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Sharm el-Sheikh mitigation ambition and implementation work programme

Subsidiary Body for Implementation
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Annual report by the secretariat

Summary

This annual report, prepared under the guidance of the co-chairs of the Sharm el-Sheikh mitigation ambition and implementation work programme, presents a compilation of the reports on the two global dialogues and investment-focused events held in 2026, which are the seventh and eighth under the work programme. The seventh global dialogue focused on enabling mitigation ambition and implementation in industries, drawing on national and regional experience. The eighth global dialogue focused on enabling mitigation ambition and implementation in industries, drawing on national and regional experience, and on exploring cross-cutting issues relevant to scaling up mitigation ambition and implementation, as per paragraph 4 of decision 4/CMA.4. The report reflects in a comprehensive and balanced manner the discussions held and presents key findings and opportunities and barriers identified relevant to the topics covered.

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Abbreviations and acronyms

AI	artificial intelligence
CCUS	carbon dioxide capture, use and storage
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO_2	carbon dioxide
CTCN	Climate Technology Centre and Network
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
MRV	measurement, reporting and verification
NDC	nationally determined contribution
OECD	Organisation for Economic Co-operation and Development
PFC	perfluorocarbon
SB	sessions of the subsidiary bodies
SIDS	small island developing State(s)
SMEs	small and medium-sized enterprises
UNIDO	United Nations Industrial Development Organization

I. Introduction

A. Mandate

1. CMA 4 decided that at least two global dialogues shall be held each year as part of the Sharm el-Sheikh mitigation ambition and implementation work programme, with one to be held prior to the first regular sessions of the subsidiary bodies, starting at SB 58, and one prior to the second regular sessions of the subsidiary bodies, starting at SB 59, and that such dialogues should be conducted in hybrid format to allow both in-person and virtual participation.[1]

2. CMA 4 requested the secretariat to prepare, under the guidance of the co-chairs of the work programme, a report on each of the global dialogues under the work programme, reflecting in a comprehensive and balanced manner the discussions held and including a summary, key findings and opportunities and barriers relevant to the topic, and to prepare an annual report comprising a compilation of the individual dialogue reports for consideration by the CMA and the subsidiary bodies.[2] CMA 5 also requested the secretariat to include, under the guidance of the co-chairs of the work programme, information on the investment-focused event held on the margins of the dialogue[3] in the report on each of the global dialogues.[4]

B. Approach

3. This report presents a compilation of the individual reports on the seventh global dialogue and investment-focused event and the eighth global dialogue and investment-focused event, held in 2026 under the work programme, contained in annexes I and II respectively. Each report includes a summary, key findings and opportunities and barriers relevant to the topics covered at the dialogues and information on the investment-focused events. The individual reports have been prepared to reflect in a comprehensive and balanced manner the discussions held at the dialogues and investment-focused events.

4. The individual reports highlight the relevance of all aspects raised and discussed during the seventh and eighth global dialogues and investment-focused events. They are based on the recordings of the seventh and eighth global dialogues and investment-focused events and on presentations delivered during the events, which are available on the UNFCCC website.[5] Details on the proceedings of the dialogues and events can be found in the full versions of the reports thereon on the UNFCCC website.[6]

II. Organizational matters

A. Appointment of the co-chairs of the work programme for 2025–2026

5. The Chairs of the subsidiary bodies appointed Angela Churie Kallhauge (Sweden) and Gao Xiang (China) as the co-chairs of the work programme for 2025–2026.[7]

[1] Decision 4/CMA.4, para. 8.
[2] Decision 4/CMA.4, para. 15.
[3] See decision 4/CMA.4, para. 11.
[4] Decision 4/CMA.5, para. 12.
[5] https://unfccc.int/event/seventh-global-dialogue-and-investment-focused-event-under-the-sharm-el-sheikh-mitigation-ambition and https://unfccc.int/event/eighth-global-dialogue-and-investment-focused-event-under-the-sharm-el-sheikh-mitigation-ambition respectively.
[6] https://unfccc.int/documents/658047 and https://unfccc.int/documents/662373.
[7] In accordance with decision 4/CMA.4, para. 7. Information on the co-chairs is available at https://unfccc.int/topics/mitigation/workstreams/sharm-el-sheikh-mitigation-ambition-and-implementation-work-programme-mwp/co-chairs-of-the-mitigation-work-programme-2025-2026.

B. Topics for the global dialogues under the work programme in 2026

6. CMA 4 decided that the scope of the work programme should be based on broad thematic areas relevant to urgently scaling up mitigation ambition and implementation in this critical decade and include all sectors covered in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*,[8] thematic areas in the contribution of Working Group III to the IPCC Sixth Assessment Report,[9] and relevant enabling conditions, technologies, just transitions and cross-cutting issues.[10]

7. CMA 4 invited Parties, and observers and other non-Party stakeholders to submit every year suggested topics in line with the scope of the work programme to be discussed at the global dialogues. Considering these submissions, the co-chairs of the work programme are to decide on the topics to be discussed at each dialogue in a given year.[11]

8. As mandated, the co-chairs, having considered the submissions received, communicated in a message to Parties, and observers and other non-Party stakeholders[12] their chosen focus area for the dialogues taking place under the work programme in 2025–2026, namely enabling mitigation solutions in the industry; agriculture, forestry and other land use; and waste sectors, drawing on national and regional experience. As communicated in another message from the co-chairs,[13] the seventh global dialogue focused on enabling mitigation ambition and implementation in industries, drawing on national and regional experience, and the eighth global dialogue focused on enabling mitigation ambition and implementation in industries, drawing on national and regional experience, and on exploring cross-cutting issues as per the mandate referred to in paragraph 6 above.

[8] IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

[9] IPCC. 2022. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. P Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available at https://www.ipcc.ch/report/ar6/wg3/.

[10] Decision 4/CMA.4, para. 4.

[11] Decision 4/CMA.4, paras. 12–13.

[12] Available at https://unfccc.int/documents/645941.

[13] Available at https://unfccc.int/documents/655943.

Annex I

Seventh global dialogue and investment-focused event under the Sharm el-Sheikh mitigation ambition and implementation work programme*

I. Summary of discussions, key findings, opportunities and barriers at the seventh global dialogue

A. Technology options and trends in decarbonizing industries, drawing on national and regional experience

1. Experiences of best practices and lessons learned

(a) Key observations from national and regional experiences

1. Industrial decarbonization was widely discussed and viewed as requiring a combination of complementary technologies sequenced according to national circumstances, readiness, resource availability and industrial structures, rather than relying on any single solution. Near-term options cited included energy efficiency improvements, electrification of industrial processes, fuel and feedstock switching and use of alternative materials, with CCUS and green hydrogen identified as important for hard-to-abate sectors over the medium and longer term. Participants observed that the prioritization of technologies will necessarily differ across countries and sectors.

2. Long-term sectoral road maps reflecting operational and technical realities, developed in collaboration with industry, were highlighted by several participants as useful for supporting industrial decarbonization planning across different sectors and time-horizons, through scenario analysis, technology sequencing, identification of the lowest-cost abatement pathways and alignment of investment decisions and industrial policy.

3. Cluster-based approaches to industrial decarbonization, in which co-located facilities collectively plan and implement decarbonization, were presented by several participants as a means of sharing infrastructure costs and creating cross-sectoral synergies, including by mutualizing CO_2 pipelines, hydrogen networks and electricity connections, as well as allowing for integrated workforce and supply chain planning across facilities. Participants described as beneficial the development of integrated green manufacturing systems encompassing green factories, industrial parks and supply chains alongside resource recycling and water conservation.

4. Carbon pricing was referred to by many participants as a policy instrument being applied to incentivize investment in the reduction of industrial emissions, with revenues in some cases channelled to dedicated innovation and transition funds, while contributing to creating stable demand for innovative clean technologies. Several participants noted that carbon pricing tends to be most effective as part of a broader policy package, alongside other instruments, including investment support, demand for low-carbon industrial products, infrastructure development, and regulatory measures, rather than being used in isolation. Some participants expressed concern that approaches invoking a broad interpretation of the polluter-pays principle can risk shifting a disproportionate burden onto developing countries and consumers therein in a manner inconsistent with the principles of equity and common but differentiated responsibilities and the nationally determined nature of the Paris Agreement.

5. Retrofitting existing industrial facilities was discussed by several participants as a near-term decarbonization approach given long asset lifetimes, with large-scale low-emission retrofits cited as demonstrating the potential for significant energy savings alongside

* Not formally edited.

continued growth in industrial output. Digitalization, including using digital twins, AI-enabled analytics, advanced sensors and predictive maintenance, was highlighted as a practical means of improving the emissions performance of existing infrastructure, while emphasizing that the credibility of such interventions depends on the design of robust MRV systems. Participants also noted that building internal capacity on digitalization alongside deploying technology solutions can ensure their continuity, facilitate replication across sites and produce long-term impacts.

6. The electrification of industrial processes was highlighted by many participants as being pursued in their countries. Participants noted that the effectiveness of electrification of industrial processes depends on concurrent investment in grid infrastructure and renewable energy capacity, given that scaling up industrial decarbonization will require significant grid investment, interconnectivity and optimization.

7. CCUS was discussed by several participants in the context of hard-to-abate sectors, where process emissions cannot be eliminated through electrification or fuel switching alone. Shared CO_2 transport and storage infrastructure was highlighted as a means of reducing the costs thereof. Participants noted the importance of piloting a range of approaches, including point-source capture, direct air capture, cryogenic carbon capture technology development and alternative mineralization pathways, in order to improve their performance and test their applicability under different regional conditions. Certifications and standards relevant to the approaches were noted as important for both storage effectiveness and investor confidence.

8. Non- CO_2 emissions were framed by participants as key levers for industrial emissions reductions and as a set of mitigation options that are relatively accessible in the near-term. It was noted that targeting gases such as nitrous oxides and Perfluorocarbons alongside improvements in process efficiency, can in some contexts contribute to achieving significant emissions reductions. However, it was also emphasized that CO_2 emissions represent a fundamentally different challenge, particularly in hard-to-abate sectors where they are linked to core chemical processes. In this context, participants highlighted that addressing CO_2 emissions requires deeper structural transformations including the deployment of new technologies such as electrification, hydrogen use and carbon capture and storage.

9. Some participants emphasized that mitigation action must be accompanied by strong safeguards, including with respect for the rights of Indigenous Peoples and the principle of free, prior and informed consent. Participants further noted that prioritizing partnerships with companies and financial institutions that adopt clear policies on these rights can contribute to ensuring mitigation efforts do not lead to social harm, as well as encouraging organizations and institutions to adopt such policies. It was stressed that without sufficient safeguards in place, mitigation actions risk becoming sources of rights violations rather than providing sustainable solutions.

