Framework Convention on
Climate Change

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Report on the first global dialogue under the Sharm el-Sheikh mitigation ambition and implementation work programme

Report by the co-chairs of the work programme

Abbreviations and acronyms

CCS	carbon capture and storage
CCU	carbon capture and utilization
CO_2	carbon dioxide
EU	European Union
GHG	greenhouse gas
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
MDB	multilateral development bank
NDC	nationally determined contribution
SB	sessions of the subsidiary bodies
SDG	Sustainable Development Goal
TEC	Technology Executive Committee

I. Introduction

A. Mandate

1. The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement, at its fourth session, 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,[1] 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.[2]

2. It requested the secretariat to prepare, under the guidance of the co-chairs of the work programme, a report on each of the dialogues referred to in paragraph 1 above, 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 Conference of the Parties serving as the meeting of the Parties to the Paris Agreement and the subsidiary bodies.[3]

3. This report has been prepared under the guidance of the co-chairs of the work programme, reflecting in a comprehensive and balanced manner the discussions held at the first global dialogue, including a summary of the discussions and the key findings, opportunities and barriers identified in each breakout group. This report captures and summarizes views shared during the dialogue but may not represent an exhaustive summary of all interventions.

B. Proceedings

4. The first global dialogue under the Sharm el-Sheikh mitigation ambition and implementation work programme took place in hybrid format[4] in conjunction with SB 58 from 3 to 4 June 2023 with 161 registered in-person and 73 registered virtual participants. It focused on the topic of accelerating the just energy transition, including by:

(a) Implementing policies and measures with a global overview and country-specific experience;

(b) Addressing financial, technological and capacity-building needs in this area, such as through international cooperation, including with non-Party stakeholders, and the provision of support to developing countries;

(c) Promoting sustainable development and understanding of socioeconomic effects.

5. Opening remarks were provided by Mohamed Nasr, from the Presidency of the Conference of the Parties at its twenty-seventh session, and Hana AlHashimi, from the incoming Presidency of the Conference of the Parties at its twenty-eighth session. This was followed by welcoming remarks from Simon Stiell, UNFCCC Executive Secretary, introductory remarks from the co-chairs of the work programme, Amr Osama Abdel-Aziz and Lola Vallejo, and a scene-setting presentation on accelerating the just energy transition and insights from the sixth assessment cycle of the IPCC by Youba Sokona, Vice-Chair of the IPCC.

[1] The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement, at its third session, decided that the Sharm el-Sheikh mitigation ambition and implementation work programme is to be implemented in a manner that complements the global stocktake. Information relating to the global stocktake is available at https://unfccc.int/topics/global-stocktake.

[2] Decision 4/CMA.4, para. 8.

[3] Decision 4/CMA.4, para. 15.

[4] The webcast links, schedule and all presentations are available at https://unfccc.int/event/first-global-dialogue-and-investment-focused-event-under-the-sharm-el-sheikh-mitigation-ambition-and.

6. Youba Sokona highlighted that global total GHG emissions in 2019 were approximately 12 per cent higher than in 2010 and 54 per cent higher than in 1990, and that limiting warming to 1.5 °C or 2 °C requires rapid, deep and immediate GHG emission reductions. He noted that despite ongoing efforts and commitments over the past few years, the world is not on track to limiting global warming to 1.5 °C and implemented policies are projected to lead to 3.2 °C (2.2–3.5 °C range). CO_2 from energy and industry represents the largest share of GHGs and is projected to continue to increase. He further stated that global net zero GHG emissions can be achieved through strong reductions across all sectors; however, the window for climate-resilient development is rapidly closing.

7. Youba Sokona elaborated on the conditions that enable collective action by governments, the private sector and civil society for climate-resilient development, such as inclusive governance; diverse knowledge and values relating to climate action; finance and innovation; integration of policies across sectors and timescales; ecosystem stewardship; synergies between climate and development actions; and behavioural change supported by policy, infrastructure and sociocultural factors. Conditions that constrain individual and collective action on the other hand include poverty; inequity and injustice; economic, institutional, social and capacity barriers; lack of finance; and trade-offs in relation to the SDGs.

8. Youba Sokona indicated several solutions that could help to at least halve GHG emissions by 2030 compared with the 2019 level, some of which can already be implemented and would bring many benefits by addressing health, equity, justice and even economic concerns, while increasing resilience and accelerating the transition to a clean energy future. He emphasized that there are multiple opportunities for scaling up climate action on both the supply and demand sides, including mitigation options with a net lifetime cost of USD 100/t CO_2 eq or less. In this context he mentioned solar and wind, as well as reducing methane from coal, oil and gas, which has considerable potential for reducing energy supply emissions by 2030. He also gave an overview of mitigation options in other areas such as land, water and food; settlement and infrastructure, including mobility systems, public transport and electric vehicles; health; and society, livelihood and the economy. The cost of such mitigation options is often less than the reference scenarios assessed by the IPCC. As for demand-side mitigation options, Youba Sokona noted that their emission reduction potential is estimated to range between 40 and 70 per cent by 2050 compared with the 2019 level in end-use sectors, including food, land transport, industry, buildings and electricity.

9. On the first day of the dialogue, four technical experts presented on opportunities, actionable solutions and technologies relating to the following subtopics in the context of the just energy transition:

(a) Renewable energy – Juan Jose Garcia Mendez, Programme Officer, Clean Energy Transition Scenarios, IRENA;

(b) Grid and energy storage – Matthew Wittenstein, Chief of Section, Energy Connectivity, United Nations Economic and Social Commission for Asia and the Pacific;

(c) CCU and CCS – Jarad Daniels, Chief Executive Officer, Global CCS Institute;

(d) Energy efficiency – Rana Ghoneim, Chief, Energy Systems and Infrastructure Division, United Nations Industrial Development Organization.

10. Subsequently, participants were divided into four breakout groups. Each group discussed the above subtopics with the technical experts and facilitators. Over the course of the day, all participants were able to attend each breakout group and discuss each subtopic.

11. The following guiding questions provided a framework for the discussions in each breakout group:

(a) What are opportunities, best practices and actionable solutions for the just energy transition to urgently scale up mitigation ambition and implementation in this critical decade in each of the respective sub-topics (renewable energy, grid and energy storage, energy efficiency, CCU and CCS)?

(b) What are effective policies and measures implemented from a global perspective and country-specific experience for each of the respective sub-topic?

(c) How are financial, technological, and capacity-building needs addressed for each of the respective subtopics?

(d) How are the issues of international cooperation, including with non-Party stakeholders, and the provision of support to developing countries addressed?

