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CHAPTER OUTLINE OF THE WORKING GROUP III CONTRIBUTION TO THE IPCC SIXTH ASSESSMENT REPORT (AR6)

As Adopted by the Panel at the 46th Session of the IPCC

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IPCC Secretariat

c/o WMO • 7bis, Avenue de la Paix • C.P. 2300 • 1211 Geneva 2 • Switzerland
telephone : +41 (0) 22 730 8208 / 54 / 84 • fax : +41 (0) 22 730 8025 / 13 • email : IPCC-Sec@wmo.int • **www.ipcc.ch**

WMO UNEP

CHAPTER OUTLINE OF THE WORKING GROUP III CONTRIBUTION TO THE IPCC SIXTH ASSESSMENT REPORT (AR6)

The Intergovernmental Panel on Climate Change decides:

(1) to agree with the outline of the *Working Group III contribution to the IPCC Sixth Assessment Report* as contained in Annex 1 to this document.

(2) that this report assesses relevant literature, especially since the Fifth Assessment Report (AR5), in a manner consistent with the IPCC guidance on the use of literature.

(3) that the bulleted text in Annex 1 to this Decision, that resulted from the scoping process and refined through comments by the Plenary, be considered by authors as indicative.

(4) to invite the Co-Chairs of Working Group III and the Co-Chairs of WGI and WGII to develop appropriate mechanisms to ensure the effective co-ordination of Working Group contributions to the IPCC Sixth Assessment Report, to oversee the treatment of cross-cutting themes, and to prepare a Glossary common to Working Groups I II and III.

(5) in order to achieve this, the timetable for the production of the IPCC Working Group III contribution to IPCC Sixth Assessment Report is as follows:

Sep 15 – Oct 27, 2017	Call for CLA/LA/RE Nominations
Jan 29 – Feb 4, 2018	Decision on selection of CLA/LA/RE
Apr 1 – 5, 2019	1st Lead Author Meeting (LAM1)
Sep 30 – Oct 4, 2019	2nd Lead Author Meeting (LAM2)
Dec 9, 2019 – Jan 31, 2020	1st Order Draft (FOD) Expert Review
Mar 30 – Apr 3, 2020	3rd Lead Author Meeting (LAM3)
Jun 1 – Jul 24, 2020	2nd Order Draft (SOD) Expert Review
Oct 19 – 23, 2020	4th Lead Author Meeting (LAM4)
Feb 1– Mar 26, 2021	FGD Government Review of SPM
Jul 12 – 14, 2021	IPCC acceptance/adoption/approval

(6) that the budget for the production of the Working Group contribution to the IPCC Sixth Assessment Report is as contained in Decision (IPCC/XLVI-1) on the IPCC Trust Fund Programme and Budget.

ANNEX 1

Chapter outline of the Working Group III contribution to the IPCC Sixth Assessment Report (AR6)

Summary for Policymakers

Technical Summary

Chapter 1 Introduction and Framing

- Key findings from AR5 and Special Reports
- Recent developments such as the Paris Agreement and potential scientific inputs from the IPCC, including to the Global Stocktake and the SDGs
- Sustainable development perspectives
- Technology and other developments: multiple entry points to climate mitigation
- Solution orientation and accelerating progress
- Policy (multiple goal setting)
- Regional breakdown as relevant — local institutions, cultures, circumstances
- Sectors, services and systems
- Methods and framings including models, analysis, top-down/bottom-up, scenario framework, cost-benefit, treatment of uncertainty, risk assessment, data, social science framings
- Knowledge gaps
- Strong link with Chapter 17

Chapter 2: Emissions trends and drivers

- Past and present trends of territorial emissions and sinks on an annual and cumulative basis (by region, sector, GHG, etc.), including estimates of uncertainty
- Past and present trends of consumption-based emissions on an annual and cumulative basis (by region, sector, GHG, etc.), including estimates of uncertainty
- Socio-economic and demographic drivers (e.g. GDP, population, international trade) and their trends
- Overview of sectoral emission drivers and their trends
- Climate and non-climate policies and measures at different scales and their impacts on emissions
- Technological choices and changes and impacts of technological breakthroughs
- Emissions associated with existing and planned long-lived infrastructure
- Behavioral choices and lifestyles at individual and societal levels