10. Industrial decarbonization was framed by participants not only as a means of meeting climate objectives but also as an opportunity to advance sustainable, long-term economic development, including through emerging industrial sectors such as green steel, green cement and manufacturing based on clean technologies. It was noted that this framing is relevant to a broad range of contexts, with all countries able to take advantage of the opportunity it represents. International cooperation on technology transfer, including through support from developed countries to developing countries and South–South cooperation, was seen as remaining an important aspect of industrial decarbonization efforts.

(b) Opportunities (including actionable solutions) and barriers

11. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Scaling up the electrification of industrial processes, including by using heat pumps, electric boilers and electric arc furnaces, in conjunction with renewable electricity generation and grid infrastructure investment, as a pathway applicable to a wide range of sectors;

(b) Expanding CCUS deployment in hard-to-abate sectors, including by using shared transport and storage infrastructure at the regional and cross-border level, starting with low-cost, high-purity CO_2 capture approaches and building towards integrated storage hubs;

(c) Deploying green hydrogen and its derivatives as a feedstock and energy carrier in sectors and applications where electrification is not feasible, including iron and steel production, chemicals manufacturing and high-temperature industrial processes;

(d) Promoting circular systems and industrial symbiosis approaches, including the co-processing of waste, the substitution of clinker in cement production, the recycling of resources and the cascading use of residual heat and CO_2 across agriculture, industry and urban infrastructure, as measures that can simultaneously reduce emissions and improve resource efficiency;

(e) Developing integrated approaches to infrastructure planning that co-design renewable energy, hydrogen and CO_2 transport and storage systems consistent with industrial decarbonization timelines, including cluster-based approaches to industrial decarbonization that enable the mutualization of infrastructure costs across facilities;

(f) Developing and applying digital technologies to improve the emissions performance of existing industrial infrastructure, supported by implementing robust MRV systems and investing in data integration as shared infrastructure with common standards and architecture;

(g) Establishing government-supported units mandated to assist industries in navigating the landscape of applicable climate regulations and available support programmes and to provide a feedback loop to governments on implementation experience.

12. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants include:

(a) The long asset lifetimes of industrial facilities, which make comprehensive replacement operationally and economically impractical and necessitate industrial decarbonization strategies that incorporate retrofitting and allow for incremental advances;

(b) The high capital intensity of industrial decarbonization investments, combined with the risk of stranded assets where future technology availability, carbon prices or regulatory frameworks cannot be predicted with confidence;

(c) Insufficient long-term market signals and policy frameworks for industrial decarbonization and the lack of consolidated goals with interim milestones, which can undermine investor confidence and delay the mobilization of private capital;

(d) Infrastructure gaps resulting from, for example, planning and permit delays for CO_2 pipelines and hydrogen networks, insufficient grid capacity and the absence of shared CO_2 storage infrastructure, all of which can slow project delivery and increase project costs;

(e) Limited access to finance, including to concessional finance in the case of SIDS and other developing countries, alongside limited technical capacity and skills, and insufficient public awareness, all of which can constrain the ability of governments and industries to engage with and implement available methodologies and policy frameworks for industrial decarbonization;

(f) Difficulties in adapting internationally developed standards and technologies to local conditions, resource constraints and unfavourable regulatory contexts, all of which can impede the deployment of available solutions;

(g) Concerns that carbon pricing measures invoking a broad interpretation of the polluter-pays principle may impose disproportionate costs on developing countries and can undermine industrial competitiveness in countries with more limited capacity to respond to such measures.

2. Experiences of addressing challenges and barriers

(a) Key observations from national and regional experiences

13. The long operational lifetimes of industrial assets were recognized by many participants as a central structural challenge for industrial decarbonization, creating the risk of stranded assets. Several participants noted that industrial facilities in several sectors are designed to operate for between 20 and 40 years, making rapid replacement operationally and economically impractical. Several participants described approaches focused on retrofitting existing assets and phased transitions of existing infrastructure, noting that such approaches can enable emissions to be reduced without necessitating the early retirement of capital stock.

14. Several participants drew attention to the bottleneck between technology demonstration and commercial deployment, noting that financing frameworks for scaling up technologies beyond the pilot stage remain, in many cases, underdeveloped and that the cost and maturity of breakthrough technologies remain prohibitive to their application. Several participants observed that phased deployment approaches, prioritizing mature, lower-cost applications in the near term and creating pathways for emerging technologies to be scaled up over time, represent a practical means of managing this challenge, alongside clearer frameworks for sequencing public and private investment.

15. Gaps in infrastructure, particularly in grid networks, hydrogen systems and CO_2 transport and storage systems, were cited by many participants as a barrier to near-term deployment of technology, although some participants noted that such gaps can also reveal longer-term investment priorities. Several participants noted the conflicting dynamic in which the absence of shared infrastructure may deter investment in individual projects, while the scale of individual projects may be insufficient to justify infrastructure development in isolation. Some participants highlighted regulatory frameworks in their countries which set storage capacity goals for relevant industries as a means to enhance capacities over time. Cluster-based approaches to industrial decarbonization were highlighted by some as a means of reducing infrastructure costs across multiple facilities.

16. The misalignment between national industrial transition objectives and renewable energy and hydrogen infrastructure planning was raised by several participants as an area that would benefit from greater policy attention and coordination. Some participants noted that realizing the potential of hydrogen requires attention to the full value chain, from renewable power generation to end-use applications, as policy emphasis on one element without corresponding attention to sequencing may delay progress.

17. The level and predictability of carbon pricing was identified by several participants as a factor having a bearing on the extent to which price signals are able to drive long-term investment in low-carbon alternatives. Several participants observed that the predictability of carbon price trajectories is as important as the price itself in terms of influencing long-term capital allocation decisions.

18. Limited demand for low-carbon industrial products was identified by several participants as a barrier affecting the investment case for decarbonization across the value chain. Several participants noted that buyers often face difficulty distinguishing low-carbon products from their conventional equivalents, and that the limited willingness of buyers to pay a premium for low-carbon products constrains the development of the market for them. Public procurement frameworks, demand aggregation mechanisms, value visualization initiatives and internationally aligned standards for emissions accounting, benchmarking and product definitions for green industrial goods were among the approaches highlighted as a means of stimulating demand for low-carbon products. Some participants noted, however, that the development of standards should take into account different national circumstances and levels of industrial development, to ensure they function as enablers of market access

19. The challenge of adapting technologies developed in one national or regional context to the conditions prevailing in another was raised by several participants as an important barrier to technology transfer and deployment, particularly for emerging markets and developing countries. Several participants noted that technology transfer is most effective when it involves co-development with and local technical validation in the recipient country,

undertaken at an industry-wide level, as this approach can reduce costs and enable wide dissemination.

20. Long-term, stable policy frameworks for industrial decarbonization were described by many participants as an important enabling condition for investment therein. Several participants noted that enshrining long-term climate goals in national legislation and developing sectoral investment strategies have assisted in providing clarity in terms of both public and private capital allocation. Fragmentation of governance responsibilities across multiple ministries was noted as having the potential to undermine policy coherence.

21. Public–private collaboration on technology development, research and development, demonstration and commercialisation was highlighted by several participants as important to advancing industrial decarbonization, particularly in the case of investments with high upfront costs that individual actors may not be willing or able to undertake in isolation. The role of government as both a provider of financial support for research, development and demonstration and a convener of actors across the technology and innovation landscape was also noted. Several participants observed that industry associations can serve as platforms for aggregating demand, reducing transaction costs and facilitating the uptake of low-carbon solutions, and that technology deployment programmes in which operators increase their internal capabilities alongside adopting technology solutions can contribute to producing longer-lasting and more readily replicable outcomes.

22. Challenges relating to workforce and skills, including shortages of interdisciplinary technical professionals and the need for workforce re-skilling in affected regions, were raised by several participants as arising across multiple sectors and contexts. Several participants observed that industrial decarbonization presents both risks and opportunities for affected workers and communities, and that early, inclusive community engagement, benefit-sharing arrangements and coordinated approaches to workforce retraining are practical measures being applied in some contexts.

23. Access to finance was identified by several participants as a persistent barrier to the uptake of low-carbon industrial technologies given their high upfront costs and long payback periods. It was noted that small-scale actors in developing countries are frequently constrained by requirements for collateral and the absence of adequate financial support mechanisms.

24. Some participants highlighted the vulnerability of the industrial sectors to external market volatility and supply chain exposure, particularly in the context of increases in fossil-fuel import costs and the growing difficulty in accessing critical raw materials at competitive prices and in required quantities due to strategic dependencies.

25. The risk of carbon leakage was raised by some participants as a challenge with implications for the effectiveness of national mitigation action, with industries at risk of leakage noted as representing a significant share of national industrial emissions. Carbon border adjustment mechanisms were raised by some participants as an instrument being developed to address the risk of carbon leakage, alongside broader efforts to support the uptake of carbon pricing and accelerate industrial decarbonization internationally, and it was noted by these participants that such mechanisms can be designed to focus on large importers while exempting the majority of smaller ones. Some participants called for an open, inclusive and non-discriminatory global trade environment as a positive enabler of international cooperation on green transition and expressed concern that unilateral trade-related climate measures risk imposing a disproportionate burden on developing countries and present a structural challenge to international cooperation and as such should be considered in the light of the principles of equity and common but differentiated responsibilities, noting that such measures can hinder the free flow of green technologies and products, increase transition costs and undermine collective efforts towards low-carbon industrial development. While others highlighted that such measures are domestic and nationally determined and hence cautioned against characterising them as unilateral.

(b) Opportunities (including actionable solutions) and barriers

26. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization

of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Developing sectoral investment strategies and industrial decarbonization strategies that use, for example, least-cost pathway analysis to identify technology sequencing and support measures for priority industries;

(b) Adopting phased implementation approaches to industrial decarbonization that prioritize near-term, low-cost measures, including energy efficiency improvements, renewable energy integration into industrial systems and processes and fuel switching, while developing pathways for emerging technologies to mature and be integrated into decarbonization approaches over time;

(c) Developing integrated infrastructure planning approaches, including cluster-based approaches, to industrial decarbonization;

(d) Supporting the adaptation of proven low-carbon technologies to different national and local contexts through co-development and technical validation of technologies in recipient countries;

(e) Stimulating demand for low-carbon industrial products through public procurement frameworks, coordinated offtake agreements among buyers and producers, and aligned product standards and definitions;

(f) Strengthening interministerial coordination and whole-of-government approaches to policymaking on industrial decarbonization with a view to ensuring policy coherence across the climate, energy, industry and finance portfolios;

(g) Investing in workforce re-skilling, community engagement and benefit-sharing arrangements to address the just transition dimensions of industrial decarbonization in affected regions;

(h) Applying carbon pricing as part of a broader policy package that also addresses investment support, demand creation and infrastructure development and takes into account the need for predictability of carbon price trajectories over time to provide the certainty needed for long-term industrial investment decisions;

(i) Promoting industry associations as platforms for aggregating demand, reducing transaction costs and facilitating the uptake of low-carbon solutions by companies, particularly SMEs, and across regions.

27. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants include:

(a) Long operational lifetimes of industrial assets, which may give rise to the risk of lock-in;

(b) The gap between technology demonstration and commercial deployment, which may have arisen owing to, for example, underdeveloped financing frameworks for scaling up technologies beyond the pilot stage and an insufficient level of public investment;

(c) Gaps in infrastructure, including in electricity networks, hydrogen systems and CO_2 transport and storage systems, resulting in network capacity constraints, grid connection delays and the absence of shared infrastructure at the required scale to make investments in individual projects viable;

(d) Misalignment between national industrial decarbonization objectives and renewable energy and hydrogen infrastructure planning and development timelines, resulting in situations where low-carbon industrial processes must rely on fossil-derived inputs in the near term owing to the absence of a clean supply chain;

(e) Limited market demand for low-carbon industrial products, reflecting difficulties in distinguishing such products from conventional alternatives, limited willingness of consumers to pay a premium price for such products, and the absence of international standards for such products;

(f) The risk associated with adapting technology solutions developed in one national context to conditions prevailing in another, which can raise the cost of capital and constrain deployment;

(g) Shortages of interdisciplinary professionals with technical experience in emerging industrial decarbonization fields, and the lack of coordinated approaches to workforce re-skilling in areas undergoing industrial transition;

(h) Limited access to finance for industrial decarbonization initiatives in developing countries as a result of, for example, high upfront costs, long payback periods, insufficient concessional finance and collateral requirements, all of which may exclude small-scale actors from accessing green investment;

(i) Fragmentation of governance structures, insufficient or unpredictable carbon prices, and outdated permit processes and regulatory frameworks that do not reflect the requirements of industrial decarbonization technologies, which can collectively slow investment and implementation.

B. Enabling mitigation ambition and implementation in industries, drawing on national and regional experience

1. Finance, technology development and transfer, and capacity-building

(a) Key observations from national and regional experiences

28. Many participants highlighted that long-term regulatory stability is essential for investor confidence and capital deployment in capital-intensive sectors such as steel, cement and chemicals. They emphasized that embedding industrial decarbonization within broader economic development plans would allow climate action to drive competition, job creation and economic transformation, rather than being seen as a stand-alone agenda.

29. Many participants emphasized that blended finance, public–private partnerships and stable policy environment are essential for mobilizing industrial decarbonization investments. Combining public resources with de-risking instruments helps overcome the green premium, facilitate and unlock private capital for investing in low-carbon infrastructure, particularly in hard-to-abate sectors, ensuring a just transition.

30. Participants discussed financing instruments and carbon pricing schemes, including emissions trading schemes and carbon taxes, that are aimed at accelerating the uptake of clean industrial products. These mechanisms provide the long-term signals necessary to unlock significant private investment in low-carbon infrastructure and innovation.

31. Many participants highlighted that context-specific application of technologies, including electrification, green hydrogen and CCUS, are important for reducing emissions in hard-to-abate sectors. Their successful deployment depends on aligning the maturity of the technologies with sectoral road maps, while being supported by carbon pricing and blended finance. Circular solutions such as bioenergy require localization alongside capacity-building for local actors to deploy these technologies effectively.

32. Several participants noted that risk mitigation mechanisms and innovative financial instruments build private sector confidence in mobilizing capital and scaling up projects. Such mechanisms and instruments include blended finance, which address upfront costs; carbon contracts, which provide price certainty; and green taxonomies, which prevent greenwashing. Participants expressed the view that market and non-market cooperative approaches under Article 6 of the Paris Agreement and sovereign green bonds are essential for bridging financing gaps in low-carbon infrastructure and deploying low-carbon technologies.

33. Many participants emphasized that robust MRV systems for emissions, digital tools and reliable environmental data are essential for attracting green investment. Standardizing sustainability information reduces investor risk while aligning MRV frameworks with green procurement enhances global credibility of low-carbon products. Digital technologies and

product life-cycle analyses are critical for ensuring environmental integrity of complex supply chains.

34. Participants noted that international and regional cooperation, the provision of financial assistance and technology transfer are essential for assisting developing countries in overcoming the high costs and technical barriers related to industrial decarbonization. In particular, some participants highlighted the existing finance gap, citing that investments in mitigation must rise three- to six-fold.

35. Several participants highlighted that capacity-building to adopt and manage low-carbon technologies was noted by many participants as being essential for industrial decarbonization, especially in developing countries. Specialized training and knowledge transfer initiatives equip the workforce with the necessary skills to implement sustainable industrial process. Investment in research, development, deployment and commercialization can contribute to accelerating innovation and creating locally appropriate clean technology solutions, while sustained institutional strengthening and human capital development ensure these technologies deliver long-term socioeconomic benefits.

(b) Opportunities (including actionable solutions) and barriers

36. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Designing blended finance mechanisms and public–private risk-sharing models, including contracts for difference, concessional loans and innovation funds, to front-load corporate investment into industrial decarbonization initiatives and bridge the gap between current deployment costs of low-carbon alternatives and market capacity;

(b) Providing developing countries access to concessional finance, grants and carbon- or climate-related funding through instruments such as Article 6 markets, green transformation funds and global matchmaking platforms, thereby connecting their industrial decarbonization needs with targeted financial and technical support;

(c) Investing in industrial decarbonization infrastructure, including renewable energy grids, green hydrogen production and transportation networks and CO_2 storage systems, alongside applying cluster-based approaches to industrial decarbonization that enable companies to share costs related to carbon capture and clean energy generation;

(d) Supporting technology transfer (e.g. of green hydrogen, low-carbon cement and digital industrial technologies), capacity-building (e.g. via training academies) and local innovation (e.g. via partnerships that adapt global innovations to local circumstances);

(e) Implementing advanced digital tools for data collection and emissions MRV frameworks to facilitate investment in low-carbon projects and regulatory oversight, these measures encompass digitalizing manufacturing processes, monitoring the carbon footprint of industrial goods and ensuring the transparency of emission reductions across entire supply chains;

(f) Promoting international and regional partnerships among public and private sectors, expertise exchange of technical and policy expertise and the scaling up of innovative low-carbon solutions; these efforts are facilitated by multilateral initiatives, working groups, bilateral trade agreements focused on low-carbon technologies and matchmaking platforms aimed at aligning national decarbonization goals with international capital and specialized technical assistance.

37. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants include:

(a) Restricted access to affordable finance, high upfront capital expenditures and significant lock-in risks created by the lengthy lifetimes of existing infrastructure. These

challenges are intensified by a mismatch in timing between investments and returns, thereby impeding project bankability and commercial viability;

(b) Insufficient risk-sharing mechanisms and innovative financial instruments, which deters private investment in nascent technologies owing to the high risks and commercial unviability associated with them. Mismatched investment timing and low-demand for low-carbon products hinder capital-intensive projects from reaching the final investment stage;

(c) Limitations in access to technologies, locally appropriate solutions and infrastructure pose major barriers to industrial decarbonization. These are compounded by the lengthy lifetimes of existing industrial assets, creating risks of lock-in of older, high-emission facilities and a lack of scale for newer, near zero emission technologies;

(d) Disparities in technological maturity and institutional capacity, where developing nations, particularly SIDS and emerging markets, struggle to overcome their constraints in designing bankable projects and lack of expertise in carbon accounting and emissions MRV systems;

(e) Governance and regulatory obstacles hindering investment and technical progress, such as fragmentation of policy frameworks and unpredictability of regulatory frameworks, which compound the risks for long-lived industrial assets;

(f) Information deficiencies, inconsistent metrics and underdeveloped digital foundations, including fragmented GHG MRV systems. Participants noted that the significant financial burden of establishing and maintaining these robust MRV systems constitutes a major finance barrier rather than solely a technical capacity limit. These are exacerbated by an absence of harmonized international standards and data.

2. Governance and policy

(a) Key observations from national and regional experiences

38. Many participants highlighted the importance of integrating industrial decarbonization into broader national development strategies, long-term low-emission development strategies and NDCs, rather than being seen as a stand-alone climate agenda. Several participants noted that doing so could help to ensure policy coherence and link mitigation objectives with broader economic development goals.

39. Several participants pointed to the enshrining of long-term climate and industrial decarbonization goals in national legislation as an important tool for providing policy signals to industry and investors across political cycles. Participants described national climate laws anchoring NDC goals and long-term emission reduction goals in stable legislative frameworks, with annual reporting mechanisms on progress towards these goals cited as providing accountability and enabling regular assessment of whether policies need to be strengthened in order to achieve them. It was noted that linking such reporting to budget planning can help to ensure that budgetary decisions reflect progress towards national emission reduction goals.

40. Several participants described coherent, cascading policy frameworks in which economy-wide emission reduction targets can be used to develop sectoral policies, investment strategies and regulatory instruments, highlighting them as an important means of translating national ambition into implementable action. Sectoral decarbonization road maps, developed through structured engagement between governments, industry associations and financiers, were identified as a practical tool within such frameworks.

41. Several participants described interministerial coordination mechanisms, including climate committees, multi-entity designated national authority structures and cross-sectoral commissions, as a practical means of ensuring policy coherence across the energy, industry, environment and finance portfolios involved in industrial decarbonization.

42. Carbon pricing was referred to by many participants as an important instrument for driving industrial decarbonization, with emissions trading systems cited as providing both a price signal and revenues that can be channelled back into mitigation implementation.

Several participants noted that emissions trading systems tend to be most effective when emission caps are sufficiently stringent and surplus allowances are managed so as to sustain a price level capable of influencing long-term investment decisions.

43. Robust MRV systems for GHG emissions were identified by many participants as an important enabler of effective climate governance, underpinning evidence-based policymaking, the tracking of NDC progress and access to climate finance. Several participants noted that MRV systems can contribute to improving the availability and consistency of emissions data across sectors, thereby strengthening policy signals for investors. Some participants also noted that engagement with cooperative approaches and market mechanisms under Article 6 of the Paris Agreement and with voluntary carbon markets can help to support the development of national MRV capacity.

44. Several participants noted the increasing role of industrial decarbonization strategies in supporting technologies where emissions reductions are aligned with commercial adoption and market viability, rather than dependent on a climate rationale alone. They highlighted that the durability and predictability of policy frameworks has become an important factor in investment decision-making for such technologies.