(e) How is sustainable development promoted and what are the socioeconomic effects under each of the respective sub-topics?

12. At the beginning of the second day of the dialogue, the facilitators reported back on the first day's breakout groups.

13. Subsequently, four technical experts presented on barriers, challenges and financing issues relating to the just energy transition, specifically in the areas of:

(a) Barriers and challenges around policies and measures – Richard Kozul-Wright, Director, Globalization and Development Strategies Division, United Nations Conference on Trade and Development;

(b) Financing issues – Chienyen Goh, finance expert;

(c) Technology and capacity challenges – Stig Svenningsen, Chair, TEC, UNFCCC;

(d) Barriers and challenges in addressing sustainable development and socioeconomic impacts – Yin Shao Loong, Senior Research Associate, Khazanah Research Institute.

14. Participants were then divided into four breakout groups. Each group discussed the above subtopics with the technical experts and facilitators. Over the course of the day, all participants were able to attend each breakout group and discuss each subtopic.

15. One guiding question provided the framework for the discussions in each breakout group: what barriers and challenges are there for the just energy transition to urgently scale up mitigation ambition and implementation in this critical decade, taking into account the subtopics from the first day of the dialogue (renewable energy, grid and energy storage, energy efficiency, CCU and CCS)?

16. At the closing plenary the co-chairs of the work programme invited the facilitators of each breakout group on the second day to report back on the discussions. The co-chairs of the work programme then thanked the participants, experts and facilitators, and declared the first global dialogue closed.

17. The global dialogue was followed by a one-day investment-focused event, organized under the guidance of the co-chairs of the work programme, to consider the cost of mitigation implementation with a view to unlocking finance, including for just transitions, overcoming barriers to access to finance and identifying investment opportunities and actionable solutions informed by NDCs to help public and private financiers, investors and international climate finance providers direct finance flows towards supporting areas of opportunity to enhance mitigation in this critical decade.[5] The event started with an introduction to the global outlook on energy, including renewable energy and the energy transition, investment and country case studies, and addressed matters including project preparation, financing and opportunities for mobilizing investment, focusing on different regions. The event can be re-visited via the webcast links.[6]

[5] As per decision 4/CMA.4, para. 11.
[6] As footnote 4 above.

II. Summary of discussions and key findings, and opportunities and barriers

A. Renewable energy

1. Summary of discussions and key findings

18. The breakout group was facilitated by Elizabeth Press, Director, Planning and Programme Support, IRENA, and supported by Juan Jose Garcia Mendez.

19. The introductory presentation by Juan Jose Garcia Mendez underscored the importance of the rapid deployment of all forms of renewable energy (solar, wind, biomass, geothermal, marine, hydro, etc.) as a readily available mitigation solution that can also help to realize multiple economic, social and environmental policy objectives. It was indicated that the growing competitiveness of renewable energy, with global price levels for electricity generated by renewables already comparable to or lower than that of fossil fuels for some technologies, continues to provide a compelling pathway for decarbonizing the global energy system. In 2022, global investment in the energy transition grew by around 70 per cent compared with the level before the pandemic. However, despite accelerated current deployment rates, annual global additions to renewable energy power and investment therein need to grow significantly by 2030 in order to stay on the pathway to limiting global warming to 1.5° C. Further, it was highlighted that the majority of renewable energy capacity deployment remains concentrated in the Global North and has reached a very limited number of developing countries; therefore, barriers faced by developing countries need to be removed in order to achieve equal global deployment. In the presentation, enablers for the energy transition were highlighted, including forward-looking planning, modernization and expansion with regard to supporting infrastructure on land and sea; facilitation of national, regional and global strategies for new supply–demand dynamics and promotion of equity and inclusion; design of policy and regulatory frameworks that facilitate deployment, integration and trade of renewables and promote equality and capacity-building among institutions, communities and individuals to enable acquisition of the requisite skills, knowledge and expertise for driving and sustaining the energy transition.

20. During the discussions it was mentioned that the rapid and large-scale adoption of renewable energy can significantly reduce GHG emissions, thereby mitigating climate change, in addition to contributing to multiple co-benefits, including improvements in air and water quality, with some participants stating that this should happen with a parallel phase-out of unabated fossil fuels. Some supported a global goal for renewable energy deployment and others did not, stressing the importance of equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances considerations and of taking into account national development priorities and pathways and highlighting that according to decision 4/CMA.4, paragraph 2, the outcomes of the mitigation work programme will not impose new targets or goals. It was noted, however, that just energy transitions must be country-driven and realistic and energy must be affordable and accessible, enabling and not hindering sustainable development and other development priorities. Participants highlighted the need to ensure energy security during the energy transition. It was highlighted that some countries have adopted pragmatic and flexible energy policies during the energy crisis, where all types of energy have a role in ensuring energy security.

21. Participants noted that while the cost of renewable technologies has fallen sharply, their deployment remains concentrated in a limited number of countries and regions.

22. Given the links between deployment of renewables and broader economic and societal issues, it was underscored that it is essential to engage with all stakeholders to secure social acceptance of renewables, especially by ensuring community involvement and benefits, as well as considering environmental issues related to the deployment of renewables. The importance of a just transition was emphasized, while recognizing that some countries are not transitioning but developing their energy system.

23. Views were expressed that although renewable technologies are mature and ready for deployment at scale, barriers still exist in many countries and innovation is needed to further improve the efficiency and flexibility of the energy system. Existing barriers include available options for energy storage, access to finance and technologies, and costs of enabling technologies, which need to be further driven down.

24. Participants commented that the ability of countries to turn renewable potential into energy production depends on their capacity to develop and deploy technologies and systems. Access to technology, training, capacity-building and affordable finance will be vital to realizing the full potential of renewables to decarbonize the global energy system and contribute to sustainable development.

2. Opportunities (including actionable solutions) and barriers

25. During the discussions, it was emphasized that the deployment of renewables can create new industries and jobs, stimulate economic growth, decrease dependency on fossil fuel imports and increase energy security. For instance, growth in solar and wind energy can spur the development of a skilled labour force, specialized manufacturing industries and service sectors. It was noted that 12.6 million people already work in renewables and there is the potential to triple this number by 2030.

26. Participants stated that renewable energy deployment can have important social implications, such as improving public health by reducing air pollution, and contributing to energy equity by providing energy access to the more than 600 million people who currently lack it, mostly in sub-Saharan Africa where there is abundant renewable energy potential.

