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Ministerial policy dialogue: investing in innovative environmental solutions to accelerate implementation of the Sustainable Development Goals and Agenda 2063 in Africa

Investing in innovative environmental solutions to accelerate implementation of the Sustainable Development Goals and Agenda 2063 in Africa

Note by the secretariat

I. The Sustainable Development Goals and Africa's perspective: it is time for innovative thinking

1. Amidst impressive reported headline growth and positive reviews on Africa, the continent continues to face formidable challenges that are negatively affecting its socioeconomic progress. The latest findings on the region's progress towards achieving the Sustainable Development Goals of the 2030 Agenda for Sustainable Development, as documented in *The Sustainable Development Goals Report 2016*, note that the advance is slow. Food insecurity, high youth unemployment, poverty, energy poverty and low health standards remain key challenges, and these are further continuously compounded by climate change. This means the Sustainable Development Goals are far from being a reality for the majority of people on the continent.

2. The attainment of the Sustainable Development Goals, as stated in the 2030 Agenda for Sustainable Development, and Agenda 2063, will therefore require a substantial reorientation of development policies to focus on key sources of economic growth, especially those associated with the use of innovative scientific and technological knowledge, and related institutional adjustments. Therefore, countries must deviate from the "business-as-usual" approach and devise ways and means on how to address issues such as rising energy costs, poverty, environmental degradation and social inequality and, where necessary, to achieve changes in legislation to address these issues. Ultimately, if African countries do not take action now, they run a higher risk of failure as these issues inevitably continue to take effect.

3. There is, therefore, a growing need to find alternative approaches that can help to address sustainability-related drivers while at the same time offering opportunities for better environmental management. Innovation is one such approach that brings value added novelty, which can fulfil key environmental challenges and opportunities. It also helps to drive changes in policy and institutional frameworks, private sector participation, financial instruments, social interventions and business models.

* AMCEN/16/1.

4. With environment integrated into all aspects of development, this document focuses on how innovative environmental solutions could provide affordable practical solutions to drive the implementation of the Sustainable Development Goals and Agenda 2063 in Africa.

Africa's reality check

5. *The Sustainable Development Goals Report 2016* notes that, while poverty has been reduced at the global level, it remains widespread in sub-Saharan Africa, where more than 40 per cent of the population lives on less than \$1.90 per day. This does not bode well for Africa's efforts to realize Sustainable Development Goal 1, which aims to end poverty in all its forms everywhere.

Unemployment is also rife. Young people aged 15–25 represent more than 60 per cent of the continent's population, of whom 60 per cent are unemployed and more than 70 per cent live on less than \$2 per day. This is not only an exacerbation of poverty, it also entrenches inequalities and increases conflicts, threatening the realization of Sustainable Development Goals 10 (Reduce inequality within and among countries) and 16 (Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels). Furthermore, considering unemployment rates among women in sub-Saharan Africa are more than 50 per cent higher than those of men, Africa's quest to achieve Sustainable Development Goal 5 (Achieve gender equality and empower all women and girls) remains a distant reach.

6. Related to the fight against poverty is labour productivity, which continues to be low, especially in sub-Saharan Africa. Africa's labour productivity is 20 times less than that in developed regions, implying that the region's performance on Sustainable Development Goal 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), which comes through increased industrialization and value addition (Sustainable Development Goal 9, Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation), remains alarmingly low.

7. Food and nutritional insecurity is also high. While the global proportion of people suffering from hunger has declined, more than 50 per cent of the adult population in sub-Saharan Africa still faces moderate or severe food insecurity.

8. Africa lags behind the rest of the world in all the indicators of health. For example, while 50 per cent of the world's population is at risk of malaria, sub-Saharan Africa is at 89 per cent risk. Going forward, few countries in Africa can afford to spend the World Health Organization-recommended \$35 per capita for minimum health care. This means that, if this state of affairs prevails, realization of Sustainable Development Goals 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture) and 3 (Ensure healthy lives and promote well-being for all at all ages) remains a distant reality for the continent.