45. Several participants highlighted the importance of inclusive multi-stakeholder engagement as a component of effective governance for industrial decarbonization. They noted that technical round tables on industrial decarbonization methodologies and data with industry associations have proven to be effective in standardizing GHG emission methodologies, improving data consistency and ensuring that policies are both technically sound and implementable. It was also noted that inadequate consultation with local stakeholders, including farmers, fishers, Indigenous Peoples and local communities, can undermine the social acceptability of mitigation measures. Several participants observed that governance mechanisms need to be extended to the subnational level to ensure coherence between national policy frameworks and their local implementation, noting that subnational authorities often have a critical implementation role but may lack the technical and financial resources to fulfil it.

46. Several participants from SIDS highlighted specific governance challenges, including fragmented markets for low-carbon products, infrastructure gaps and constrained fiscal space, observing that, in such contexts, the policy challenge is often not market distortion, but market absence. Public sector leadership through procurement, concessional power purchase agreements and early adoption of low-carbon technologies was highlighted as important for market creation. Regional collaboration, including through shared technical platforms for infrastructure planning and investment facilitation, pooled procurement of low-carbon products and equipment and the development and application of regional standards for product certification, was highlighted as a practical means of overcoming scale-related constraints in accessing finance and deploying low-carbon technologies.

(b) Opportunities (including actionable solutions) and barriers

47. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Enshrining long-term climate goals in national legislation, supported by reporting mechanisms linked to budgetary processes with a view to providing long-term policy signals to industry and investors and establishing accountability for progress towards these goals across political cycles;

(b) Developing national sectoral decarbonization road maps through structured engagement with governments, financiers and industry, including through industry associations, to build a shared understanding of technology pathways and investment requirements across sectors and time-horizons;

(c) Applying carbon pricing as part of a broader policy package that includes investment support, technology development and demand creation measures, with revenues channelled into climate funds, including in support of just transitions;

(d) Using green public procurement frameworks to create early demand for low-carbon industrial products as a means of stimulating market development where private demand remains insufficient;

(e) Leveraging market-based mechanisms, including arrangements under Article 6 of the Paris Agreement, voluntary carbon markets and carbon pricing schemes, to bridge the green premium gap and crowd in private finance for low-carbon industrial projects and technologies, while ensuring adequate safeguards for social and environmental integrity, including through the meaningful participation of affected communities in project design and benefit-sharing arrangements;

(f) Establishing interministerial coordination mechanisms and designated national authorities to ensure policy coherence across the climate, energy, industry and finance portfolios, with a bottom-up design process that accounts for the roles and responsibilities of the sectoral ministries and entities in implementing such policies;

(g) Promoting regional collaboration, including through shared technical platforms, pooled procurement and regional standards, to assist countries, particularly SIDS, in addressing scale-related constraints and in overcoming infrastructure and financing barriers;

(h) Developing inclusive multi-stakeholder governance mechanisms, including technical round tables with industry associations and structured community engagement processes, to ensure that policies are technically sound, implementable and socially acceptable, and are extended to the subnational level.

48. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants include:

(a) Policy uncertainty and mid-cycle regulatory changes, which can undermine investor confidence and prevent pilot projects from being commercially deployed, particularly as climate finance tends to focus on commercially mature assets with near-term returns;

(b) Gaps between national climate and industrial decarbonization technologies and their implementation, including the absence of sectoral road maps and limited technical guidance, which can prevent national climate goals from being translated into implementable projects;

(c) Fragmented and non-interoperable MRV and data systems, which limit the availability of consistent emissions data across sectors and can constrain both evidence-based policymaking and access to climate finance;

(d) Insufficient market demand for low-carbon industrial products owing to limited awareness, the absence of green public procurement frameworks and the unwillingness of buyers to absorb green premiums;

(e) Governance challenges specific to SIDS and other countries with limited institutional capacity, including market absence, infrastructure gaps and constrained fiscal space for public investment.

II. Summary of the seventh investment-focused event

A. Discussions

49. The scene-setting presentation highlighted that mobilizing finance and investment are critical for industrial decarbonization, particularly in emerging markets and developing economies, where most global steel and cement production takes place. Current public bilateral and multilateral financial support remains limited as a share of total mitigation finance, while investment needs for near zero emission technologies are substantial. The presentation emphasized that there is no single instrument that can close the gap in terms of

competition with conventional fossil fuel based production; rather, a mix of grants, concessional loans, guarantees, capital and operational expenditure support, demand-side measures, carbon pricing, carbon credits and revenue-stabilization mechanisms may be needed, supported by long-term plans for industry decarbonization, NDCs, sectoral road maps, taxonomies, regulations for low-carbon technologies, infrastructure, affordable energy and raw materials, policy coordination, stakeholder engagement and international cooperation.

50. The panel discussion considered the elements that enable financing for industrial decarbonization to work in practice and at scale, drawing on perspectives from multilateral climate funds, multilateral development banks, philanthropies and private financial institutions. Participants noted that finance for industrial decarbonization should be approached according to technological maturity, namely through capacity-building for SMEs and developing economies where mature technologies are available; public–private collaboration to create demand for technologies that have proven to be effective but have not yet been implemented at scale; and national strategic coordination to guide private capital towards next-generation technologies such as green hydrogen and CCUS. Financial institutions may understand transition objectives at a general level but require stronger sector-specific knowledge, clearer project pipelines and closer engagement with real-economy actors, including ministries of industry, regulators and industries.

51. Participants discussed the role of multilateral climate funds and development banks in supporting countries across the full investment chain, from readiness and institutional strengthening to project preparation and large-scale financing. The catalytic role of the GCF in mobilizing finance was also mentioned including through provision of readiness support, project preparation facilities and blended financial instruments to help developing countries translate NDCs into bankable project pipelines. Participants highlighted the role of multilateral development banks in integrating climate objectives into national systems, tailoring financing instruments to the specific complexities of industrial decarbonization and addressing fragmentation of SMEs, transition risk and the need for clear economic rationales to mobilize private sector capital.

52. Participants further discussed the importance of targeted upstream technical assistance, including in relation to transition risk modelling, economic viability assessments, firm-level road maps towards decarbonization, energy efficiency audits of industrial processes and financial structuring of industry decarbonization finance, to create actual demand and identify practical opportunities for climate-informed investment. They also highlighted the catalytic role of philanthropic funding in supporting policy design, capacity-building, market transformation and coordination among governments, industry associations and financial institutions. It was suggested that the “hard-to-abate sector” label should not discourage action, as available and emerging technologies provide opportunities to scale deployment of technological solutions.

53. The session on case studies and perspectives on financing mitigation in industries included presentations on policy, finance and project-development approaches for financing industrial decarbonization. Topics discussed included scaling technologies through investment in public research and development, the role of export credit guarantees, multilateral climate finance under the GEF, source of finance for enabling the transition of hard-to-abate sectors such as iron and steel, circularity of palm oil waste biomass through co-firing in power plants, and technical assistance for developing investment-ready project pipelines and national technology road maps for NDC implementation.

54. Participants emphasized that industrial decarbonization requires a coherent combination of technology development, targeted finance and credible market signals. The experience of the Republic of Korea in scaling industrial decarbonization technologies highlights the importance of targeted research and development, concessional lending, tax incentives and credible carbon pricing to reduce risks for capital-intensive technologies and mobilize private capital. Export credit agencies were also mentioned as an important but often underutilized tool to reduce political and financial risks, enabling long-term financing for industrial decarbonization projects with lending from commercial banks.

55. Participants discussed how multilateral climate funds and implementing entities can support countries in developing investment-ready project pipelines. Examples from the GEF included grant financing, technical assistance and blended finance for improvements in relation to industrial energy efficiency, electrification, material efficiency and circularity, feedstock substitution, development of green hydrogen, battery supply chains development and decarbonization of the cement production. A representative of UNIDO, as a GEF implementing agency, described how such support can be translated into concrete country-level projects aligned with national strategies, such as South Africa's just energy transition priorities, green hydrogen development, battery value chains and initiatives aimed at creating long-term industrial growth and jobs.

56. During the discussions, participants underscored the need to strengthen project preparation and investment readiness. They noted that technical assistance, including through feasibility studies, technology assessments, product standards, asset-level data systems, financing strategies and capacity-building for local financial institutions, is often needed before or alongside investment to address policy, regulatory, technical and financial barriers. A representative of UNIDO shared information on the organization's technical assistance, including regional workshops on the use of low-carbon cement alternatives. Innovative financial instruments for transition, including those linked to carbon credits and buyer-of-last-resort structures, were discussed as possible ways of addressing revenue uncertainty and improving access to capital, provided that they include robust baselines, additionality provisions and sunset clauses.

57. Participants also discussed practical implementation issues, including the need for reliable supply chains, appropriate procurement structures and institutional coordination. A case study presented by a representative of IRENA on co-firing palm oil waste biomass in coal power plant in Malaysia highlighted the importance of feedstock availability, fuel quality and financing mechanisms to address biomass procurement costs that exceed those of conventional fuels. The case study on Pakistan's collaboration with CTCN and the Global Green Growth Institute in developing technology road maps and investment pipelines also underscored the importance of government ownership, technical assistance, matchmaking with financiers and alignment with national development and just transition objectives.

B. Pitch hub

58. The feedback from the advisory panel emphasized the critical importance of clear communication, well-defined project scope, detailed financial information, robust data and planning, effective governance and a strong commitment to ensuring sustainability and social impact in terms of improving the proposal and attracting investment. The feedback on the presentations can be summarized as follows:

(a) It was highlighted that projects need clear concepts, timelines and alignment with national goals. As lenders shift from purely grant-based funding towards blended finance, project proposals should split large financing requests into manageable phases, identify revenue-generating milestones and demonstrate long-term financial self-sufficiency;

(b) The advisory panels emphasized the importance of tailoring project scopes in alignment with local needs and showing the potential for replicability. Baseline costs and qualitative benefits should be quantified;

(c) Projects should have a long-term vision integrating climate resilience and infrastructure development. To survive post-grant funding, it was advised that projects should clarify operational costs and quantify job creation, the value chain and specific health impacts, especially for women and children;

(d) Scaling strategies should bundle small-scale activities into bankable programmes that can justify transaction costs. Clear road maps should detail costs, reductions in greenhouse gas emissions and private sector engagement, while establishing mechanisms that recycle capital to create sustainable markets;

(e) Government leaders should be engaged at an early stage to ensure project alignment with national strategies and eventual policy ownership. Building public–private

partnerships, exploring opportunities for subnational funding and using co-financing to share risks and boost investor confidence was also advised;

(f) Operational risks should be mitigated, including supply chain disruptions and consumer adoption barriers. To ensure investment readiness and a lasting legacy, the need to evaluate regulatory requirements at an early stage and build robust institutional systems was emphasized, rather than relying on short-term capacity building workshops;

(g) The environmental benefits of projects should be quantified and verified. In addition, highlighting co-benefits such as improved public health outcomes, reduced black carbon and enhanced urban climate resilience can make project proposals more appealing to diverse investors;

(h) Involving local communities through a bottom-up co-development approach was highlighted as critical to enhancing project legitimacy and adoption. Collaboration with the private sector and local governments should focus on promoting job creation and implementing behavioural change campaigns to ensure that technical investments achieve desired social outcomes;

(i) Promoting international collaboration and technical assistance is key to effective project implementation. The project should leverage capacity-building programmes and technical assistance to equip stakeholders with tools and key performance indicators for implementation. Standardizing data systems open long-term access to carbon markets and sustainability-linked loans long after the project has been concluded.