27. Distributed renewable energy solutions were highlighted by participants as an opportunity to create a resilient energy system and therefore support vital adaptation measures for the most vulnerable communities, such as the coastal or rural communities that are most affected by climate change. In such locations, distributed renewable energy solutions can ease exposure to climate change impacts by providing ‘green infrastructure’ in indispensable sectors such as water, food and waste treatment.

28. Participants mentioned that renewable energy opens new opportunities for cross-border and regional cooperation to create economies of scale, promote energy trade and develop new industrial clusters, among others. It is therefore important to consider the entire value chain of technologies to recognize where such opportunities may exist. In this regard, South–South and peer-to-peer cooperation is vital to sharing experience and innovation in developing countries.

29. As for the barriers, views were expressed that the transition to renewables requires new policy frameworks, regulations and market designs to facilitate integration of new technologies into the energy system. Policies need to go beyond the development and deployment of renewables to also tackling priorities such as labour, industrialization, trade and finance.

30. Participants stated that infrastructure, including grid and energy storage capacities, is a major barrier to the rapid deployment of renewable energy in developed and developing countries. Grid modernization and integration and expansion of transmission lines is required, as well as new shipping routes and ports for the transport of carriers such as hydrogen. Further, many developing countries require extensive investment and financial support to overcome this barrier.

31. Access to affordable finance for renewable energy was mentioned as a key barrier. In this context, it was highlighted that concessional and grant finance is also needed, notably for developing countries.

32. A participant highlighted the limited consideration given to equity and common but differentiated responsibilities and respective capabilities, in the light of different national circumstances in the mitigation pathways and models assessed by the IPCC.

33. Public finance is essential for the energy transition and should continue to be used strategically to crowd in additional capital, including private capital. Risk mitigation instruments (e.g. guarantees, currency hedging instruments and liquidity reserve facilities)

will still play a major role in overcoming real and perceived barriers to investment, but public finance and policy must go beyond risk mitigation by, for example, including funding for capacity-building, support for pilot projects and innovative financing instruments such as blended finance initiatives.

34. Participants mentioned that channelling technical and expert knowledge into policymaking will be key to informed decision-making. Future conversations should take a granular approach and address issues such as renewable value chains, critical materials, energy transition and jobs, and regional approaches to renewable energy and resilient infrastructure.

B. Grid and energy storage

1. Summary of discussions and key findings

35. The breakout group was facilitated by Anne Olhoff, Senior Advisor, International Team, United Nations Environment Programme, and supported by Matthew Wittenstein.

36. The introductory presentation by Matthew Wittenstein highlighted that, according to current trends, investment in grid and energy storage is not sufficient to meet net zero goals. Since grid and energy storage play an important role in enabling the deployment of renewable energy – connecting demand and supply – and help to manage volatility and variability, there is a need for innovative financing mechanisms that involve private capital and climate finance, and an appropriate balance of long- and short-term market signals to incentivize investment. Regarding challenges, even though renewable energy and batteries are cost competitive, challenges such as substantial capital costs remain. The bulk of investments in grid and energy storage are in upper- and middle-income economies, with many lower-income economies experiencing high capital costs. Examples of grid investments that leverage both public and private sources of funding were presented, as in many cases public finances have competing priorities. Larger, more integrated power systems are needed as this reduces costs, improves energy security and enables decarbonization.

37. It was highlighted that grid and energy storage play an important role in enabling the energy transition, participants noted however that national circumstances and context-specific solutions need to be taken into considerations. Participants mentioned that the energy transition is inseparable from development transition and poverty eradication, and access to employment and compensation is needed for communities adversely affected by the energy transition. At the same time, grid and energy storage bring economic development opportunities, including workforce training and lower overall air pollution, among other socioeconomic and environmental benefits.

38. International collaboration and cross-border trade were identified as essential for grid and energy storage and would contribute to managing price volatility and increase the flexibility of a new, more decentralized energy structure based on renewable energy. Participants shared experience with cross-border interconnectivity and transmission lines through examples from Asia, Europe, Latin America, the Middle East and Southern Africa.

39. Participants expressed the view that critical minerals are vital to the energy transition; environmental degradation and other detrimental effects associated with the supply chain of grid and energy storage technologies need to be avoided, especially in developing countries, where most critical minerals are present.

40. Technology availability and transfer are enabling conditions for a successful energy transition. Infrastructure is often either ageing and requires substantial investment or is weak and missing. Regarding renewable energy, participants discussed capital expenditure, surplus capacity to deal with storage needs, intermittency, higher costs of financing for renewable energy compared with fossil fuel options in developing countries, and renewable energy's importance to grid expansion.

41. Differences between domestic energy policies, such as in subsidies and energy costs, have implications for cross-border energy trade that need to be taken into consideration.

Addressing regulations, rules and network codes is therefore essential for the success of cross-border interconnectivity.

2. Opportunities (including actionable solutions) and barriers

42. Participants indicated that a more systematic approach would be important to capitalize on international collaboration, experience-sharing, capacity-building and peer-to-peer learning on grid and energy storage. Exchanging views and cooperating on regulatory and legal aspects, financial solutions to address high capital costs, barriers to accessing finance, private sector involvement, and storage technologies and forecasts were also mentioned.

43. Views were shared on technological solutions such as digitizing networks, using hydrogen as an energy storage solution in the medium term, considering an international hydrogen supply chain, and grid and off-grid solutions, which constitute opportunities to enhance energy access and flexibility of the energy system.

44. Participants discussed financial needs and challenges relating to the infrastructure required for the energy transition: private sector investment remains insufficient, and most grid and storage plans rely on government investment. The costs of grid and energy storage were highlighted, alongside the need to give special consideration to developing countries and the least developed countries when it comes to finance and investment solutions such as blended finance.

45. Domestic investment policy environments sometimes hinder changes and enhancements in grid and energy storage. Challenges relating to public–private partnerships and markets need to be tackled in order to enable further investment in technological advancement and deployment.

46. In many countries, barriers to grid and energy storage include ageing and/or weak infrastructure, challenging geography, lack of access to remote areas, land rights issues and the need for infrastructure linkages with expanding roads and other infrastructure, as well as barriers to technological uptake and deployment that need to be considered in energy transition pathways. It was mentioned that as long as energy storage and transmission are not feasible, reliable or cost effective, some countries, depending on national circumstances, may need to continue the use of fossil fuels, including natural gas, to ensure energy security and meet development priorities.

C. Carbon capture and utilization and carbon capture and storage

1. Summary of discussions and key findings

47. The breakout group was facilitated by Stig Svenningsen and supported by Jarad Daniels and Tim Dixon, Director and General Manager, IEA, Greenhouse Gas Research and Development Programme.

