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CHAPTER OUTLINES OF THE WORKING GROUP CONTRIBUTION TO THE IPCC SEVENTH ASSESSMENT REPORT (AR7)

Revised version of WG-III:15th /Doc. 2 agreed by the Fifteenth Session of Working Group III

(Submitted by the Co-Chairs of Working Group III)

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Version before final copyedit

Summary for Policymakers

Technical Summary

Chapter 1: Introduction and framing

- Introduction to WGIII report chapters and sections (and what is not going to be covered in the WGIII report)
- Framing, in the context of AR7, providing overarching concepts related to mitigation, including equity within and between countries, just transitions in its broader sense, differentiation considering stages of development, and circumstances, regionalization, and considerations of Indigenous knowledges and local knowledge
- Sustainable development (not limited to SDGs), national and regional priorities, and their synergies and trade-offs as a framing concept
- Framing, key concepts, and definitions of projected scenarios and pathways, including qualitative and quantitative scenarios
- Highlighting past performance and achievements in implementation of climate change mitigation and evolution of innovation (including social innovation), technology, capacity building, mitigation finance, governance, and climate policy
- Role of the ocean, land, ecosystems, and biodiversity in mitigation
- Social, economic, and environmental impacts of climate mitigation policy and action
- Adaptation interlinkages to mitigation
- Key concepts and dimensions of integration across Working Groups

Chapter 2: Past and current anthropogenic emissions and their drivers

- Historical anthropogenic emissions and emissions trends on an annual and cumulative basis (global, by region, sector, GHG, non-GHG, etc., using different indicators and definitions, at different scales), including estimates of uncertainty, and consistency with national inventories, and relationship to total and remaining carbon budgets
- Emissions, trends in drivers, including a broad set of drivers and activities at different scales
- Policy, actions, and governance at different scales, including impacts on emissions and drivers

Chapter 3: Projected futures in the context of sustainable development and climate change

- Assessment of methodologies, models, databases, development tools for scenarios and emissions pathways, methods for assessing emissions scenarios (including justice and equity assumptions and implications), and consistency of land-use emissions definitions with national inventories
- Implications of mitigation for development pathways, such as well-being, energy security, affordability and access, employment, poverty, and sustainability, including the Rio Conventions
- Assessment of how development pathways and sustainable development pathways consider and affect mitigation, including implications of Rio Conventions, meeting SDGs, and beyond

- Assessment of a broad range of projected futures for socioeconomic development, scenarios, and their underlying assumptions and outcomes, including assessments of feasibility (geophysical, environmental-ecological, technological, economic, socio-cultural, and institutional)
- Assessment of systems transitions under different projected futures
- Economics of global and national mitigation and development pathways, including mitigation costs and benefits, investment needs, employment effects, co-benefits, and spillover effects
- Climate change impacts on mitigation strategies; synergies and tradeoffs between mitigation and adaptation
- Projected emissions pathways considering current policy and projections, and relationships between national and global projected scenarios, in the context of the UNFCCC and the Paris Agreement
- Opportunities and challenges to enable climate action from current policies in the context of equity and justice
- Relationship between global temperature goals and mitigation action, including overshoot, relationship between gross emissions reductions, residual emissions, and negative emissions
- Relationship(s) between equity, justice, and mitigation across, between and within countries and generations
- Robustness of mitigation strategies and projected pathways under uncertainty

Chapter 4: Sustainable development and mitigation

- Sustainable development including and beyond SDGs as an integrative perspective for climate change responses (synergies and tradeoffs)
- Distributional consequences, within and across groups and countries
- Political economy of, co-benefits, adverse effects and livelihood and economic impacts of transitions related to mitigation
- Climate change mitigation response capacities and enabling conditions, including technology, finance, and cooperation for sustainable development
- Equity and justice (with a focus on just transitions and unpacking that at sectoral, national, regional, and global levels)
- Social and socioeconomic dimensions, including impacts of climate mitigation, and sufficiency and other strategies
- Climate change mitigation responses in the context of multi-objective policies across scales (economic development, diversification and prosperity, poverty eradication, improving living standards, etc.)
- Mitigation-adaptation interlinkages and other sustainable development objectives, including potential synergies and trade-offs
- Uncertainties and knowledge needs
- Implications of climate change mitigation responses on biodiversity and ecosystems, conservation, and restoration
- Ocean-based mitigation in the context of sustainable development and blue economy including synergies with global food and nutritional security
- Pathways in the context of sustainable development and the remaining carbon budgets, considering different stages of development, and circumstances, including links to Chapter 3