C. Opportunities (including actionable solutions) and barriers

59. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants and showcased in the regional case studies include:

(a) Developing an end-to-end ecosystem for accessing climate finance that links upstream readiness support, institutional strengthening, project preparation facilities and blended finance to translate NDC priorities into bankable industrial decarbonization projects;

(b) Improving the connection between NDCs and actual finance by integrating climate goals into sector policy planning, using country climate finance platforms and developing integrated policy and finance packages, including targeted research and development, concessional finance, export credit guarantees, carbon credit offtake agreements, contracts for difference, reimbursable grants and carbon pricing frameworks, to reduce risks during the transition from technology demonstration to commercial deployment;

(c) Developing bankable project pipelines and strengthening investment readiness through technical assistance, investment-ready concept notes, sector-specific technology road maps, feasibility studies, standardized data systems, asset-level monitoring, economic viability assessments and capacity-building for local financial institutions, including financial modelling, risk structuring, transition risk assessments, sector-specific technologies and transition pathways;

(d) Increasing collaboration among multilateral development banks, multilateral climate funds, philanthropies, insurance providers, national development banks and local financial institutions to make financial instruments more accessible to both SMEs and larger industrial actors;

(e) Using transition finance instruments, including bonds linked to carbon credits, buyer-of-last-resort arrangements to stabilize revenue streams, and revolving catalytic funds while ensuring that they include robust baselines, technical additionality, revenue-generation milestones and sunset clauses;

(f) Harnessing the catalytic role of philanthropic funding, including through civil society organizations, think tanks and coordination platforms, to support enabling

environments, policy design, market transformation and the preparation of bankable project pipelines;

(g) Implementing demand-side policies, green public procurement, low-emissions product standards, public–private coordination and market development measures to create demand for low-emission and near zero emission industrial products;

(h) Advancing broader sustainable development benefits while promoting industrial decarbonization to access philanthropic and public–private finance in cross-sectoral areas such as public health, job creation, rural livelihood improvement, increasing productivity, climate resilience and energy security;

(i) Improving enabling conditions for biomass and other resource-based mitigation solutions by identifying national champions to strengthen ownership of implementation, securing reliable feedstock supply, reducing contractual risks, developing pre-treatment supply chains and using public de-risking instruments to absorb early stage project risks.

60. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants and showcased in the regional case studies include:

(a) Financing gaps between technology validation and commercial deployment attributable to high upfront costs, long investment cycles and payback periods, high perceived risks for unproven new technologies, currency and credit risks, limited access to affordable long-term capital and limited sector-specific knowledge among financial institutions, with many financing approaches relying on corporate lending or broad sustainability-linked loans, rather than project-based structures suited to complex blended finance solutions;

(b) Weak pipelines of investment-ready projects as a result of limited pre-feasibility work such as market readiness assessments, financial sustainability analysis and targeted matchmaking with development partners and financiers;

(c) Weak enabling environments, including limited data availability, unsuitable technical standards, fragmented technical assistance, policy uncertainties, lack of standardized contractual architectures for long-term supply of low-emission products, and constraints related to existing green finance definitions and taxonomies, which may favour fully green technologies and fail to sufficiently recognize credible transitional or incremental improvements in hard-to-abate sectors;

(d) High transaction costs due to fragmented industrial markets, especially where SMEs and smaller manufacturers lack the scale, credit profile or experience needed to directly access multilateral or commercial finance;

(e) Weak implementation capacity, including insufficient coordination across ministries, regulators, financial institutions and industries, including cases where financial initiatives and central bank sustainability efforts on industry decarbonization operate separately from ministries of industry and sectoral policymakers;

(f) Challenges faced by SIDS in accessing timely and predictable finance, despite having developed NDC investment plans, implementation road maps and investment pipelines;

(g) The limited scale of philanthropic funding relative to overall climate investment needs, requiring careful targeting of such resources to harness their catalytic role;

(h) Technical and supply chain constraints for resource-based solutions, including feedstock impurities, fuel quality risks, the lower calorific value of biomass compared with coal to ensure effective power plant operation through co-firing, higher procurement costs of low-emission industrial products, lack of long-term fuel supply contracts and weak contractual architecture.

Annex II

Eighth global dialogue and investment-focused event under the Sharm el-Sheikh mitigation ambition and implementation work programme*

I. Summary of discussions, key findings, opportunities and barriers at the eighth global dialogue

A. Experiences of best practices and actionable solutions in addressing challenges and barriers, including the enablers of ambition and implementation of mitigation action in industries

(a) Key observations from national and regional experiences

1. Industrial decarbonization was widely discussed as requiring integrated and whole-of-systems approaches that combine technological innovation, enabling infrastructure, supportive policy and regulatory frameworks, financing mechanisms, market creation and institutional capacity. It was noted that no single technology, policy instrument or pathway can bring about such a transition in isolation and that success depends on coordination across multiple sectors and stakeholders. Participants highlighted a range of mitigation approaches and areas, including digital technologies, pertaining, inter alia, to energy efficiency, electrification, renewable energy, green hydrogen, CCUS, methane mitigation and resource efficiency, alongside the use of digital technologies to improve industrial efficiency, optimize operations and strengthen monitoring. Participants emphasized that countries' choices among these approaches are likely to vary according to their national circumstances, existing industrial structures and stage of development, with systems-based, sectoral and bottom-up approaches all presented as viable entry points.

2. Participants also emphasized that many of the technologies and approaches required for industrial decarbonization are already available and that a central challenge in advancing mitigation action is accelerating their deployment and commercialization. Discussions underscored the need to move beyond isolated pilot projects and towards implementation at scale with the support of enabling policy, financial and institutional frameworks.

3. Participants highlighted industrial decarbonization not only as a climate objective but also as an opportunity for countries to strengthen their industrial competitiveness, support economic diversification, enhance energy security, create jobs and develop new value chains. It was emphasized that industrial transformation is more likely to be sustained in cases where a country's mitigation objectives are aligned with its broader economic and development priorities.

4. Several participants emphasized that industrial decarbonization cannot be considered separately from broader systems transformation. Experience shared highlighted the importance of expanding renewable energy generation, strengthening grid infrastructure, deploying energy storage systems and improving system integration in supporting the increasing electrification of industrial processes and the deployment of other low-emission technologies. Participants noted that it may be beneficial to undertake industrial and energy system planning in a coordinated manner to support infrastructure readiness.

5. Participants highlighted the role of industrial clusters, eco-industrial parks and shared infrastructure in supporting industrial decarbonization. Experience shared demonstrated the ways in which coordinated approaches can reduce the costs associated with industrial decarbonization, facilitate deployment of emerging technologies and support the development of common electricity, hydrogen and CO_2 infrastructure. Several participants noted that such approaches can also strengthen collaboration across value chains and create

* Not formally edited.

opportunities for industrial symbiosis and resource sharing. Regional cooperation was noted as being a way of expanding the markets of smaller economies and the least developed countries.

6. Participants highlighted the growing role of digitalization, data systems and AI in improving industrial efficiency, optimizing operations, supporting predictive maintenance and strengthening emission monitoring. They noted that investment in institutional capacity, workforce skills and data management systems can enhance the benefits of digital technologies; that AI-based solutions should be tested under real-world conditions and results verified against reliable measurements; and that human oversight and cybersecurity are important.

7. Participants observed that challenges faced by countries with regard to industrial transformation differ according to their levels of industrial development and existing asset bases. While countries with mature industrial systems may face challenges associated with retrofitting long-standing industrial facilities and infrastructure, countries continuing to industrialize may be able to integrate low-emission technologies and infrastructure at earlier stages of development. Participants therefore stressed that industrial decarbonization pathways should reflect countries' national circumstances and development priorities. Some participants from developing countries emphasized that industrialization itself should be low carbon, resource efficient and climate resilient, and highlighted opportunities for industrial transformation to support domestic value addition, the development of local capabilities and participation in higher-value, low-emission value chains, rather than relying primarily on the export of raw materials.

8. Many participants identified long-term policy certainty, often anchored in law, as a key enabler of industrial investment. Other enablers cited include structured dialogue between governments and industry actors, the application of carbon pricing as part of a broader policy package, including investment support, demand-side measures and infrastructure development, and the creation of demand for low-carbon products through green public procurement, shared standards and offtake arrangements. It was noted that policies that change with each government and short funding cycles tend to produce demonstration projects but may not facilitate deployment at scale.

9. Many participants noted that, while finance may often be available, a lack of investment-ready projects can constrain its mobilization. They highlighted project preparation, risk sharing for first-of-a-kind projects and transparent project-level data as being ways of bridging this gap, noting that climate finance can also be understood as the transfer of risk and not only of money. Many developing countries emphasized that their capacity to implement industrial mitigation projects depends on affordable long-term finance, de-risking and locally adapted technology transfer, including upskilling, that is tailored to local contexts. Some called for grant-based and concessional finance and cautioned against finance that adds to debt burdens.