48. The introductory presentation by Jarad Daniels highlighted that the deployment of CCS at gigatonne scale will enable net zero emissions to be reached and limit temperature increase to 1.5 °C, including by achieving decarbonization in sectors, such as industry, enable the production of low-carbon hydrogen at scale, provide low-carbon dispatchable power and deliver negative emissions. Globally, there are around 40 commercial facilities in operation with a capacity to capture and store in the order of 50 million t CO_2/year, around 20 under construction, and some 200 in the pipeline. Moreover, country- or region-specific policies are being developed or are already in place, including in North America, Europe, the Middle East and North Africa. However, more progress is required to reach net zero emissions and the temperature goal under the Paris Agreement, which is estimated to range between 350 and 1,200 Gt CO_2 that will need to be captured and stored this century.[7] Today, CCS is mostly

[7] The range between 350 and 1,200 Gt CO_2 is based on three of four pathways assessed by IPCC. The quantity of CO_2 stored via CCS over this century in 1.5°C pathways with no or limited overshoot in four pathways assessed by IPCC ranges from zero to more than 1,200 $GtCO_2$. IPCC. 2018. IPCC

applied for enhanced oil recovery, but its application is diversifying into a wide range of sectors (including production of fertilizer, ethanol and chemicals). The economics of CCS deployment were highlighted, such as cost range along the value chain, the role of CCS in limiting the overall system cost of decarbonization, and efforts to reduce costs by sharing infrastructure through a hub and cluster business model. Necessary action at global level would include defining the role of CCS in national policies with specific legislation, regulating and enabling investment through market mechanisms and global information-sharing and capacity-building, including identifying support and appraising geological storage resources. Moreover, it is necessary to drive down the cost of the technologies involved, which would require deployment at scale and further technological advancement.

49. During the sessions, participants shared experience of using CCU and CCS: for example, over 20 years of CCS in Norway, including the "longship project", one of the first industrial CCS projects; decades of experience with CCS technology in Saudi Arabia; a technology demonstration project and a long-term road map for CO_2 storage in Japan; possible use of carbon credits from multiple ongoing CCS projects in Indonesia; scaling up CCS in the EU through the proposed net zero industry act; a carbon management strategy review in Germany; a quantitative storage capacity target for 2030 in Denmark; a draft CCU and CCS policy in Trinidad and Tobago; and consideration of a CCS regulatory framework under the national climate change plan in Argentina.

50. Participants discussed the role of CCU and CCS in the context of the just energy transition in this critical decade, expressing mixed views with regard to these technologies. While some identified the use of CCU and CCS as a viable mitigation option for achieving net zero emissions, others commented that these technologies should be a complement to, rather than a substitute for, other low-cost mitigation options, particularly in energy supply where more technologically mature and less expensive options are available in many countries, such as renewable energy power generation.

51. Whereas some stated that the use of CCU and CCS could be considered as mitigation options in the energy sector in particular, for example, in reducing emissions from upstream fossil fuel production and the production of hydrogen and ammonia from fossil fuels, others indicated that those technologies are necessary options for achieving net zero emissions beyond the energy sector by reducing emissions from sectors such as cement, steel, hydrogen and fertilizer production, where no other feasible mitigation options currently exist.

52. Another view was that consideration of technologies such as CCU and CCS should not be used as an excuse to delay the transition from fossil fuels to renewable energy, since those technologies would contribute a comparably small proportion of the emission reduction required this decade to achieve the temperature goal of the Paris Agreement. Others stated that, while the current rate of CCU and CCS deployment falls short of the level required to achieve the temperature goal of the Paris Agreement, CCU and CCS are ready for large-scale deployment that has the potential to make a significant contribution to reaching this goal given that there is more than 50 years of collective experience in implementation.

53. In addition, it was mentioned that CCU and CCS may play a future role in addressing the current emissions stock through direct air capture by removing emissions from the atmosphere, contributing to negative emissions.

2. Opportunities and barriers

54. Opportunities highlighted by participants include the ongoing development of regional carbon storage hubs to reduce costs through shared infrastructure, increasing policy support to deploy CCU and CCS in several countries, and developing business cases and case studies in the context of carbon crediting.

Special Report on the Impacts of Global Warming of 1.5 °C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. V Masson-Delmotte, P Zhai, H-O Pörtner, et al. (eds.). Geneva: World Meteorological Organization. Available at https://www.ipcc.ch/sr15/.

55. Further, it was noted that potential global storage capacity is estimated to exceed 1,000 Gt CO_2, which is greater than the remaining carbon budget.

56. Participants expressed their interest in sharing knowledge and experience of CCU and CCS, particularly on measurement, reporting and verification and the regulatory framework for carbon storage in order to ensure environmental integrity, prevent leakage, mitigate liability and effectively engage with stakeholders. In this context, several guidance resources were mentioned, including the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, International Organization for Standardization standards, IEA best practice guidance and the Global CCS Institute web page. Many participants stated the need for support to build technical capacity in developing countries to assess the feasibility of geological storage sites and the necessary infrastructure.

57. Participants viewed international cooperation as necessary to address challenges, including for developing countries, such as finance, technology development and transfer, and capacity-building. Examples of international cooperation include exploring foreign storage sites owing to lack of suitable domestic geological capacity and providing support to build developing countries' technical capacity in assessing the feasibility of geological storage sites and the necessary infrastructure, including from international organizations and MDBs. The need for international support was highlighted by the least developed countries in particular, owing to the small size of their private sectors combined with a lack of financial and technical capacity, difficulty mobilizing domestic resources at the scale needed for the transition and insufficient infrastructure, especially in rural areas.

58. Barriers to deploying CCU and CCS range from high upfront capital costs to capture CO_2 and the energy intensity of the capturing process; long lead times for project development; lack of transport infrastructure for captured carbon; lack of operational experience; limited technical expertise to formulate and implement regulations and standards, and to assess geological storage capacity, particularly in developing countries; and limited geological storage sites in many countries, including small island developing States.

59. Participants exchanged views on the potential risks of CCU and CCS technologies. In response to inquiries about the risk of permanence and long-term environmental impact, it was mentioned that CO_2 becomes more secure the longer it is stored geologically and previous assessments by international bodies have confirmed that storage risk is acceptable, and that there are existing regulations and standards for selecting secure geological sites.

60. The legal implications of transboundary shipment of CO_2 were mentioned in relation to the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Protocol), which has been amended to allow for the cross-border transportation of CO_2 for sub-seabed storage.

