sectors, among others; it has also enhanced its research and data management. In addition, a few Parties mentioned that the methodologies and tools that they have developed for their national adaptation work have been recognized by the international community as good practices.

307. In addition, several Parties indicated that they are encouraging the active participation of relevant stakeholders as a means of strengthening the implementation of their adaptation actions. Some Parties specifically mentioned the need to enhance the participation of vulnerable communities, including women, with a view to empowering them.

308. A few Parties provided objectives and targets for the overall coverage and scope of their adaptation plans, measures or actions.

Costs, losses and/or damage due to climate impacts

309. Costs, losses and/or damage associated with past[78] and projected impacts of climate variability and change were reported by several Parties. Such costs, losses and/or damage are projected to be incurred because of extreme hydrometeorological events such as drought, floods or tropical storms, but also because of sea level rise and associated coastal erosion, increases in vector-borne and waterborne diseases and fires.

310. Projected costs, losses and/or damage due to climate impacts have been quantified by some Parties, for example in the form of absolute costs, annual loss of GDP (ranges provided included from 1 to 2 per cent by 2030, 1.8 to 8.6 per cent by 2050 and 9.4 per cent by 2100; percentage of land or agricultural production lost, or percentage of population affected by a certain year or a particular threshold, for example a specific rise in sea level. One Party estimated that climate impacts will affect 80 per cent of the population. Another Party highlighted that it is in the process of calculating loss and damage through the NAP process. A few Parties provided details on projected costs of climate change impacts and how intended adaptation measures are expected to reduce the projected costs of impacts, leaving some residual damage, thus clearly making an economic case for investing in adaptation and DRR.

311. Measures highlighted by Parties with the potential to reduce projected costs, losses and/or damage due to climate impacts include, first and foremost: aligning development, adaptation and DRR; enhancing risk sharing and transfer, including setting up insurance

[78] Information on costs, losses and/or damage due to past climate impacts is included in the section on impact and vulnerability assessments above.

schemes; strengthening institutional arrangements and legislative frameworks; strengthening early warning systems; enhancing building codes and land-use planning; and promoting social protection.

Means of implementation of adaptation actions

312. Most Parties provided information on the means of implementation, including finance, technology and capacity-building, needed to support the implementation of their envisaged adaptation actions. The information reported relates to:

(a) Support received and needed, including needs for finance, technology and capacity-building;

(b) Domestic support, including institutional arrangements;

(c) International support;

(d) North–South and South–South cooperation.

313. Specific support needs identified by Parties include:

(a) Favourable enabling environments with appropriate institutional arrangements and legislation, including for mainstreaming climate change in development planning, gender mainstreaming and strengthening the engagement of subnational communities and the private sector;

(b) Sufficient financial resources to assess, plan, implement, monitor and evaluate adaptation actions;

(c) Technologies for adaptation,[79] including in the areas of climate observation and monitoring, early warning systems, water resources management, including irrigation and wastewater management, coastal zones, resilient transportation systems, sustainable or climate-smart agriculture, forestry (including forest fires) and land management;

(d) Training and building of institutional and human capacities and technical expertise, including in the area of vulnerability and adaptation assessments, cost–benefit analysis and the development of sectoral finance plans;

(e) Research, data and information, including in the areas of climate forecasting and modelling, satellite data, regionally downscaled climate data and research into international energy markets;

(f) Education, raising awareness and outreach on climate change impacts and adaptation.

314. While several Parties quantified their financial needs, others are in the process or are planning to do so. Needs for finance were expressed either as total quantified financial needs to implement mitigation and adaptation actions identified in the INDCs or as specific adaptation finance needs. Parties that reported specific financial needs for adaptation did so for either the whole INDC period (with individual needs ranging from USD 100 million to over USD 200 billion) or on an annual basis (with individual needs ranging from around USD 10 million to USD 3 billion per year). A few Parties provided additional information on their finance needs by sector or plan or strategy and two Parties provided projected adaptation costs for different mitigation scenarios.

315. Several Parties reported on how they are or will be addressing their identified support needs through the provision of domestic support, in particular finance, and some identified the amount of resources allocated in their domestic budgets. Financial resources

[79] Some Parties referred to their technology needs assessments.

were reported to come from a variety of sources, including: the national budget; insurance; contingent credit and catastrophe bonds; income credits of the domestic market; allocations from valued-added tax as well as environmental fees, taxes and levies; soft and low-interest loans; and the domestic private sector. Others highlighted support that they have received from international finance institutions, funds under the Convention and bilateral and multilateral donors.

316. Investment strategies and plans and national climate change and adaptation funds are being set up by some Parties to assist in allocating resources in their national budgets, to mobilize additional resources, to assist in engaging the private sector, including through establishing public–private partnerships, and to ensure adequate uptake of finance.

317. In addition, several Parties noted their ongoing capacity-building, training and research efforts, including related to research cooperation, innovation clusters and cooperation with regional and local governments as well as the financial sector.

318. While developing country Parties are providing significant domestic support for adaptation, many underlined the need to receive international support in the form of finance, technology transfer and capacity-building in line with the Convention. While one Party noted that all adaptation costs should be borne by developed country Parties, several Parties stressed that a substantial amount should be provided by developed countries to allow for the implementation of additional adaptation activities. International support for adaptation is further sought as it will determine Parties' ability to safeguard development gains, fulfil their intended unconditional mitigation actions and use their domestic resources for developmental purposes rather than for adaptation.