(b) Opportunities (including actionable solutions) and barriers

10. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Scaling up energy efficiency measures, retrofitting, process optimization, waste heat recovery and energy management systems across industrial sectors. These cost-effective opportunities for improving the performance of existing industrial assets are capable of delivering near-term emission reductions while improving productivity and competitiveness;

(b) Expanding the deployment of electrification, renewable electricity generation, energy storage systems and supporting grid infrastructure while integrating industrial planning into broader energy system transformation with a view to ensuring reliable access to low-emission electricity and supporting the decarbonization of industrial processes;

(c) Deploying and scaling up a portfolio of mitigation technologies and approaches, including green hydrogen and CCUS, in a manner that is tailored to both national circumstances and specific sectors (particularly sectors wherein direct electrification may not be feasible), supported by enabling infrastructure, policy and finance frameworks and complemented by demand-side measures;

(d) Pursuing abatement measures for methane and other non-CO_2 emissions, including by designing methane controls into facilities from the outset rather than retrofitting them later;

(e) Promoting circular economy approaches; industrial symbiosis; recovery and recycling and the recovery and utilization of waste streams and use of secondary materials; and low-emission industrial processes. These measures can simultaneously reduce emissions, improve resource efficiency and strengthen industrial competitiveness;

(f) Developing industrial clusters, eco-industrial parks, integrated industrial hubs and shared industrial infrastructure, including electricity, hydrogen and CO_2 transport and storage systems, as a means of reducing costs, facilitating deployment of emerging technologies and achieving economies of scale;

(g) Establishing long-term policy frameworks and industrial transition strategies, including through legislation, with the support of structured dialogue between governments and industry actors and sectoral road maps developed in cooperation with said actors;

(h) Applying carbon pricing alongside as part of a broader policy package, with revenue invested, through credible accounting processes and with national authorization, in clean energy and innovation and, where applicable, cooperative approaches under Article 6 of the Paris Agreement;

(i) Creating demand for low-carbon industrial products through green public procurement, shared standards and definitions for such products, product certification and long-term offtake arrangements;

(j) Mobilizing finance for first-of-a-kind industrial projects through project preparation and de-risking measures, including public underwriting, equipment insurance and transparent information on costs and emission reductions, using financing structures that later projects can replicate;

(k) Strengthening international cooperation to support industrial decarbonization, including through, technology cooperation and transfer, technical assistance and capacity-building (including through knowledge-sharing); facilitating access to technologies and finance; building domestic technological and institutional capabilities; and accelerating the replication and scaling of successful industrial decarbonization approaches.

11. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary according to national circumstances, barriers and challenges mentioned by participants include:

(a) The high capital intensity of industrial decarbonization investments, combined with limited access to affordable and concessional finance, and perceived investment risk with regard to and challenges in mobilizing finance for first-of-a-kind projects and emerging technologies;

(b) Persistent difficulties in developing investment-ready and bankable projects due to limited capacity for project preparation, insufficient technical support, limited availability of robust data and measurement systems, and challenges associated with demonstrating commercial viability;

(c) Infrastructure gaps, including insufficient renewable energy generation, grid capacity limitations, challenges related to energy storage, hydrogen infrastructure constraints and limited CO_2 transport and storage networks. These gaps can delay deployment and increase project costs for mitigation ambition and implementation in industries;

(d) The long lifespans of industrial facilities and supporting infrastructure, which can make industrial transformation complex and necessitate strategies that balance

retrofitting and optimization of existing assets with deployment of new technologies and systems;

(e) Limited long-term policy and regulatory certainty, including, in some cases, the absence of regulatory frameworks for industrial decarbonization projects, insufficient demand signals for low-emission products, and uncertainty regarding future market conditions. Such conditions can constrain investment decisions and delay the deployment of mitigation technologies at scale;

(f) Challenges associated with scaling technologies from the demonstration stage to commercial deployment, including lack of technology maturity, high costs, poor access to supporting infrastructure and limited opportunities for risk sharing among stakeholders;

(g) Limited institutional capacity, technical expertise, workforce skills and access to technology and knowledge, and other challenges associated with adapting mitigation solutions to local circumstances and ensuring that developing countries can effectively participate in and benefit from industrial transformation;

(h) Similar to the discussion under the area of discussion on cross-cutting issues, unilateral trade-related climate measures were identified by some participants as barriers and challenges to mitigation in industries, while others defined carbon border adjustment mechanisms as domestic and nationally determined policy measures aimed at addressing carbon leakage.

B. Experiences of other cross-cutting issues as mandated in decision 4/CMA.4, paragraph 4

(a) Key observations from national and regional experiences

12. Many participants emphasized that industrial decarbonization is part of a systemic transformation encompassing broader macroeconomic, environmental and social systems. While whole-of-government approaches aligning countries' climate strategies with their industrial, trade, energy and development goals ensure policy coherence in this regard, balancing mitigation ambition with concerns pertaining to the cost of living and economic resilience maintains public trust, ensures energy security and delivers health co-benefits.

13. Many participants mentioned that achieving a just transition for the workers and communities that depend on emissions-intensive industries is key for sustained mitigation action. Participants described national practices already in place, including climate acts; agencies dedicated to net zero economic transition; and national sustainable action plans designed to support workforce retraining, skill development and local economic diversification. Mechanisms for tripartite dialogue involving governments, labour representatives, and industry actors were highlighted as effective tools for anticipating workforce shifts and ensuring that quality employment can be accessed within emerging low-carbon value chains.

14. Several participants highlighted inclusive stakeholder engagement, equity and social inclusion, in accordance with respective human rights obligations as appropriate, as being key for sustainable industrial mitigation action. They described community benefit-sharing frameworks, especially those involving Indigenous Peoples and local communities, as means of securing localized socioeconomic returns. Participants also cited the importance of targeted initiatives, such as dedicated funding and mentoring for women in technical occupations and in science, technology, engineering and mathematics fields, as well as structured youth engagement in national climate planning.

15. Some participants and experts noted that the risk of carbon leakage poses a challenge for national mitigation action, with carbon border adjustment mechanisms highlighted as instruments to address leakage, ensure competitiveness and support carbon pricing. Furthermore, some participants called for an open and non-discriminatory international trade environment, expressing concern that unilateral trade-related climate measures that affect foundational commodities impose disproportionate economic burdens on developing countries, constrain fiscal space and hinder progress with regard to nationally determined

mitigation pathways, and these participants also referred to Article 3.5 of the Convention. Meanwhile, other participants observed that carbon border adjustment mechanisms are domestic and nationally determined policies and cautioned against characterizing them as unilateral trade barriers.

16. Many participants stressed that anchoring industrial mitigation action within overarching national development strategies, long-term low-emission development strategies and climate laws provides long-term policy signals to industry actors and investors across political cycles. Participants described whole-of-government governance structures, such as presidential climate commissions and interministerial committees, as practical tools for aligning climate objectives with industrial, trade, energy and fiscal portfolios and eliminating policy fragmentation in this area.

17. Several participants emphasized the importance of aligning industrial mitigation action with biodiversity conservation, activities pertaining to water security and ecosystem restoration through integrated territorial and watershed planning. They also noted that bioeconomy frameworks and renewable material substitution provide valuable synergies between industrial decarbonization and broader environmental and circularity goals. Furthermore, participants highlighted managing environmental trade-offs as being important to integrated system planning, citing industrial water recycling and life cycle assessments of capture technologies as practical means to avoid unintended ecological burdens.

18. Several participants highlighted dedicated revenue recycling from carbon pricing as a practical tool to balance mitigation ambition with social protection. Directing revenues from emissions trading systems and carbon taxes into targeted social mechanisms can mitigate the impact of rising costs on vulnerable households. Cooperative approaches under Article 6 of the Paris Agreement can direct investment toward community resilience and sustainable development priorities in host countries.

19. Participants underscored that the digital transition within heavy industry and manufacturing intersects with broader socioeconomic, institutional and governance dimensions. They emphasized that, while advanced data architecture and AI can enhance emissions transparency and life cycle emissions tracking across supply chains, their adoption requires increased electricity supply, robust digital public infrastructure, open data standards and reliable access to connectivity. Discussions highlighted the critical need to bridge the digital divide between developed and developing regions by ensuring equitable access to emerging digital solutions while prioritizing human oversight, data governance and workforce capacity-building to support an inclusive industrial transformation.

20. Many participants highlighted the important role of international cooperation, regional alliances and South–South partnerships in delivering sustainable development co-benefits. They noted that technology transfer needs to move beyond the provision of hardware and towards collaborative ecosystems encompassing joint research, local adaptation action and capacity-building. Multilateral initiatives, research platforms and project preparation support strengthen domestic capacities, avoid fragmented efforts and accelerate low-carbon industrial development across emerging markets.

2. Opportunities (including actionable solutions) and barriers

21. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants include:

(a) Strengthening institutional support, tailored skills training and localized benefit-sharing approaches for communities and workers in regions undergoing economic and industrial transitions;

(b) Exploring revenue recycling approaches from carbon pricing and market mechanisms, where applicable, to support vulnerable households, assist low-income consumers and facilitate industrial modernization;

(c) Advancing gender-responsive industrial transition frameworks, including targeted grants, mentorship and capacity-building programmes, to promote the participation

and leadership of women in the context of industrial transition and clean technology deployment;

(d) Strengthening the integration of industrial mitigation strategies into territorial planning, water resource management and ecosystem restoration to foster biodiversity and resilience co-benefits;

(e) Fostering international cooperation to ensure consistency between carbon accounting methodologies and cross-border regulatory requirements, improve data and accounting comparability and mitigate the adverse socioeconomic impacts of such measures on developing countries;

(f) Strengthening regional cooperation platforms, such as regional clean technology and efficiency networks, in order to more effectively share case studies, pool technical resources and expand access to clean energy solutions.

22. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants include:

(a) Competing national socioeconomic priorities and limited fiscal space in developing economies posing challenges such as severe budgetary trade-offs and constraints on committing public funding to capital-intensive mitigation projects in the context of distributing capital between industrial decarbonization and critical needs such as public health, education and poverty eradication, compounded by limited institutional capacity and resources to enforce existing environmental laws and technical standards in practice;

(b) Adverse socioeconomic impacts of industrial mitigation action on regions and workforces reliant on emission-intensive and traditional industries, including potential job displacement and localized challenges arising from economic restructuring;

(c) Potential adverse impacts of unilateral trade-related climate measures, including risks to export competitiveness, foreign exchange earnings and, in developing countries, domestic financing available for sustainable transitions;

(d) Gender-based disparities in access to technical education, quality employment and financial resources within evolving industrial and technology sectors;

(e) Environmental trade-offs, such as elevated industrial water consumption and upstream environmental pressures, arising at various stages in the life cycles of industrial technologies.