Chapter 3: Mitigation pathways compatible with long-term goals

- Methods of assessment, including approaches to analysis of mitigation and development pathways
- Socio-cultural-techno-economic assumptions and projections, including regional differences (referring to baseline and mitigation scenarios, Shared Socio-economic Pathways (SSPs), etc.
- Modelled emission pathways compatible with the Paris Agreement, including the long-term temperature goal[1], and higher warming levels, taking into account CO_2, non-CO_2 and short-lived climate forcers (including peaking, rates of change, balancing sources and sinks, and cumulative emissions)
- Role of changing climate on emissions
- System transitions and/or transformation compatible with mitigation pathways, including supply and demand and integrating sectoral information
- Economics of mitigation and development pathways, including mitigation costs, investment needs, employment effects, etc.
- Technological and behavioural aspects of mitigation pathways and socio-technical transitions
- Interaction between near- to mid-term action, and long-term mitigation pathways
- Links to sustainable development including risks, co-benefits, synergies, trade-offs and spill-over effects
- Links to adaptation including risks, co-benefits, synergies, trade-offs and spill-over effects
- Benefits of mitigation, including information from WG II
- Risk analysis of emission pathways considering uncertainty about climate response

Chapter 4: Mitigation and development pathways in the near- to mid-term

- Accelerating mitigation in the context of sustainable development at the national, regional and international scales
- Projections of socio-economic and demographic drivers (e.g. GDP, population)
- Aggregate effects of climate action including NDCs and other mitigation efforts relative to long-term mitigation pathways, including methodologies and gap analysis
- Mitigation efforts in the context of national and, where appropriate, subnational action plans and policies
- National, regional and global modelling of mitigation and development pathways in relation to mid-century strategies
- Implications of mitigation for national development objectives, including: employment, competitiveness, GDP, poverty, etc., and contributions of sustainable development pathways to mitigation
- Enabling conditions for mitigation, including technology development and transfer, capacity building, finance, and private and public sector participation
- Uncertainties and risks to the achievement of mitigation goals
- Links to sustainable development including risks, co-benefits, synergies, trade-offs and spill-over effects
- Links to adaptation including risks, co-benefits, synergies, trade-offs and spill-over effects
- Benefits of mitigation, and mitigation co-benefits of adaptation including information from WG II

[1] As set out in article 2 of the Paris Agreement.

Chapter 5: Demand, services and social aspects of mitigation

- Mitigation, sustainable development and the SDGs (human needs, access to services, and affordability)
- Patterns of development and indicators of wellbeing
- Sustainable consumption and production
- Linking services with demand, sectors, systems - implications for mitigation and sustainable development
- Culture, social norms, practices and behavioural changes for lower resource requirements
- Sharing economy, collaborative consumption, community energy
- Implications of information and communication technologies for mitigation opportunities taking account of social change
- Circular economy (maximising material and resource efficiency, closing loops): insights from life cycle assessment and material flow analysis
- Social acceptability of supply and demand solutions
- Leapfrogging, capacity for change, feasible rates of change and lock-ins
- Identifying actors, their roles and relationships
- Impacts of non-mitigation policies (welfare, housing, land use, employment, etc.)
- Policies facilitating behavioural and lifestyle change
- Case studies and regional specificities

Common elements across sectoral chapters 6-11

- Boundaries, scope and changing context
- Key findings from AR5 and the Special Reports
- Trends in emissions and their key drivers
- Global and regional costs and potentials
- Regional specificities
- The impacts of climate change on emissions and mitigation options
- Links to adaptation, including risks, adaptation with mitigation co-benefits, co-benefits, synergies, trade-offs and spill-over effects, as appropriate
- Links to sustainable development, including risks, co-benefits, synergies, trade-offs and spill-over effects, as appropriate
- Infrastructure and lock-in, as appropriate
- Sector specific barriers, policies, financing, and enabling conditions
- Knowledge gaps
- Case studies – as appropriate

Chapter 6: Energy systems

- Energy services, energy systems and energy sector, integrations with other systems (including food supply system, buildings, transportation, industrial systems)
- Energy resources (fossil and non-fossil) and their regional distribution
- Global and regional new trends and drivers
- Policies and measures and other regulatory frameworks; and supply and demand systems
- Fugitive emissions and non-CO_2 emissions
- Global and regional new trends for electricity and low carbon energy supply systems, including deployment and cost aspects.
- Smart energy systems, decentralized systems and the integration of the supply and demand