Chapter 5: Enablers and barriers

- Feasibility of mitigation in different contexts and under multiple barriers and enablers
- Development as enabler of mitigation
- Capacity for mitigation, including technological, institutional, economic, and human capacity
- Technology, including access, cost, infrastructure, innovation, scalability, replicability and speed of and disparity in adoption
- Finance, investment, policies and governance
- Distribution of benefits, costs, and impacts of mitigation
- Inequality and inequity within and across countries, including intergenerational aspects
- Social enablers, barriers, and impacts of mitigation, including public perception and support, lifestyles and behavior, production and consumption, communication, information, engagement, education, health and well-being
- Labor as enabler and barrier to mitigation, including supply, organization, wellbeing, skills
- Just transitions
- Environmental and natural resources enablers and barriers for mitigation at national, international, and subnational levels, including land, water, natural resources, minerals, and climate services
- Indigenous rights, governance, and knowledge systems
- Political economy of mitigation including public preferences, interest groups, and political institutions
- International cooperation and supply chains
- Peace, security, and conflict, including resource competition

Chapter 6: Policies and governance and international cooperation

- Policies and governance compatible with development pathways, equity, justice, distribution and integration with adaptation and sustainable development
- Various approaches to policy and institutional design
- International cooperation, taking into account political economy dimensions
- International climate and relevant non-climate agreements
- Multiple objectives, tradeoffs and co-benefits with climate and non-climate objectives
- Policy innovation, learning, and diffusion, and assessment of policy instruments
- Non-state actors' roles and efforts at different levels and contexts, including corporate and financial institutions, civil society, labor and informal economy, media, social, gender and youth movements, Indigenous Peoples and local communities
- Mitigation policies, action and cooperation at different levels
- Diverse climate regulatory and governance frameworks and other policy frameworks
- Long-term policy, governance and international cooperation for climate action and net zero emissions and beyond

Chapter 7: Finance

- Scaling finance to meet current and future finance needs
- Investment and finance for innovation and for mitigation and transitions in the context of sustainable development
- Innovation for financing
- Finance instruments, sources, channels and mechanisms
- Financial adequacy, access (equity and justice), inclusion, effectiveness, and outcomes considering finance at different scales (including national, regional, and global)
- Financial flows to support mitigation (including those to, from and between developed and

developing countries), and tracking by sources, sectors and levels of governance, channels, regions, countries, and instruments
- Enablers and barriers for finance, including barriers to access
- Climate-related planning and management of finance
- Gender, Indigenous Peoples and local communities climate finance

Common elements across Chapters 8-13
- Key findings from the Sixth Assessment Report (AR6) and the Special Report on Climate Change and Cities
- Policies and implementation as appropriate
- Drivers and current trends in emissions and removals, as appropriate
- Mitigation measures and potentials and futures in the context of sustainable development, justice, equity, and global warming levels
- Feasibility and social acceptance
- Links to projected regional and global futures
- Links to sustainable development and adaptation, including risks, co-benefits, synergies, tradeoffs, and spill-over effects, as appropriate
- Links to Indigenous Peoples, local communities and gender
- Interactions between relevant UN Conventions and other relevant frameworks, as appropriate
- Assessment of costs and benefits of mitigation options
- Financial instruments (e.g., market and non-market)
- Innovation and knowledge gaps
- International cooperation and related aspects
- Case studies, as appropriate

Chapter 8: Services and demand
- Human needs, aspirations, inclusive well-being, and development
- Demand, equity, affordability and access to services across regions and social groups including the informal sector
- Demand-side mitigation potential of different service provisioning options including at system scale
- Demand-side options for comparison with other emission reductions options
- Social drivers of behavioral change, such as lifestyles, culture, value systems, psychology, communications, education, Indigenous knowledge systems, capacity building, social trust, and governance
- Other drivers of change
- Empirical evidence of the speed for diffusion of social innovations, including business model, behavioral, community based, and institutional innovations
- Policy, governance, and the roles of actors in the diffusion of demand-side solutions
- Synergies and co-benefits, including cross-sectoral implications for adaptation, health, energy security, inclusive development, and materials
- Feasibility dimensions of demand-side solutions, including synergies and tradeoffs with sectors and with sustainable development dimensions
- Services and demands related to oceans

Chapter 9: Energy systems
- Trends, historical, current and future
- Options and technologies for mitigation

- Abatement potentials and implications
- Energy access for household and productive use, including distributed approach potential
- Energy security, affordability, sustainability, resilience, and adequacy
- Energy system infrastructure changes, and timescales
- Energy transitions
- Energy governance and political economy (including energy markets and supply chains)
- Material and resource needs and constraints
- Capacity building and capacities (technology transfer and assimilation)
- Renewables, nuclear, carbon capture and storage, carbon capture and utilisation, and synthetic energy carriers (e.g., hydrogen)
- Equity, justice, just transitions, and distributional impacts
- Fugitive emissions and methane mitigation