9. With an estimated 621 million Africans living without electricity, and that number expanding, energy poverty is high, impacting Africa's growth on multiple levels. Highlighting the high cost of energy, the *Atlas of Africa Energy Resources* reveals that the poorest African households spend 20 times more per unit of energy than do wealthy households, when connected to the grid. The high costs are largely driven by poor infrastructure. This means that, with current trends, and if the strategies being pursued by the bank through the new deal are not embraced, it will take Africa until 2080 to achieve full access to electricity. This means that biomass will continue to supply energy to the majority of African households, to the detriment of both their health and finances. Health-wise, the resulting indoor pollution from unclean sources causes up to 600,000 deaths annually on the continent. Lack of electricity also means that 60 per cent of refrigerators used to store vaccines lack access to reliable power, leading to spoilage and hampering Africa's health care.

10. On the business front, about 10 million medium-sized enterprises lack access to electricity. Available electricity costs three times that in the United States of America and Europe, and is compounded by frequent shortages. Cumulatively, this costs African economies 1–4 per cent in lost gross domestic product (GDP) annually.

11. In education, access to electricity in primary schools is 35 per cent, and in some countries, 80 per cent of primary schools have no electricity. This has implications for learning, as these pupils are denied the light they need to study, which affects their performance in school and hence later in life. This scenario perpetuates the poverty cycle for this segment of society.

12. Climate change is a major driving force which compounds all the above with negative impacts in all critical socioeconomic sectors of the continent.

13. At the first gathering of the Sustainable Development Goals Centre for Africa, it was revealed that Africa needed at least \$1.2 trillion annually to achieve the Sustainable Development Goals. This would require setting aside a minimum of \$25 billion annually to achieve universal access to modern energy services by 2030, \$18 billion for climate change adaptation, and \$210 billion for basic infrastructure, food security, health care, security and climate change mitigation. Notwithstanding these seemingly astronomical amounts, Africa cannot rely on traditional public assistance, including official development assistance, whose contributions have dropped to a mere 1 per cent of all capital inflows into the continent. Official development assistance now accounts for only 3 per cent of continental GDP. This presents a clear financing challenge for the continent.

14. The bottom line is that, without affordable, practical innovative solutions to address the aforementioned challenges, realization of the Sustainable Development Goals and Agenda 2063 will be elusive. The foundations of an inclusive, sustainably growing “Africa we all want”, as envisioned in the region’s Agenda 2063, will remain on shaky ground. Perhaps the biggest challenge for Africa is that, if the current trends are maintained, its environment and natural resources will no longer be able to buttress the region’s development. The universal adoption of the Sustainable Development Goals by all countries across the globe, including Africa, is premised on the environment being integral to solutions to these challenges. It is clear that, going forward, the region’s environmental sector needs to play a strategic role, providing practical, affordable and innovative solutions to the aforementioned socioeconomic development challenges, in order for Africa to progressively achieve the Sustainable Development Goals and realize the aspirations of the African Union’s Agenda 2063.

II. Seizing the moment: viewing Africa through the natural capital lens

15. Even with the myriad of challenges the region faces, Africa’s natural capital wealth offers a critical entry point, where environment offers the required solutions. Indeed, this has been recognized and endorsed by Governments across the region through the African Ministerial Conference on the Environment. This paradigm was first mooted in the 2012 Gaborone Declaration for Sustainability in Africa. The Declaration recognized the key role of natural capital in achieving inclusive sustainable growth in Africa, thus reconfirming the niche of environment in the context of Africa’s economic growth.

16. In 2015, the imminent adoption of the 2030 Agenda for Sustainable Development led Africa’s environment ministers to affirm that natural capital provided a gateway to the path for inclusive sustainable development in Africa. This was captured in the Cairo Declaration on Managing Africa’s Natural Capital for Sustainable Development and Poverty Eradication adopted by the African Ministerial Conference on the Environment at its fifteenth session.

17. This paradigm was further built on at the sixth special session of the African Ministerial Conference on the Environment in April 2016. At the session, Governments were faced with the need to implement the newly adopted 2030 Agenda for Sustainable Development and the Paris Agreement on climate change. Aware of the astronomical costs associated with the tasks at hand, environment ministers reconfirmed the environment as a credible solution by demonstrating how natural capital can contribute at the economic, social and environmental level towards the implementation of the 2030 Agenda and the Paris Agreement. All this was also aligned with Africa’s aspirations, as encapsulated in its Agenda 2063.