319. International finance is to come from the GCF, the Adaptation Fund, the GEF, including the Least Developed Countries Fund and the Special Climate Change Fund, other bilateral and multilateral funds, including United Nations programmes and organizations, and foreign direct investment and soft loans.

320. In addition to finance, Parties called for international support in the areas of:

(a) Clean technology transfer on concessional and preferential terms, including through the Climate Technology Centre and Network;

(b) Capacity-building.

321. South–South cooperation on the basis of solidarity and common sustainable development priorities was highlighted by a few developing country Parties as a further means to support and strengthen adaptation, including at the regional level. For example, one Party communicated its intention to establish a fund for South–South cooperation on climate change.

Monitoring and evaluation

322. Given that the complex and long-term nature of climate change and its impacts require adaptation to be designed as a continuous and flexible process and subject to periodic review, several Parties described how they will monitor and evaluate their intended measures.

323. While some Parties have developed or are in the process of developing an integrated system for monitoring, reporting and verifying their mitigation and adaptation components, others have developed or are in the process of developing adaptation-specific monitoring and evaluating systems and institutional set-ups. A few Parties intend to integrate the review of adaptation into existing monitoring and evaluation systems and processes for national development, for example into annual sector-based progress reports or results-based management systems, or into reporting supervised by a designated national authority

to ensure that adaptation achievements are captured and reported in regular development reports.

324. Parties seek to monitor and evaluate adaptation actions as well as support provided and received, with a view to:

(a) Tracking progress in implementation to inform the adaptation process by sharing lessons learned and to update adaptation plans;

(b) Determining the degree to which the adaptive capacity of individuals, communities and systems has been raised and vulnerability has decreased;

(c) Improving transparency, performance evaluation and accountability;

(d) Ensuring that resources are well utilized to increase resilience and produce real benefits;

(e) Tracking climate finance as well as technology transfer and capacity-building.

325. Regarding the monitoring and evaluation of adaptation action, some Parties highlighted that they have established or will establish adaptation and vulnerability indicators and baselines to monitor and measure progress. Parties reported both quantitative (e.g. number of people benefiting from adaptation activities, number of hectares with drought-resistant crops under cultivation, and forest coverage increases to 45 per cent) and qualitative (e.g. degree of integration of adaptation into sectoral policies and plans and level of awareness) indicators.

326. The focus on short-term monitoring of activities, processes and outputs rather than on longer-term outcomes was stressed by one Party. A few Parties have initially tested the monitoring and evaluation of adaptation for specific regions, sectors or projects and, on the basis of those experiences and lessons learned, are now planning to scale up monitoring and evaluation to the national level. Connecting project-level with national-level monitoring and evaluation of adaptation is the goal of the three-tier monitoring and evaluation approach[80] highlighted by one Party.

327. In terms of the monitoring and evaluation of domestic and international support provided and received, in particular finance, a few Parties are putting in place climate finance systems for determining, disbursing and monitoring climate expenditure and for enhancing the visibility of adaptation measures within the allocation of their national budgets.

Synergies between adaptation and mitigation

328. Noting that climate change actions require a holistic approach, several Parties elaborated on the synergies between adaptation and mitigation as part of their overall low-emission climate-resilient development strategies. One Party indicated that it considers mitigation to be a function of adaptation. Synergies are being sought at project, sector or landscape level, in planning or institutional frameworks at national, regional or local level and in urban and rural settings. One Party estimated that its adaptation measures would generate emission reductions of up to 130 Mt CO_2 eq. Table 3 provides an overview of the

[80] The first tier, macro-level monitoring, would allow for tracking the evolution of the national adaptation planning process as a whole. The second tier, meso-level monitoring, would allow for tracking progress and results at a disaggregated level, either sectoral or geographical. The third tier, a micro-level structure of reporting, would apply to specific adaptation actions. Reporting is envisaged to be undertaken annually. Every four years (i.e. at the end of a planning cycle), an aggregated NAP impact study would elaborate on results achieved and make recommendations for the next cycle.

frequently highlighted sectors offering adaptation and mitigation synergies along with example measures.

Table 3
Sectors and sample measures reported by Parties in the adaptation component of their intended nationally determined contributions offering synergies between adaptation and mitigation

Sector	*Examples of adaptation measures with mitigation co-benefits*
Agriculture, forestry and other land-use, including livestock	– New crop varieties that require less use of pesticides and are able to withstand water stress – Sustainable land management practices – Improved livestock production practices – Protection and restoration of forests – Afforestation, including of mangroves and drought-tolerant species
Human settlements and infrastructure	– Climate-smart and resilient urban centres – Sustainable urban planning – Transportation (e.g. public transportation) – Waste management and treatment
Water	– Integrated water resources management, including watershed protection, waste- and storm water management, conservation, recycling and desalination – Wetlands restoration to promote absorption of greenhouse gases
Energy	– Renewable energy (increases the resilience of the energy, water and health sectors) – Energy efficiency
Ecosystems	– Marine protection, blue carbon and seagrass beds – Combating desertification
Tourism	– Ecotourism

329. Reported ways of maximizing synergies between adaptation and mitigation include:

(a) Taking an ecosystem-based or community-based approach;

(b) Prioritizing adaptation measures that offer significant mitigation co-benefits;

(c) Minimizing the carbon footprint of adaptation measures;

(d) Diversifying the economy away from fossil fuel production to generate mitigation and adaptation co-benefits.