

Preface

The Working Group III (WG III) contribution to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) provides a comprehensive and transparent assessment of the scientific literature on climate change mitigation. It builds upon the WG III contribution to the IPCC's Fifth Assessment Report (AR5) in 2014, the WG I and WG II contributions to the AR6, and the three AR6 Special Reports: *Global Warming of 1.5°C*; *Climate Change and Land*; and *The Ocean and Cryosphere in a Changing Climate*.

The report assesses progress in climate change mitigation and options for reducing emissions and enhancing sinks. It evaluates the societal implications of mitigation actions, without recommending any specific options.

Scope of the Report

The scoping of the WG III contribution to AR6 was driven by three guiding principles: to achieve a better synthesis between higher-level whole system and grounded bottom-up insights into technologies and other approaches for reducing emissions; to make wider use of social science disciplines, especially for gaining insight into issues related to lifestyle, behaviour, consumption and socio-technical transitions; and to link climate change mitigation better to other agreed policy goals both nationally and internationally.

The core of the report remains, as in AR5, a set of chapters devoted to different sectors, broadly aligned with the categorisation used in the IPCC Guidelines for National Greenhouse Gas Inventories. These chapters cover emission trends and drivers, mitigation costs and potentials, regional specificities, and sector specific barriers, policies, financing and enabling conditions. A systems level perspective was followed where appropriate. A cross-sectoral perspectives chapter integrates findings from the sectoral chapters and assesses approaches falling outside the scope of individual sectors.

As in the AR5, there is a chapter on recent trends and drivers, with the scope expanded to cover historic emissions and recent policy developments. Following the pattern established in the WG III AR5 report, and the Special Report on Global Warming of 1.5°C, this report assesses published emission scenarios with a 21st century perspective. Modelled emission scenarios are categorised according to climate outcomes, allowing a handshake with the WG I assessment. To meet the goal of linking top-down and bottom-up insights, the report includes an additional pathways chapter that provides a mid-century perspective, focussing on national and regional scales and the alignment between development pathways and mitigation actions.

As in the AR5, this report addresses mitigation enablers such as international cooperation, finance and investment, and policies and institutions, with a greater emphasis placed on the role of institutions than in the AR5. A new chapter is dedicated to the assessment of innovation systems, technology development and technology

transfer. A further novelty is a chapter that assesses the literature on human behaviour, lifestyle and culture, and its implications for mitigation action. This chapter touches on patterns of development and human well-being, and circular and sharing economy concepts. It brings a wide range of disciplines, notably from the social sciences, within the scope of the WG III assessment.

Linkages with development and specifically the Sustainable Development Goals (SDGs) permeate the WG III report. This framing is set up in Chapter 1, and the threads are drawn together in the final chapter where linkages between mitigation and the SDGs are systematically assessed.

The AR6 has benefited from close and unprecedented collaboration between the three IPCC WGs: with WG I on scenarios and with WG II on urban systems, land use and development pathways. This collaboration is manifested in a number of Cross-Working Group boxes covering topics such as the economic benefits from avoided impacts along mitigation pathways, climate change and urban areas, mitigation and adaptation through the bioeconomy, and solar radiation modification.

Structure of the Report

This report consists of a Summary for Policymakers, a Technical Summary, 17 Chapters, six Annexes, and Index, as well as online Supplementary Material to chapters.

Chapters 1 (Introduction and framing) and 17 (Accelerating the transition in the context of sustainable development), the first and final chapters of the report, set climate change mitigation in the context of sustainable development. Chapter 1 sets out the evolving policy landscape for climate mitigation, provides the reader with the framing of, and context for, the report, and highlights key concepts. Chapter 17 adopts an integrative perspective on sustainable development and climate change responses, identifying synergies and trade-offs, and explores joint responses to climate change and sustainable development challenges.