61. The need for further policy support such as tax credits, subsidies and carbon pricing to promote private investment was highlighted, alongside collaboration between government, industry, the financial sector and other stakeholders that are crucial to accelerating the deployment of new technologies.

62. Participants exchanged views on the financial costs of CCS and CCU, which often become a barrier to deploying the technology and can range from USD 20/t CO_2 to USD 150/ t CO_2 and beyond depending on several factors, including:

(a) The cost of the carbon capture process, which is often the highest cost component and varies according to the purity and concentration level of CO_2 and economies of scale;

(b) The cost associated with transport, which is generally lower for pipelines but higher for shipping;

(c) The availability and quality of storage sites.

63. In this context, it was stated that the total system cost to reach net zero emissions is estimated to be more than double if CCS and CCU technologies are not deployed at gigatonne scale, but others did not share this view.

D. Energy efficiency

1. Summary of discussions and key findings

64. The breakout group was facilitated by Ambrosio Yobánolo del Real, Vice-Chair, TEC, UNFCCC, and supported by Rana Ghoneim.

65. The introductory presentation by Rana Ghoneim highlighted that energy efficiency is a vital building block of the energy transition and climate action. Energy efficiency is estimated to have the potential to contribute 25–40 per cent of the emission reductions necessary to achieve the goal of the Paris Agreement. It was stated that incremental global energy consumption (2016–2021) may have doubled in the absence of current energy efficiency measures. She stressed the need for accelerating the rate of improvement of energy efficiency by tripling annual investments from some USD 300 billion to an average of USD 840 billion in sectors such as industry, buildings and transport through strategic deployment of public finance, development of innovative financing and business models, deployment of de-risking instruments, financing models for small and medium-sized enterprises and counter-guarantee support for energy service companies, and market readiness activities. Energy efficiency is associated with multiple socioeconomic benefits, such as increased economic productivity and competitiveness, energy cost savings, reduced energy dependency, health improvements, gender equality and job creation. It is estimated that jobs related to energy efficiency will increase to 10 million in 2030. It was pointed out that behavioural and lifestyle changes are important for furthering the adoption of energy efficiency technologies. However, despite its numerous benefits, progress on implementing energy efficiency measures at scale is lagging behind the targets set by SDG 7.

66. During the discussions, participants highlighted the need for energy efficiency measures across all sectors, with some suggesting a global goal for energy efficiency and others arguing against such a proposal, stressing the importance of equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances considerations and of taking into account national development priorities and pathways, noting that decision 4/CM.4, paragraph 2, states that the outcomes of the mitigation work programme will not impose new targets or goals. They stressed that energy efficiency plans and targets should take into account national circumstances and the potential socioeconomic impacts of mitigation measures and indicated that when planning and implementing energy efficiency measures, socioeconomic side effects, including potential environmental impacts of technologies, should be considered to ensure a just transition.

67. Participants noted that although several energy efficiency technologies have been developed, they are not currently recognized worldwide. Participants suggested that promoting bilateral cooperation could be a way of addressing this issue.

68. The cost of energy or energy tax plays a significant role in promoting energy efficiency. As such, it is important for energy to be priced at the right level and incentives to be set for small and medium-sized enterprises and households to boost the affordability and adoption of energy-efficient technologies.

2. Opportunities (including actionable solutions) and barriers

69. Participants mentioned that the scope of energy efficiency should be broadened beyond demand, and other avenues such as energy storage, infrastructure, generation, transmission and distribution should be explored. The scaling up of efficiency action through greater market activity and particularly digitalization, so as to allow for smart control and better energy management, was discussed.

70. Interest was expressed in scaling up the deployment of electric vehicles and shifting towards more efficient public transport systems. Participants underlined that energy efficiency measures could be easily implemented across the residential sector.

71. Participants identified concrete examples of energy efficiency measures as potential opportunities, including district cooling combined with power generation, combined cycle technologies, cogeneration and trigeneration. Given that methane emissions make a substantial contribution to the current and projected rise in global temperature and tackling methane emissions is one of the short-term mitigation strategies identified by the IPCC, it was mentioned that energy efficiency measures in the oil and gas industry could have a meaningful impact.

72. The main barriers highlighted by participants pertained to the high upfront cost of transitioning to a higher rate of energy efficiency, lack of capacity to implement energy efficiency measures, lack of international cooperation on fostering energy efficiency, and financial challenges due to the lack of innovative financial mechanisms and poor access to international climate finance. Other barriers to energy efficiency include inadequate national policy support, inconsistent regulations and limited enforcement mechanisms. The adoption of energy-efficient appliances is often further hindered by the fact that the rating of appliances varies according to a setting's specific conditions, temperature or humidity.

73. Participants also indicated that the development of energy efficiency measures is sometimes limited by lack of access to energy-efficient technologies or the unavailability of energy-efficient appliances, equipment and building materials. Lack of acceptance of these measures and technologies due to people's social and economic background, including factors such as levels of poverty and gender inequality, was also put forward as a key barrier.

74. Possible solutions to address barriers to energy efficiency that were shared include behavioural change in consumption patterns through education, awareness-raising campaigns and other outreach activities, as well as the empowerment of women especially at the national level. In addition, developing enabling frameworks may help to ensure private sector engagement in deploying energy-efficient technologies and better exchanges among the public and private sectors and consumers to provide systemic solutions for energy efficiency.

75. Increased international collaboration was indicated as a potential solution for driving knowledge exchange, especially in terms of matching needs with solutions through a knowledge management accelerator as a means of unlocking finance.

E. Policies and measures

1. Summary of discussions and key findings

76. The breakout group was facilitated by Minoru Takada, Team Leader on Energy, Division for Sustainable Development Goals, Department of Economic and Social Affairs, United Nations Department of Economic and Social Affairs, and supported by Richard Kozul-Wright.

77. The introductory presentation by Richard Kozul-Wright highlighted the complexities of the energy transition from both a climate and development perspective and showed that a wide range of energy policies need to be integrated in a holistic manner to accelerate the just energy transition. A just energy transition is a macro-policy challenge and financing is the key element, with an estimated 6 per cent of global gross domestic product required to meet the goals of the Paris Agreement. Developing countries often lack the necessary policy space for addressing the various limitations and asymmetries hindering the transition, in addition to facing a debt burden that is necessary for development, high interest rates and a lack of international public finance, which act as constraints for the energy transition. It was emphasized that public investment should play a more prominent role in ensuring a just and fair energy transition in developing countries. In both developed and developing countries, the energy transition requires, among other things, a revival of public banks, rethinking of the role of central banks, generation of private investment and development of policy-based loans. In this context, it was stated that enlarging the fiscal space would require a shift in taxation in both developed and developing countries, a restructure of the international financial system to ensure that sufficient international finance is available for developing countries, and stronger policy coordination to ensure financial flows to developing countries

and encourage investment in renewables. There is also a need to address capacity and financial challenges for planning, developing and implementing energy policies and measures, as well as the challenge of policy coordination at the national, regional and international level.