18. In 2017, two years after the adoption of the Sustainable Development Goals, and given slow progress, Africa is urgently looking for practical, innovative ways to accelerate the implementation of these global goals and the aspirations of Agenda 2063. Natural capital can be leveraged to achieve this. Africa is therefore urged to undertake innovative investments that carry the promise of unlocking the catalytic contribution of natural capital towards achieving these regional and global goals.

III. Unlocking the enigma of innovative environmental solutions to accelerate the implementation of the Sustainable Development Goals and Agenda 2063

19. For Africa to optimally implement the Sustainable Development Goals as well as its own vision, the region needs to leverage catalytic sectors that can simultaneously accelerate socioeconomic development. To better illustrate this in a context relevant to Africa, this section provides examples of where ecosystem-based adaptation-driven agriculture and its amalgamation with clean energy-powered value addition are used to optimize agro-value chains. This is an inclusive area that

will foster participation of the majority on the continent, including women and youths. It will ensure that food security and economic opportunities are created along the entire value chain, while simultaneously offsetting carbon and conserving ecosystems to combat climate change. In turn, it will serve to build both biophysical and socioeconomic resilience to enhance environmental security in the region.

20. This natural capital-based area holds four distinctions that position it favourably to accelerate achievement of the Sustainable Development Goals and work towards fulfilling aspirations of Agenda 2063.

21. First, the region holds a significant comparative advantage in terms of resources: 65 per cent of the world's uncultivated arable land and 10 per cent of inland freshwater resources are in Africa. There is abundant renewable energy potential, including hydropower potential estimated at 1,852 terawatt-hours annually, three times the continent's current demand, and 1,300 gigawatts of wind potential. In addition, there is a huge amount of untapped geothermal energy and the best solar resource on the entire planet. It is estimated that a mere 0.3 per cent of the sunlight that shines on the Sahara could supply nearly all of Europe's energy needs.

22. Second, focused policy and non-policy investment to maximize productivity of these subsectors contributes simultaneously to socioeconomic development priorities. To maximize this productivity, these sectors need to be considered as complementary and not in silos, as classically approached most of the time. The World Bank reports that in Africa, a 10 per cent increase in crop yields would translate into approximately a 7 per cent reduction in poverty. Growth in agriculture is at least two to four times more effective in reducing poverty than it is in other sectors. This has positive implications for accelerating the achievement of both Sustainable Development Goals 1 and 2.

23. Policies integrating ecosystem-based adaptation for on-farm production will contribute to climate adaptation and Sustainable Development Goal 13 (Take urgent action to combat climate change and its impacts), given that ecosystem-based adaptation is one of the recommended climate adaptation practices. As noted in the report submitted by the Special Rapporteur on the right to food, Olivier De Schutter (A/HRC/16/49), if widely adopted, ecosystem-based adaptation will also boost food security by increasing the yield of healthier food up to 128 per cent, thus contributing to Sustainable Development Goals 2 and 3, while raising farmer incomes to combat poverty (Sustainable Development Goal 1). The role it plays in enhancing the capacity of ecosystems to continue providing goods and services will enable communities to adapt to climate change (Sustainable Development Goals 13 and 15, Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss). Furthermore, some ecosystem-based adaptation techniques, such as agroforestry or farmer-managed natural regeneration, will enhance carbon sinks (e.g., based on inference, one large-scale forest regeneration project of 25,000 hectares can ensure that a country sequesters up to 15.6 million tons of carbon dioxide), thus contributing to Sustainable Development Goal 13.

24. Clean energy value addition of ecosystem-based adaptation agro-produce will not only further incentivize its application, but will also minimize emission sources and help respond to Sustainable Development Goal 13. For example, solar irrigation can sequester more than 1 million tons of carbon dioxide equivalent by 2030. Value addition will create additional higher-order jobs along the entire agro-value chain. This approach can potentially create up to 17 million jobs along the entire value chain and catalyse an agro-sector worth \$1 trillion by 2030. This is without adding on to aggregate greenhouse gas emissions and pollution, while minimizing health risks (Sustainable Development Goal 3). This will contribute directly towards combating poverty (Sustainable Development Goal 1), food security (Sustainable Development Goal 2) and access to energy (Sustainable Development Goal 7, Ensure access to affordable, reliable, sustainable and modern energy for all). It will also catalyse economic growth and employment (Sustainable Development Goal 8) by enhancing quality jobs, stimulating structural transformation and contributing to macroeconomic expansion through increased agriculture GDP.