- Energy efficiency technologies and measures
- Mitigation options (including CCS), practices and behavioral aspects (including public perception and social acceptance)
- Interconnection, storage, infrastructure and lock-in
- The role of energy systems in long-term mitigation pathways
- Bridging long-term targets with short and mid-term policies
- Sectoral policies and goals (including feed-in tariffs, renewables obligations and others)
- Mainstreaming climate into energy policy

Chapter 7: Agriculture, Forestry, and Other Land Uses (AFOLU)

- Mitigation measures – supply and demand - effectiveness, costs, economics
- Mitigation potentials – supply and demand - global and regional
- Emerging technologies
- Constraints and opportunities across different contexts and regions
- Provision of food, feed, fibre, wood, biomass for energy, and other ecosystem services and resources from land, including interactions in the context of mitigation strategies and pathways
- Assessment of social and policy responses (public and private)
- Mitigation approaches within food production and food security strategies
- Anthropogenic emissions and removals in each of agriculture, forestry, other land uses, and non-managed terrestrial ecosystems, and their implications for mitigation pathways, considering a range of sources of information

Chapter 8: Urban systems and other settlements

- Demographic perspectives, migration, and urbanisation trends
- Consumption, lifestyle, and linkages between urban and rural areas
- Urbanisation wedge in future emissions and mitigation at global and national levels
- City emissions and drivers analysis, city typologies
- Urban emissions and infrastructure lock-in
- Urban mitigation options and strategies
- Low-carbon city scenarios, options and costs
- Urban form, design, and role of spatial planning
- Urban technologies, including disruptive technologies, the use of information and communication technologies, involving use of data
- Waste and waste water management, material recycling
- Innovative strategies and climate actions, urban experimentation, city networks and coalitions
- Urban mitigation governance – levels, barriers, and opportunities
- Policy instruments and infrastructure investments
- Rural settlements: leapfrogging opportunities

Chapter 9: Buildings

- Access to sector specific services (e.g. affordability, energy poverty)
- Services (including comfort, nutrition, illumination, communication)
- Components (building shell, appliances, lightning), system boundaries

- Mitigation options and strategies towards zero carbon buildings: developments since AR5 and emerging solutions
- Systemic interactions, insights from life cycle assessment and material flow analysis
- Scenarios and links with targets (including sectoral targets)
- Sector specific policies and policy packages, financing, and enabling conditions

Chapter 10: Transport

- Access to mobility services, affordability
- Components and system boundaries
- Aviation and shipping (including the treatment of aviation and maritime inventories)
- Mobility services (passengers and goods)
- Mitigation options and strategies towards zero carbon transport: developments since AR5 and emerging solutions
- Mobility trends and drivers (regional specifies)
- Systemic interactions (e.g. energy sector, urban) and insights from life cycle assessment and material flow analysis
- Scenarios and links with targets (including sectoral targets)
- Sector specific policies and policy packages, financing. Enabling conditions

Chapter 11: Industry

- Industrial development patterns and supply chains
- Maximising material and resource efficiency, closing loops
- Evolving demand for industrial products in the context of cross sectoral demand and supply developments
- Mitigation technologies and efficient system options, covering process emissions, industrial waste and carbon capture and utilisation
- Scenarios, mitigation options and cross system implications
- Implications of ambitious climate targets and sustainable development for future policy

Chapter 12: Cross sectoral perspectives

- Scope of the chapter
- Summary of sectoral costs and potentials
- Comparison of sectoral costs and potentials with integrated assessments
- Summary of sectoral co-benefits and trade-offs
- Aspects of GHG removal techniques not covered in chapters 6 to 11 (land based, ocean based, direct air capture): status, costs, potentials, governance, risks and impacts, co-benefits, trade-offs and spill-over effects, and their role within mitigation pathways
- Impacts, risks and opportunities from large-scale land-based mitigation: land, water, food security; use of shared resources; management and governance
- Emissions intensity of food systems and mitigation opportunities across the food system (production, supply chain, demand and consumption) including emerging food technologies
- Policies related to food system and food security including food waste and food demand
- Links to adaptation and sustainable development (including co-benefits, synergies and trade-offs)