Chapters 2–4 take a high-level view of trends and future pathways using three different time frames. Chapter 2 (Emissions trends and drivers) covers historic and current emission trends and socio-economic and demographic drivers of emissions. It also maps developments in technologies and policies since the AR5. Chapter 3 (Mitigation pathways compatible with long-term goals) assesses modelled emission pathways compatible with the Paris Agreement and higher warming levels. It addresses socio-cultural-techno-economic assumptions, technological and behavioural aspects of mitigation pathways, and links to adaptation and sustainable development. Chapter 4 (Mitigation and development pathways in the near- to mid-term) takes a mid-century perspective, considering national, regional and international scales and the implications

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of mitigation for national development objectives including employment, competitiveness, poverty eradication and the SDGs. Annex III (Scenarios and modelling methods) provides methodological background to Chapters 3 and 4.

Chapter 5 (Demand, services and social aspects of mitigation), a new chapter in AR6, explores how mitigation interacts with meeting human needs and access to services. It explores, *inter alia*: sustainable production and consumption; patterns of development and indicators of wellbeing; the role of culture, social norms, practices and behaviour changes; the sharing economy and circular economy; and policies facilitating behavioural and lifestyle change.

Chapters 6–12 (Energy systems; Agriculture, Forestry, and Other Land Uses (AFOLU); Urban systems and other settlements; Buildings; Transport; Industry; Cross-sectoral perspectives) assess the potential for emissions reductions in specific systems and sectors, taking into account trends in emissions and their key drivers, global and regional costs and potentials, links to climate adaptation and associated risks and co-benefits, and sector specific barriers, policies, financing and enabling conditions. Specificities include fugitive emissions and carbon capture and storage (Energy), provision of food, feed, fibre, wood, biomass for energy and other ecosystem services (AFOLU), demographic changes and urban form (Urban systems and other settlements), mitigation strategies including efficiency, sufficiency and renewables (Buildings), access to mobility (Transport), and resource efficiency (Industry). Chapter 12 (Cross-sectoral perspectives) synthesises costs and potentials, and co-benefits and trade-offs, across sectors; it also addresses cross-cutting approaches such as carbon dioxide removal and mitigation opportunities in the food system.

Chapters 13–16 address enabling conditions for mitigation action. Chapter 13 (National and sub-national policies and institutions) provides insights from national and subnational plans and strategies, including trends in legislation and institutions. Chapter 14 (International cooperation) assesses international cooperation and institutions, including linkages with non-climate organisations and processes, international sectoral agreements, and institutions for finance and investment and capacity building. Chapter 15 (Investment and finance) assesses scenarios of, and needs for, mitigation investment and financial flows, and the means of mobilising climate finance at the national and sub-national levels. Chapter 16 (Innovation, technology development and transfer) examines the role of innovation, technology development, diffusion and transfer in contributing to sustainable development and the aims of the Paris Agreement. It addresses specific challenges in emerging economies and least developed countries.

The Assessment Process

This WG III contribution to the AR6 has been prepared in accordance with IPCC rules and procedures. A scoping meeting was held in May 2017 and the outlines for the contributions of the three WGs were approved at the 46th Session of the Panel in September 2017.

Governments and IPCC observer organisations nominated experts for the author teams. The team of 199 Coordinating Lead Authors and Lead Authors, plus 38 Review Editors, selected by the WG III Bureau, was accepted at the 55th Session of the IPCC Bureau in January 2018. More than 350 Contributing Authors provided text for the author teams.

Drafts were subject to two rounds of formal review and revision followed by a final round of government comments on the Summary for Policymakers. More than 59,000 written comments were submitted by more than 1,600 expert reviewers and 42 governments. For each chapter, the review process was monitored by Review Editors to ensure that all comments received appropriate consideration.

During the review periods and in the run-up to the approval session, webinars were held with governments and two of the UNFCCC non-governmental organisation (NGO) constituencies, the Business and Industry NGOs (BINGOs), and the Environmental NGOs (ENGOS). These informal webinars offered an opportunity for authors to present draft material to IPCC audiences and to receive additional feedback.

The Report was accepted by the Panel at its 56th Session. The Summary for Policymakers was approved line-by-line and the underlying chapters were accepted at the 14th Session of IPCC WG III from 21 March – 4 April 2022, hosted virtually by the United Kingdom of Great Britain and Northern Ireland (UK).

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Sincerely,



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