Across Africa, pockets of success demonstrate the potency of integrated innovative environmental approaches to accelerate the realization of the Sustainable Development Goals

In the Democratic Republic of the Congo, a group of graduate youthful “agripreneurs” is using clean energy to process cassava, an indigenous climate-resilient crop, into flour, then packaging and standardizing it for sale to higher-value markets. The youths generate up to \$4,000 of weekly income, translating to \$16,000 monthly and \$196,000 annually. In turn, they create incentives for the production of climate-resilient cassava and add clean energy value (Sustainable Development Goal 13), while creating incomes and jobs and enhancing food security (Sustainable Development Goals 1 and 2).

In Kenya, farm value addition using solar-powered, efficient microirrigation is saving farmers more than \$10,000 annually in operating costs relative to using conventional fossil fuel-powered, non-efficient farrow systems. Cumulatively, farmers are generating more than \$70,000 per hectare annually. This is combating community-level poverty while enhancing food security (Sustainable Development Goals 1 and 2). For climate action, this system is conserving up to 1.9 billion litres of water annually to sustain ecosystems and enhance climate resilience (Sustainable Development Goals 13 and 15), while offsetting carbon by generating up to 64,499 kilowatt-hours of clean energy (Sustainable Development Goal 13).

To accelerate the implementation of the Sustainable Development Goals and achieve impactful progress in the region, policy and non-policy incentives and investments are needed to upscale this innovative approach of amalgamating clean energy and ecosystem-based adaptation in agriculture across the continent.

25. Third, this catalytic area will eliminate current inefficiencies and losses in Africa’s agro-value chains to unlock additional funds that can capitalize other sectors of the economy towards actualizing the Sustainable Development Goals. Across Africa, degraded ecosystems including agroecosystems cost up to \$68 billion annually. Studies show, however, that under the changing climate, upscaling ecosystem-based adaptation can enhance yields and raise accompanying farmer incomes. This happens at lower environmental cost (minimal use of chemicals, fertilizer and related inputs), to reverse degradation and enhance productivity of ecosystems.

26. In addition, lack of value addition means Africa loses on average more than \$4 billion worth of food annually as post-harvest losses. In 2010, Africa’s post-harvest losses were valued at more than \$48 billion. When juxtaposed with Africa’s \$35 billion food import bill in 2011, recovering these losses through integrating clean energy value addition would essentially eliminate the need for imports without increasing production. Considering that the food import bill is expected to rise to \$110 billion by 2025, clean energy value addition will inject \$35 billion–\$110 billion between now and 2025 to capitalize other sectors of the continent’s economy. This will all be done while offsetting carbon emissions. Thus, it is possible to accelerate the realization of multiple Sustainable Development Goals – at a minimum Goals 1, 2, 7, 8 and 13 – and recouping up to \$110 billion in fiscal resources by 2025 to further capitalize other priority development areas. This includes supporting reinvestments to further enhance productivity of the catalytic sectors.

27. Fourth, agriculture is the most inclusive economic sector, providing livelihood opportunities for a majority in the continent, including vulnerable women. The sector employs an average of 64 per cent of labour in Africa, while women produce up to 80 per cent of the food. It is thus the most all-embracing sector that can practically enhance inclusive growth on the continent. In addition, ecosystem-based adaptation is compatible with smallholder farmer approaches that produce up to 80 per cent of food in sub-Saharan Africa. Maximizing productivity will have a direct knock-on effect in improving livelihoods of a majority in the region, including vulnerable groups, to accelerate realization of multiple Sustainable Development Goals across Africa.

IV. Innovative environmental solutions and investments to accelerate the implementation of the Sustainable Development Goals in Africa: how Africa can seize the moment?

A. Innovative financing to maximize Africa’s catalytic sectors

28. While Africa needs up to \$1.2 trillion to implement the Sustainable Development Goals, examples across the continent demonstrate innovative environmental approaches that are unlocking direct and indirect financing towards maximizing productivity of the catalytic areas and contributing to

the realization of multiple Sustainable Development Goals. A notable example is Rwanda's Fund for Environment and Climate Change, which provides a financial framework to support the implementation of the different strategies in the country, as detailed in its blueprint "Green Growth and Climate Resilience" strategy. This type of innovative financing sets a good example that can be widely adopted and implemented across the region to support countries in placing themselves firmly on the path to achieving regional and global goals.