Chapter 13: National and sub-national policies and institutions

- Cross-country insights from implementation of policies, including national and, where appropriate, sub-national plans and strategies
- Trends in national climate legislation, strategies and institutions, in the context of sustainable development
- Building agreement - stakeholder engagement and public opinion formation, media roles, policy frames and normative change
- Governance systems and climate action – comparative case analysis
- Assessment of policy instruments and regimes- links to multiple objectives of sustainable development (including co-benefits synergies and trade-offs)
- Integrated analysis of sectoral policies – integration with national policy, interactions across sectors, policy packages, enabling conditions, and infrastructure planning and investment
- Institutions for climate governance – lessons from cross country experience, including for capacity building, coordination, implementation, and monitoring
- Subnational climate action, including cities and states/provinces - prevalence and lessons from comparative cases
- Partnerships for climate governance – multi-sectoral networks of government, civil society and private sector, private governance, community-led and indigenous governance
- Interactions between national actions across countries, including spill-overs (e.g.: transboundary infrastructure, trade)
- Metrics to monitor climate action in the context of sustainable development (including co-benefits, synergies and trade-offs) – national, sub-national, and local
- Mitigation and adaptation linkages

Chapter 14: International cooperation

- Key findings from AR5 and recent developments
- International cooperation and institutions, including linkages with non-climate international organisations and processes
- International sectoral agreements and approaches
- Implementing mitigation pathways
- Enabling institutions for finance and investment
- Capacity building institutions and approaches
- International partnerships, including business partnerships
- International co-operation at the regional, sub-national and city level, as appropriate
- Transparency and accountability frameworks
- Lessons of implementation from relevant international agreements outside the climate arena
- Links to development policy and relevant international environmental agreements
- International climate policy and co-operative approaches
- Ethics and governance of solar radiation management, associated risks

Chapter 15: Investment and finance

- Key findings from AR5 and recent developments
- Definitions of climate finance
- Scenarios of and needs for investment and financial flows related to mitigation pathways and climate change action at the global and regional scales

- Scenarios of and needs for investment and financial flows related to mitigation pathways and climate change action in developing countries
- Investment patterns, and financing for climate resilient development, consistent with different mitigation pathways
- Enabling conditions for changing finance and investment patterns
- Public climate finance flows, including multilateral and bilateral, taking into account the scaling up of such flows
- International private flows of climate finance
- Links between national and international finance including developments in financial mechanisms and public-private partnerships
- National and sub-national climate finance mobilization and flows, within and across countries, including links to climate policy
- Emerging trends (community involvement in climate finance, sustainable investment criteria by institutional investors)
- Climate-related investment opportunities and risks
- Linkages between finance and investments in adaptation and mitigation, and implications for sustainable development
- Case studies

Chapter 16: Innovation, technology development and transfer

- Key findings from AR5 and recent developments
- Role of innovation, technology development, diffusion and transfer in contributing to sustainable development and the aims of the Paris Agreement, including mitigation pathways
- Innovation and technology as systemic issues, evaluating literature on cases of technological innovation systems and innovation policy
- Assessment of international institutions partnerships and cooperative approaches relevant to technology, innovation and R&D
- Capacity for transformative change, including capabilities for innovation, engineering, governance, R&D cooperation and deployment incentives
- Assessment of experiences with accelerating technological change through innovation policy for climate change at the national level, including successful case studies
- Specific challenges in emerging economies and least-developed countries, e.g. SIDS and land-locked countries
- Acceptability and social inclusion in decision-making, communication and information diffusion
- Characterisation and implications of new disruptive technologies
- Links to adaptation and sustainable development (including co-benefits, synergies and trade-offs)

Chapter 17: Accelerating the transition in the context of sustainable development

- Learning from integrative perspectives on sustainable development and climate change responses (synergies and trade-offs)
- Pathways for joint responses to climate change and sustainable development challenges
- Climate change mitigation responses in the context of multi-objective policies across scales
- Climate change mitigation response capacities and enabling conditions, including technology, finance & cooperation for sustainable development
- Mitigation-adaptation interlinkages, including potential synergies & conflicts

- Regional perspectives on climate change mitigation, including regional case studies on mitigation-adaptation interactions
- Other emerging issues dealing with climate change responses and sustainable development in relation to the Agenda for Development 2030 and beyond
- Uncertainties and knowledge needs

Annex A: Glossary

Annex B: Definitions, units and conventions

Annex C: Scenarios and modelling methods

Annex D: Contributors to the IPCC WG III Sixth Assessment Report

Annex E: Expert reviewers and government reviewers