C. Closing session – facilitative exchange

23. Participants reflected on opportunities to overcome challenges in advancing mitigation action, including those emerging from discussions held under the Sharm el-Sheikh mitigation ambition and implementation work programme. Aspects of mitigation action frequently mentioned by participants include:

(a) The absence of a one-size-fits-all pathway to reducing greenhouse gas emissions and the importance of considering national circumstances, such as economic structure, energy systems and development priorities, in order to identify actionable solutions, build trust and enhance mutual learning;

(b) The importance of international cooperation in addressing barriers to implementing mitigation solutions, including in the context of developing standards, methodologies, and research and development partnerships; improving measurement, reporting and verification practices in order to strengthen their reliability; conducting feasibility studies of first-of-a-kind projects; and enhancing the means of implementation support to developing countries, including through finance, technology development and transfer, and capacity-building;

(c) Opportunities arising from capacity-building to develop pipelines of replicable investment projects based on the best available science and technology options, including in the areas of renewable energy, energy efficiency, material efficiency, circular economy, waste heat recovery and waste management;

(d) The importance of creating enabling environments to achieve emission reductions at scale, including through predictable policy and regulatory frameworks, public procurement, carbon pricing and the development of infrastructure such as electricity networks, CO_2 transport and storage and hydrogen systems;

24. Participants mentioned areas for improvement with regard to future action under the Sharm el-Sheikh mitigation ambition and implementation work programme, including:

(a) The value that facilitative, non-prescriptive exchanges of views, information and experience offer in the context of bridging mitigation ambition and implementation, including by facilitating access to technical support, fostering enabling environments for mitigation action and supporting Parties in implementing their NDCs;

(b) A stronger focus on implementing mitigation solutions, particularly in developing countries, such as facilitation of project pipeline development, to overcome constraints related to institutional capacity and access to affordable finance;

(c) The need to move away from discussions on general opportunities, challenges and solutions pertaining to mitigation action and towards creating a platform for helping to address barriers to implementing such solutions at scale, such as a lack of institutional capacity to implement policies, prepare investable projects and access affordable finance;

(d) Increased participation of practitioners and financiers and stronger cooperation with relevant constituted bodies, including under mechanisms such as the Financial Mechanism and Technology Mechanism, organizations and capacity-building providers;

(e) Greater consideration of national circumstances, including through regional exchanges (particularly in the case of the least developed countries and SIDS);

(f) More effective outputs, including stronger messages in annual CMA decisions;

(g) A more efficient timeline of activities, including submissions, and multi-year planning.

25. Views were expressed on the cross-border impacts of mitigation and trade measures, the coverage of topics under the Sharm el-Sheikh mitigation ambition and implementation work programme and its linkages with the global stocktake and NDCs.

II. Summary of the eighth investment-focused event

A. Discussions

1. Scene-setting session

26. The scene-setting presentation highlighted that industrial decarbonization is one of the least financed areas of climate action, with USD 29.26 billion, or about 1.5 per cent, of the USD 2 trillion in global climate finance flows in 2024 directed towards industrial decarbonization. It was noted during the presentation that the major share of this finance was non-concessional, with equity and loans accounting for the largest shares, and that public finance accounted for 68 per cent of flows. The presentation highlighted the complementary roles of grants, concessional finance, guarantees, and equity and debt instruments, including through blended finance approaches, in supporting investment across different industrial decarbonization pathways. Barriers to mobilizing finance for industrial decarbonization identified in the presentation extended beyond the availability of capital and include data gaps with regard to emissions and decarbonization opportunities, limited capacity to develop credible and bankable project pipelines, scarcity of large-scale pilots translated into commercial ventures with structured financing plans, high capital costs and perceived investment risk. Sectoral road maps; investment planning; policy and regulatory incentives, including carbon pricing mechanisms, green public procurement and targeted fiscal

incentives; updates to standards and regulations; and technical assistance and capacity-building, particularly for small and medium-sized enterprises, were highlighted as means of strengthening enabling environments for industrial decarbonization.

27. Participants of the panel discussion considered the conditions that enable industrial decarbonization projects to move from concept to implementation and attract investment at scale. Several participants noted that, while capital is often available, successful mobilization of finance depends on developing investable projects with clear commercial propositions and appropriate allocation of risk. Participants further emphasized that investment readiness also extends beyond individual projects and relates to broader enabling factors such as supportive and predictable policy environments, institutional capacity to support project development, access to project preparation and long-term market demand for low-emission products and services. The view was also raised that policy and demand signals come first, including clarity on who the prospective buyers are and why they would pay, while capital structuring comes second.

28. Participants discussed the roles of different sources of finance in supporting industrial decarbonization. They emphasized that public finance and concessional finance and can play a catalytic role in transforming early-stage concepts into investment-ready projects and in mobilizing additional private sector finance, while technical assistance can support project preparation and investment readiness. Participants also discussed blended finance approaches that combine public, concessional and commercial capital to allocate risks among different sources of finance and can improve the risk-return profile of investments, particularly for technologies, markets and business models that are not yet fully mature. Furthermore, participants noted the complementary roles of development finance institutions, multilateral development banks, multilateral climate funds, commercial investors, private equity firms, institutional investors and philanthropic organizations in supporting different stages of project development and technology deployment.

29. Participants highlighted that investors have varying mandates, return expectations, risk appetites and investment horizons and that financing structures must reflect these differences. It was noted that there is no single pool of institutional capital and that sovereign funds, pension funds, insurers and other institutional investors operating within different investment parameters, including with regard to investment-grade structures, ticket sizes and exposure to currency risk. Institutional investors were described as requiring larger-scale investment opportunities, while early-stage and higher-risk technologies were identified as often requiring more flexible sources of capital. It was noted that, through blended finance, concessional capital can be used to absorb uncertainties that commercial capital cannot, enabling investment decisions to be made on less complete information. Several participants emphasized the importance of policy clarity and long-term policy signals, including through NDCs, long-term low-emission development strategies, industrial policies and energy transition plans, in reducing uncertainty and supporting investment decisions. It was suggested that investors are increasingly considering industrial decarbonization opportunities through broader lenses such as energy security, energy affordability, and competitiveness and resilience.

30. Discussions highlighted the importance of programmatic and portfolio approaches for mobilizing finance. Participants noted that bundling projects can reduce transaction costs, diversify risk and create investment opportunities of sufficient scale to attract institutional investors. Experiences shared by participants pertained, inter alia, to programme-based approaches supporting renewable energy deployment in SIDS through project aggregation; technical assistance and capacity-building; and financing packages that combine concessional resources, guarantees, loans and equity to mobilize private and other sources of investment. Participants observed that such approaches can be particularly important in smaller and developing economies where individual projects may be too small to attract commercial investors, while noting that project aggregation approaches in developing markets still have to mature to create investment opportunities at the scale required by large institutional investors.

31. Several participants underscored the importance of upstream technical assistance and institutional strengthening in improving the readiness of countries and project developers to identify, develop and finance industrial decarbonization projects. Examples discussed

include support for technology and sectoral road maps and policy development at the country and sectoral level, as well as feasibility studies, project development and financial structuring at the project level, alongside broader capacity-building. Participants emphasized that technical assistance could help countries identify viable mitigation opportunities, develop pipelines of projects aligned with national strategies and strengthen the enabling conditions necessary to attract investment.

32. During the discussion, participants raised challenges related to the accessibility of climate finance, particularly for SIDS and other developing countries. Some participants emphasized that access to finance is the main barrier in these countries rather than a lack of project pipelines or enabling policies, and that available financing opportunities do not always correspond to the scale and circumstances of their financing needs. Furthermore, some participants noted that aggregation, concessional resources and guarantees can help address barriers associated with small project size and perceived investment risk. In the Pacific, it was also noted that many investment opportunities are primarily focused on adaptation and resilience, while generating mitigation co-benefits.

2. Session on case studies and perspectives on financing mitigation in industries

33. The session on case studies and perspectives on financing mitigation in industries included presentations on project preparation, blended finance structures, country platforms and infrastructure sequencing for industrial decarbonization. Topics discussed included the use of national road maps as planning and de-risking instruments in industries; aggregate investment requirements and the high cost of capital in emerging markets and developing economies; regional aggregation and blended finance facilities for maritime transport and sustainable port infrastructure in SIDS; and the linking of large-scale renewable power, dedicated industrial hubs and national development banks to finance low-carbon export value chains.

34. Participants highlighted that industrial decarbonization requires the translation of high-level national ambition into bankable project pipelines through the alignment of policy frameworks, public finance and private capital across project life cycles, from preparation and de-risking through to construction and operation. A case study presented by the CTCN and Zimbabwe on the latter's national decarbonization road map for its cement industry illustrated how structured industry methodologies centred on clinker substitution, energy efficiency and frontier technologies can guide investment. The case study on the cement industry illustrated that near-term operational levers often face constraints related to regulatory standards, building codes and rules surrounding public procurement, while frontier solutions such as kiln electrification, low-emission hydrogen and CCUS continue to face barriers pertaining to technology maturity and commercial viability. Participants noted that sequencing capital is essential for essential for industrial decarbonization in general; while grants and technical assistance can address barriers pertaining to policy and standard setting, concessional debt and blended finance can absorb capital expenditure risks for proven technologies, and equity combined with carbon finance can support first-of-a-kind technologies in the commercial demonstration stages.

35. Participants discussed in detail the role of international organizations, enabling policy environments and country platforms in mobilizing commercial finance for industrial decarbonization. The OECD highlighted the substantial financing gap that exists in scaling investment in the transition to near-zero emissions within industries, including steel and cement, and emphasized that a multifold increase in such capital is required over the next decade, with the vast majority needed in emerging markets and developing economies. Participants emphasized that the high cost of capital and perceived investment and market risks in developing regions are the primary obstacles to final investment decisions being made there. They also emphasized the importance of strengthening national financing platforms, interoperable sustainable finance frameworks and blended finance instruments, such as technology performance insurance, guarantees and contracts for difference, in order to de-risk capital expenditures and operating costs across value chains.

36. Participants addressed the specific challenges with regard to financing and scaling industrial mitigation action faced by SIDS, where opportunities for such action are primarily concentrated in maritime transport, ports, utilities and tourism. A case study presented by the

Asian Development Bank on sustainable and resilient maritime initiatives in the Pacific, including port modernization, demonstrated how regional aggregation and programmatic project bundling can overcome barriers arising from small project size and high transaction costs. The case study highlighted that dedicated project preparation facilities, technical assistance for feasibility studies and blended finance funds are key for integrating initiatives pertaining to energy efficiency, port electrification and climate resilience into investable infrastructure assets capable of attracting institutional investors.

37. A case study presented by the IRENA and Brazil on the Pecém industrial and port complex highlighted the benefits of coupling comparative advantages in abundant renewable energy resources with power grid expansions and sustainable industrial water management. Participants noted the essential role of national development banks in managing large-scale decarbonization programmes and channelling multilateral climate funds and private capital into low-emission hydrogen, near-zero-emission steel and sustainable fuels. Securing bankable long-term offtake agreements and advancing adoption of interoperable carbon accounting standards were highlighted as key to mitigating market uncertainty, and coordinating grid integration and access was seen as important for addressing infrastructure bottlenecks.

3. Session on investment readiness, project development and investor perspectives

38. Participants discussed conditions that enable industrial mitigation projects to progress from the concept stage towards a final investment decision being made. They discussed investor perspectives, financial instruments such as blended finance and carbon market finance, and national and regional experience of mobilizing investment.