78. During discussions, participants noted that policies and measures for energy transformation should be considered holistically, rather than in isolation or by focusing on a specific sector or region, while ensuring that a balance is maintained between low-emission targets and other development priorities such as job creation. It was noted that there is no 'one size fits all' policy and that policies should be tailored to each country's circumstances. Some participants commented that in this regard, phasing out fossil fuel subsidies can be challenging owing to socioeconomic impacts and broader political considerations.

79. Participants indicated that to generate broad buy-in and participation in terms of implementing domestic policies and measures, it is important to have an inclusive policymaking process with regard to the public and private sectors, local communities, young people and civil society to ensure the development of sustainable policies and measures and stimulate private sector investment. Therefore, policies may be designed in a manner that provides incentives, both fiscal and non-economic, and helps to build trust for adopting new technologies over time in order to overcome the risk of returning to 'business as usual'.

80. Participants discussed the formulation of policies and measures to disrupt fossil fuel investment with a view to reducing the use of fossil fuels and promoting global investment in low-carbon energy. Consideration of equity in policies and measures was also mentioned as an important element to consider.

81. International cooperation was recognized as critical to policy planning and implementation, and to facilitate financial flows. Improving bilateral and multilateral cooperation on energy and mitigation matters was considered an important area for further exploration.

2. Opportunities (including actionable solutions) and barriers

82. Opportunities shared by participants include the development of tailored investment policies for renewable energy that may encompass, as appropriate, feed-in tariffs and tax incentives to encourage the creation of sustainable jobs and other economic opportunities within the renewable energy sector.

83. Participants shared their interest in developing enabling policies and measures to facilitate technology development and deployment. The need to ensure a conducive policy landscape for green projects and infrastructure, with clear targets and streamlined permit procedures, was discussed.

84. Participants discussed the issue of considering a carbon price when developing mitigation policies, given its potential to encourage people to shift from fossil fuels to cleaner technologies.

85. In their interventions, participants noted key barriers that need to be addressed, including the lack of technical capacity and enforcement mechanisms for designing, assessing and implementing policies and measures at the national level, and stressed that the deployment of policies is often a lengthy process as new policies have to pass through various stages of planning, adoption, implementation and enforcement.

86. Another barrier highlighted by participants is the lack of outreach to stakeholders and citizens, which inhibits policy coordination among the various levels and thereby delays the implementation of policies and measures. For instance, the adoption of energy efficiency policies often depends on voluntary individual actions. The need for vertical and horizontal coordination within government, taking into account the strengthening of collaboration among different ministries, was emphasized.

87. Participants discussed challenges with the availability of data on GHG emissions, which often hinder timely implementation of effective mitigation policy measures in the private sector.

88. The lack of policies supporting access to affordable financing was identified by some as another barrier to the just energy transition. Appropriate market systems may be developed, including fiscal frameworks for phasing out fossil fuel use.

F. Financing issues

1. Summary of discussions and key findings

89. The breakout group was facilitated by Youba Sokona and supported by Chienyen Goh.

90. The introductory presentation by Chienyen Goh highlighted climate finance needs, identified by cost type and by region, in quantitative terms. Focusing specifically on sub-Saharan Africa, the cost of financing has increased, reflecting a higher risk profile for the region and for low-income countries. The relationship between debt and investment opportunities was underlined, since as debt burden increases the fiscal space available for investing in climate action decreases. Challenges such as low leverage ratios for low-income economies and uncertainties around economic developments, such as the future of African exports, were highlighted. Blended finance structures offer potential vehicles for the public sector to create investment opportunities for the private sector, but the lack of customization of these structures for low-income countries presents an obstacle. In that regard, the presentation explained, MDBs and development finance institutions often need to alter their business models to take on greater risk. It was noted that exports such as fossil fuels, minerals and metals are key sources of income for many countries, including in Africa, which poses several challenges. Factors such as the uncertainty of fossil fuel demand, the need for critical minerals for renewable energy technologies, the impact of cross-border initiatives on trade relations, and emission-intensive production could play a significant role in the path to decarbonization. Potential solutions were identified, such as introducing carbon pricing mechanisms, attracting investment in green technologies, and enhancing the mobilization of concessional financing, debt relief and resolution, as well as national economic development.

91. In their discussions on financing issues, participants referred to several reports, such as the Synthesis Report of the IPCC Sixth Assessment Report,[8] which indicated that sufficient global capital exists to rapidly reduce GHG emissions if existing barriers are reduced; an IEA report,[9] which stated that subsidies worldwide for fossil fuel consumption increased to more than USD 1 trillion in 2022; and an IRENA report,[10] which cited that global investment in energy transition technologies, including energy efficiency, reached a record high of USD 1.3 trillion in 2022.

92. Participants indicated that challenges in climate finance access, adequacy and architecture need to be addressed, as they are affecting climate ambition and action. The need for reforms in the global financial system, discussions on new climate finance commitments and tailored approaches that take into account national circumstances and economic realities were underlined, among others. Moreover, some participants noted that scaling up mitigation ambition in developing countries is contingent upon the provision and mobilization of finance from developed countries, which should be new and additional, predictable and primarily grant-based and concessional.

93. Regarding public and private sources of climate finance, participants noted that public finance was crucial to climate action and an enabler of private sector investment. Some participants highlighted that, even though public finance is essential for climate action, it is insufficient to enable the energy transition, and private sector finance is needed. In that regard,

[8] IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 184 pp., doi: 10.59327/IPCC/AR6-9789291691647.

[9] IEA (2023), World Energy Investment 2023, IEA, Paris https://www.iea.org/reports/world-energy-investment-2023, License: CC BY 4.0.

[10] IRENA (2023), World Energy Transitions Outlook 2023: 1.5°C Pathway, Volume 1, International Renewable Energy Agency, Abu Dhabi.

participants shared concerns about current private sector engagement in climate action in developing countries.

94. Participants shared views on the need for reforms in international climate finance. It was stated that the current principles governing the global financial system are not in line with the goals of the Paris Agreement and international climate finance therefore needs reform, particularly with regard to MDBs. Participants reflected on aligning the portfolios of MDBs with the Paris Agreement by, for example, including climate change in balance sheets, redefining risk perception, enhancing grant-based instruments and considering climate risk in projects. One view expressed by participants was that the UNFCCC process is not the correct platform for discussing reform of the global financial architecture.