Chapter 10: Industry

- Industry, society, well-being and inclusive development
- Current and future demand for industrial products to meet end-use services
- Past and current level of emissions by industries
- Material end-use demand, material efficiency, consumption patterns, circularity, waste; CCU and CCS; critical minerals
- Potential sector mitigation options (e.g., energy efficiency, clean fuel switching, feedstocks; process changes, such as electrification and hydrogen; carbon management), and co-benefits
- Access to technology, infrastructure, and capacity
- Governance, institutions, laws, and barriers
- Impacts on and interactions with local communities and Indigenous Peoples
- Policies to drive mitigation and co-benefits in a context of sustainable development, equity, and justice
- International cooperation and related aspects

Chapter 11: Transport and mobility services and systems

- Socioeconomic, geographic-related context circumstances
- Mobility access, affordability, and equity
- Spatial planning, infrastructure, and supply chains for mobility and energy carriers (passenger and freight; public transport, road, rail, micromobility, aviation, maritime, water-based, and multimodal transport)
- Mitigation options and strategies for passenger and freight transport (including Avoid, Shift, Improve options and social and technological innovation) towards low or zero emissions transport
- Interaction with adaptation, disaster risk and resilience, synergies and tradeoffs with sustainable development, including environment and health
- Sector-specific policies and policy packages, laws, multi-level governance, financing, and enabling conditions

Chapter 12: Buildings and human settlements

- Framing the scope and new developments
- Emission trends and drivers
- Services (including comfort, nutrition, illumination, communication)
- Potential mitigation options and strategies for buildings and human settlements (e.g., spatial planning and land use, design, construction, retrofitting and renovation technologies, behavior)

- Direct and embodied emissions reduction, including alternative building materials and material efficiency
- Interaction with adaptation, disaster risk and resilience, synergies and tradeoffs with sustainable development
- Distribution impacts under different urban, rural, and regional specificities/informal settlements, social vulnerability, and land use
- Barriers and opportunities (technological, physical, financial, institutional, governance, cultural, etc.)
- Infrastructure, systemic interactions, cross-sectoral benefits, circular economy, insights from life cycle assessment and material flow analysis

Chapter 13: Agriculture, Forestry, and Other Land Uses (AFOLU)

- Mitigation measures (emissions and removals) and potentials in the context of sustainable development and global warming levels (including equity and justice, risks, food security, feasibility, regions, tradeoffs, and synergies)
- Use of consolidated national/regional data on emission factors, forest and soil parameters, and livestock production systems from under-represented regions, including recent data on fragile ecosystems
- Projected mitigation pathways, including alternative demand scenarios, that assess the scale of land mitigation measures, impacts on gross and net land-use change across different ecosystems, and social and environmental contexts
- Effects of climate impacts on socio-ecological systems, responses, and consequences for mitigation potentials and scenarios
- Consideration of the role of Indigenous Peoples and local communities in codesigning and implementing mitigation measures
- Integration of economic, social, and technological responses and their efficacy and limits for delivering mitigation and multiple outcomes
- Comparing and reconciling land use emissions with national inventories (including the effects of increasing background fluxes on total and net GHG flux from AFOLU)
- Tradeoffs and synergies of measures with sustainable development (beyond SDGs) at regional and subregional levels
- Systems integration related to AFOLU, including linkages to Chapter 14

Chapter 14: Integration and interactions across sectors and systems

- System integration, including energy, transport, buildings, and industry
- Infrastructure used by multiple sectors for enabling low or net-zero emissions economies
- The role of urban systems in mitigation
- Materials, circularity, and waste across sectors
- Energy system integration (power-to-heat, power-to-transport, power-to-water, power-to-fuels, energy storage)
- Intersections between water, energy, food, ecosystems, and climate change; food systems; bioeconomy
- Costs and potentials, including the effects of integration
- Policies and enabling conditions for system integration and cross-sector synergies
- Digitalization and communication technologies for enabling system integration and interaction, and their implications

Chapter 15: Potentials, limits, and risks of Carbon Dioxide Removal (CDR)

- Effectiveness of CDR approaches at different warming levels and time scales
- The role of CDR strategies in net-zero and net-negative emissions futures, including levels of residual emissions achievable
- Technical and economic potential, sustainability aspects, scalability, equity implications and costs of different approaches, including storage potential, CDR approaches in other chapters and marine carbon dioxide removal
- Co-benefits, opportunities, synergies, tradeoffs and adverse effects of different CDR approaches on land, biodiversity and ecosystems, energy, materials, food, and waterbodies
- Feasibility assessment of CDR approaches (including geophysical, environmental-ecological, technological, economic, institutional and sociocultural) reflecting different regional and sub-regional contexts and scales
- Permanence, durability and reversibility of CDR approaches at different scales
- Assessment of current status and limits of MRV approaches
- Policies and governance, market, non-market and financing for research and development and implementation of CDR approaches
- Interactions with sustainable development, adaptation, and other mitigation options
- Technology transfer and capacity building for CDR approaches

Annex: Glossary