39. The investor perspectives underlined by the panellists pertain, inter alia, to:

(a) Consideration of investment readiness not only at the individual project level, but also in relation to the broader investment environment, including:

(i) Policy and regulatory predictability;

(ii) Demand for low-emission products;

(iii) Availability of relevant infrastructure;

(iv) Sovereign creditworthiness;

(v) Cost of capital;

(vi) Capacity to track progress of emissions targets at the national and project level;

(vii) Current state of climate finance, including sources of finance, finance providers and types of institutional financiers;

(viii) Integration of projects into broader investment programmes aligned with NDCs, national development strategies and industrial planning;

(b) Differing mandates, risk appetites, return expectations, time horizons and information requirements of different types of investor, including:

(i) Domestic enterprises;

(ii) Local and international banks;

(iii) Development finance institutions;

(iv) Institutional investors;

(v) Sovereign wealth funds;

(vi) Asset managers;

(vii) Insurers;

(viii) Pension funds;

(ix) Philanthropies;

(x) Family offices;

(c) General required features of an investment-ready project, including:

(i) Clear commercial strategy;

(ii) Credible revenue streams;

(iii) Defined scope and clearly outlined costs and timelines;

(iv) Credible implementation and governance arrangements;

(v) Credible project sponsors;

(vi) Registry for the assessment and allocation of risks among stakeholders, including technical, commercial, policy, currency, credit and demand risks;

(d) The fact that institutional investors usually invest through intermediaries or aggregated investment vehicles and consider the track record of the investment manager (typically over three to five years), the participation of local co-investors and the risk allocation strategies used by the institutional investors. Namely, the information they require includes:

(i) Policy orientation of state-aligned, large-scale institutional investors such as public pension funds, sovereign wealth funds and state-backed insurance companies;

(ii) Early-stage capital of nimble entrepreneurial institutional investors such as foundations, family offices and philanthropies;

(iii) Commercial strategies of global insurers, asset managers and global banks.

40. The financial instruments discussed by the participants include:

(a) Portfolio and programmatic approaches to mobilizing finance that strengthen political ownership, aggregate smaller projects, diversify risk, reduce transaction costs including through standardization and ensure continuity across political cycles;

(b) Carbon finance as a means of providing a supplementary revenue source alongside public, concessional, equity and debt finance for projects that are technologically viable but not yet financially so

(c) Blended finance incorporating official development finance, public finance and philanthropic resources as a means of helping reduce the cost of capital; address specific risks such as technology performance, as well as perceived risks, in the context of commercially viable project opportunities; and develop new financial models such as nature-based solutions. Blended finance typically support projects with a credible pathway to commercial viability rather than subsidizing projects that are already bankable;

(d) Grant finance, which often supports activities that generate information on public goods, including feasibility studies and development of the first carbon accounting methodologies;

41. National and regional experience of mobilizing investment shared by participants includes:

(a) Good practice with regard to engagement with private sector actors at the key stages of project development to understand the risks investors face and protect the return they need to make;

(b) Exploring carbon financing an early stage in project development to demonstrate financial additionalities required to utilize carbon finance;

(c) High demand for technical assistance for building capacity to develop investment projects such as technology assessments, financial modelling, risk structuring and preparation of project pipelines;

(d) Challenges faced by small and highly indebted developing countries in mobilizing investment due to small project size, and the need to use international public finance and regional investment facilities to aggregate projects across sectors and countries to address such challenges;

(e) A portfolio approach used for identifying steel decarbonization projects with higher carbon credit finance potential;

(f) The engagement of national ministries of finance in ecological transformation planning; this allows them to study its potential implications for economic growth and employment, as well as the distributional impacts of climate policies;

(g) The use of green hydrogen road maps, NDCs and renewable energy potential to explore carbon finance with a view to enhancing industrial decarbonization and energy security while reducing exposure to fossil fuel price volatility;

(h) National carbon legislation that enables international carbon credits to meet a limited portion of carbon tax obligations;

(i) Efforts to develop carbon finance taxonomies and disclosure frameworks with a view to strengthening its enabling environment for sustainable finance.

B. Pitch hub

42. Ahead of the project presentations, two previous pitch hub participants shared their experience. The Gambia explained that its solar-powered composting project secured grant funding following its pitch. Malawi described how feedback received on its landfill management and methane capture concept helped it to revise its budget, add public awareness and regulatory components and seek co-financing, including from carbon markets.

43. The feedback from the advisory panel emphasized the critical importance of clear business models, transparent cost breakdowns, staged risk management frameworks and credible revenue pathways to translate project ideas into bankable assets and attract public and commercial finance. The feedback can be summarized as follows:

(a) The advisory panel members emphasized that project proposals need to include robust business models and structured financial requests with clear cost breakdowns by component. Proposals benefit from distinguishing committed funding from prospective co-financing, demonstrating the catalytic leverage of private capital and showing how projects will transition from grant support to long-term financial self-sufficiency;

(b) Advisory panel members underscored the value of clearly defining the specific market barrier or commercial viability gap that concessional capital would address. Proposals benefit from identifying targeted instruments, such as guarantees, first-loss facilities and risk sharing mechanisms, while distinguishing components that are commercially investable from those requiring sustained public support;

(c) Advisory panel members noted the utility of exploring carbon finance opportunities in the early stage of project development, including alignment of projects with emerging international crediting standards, cooperative approaches under Article 6 of the Paris Agreement, and book-and-claim mechanisms. It was observed that such instruments require structured upfront financing solutions to bridge the gap between upfront capital needs and delayed carbon revenue streams;

(d) Advisory panel members highlighted the value of programmatic approaches in bundling distributed assets, enabling projects to reach commercial scale and lowering transaction costs. Deploying phased pilots across selected transport corridors or industrial facilities enables proponents to establish proof of concept, learn from experience and align project design and financing structures with established regional financing programmes before scaling up investment;

(e) Advisory panel members highlighted the importance of early engagement with industrial partners and prospective buyers. They also highlighted that early collaboration with existing industrial facilities helps demonstrate market demand, supports technical validation against industry standards and strengthens the commercial case for financing;

(f) Advisory panel members noted that quantifying emission reduction potentials of projects against defined baselines and establishing transparent monitoring, reporting and

verification systems play an important role in supporting cost-effectiveness assessments and the alignment of projects with national climate priorities;

(g) Advisory panel members observed that communicating broader sustainable development co-benefits, such as job creation and improved public health, energy security and social inclusion, strengthens the perceived project bankability for diverse climate financiers and high-integrity carbon market participants;

(h) Advisory panel members emphasized the importance of assessing regulatory frameworks and policy environments at an early stage in project development. It also emphasized that demonstrating alignment of projects with government regulations, relevant technical standards and environmental licensing supports investment readiness, and establishing defined testing, certification and approval processes helps validate the technical performance of technologies and materials for prospective financiers;

(i) Advisory panel members noted the benefit of incorporating phased implementation milestones, stage-gated decision points and risk management frameworks into project planning. They also noted that establishing structured interim review points enables proponents and funders to evaluate technical progress against relevant standards, adapt the scope of a project prior to scaling it up and ensure that public good outputs, such as data platforms and guidelines, are maintained after grant completion.

C. Opportunities (including actionable solutions) and barriers

44. Noting that not all of the following opportunities are applicable to every national or regional context, that there is no single solution that fits all contexts, and that the prioritization of opportunities will vary in accordance with national circumstances, opportunities mentioned by participants and showcased in the regional case studies include:

(a) Aggregating projects through programmatic, portfolio and regional approaches to increase their scale and reduce transaction costs;

(b) Aligning investment pipelines with NDCs, sectoral plans and national development and investment programmes, including through coordination among ministries, regulators and financial institutions;

(c) Engaging investors, financial institutions, project developers and potential offtake partners early in project development, as well as exploring carbon finance opportunities;

(d) Strengthening domestic financial institutions and encouraging the participation of local investors in project development and financing to facilitate international investment;

(e) Strengthening project preparation through feasibility studies, financial modelling, risk assessment, clear commercial strategies and use of blended finance, guarantees and concessional resources to address clearly identified barriers;

(f) Exploring, as appropriate, aggregation and debt-conversion mechanisms, including debt-for-nature swaps, to improve access to finance in small and highly indebted developing countries;

(g) Tailoring financing structures to the risk profiles and investment requirements of different categories of investor, including sovereign wealth funds, pension funds, insurers, family offices and development finance institutions, to broaden participation in industrial decarbonization investments;

(h) Establishing stable policy frameworks, demand-side measures and disclosure requirements to improve revenue certainty and investor confidence;

(i) Leveraging synergies between climate resilience and low-carbon infrastructure to safeguard vital economic lifelines while delivering mitigation co-benefits tailored to small-scale investment contexts;

(j) Integrating wider development priorities, including resilience, adaptation, livelihood protection and energy security objectives, into mitigation investments in order to generate multiple benefits from them and strengthen investment cases;

(k) Adopting, with the support of country-led investment platforms, integrated industrial planning and cluster-based approaches that locate clean energy generation in close proximity to industrial demand and shared infrastructure, thereby alleviating grid bottlenecks, coordinating multilateral and domestic public finance and mobilizing private capital at scale;

(l) Exploring financing structures that facilitate the participation of Indigenous Peoples and local communities in mitigation investments, including guarantees, government underwriting of revenue, preferred equity structures and intermediary investment vehicles;

45. Noting that not all of the following barriers or challenges are present in every national or regional context, and that the prioritization of actions to be considered to overcome relevant barriers and challenges will vary in accordance with national circumstances, barriers and challenges mentioned by participants and showcased in the regional case studies include:

(a) Limited availability of data on emissions, mitigation potential and technology pathways, which can create uncertainty for policymakers, industries and investors when identifying viable decarbonization opportunities;

(b) Weak alignment among national priorities, sectoral plans, project pipelines and investor requirements;

(c) Limited institutional capacity to prepare bankable proposals, including revenue models and commercial strategies, and to assess technologies and financial risks;

(d) High upfront costs; long payback periods; high sovereign, credit and currency risks; and limited access to affordable long-term capital, particularly in developing countries;

(e) Diverse investor requirements and expectations with regard to liquidity, return, foreign exchange risks, investment-grade ratings and minimum transaction sizes, which may constrain investment in developing country projects;

(f) A lack of experienced sponsors; intermediaries and local co-investors with limited track records; and low creditworthiness of smaller project developers;

(g) Small project size, constrained fiscal space and high domestic interest rates, particularly in small developing countries;

(h) Fragmented technical assistance and bespoke financing structures that increase transaction costs;

(i) Policy and regulatory uncertainty and insufficient demand for low-emission products;

(j) Constraints with regard to technology, infrastructure and supply chains;

(k) Limited accessibility and suitability of available financing instruments for SIDS and other capacity-constrained countries;

(l) Divergent carbon accounting standards and complex facility-level verification protocols associated with trade-related climate policies, which place reporting and financial burdens on enterprises in emerging markets facing constraints with regard to digital infrastructure and harmonized measurement, reporting and verification systems.