95. Several participants noted that fossil fuel subsidies should be redirected towards cleaner technologies, while others highlighted the need to consider national circumstances and priorities in that regard. A few participants mentioned that the promotion of technologies such as CCU and CCS might affect the phasing out of fossil fuel subsidies. It was mentioned that the fossil fuel industry should be considered a partner in the energy transition, as the industry is engaging in sustainability practices and supporting communities in some countries.

2. Opportunities (including actionable solutions) and barriers

96. Participants discussed innovative climate finance instruments to be explored as an avenue for countries with high levels of investment risk to access enhanced climate finance. Several participants mentioned blended finance as a useful tool for de-risking investments, while others mentioned debt-for-climate swaps as an instrument that could unlock climate finance.

97. Some participants mentioned the role of NDCs in informing the direction of international finance, noting that NDCs take into account both national economic development and climate action. Furthermore, NDC investment plans can act as a catalyst for projects and opportunities. However, it was also noted that developing investment plans for NDCs will require additional financial and human capital resources which may not be available, and the need for scaling up means of implementation and support was therefore emphasized.

98. Examples were shared of partnerships, support and collaboration, highlighting best practices and lessons learned that can be replicated and scaled up, such as the Just Energy Transition Partnerships; the Clean Energy Transition Partnership; the Danish Energy Agency ‘one-stop shop’ approach; large-scale financing for renewable energy in China; just transition practices for the coal industry in Spain; blended finance platforms in the United States of America; the European Union Emissions Trading System; the multidimensional vulnerability index for vulnerable countries; and the forthcoming handbook on blended finance from the Network of Central Banks and Supervisors for Greening the Financial System.

99. The need for fit-for-purpose climate finance instruments and enhanced enabling environments was mentioned.

100. Participants mentioned that barriers to accessing climate finance often include lengthy and demanding processes, and the eligibility criteria of finance providers. A few participants mentioned that some challenges in accessing climate finance are not only technical but also political in nature.

101. Participants stressed that national circumstances, economic realities and existing barriers need to be taken into account when financing climate action. Such barriers often include high public debt levels, high financing costs, high capital costs and high risk assessments, which hinder investment in climate action and energy transition projects, especially in low-income economies. This is often in addition to the small scale and limited capacities of domestic markets, the private sector and the banking industry, which further affects the resources available for the energy transition. It was mentioned that the timeline for the global energy transition often puts pressure on poor and vulnerable countries since they experience competing development priorities and challenges, including energy poverty.

102. Participants noted that the current status of climate finance commitments under the Convention and the Paris Agreement presents a barrier. In this regard, it was mentioned that

urgent action is needed to close the climate finance gap and prioritize related discussions on the new collective quantified goal on climate finance, taking into account the importance of transparency and the tracking of finance.

103. Financing the technology development and deployment needed for the energy transition was mentioned as a challenge. Several participants stressed that advanced technologies are often planned for or imported without considering national capacity and uptake, and that there is a need to build relevant national capacity and reduce dependence on technological imports. It was also stated that current global deployment rates, including for renewable energy technologies or CCS used in some modelled pathways limiting global warming to 1.5–2 °C, are significantly below the deployment rates provided for in the modelled scenarios, and investment therefore needs to be scaled up in order to increase deployment and achieve the goals of the Paris Agreement. Participants also stressed that national incentives and subsidies for new technologies could negatively affect national budgets.

G. Technology and capacity

1. Summary of discussions and key findings

104. The breakout group was facilitated by Kaveh Guilanpour, Vice-President for International Strategies, Center for Climate and Energy Solutions, and supported by Stig Svenningsen.

105. The introductory presentation by Stig Svenningsen described the key findings of the TEC on enabling environments and challenges for technology development and transfer identified from technology needs assessments, NDCs and technical assistance provided by the Climate Technology Centre and Network. The most frequently identified challenges for mitigation were economic and financial, followed by technical, legal and regulatory, information and awareness, human skills, institutional and organizational, market conditions, and social, cultural and behavioural challenges. Opportunities to address challenges ranged from multifaceted actions, the role of governments in creating enabling environments through regulatory and institutional frameworks, and a combination of market stimulation and human capacity development in developing country Parties, to education and training to assist countries in making early-stage decisions on financing, and matching countries' technology priorities. TEC findings were also shared on emerging climate technologies in the energy supply sector and their key characteristics, such as maturity level, probable cost, key applications and probable barriers, and on capacity gaps and needs and relevant recommendations, including customized capacity-building projects based on local needs and levels of skill and knowledge.

106. Participants shared examples of international cooperation, including a technology demonstration project on private investment and expert training by Japan; a technology demonstration project with intellectual property rights licensing support by Norway; a research development programme with international partners by the EU; international cooperation by Denmark with a modelling team to develop a technology catalogue for partner countries to make more informed decisions; a technology transfer experience by Spain that incentivized best practice and helped to prevent flawed decision-making; the Green Grids initiative by the United Kingdom of Great Britain and Northern Ireland; and the Just Energy Transition Partnership by multiple countries.

107. Participants expressed the view that the just energy transition should go beyond changing the composition of energy supply and take into account energy security, affordability and supply reliability, as well as industry and supply chain development, macroeconomic impact and socioeconomic aspects, such as creating local jobs. Reskilling the workforce, education for new clean energy opportunities and local business development are considered important in that context.

108. Participants highlighted the need for capacity-building for decision makers to plan and implement systematic change, including through developing technology road maps and avoiding high-emission technology lock-in. Participants also mentioned the need to better

utilize existing resources, coalitions and organizations, such as the high-level champions, IRENA and the NDC Partnership.

109. While trade and investment promotion were mentioned as facilitating technology deployment internationally, participants raised the issue of exporting cheaper inefficient old technologies, such as used vehicles, from developed to developing countries.

110. On the basis of the experience of technology needs assessments, the need to address challenges in translating the results of assessments and feasibility studies into implementation was underlined. Given the information shared from the TEC, participants expressed interest in learning from the work of the other UNFCCC constituted bodies. In this regard, it was mentioned that the UNFCCC Technology Mechanism could be enhanced through strengthening capacity-building and links to the entities of the Financial Mechanism under the Convention and the Paris Agreement.

2. Opportunities (including actionable solutions) and barriers

111. Participants exchanged views on strengthening knowledge and experience exchanges and discussed information on new technology development through international cooperation, including the role of existing forums such as the Clean Energy Ministerial, Mission Innovation, the TEC, the Climate Technology Centre and Network, and the United Nations Regional Commissions.

112. New and emerging technologies were mentioned as areas for international cooperation, including grid and storage to integrate a high share of variable renewable energy, CCS, CCU and offshore wind power. In this regard, it was mentioned that many technologies, including carbon removal technologies, need enabling environments to address barriers, facilitate inclusion of these technologies in long-term planning and promote large-scale deployment. To further advance technology development, research and development funding is often critically needed, partly to bring down costs.

113. Participants discussed regional approaches that may present a possible tool for addressing some barriers. Interest was expressed by some participants in organizing a regional dialogue on the margins of regional climate weeks or other regional events.

114. Several barriers and challenges shared by participants were common across countries that differ in terms of region, population size and stage of economic development, including:

(a) The financing of the high initial cost of new and clean energy technologies, such as battery storage, particularly the allocation of cost among stakeholders with limited short-term return on investment;

(b) The requirement to update the whole energy system to be compatible with a high share of renewable energy for energy transition;

(c) The high share of variable renewable energy in power generation, which poses a challenge to grid stability, particularly in countries and regions without the modern grid infrastructure to exploit the full potential of renewable energy;

(d) The transition from existing fossil fuel infrastructure to a system based on renewable energy, which calls for a just transition that includes workforce training to create local jobs associated with clean technologies;

(e) The capacity-building required to train the workforce not only in the energy sector, but also in related sectors that consume energy, as well as the development of endogenous capacities for technology development and transfer;

(f) The need to invest in innovation, given that many key technologies are still in the research and development phase of the technology cycle.

115. Participants discussed barriers and challenges associated with specific national circumstances, including limited land for deploying solar and onshore wind power, in particular in small island developing States; limited availability of geological storage for CCS in national territory; lack of economies of scale to attract private investment in small developing countries; requirements for capacity-building in developing countries in order to use new and emerging technologies and develop regulatory frameworks; weak institutional

arrangements for inter-ministerial coordination; and the risk of unsustainable technology deployment due to a reliance on foreign companies.

116. Deepening dialogues about barriers, opportunities and actionable solutions, such as technology standards, training, regional grids and economies of scale to attract private finance, was discussed as a possible avenue for generating solutions to technology problems.

H. Sustainable development and socioeconomic impacts

1. Summary of discussions and key findings

117. The breakout group was facilitated by Kirsten Orschulok, Advisor for sustainable and climate-friendly transport policies, German Agency for International Cooperation, and supported by Yin Shao Loong. The aim was to provide information on the linkages between the just energy transition, sustainable development and socioeconomic impacts with a view to engaging participants on issues such as governance, policy alignment, barriers and challenges within this nexus.

118. The introductory presentation by Yin Shao Loong addressed the complexities faced by countries in contributing to global climate goals and sustainable development targets, and therefore balancing decarbonization efforts and costs with other national development priorities. The need to include social protection in sustainable development and energy transition policies was highlighted, as well as the need for coordination and communication between the public and private sectors and local communities through regular dialogue prior to the development of such policies. It was underlined that coordination and communication are crucial aspects of the just transition. As such, the need for a tripartite dialogue between government, workers and business at the national and regional level was stressed. He also discussed the importance of integrating climate-resilient development aspects into energy transition modelling and the reskilling of workforces, including by state-owned firms or through sovereign wealth funds.

119. Participants shared best practices for successful implementation of emission reduction plans to address socioeconomic issues that have involved the transfer of skills from the oil and gas industry to the offshore wind energy sector, and also from the offshore wind sector to the onshore wind sector. The EU highlighted the development of a social climate fund to support measures and investment related to energy efficiency of buildings and decarbonization of heating and cooling in buildings, including the integration of energy from renewable sources, and to improving access to zero- and low-emission mobility and transport.

120. Participants indicated that a holistic approach should be adopted for the just energy transition, balancing climate objectives with national socioeconomic development priorities, including poverty eradication, economic development, energy security and access, alignment with the SDGs, long-term low-emission development strategies and other national development policies and strategies.

121. Participants highlighted the importance of driving private sector investment and stimulating job creation and community development. In this context, tripartite dialogues with government, the private sector and local communities, including Indigenous Peoples, were mentioned in the context of the development of national policy or strategy for the just energy transition.

122. Participants stated that a just energy transition policy or strategy cannot be a ‘one size fits all’ solution but should take into account the different circumstances and stages of development of a particular country.

2. Opportunities (including actionable solutions) and barriers

123. In terms of opportunities, participants indicated that a wide range of possible solutions is already available, and that countries should select appropriate policies and measures on the basis of their national circumstances and development priorities, while further avenues should be explored for scaling up just energy transition projects in a sustainable manner and replicating emission reduction plans in different countries to address socioeconomic issues.

124. Participants expressed interest in learning from countries' best practices on economic restructuring, mitigation projects, long-term low-emission development strategies and regulatory frameworks on the just energy transition and in strengthening their modelling capacity to understand the effects of mitigation actions on achievement of the SDGs.

125. It was pointed out that, in some cases, it is challenging to translate national strategies into implementation at the subnational level, often owing to a lack of coordination among public institutions, the private sector and local and Indigenous communities.

126. Participants noted that barriers often include the high upfront cost of implementing just energy transition projects at national level; lack of energy security and access to energy at community level; policy uncertainty for just energy transition; lack of governmental support; prioritization of projects leading to short-term economic growth rather than sustainable development; and lack of knowledge or capacity for linking the effects of mitigation actions to the achievement of SDGs.

127. Some actionable solutions proposed by participants for scaling up mitigation ambition and implementation and achieving socioeconomic benefits in addition to the SDGs are:

(a) Strengthening international collaboration to unlock finance;

(b) Promoting stronger collaboration among institutions and the private sector to drive the just energy transition at the national level;

(c) Developing robust national regulatory frameworks for the just energy transition;

(d) Furthering social and inclusive dialogues on the just energy transition and the SDGs and socioeconomic issues;

(e) Promoting the transfer of skills among sectors through continuous education and skills development to ensure job security;

(f) Accelerating knowledge management to bring about behavioural change through the adoption and implementation of technologies in the community, since new technologies create uncertainty and are rarely affordable;

(g) Empowering women to support the just energy transition;

(h) Strengthening regional collaboration with banks and power industries;

(i) Ensuring access to affordable, reliable and sustainable modern energy for all, including by addressing energy shortage and inaccessibility, in the context of sustainable development, equity and poverty eradication.