1. Information technology and financial services for clean energy

29. In recent years, millions of Africans have been provided with basic access to energy by commercially-minded "start-ups", driven by innovative business models using pico-scale solar photovoltaic, mobile platforms for funds transfer, and cloud-connected wireless communications technologies. Combined with falling solar panel and battery costs, a new breed of energy companies is increasing energy access across Africa faster, more cheaply and more widely than with conventional grid extensions.

30. M-Kopa, a pay-as-you-go decentralized solar solutions company, is leveraging the M-Pesa mobile money solution to provide flexible payment options based on client financial transaction records for acquisition of domestic solar lighting solutions. Through this model, M-Kopa has electrified up to 400,000 rural homes across East Africa in direct fulfilment of Sustainable Development Goal 7 and indirectly Goal 3, by reducing indoor pollution to enhance health; Goal 5, by empowering women; and Goal 4, by facilitating clear lighting to allow children to study. Building on this success, offshoots of viable models to finance off-grid energy for industrial applications should be targeted for powering agro-value addition and other micro, small and medium-sized industries in Africa.

2. Complementary partnerships to finance profitable enterprises in the catalytic areas

31. Under this approach, mutual business partnerships between financing institutions and entrepreneurs in environment-related catalytic areas are developed to enhance business objectives. As a result, the identified catalytic areas are indirectly financed and, where feasible, upscaled, leading to better value optimization while giving new impetus to the building of partnerships. This has been used in ecosystem-based adaptation-driven agriculture and clean energy-powered value addition through financing and upscaling ecosystem-based adaptation and clean energy.

32. Other examples are the interventions through the European Union-funded SWITCH Africa Green projects in Africa that have as their main objective harmonizing policies that promote green business development through transition to green economy and sustainable consumption and production practices. Through grants, more than 3,000 micro, small and medium-sized enterprises that are mostly women-led and employing youths have been able to implement various interventions that are leading to the creation of green jobs, increased profitability, reduced costs, enhanced compliance with environmental laws and regulations, and improved workplace health.

3. Improved tax administration capacity

33. Curtailing illicit financial flows significantly attributable to tax evasion in the exploitation of Africa's environmental assets will recoup an estimated \$50 billion–\$60 billion annually. These resources could be channelled for investment in the catalytic areas capable of opening up paths to multiple Sustainable Development Goals. Improved tax administration is a key strategy for eliminating illicit financial flows. For example, through some targeted interventions to reduce these illicit flows, Mozambique was able to increase short-term revenues by 350 per cent. These recouped revenues will have an even greater impact if invested in developing and implementing policies aimed at maximizing the productivity of the catalytic sectors.

4. Risk-sharing facilities

34. Private sector lending to the catalytic sectors remains underdeveloped, due to perceived high risk. To remedy this, risk-sharing facilities that cover key risk factors of climate risk (driven by climate change-induced crop failure) and financial risk (including those driven by repayment defaults) can be implemented. An example is the European Commission-led Africa Investment Facility, whose goal is to improve the efficiency of the renewable energy technologies by initiating and scaling up domestic bank lending to end users of small-scale clean energy technologies in the region. Consumer credit and microfinance approaches have proven effective in some countries at providing consumers and communities with financing for purchases of small-scale clean energy technologies, such as solar or other renewable energy systems. Similarly, fee-for-service and leasing models can enable customers to purchase small-scale clean energy technologies by paying for the technology as part of a bundled energy service plan.

35. These financial mechanisms, in addition to raising capacity of local institutions, have the potential to strengthen the consumer market for clean energy technologies, in turn improving investor confidence and mobilizing capital to entrepreneurs developing and distributing small-scale clean energy technologies. The dividends that accrue from this innovative approach are in the areas of growth and income poverty reduction, education and health. In urban areas, clean energy technologies help reduce air pollution and provide energy users with an additional and reliable energy source. At the country level, increased use of clean energy technologies improves energy security, alleviating issues such as fuel availability and quality.

5. Maximization of diaspora remittances for the catalytic areas

36. Annual remittances from Africans in the diaspora have risen to more than 2 per cent of continental GDP, or more than \$41 billion. This money goes directly to households. To facilitate their contribution to accelerating the realization of the Sustainable Development Goals, Governments need to put in place mechanisms to enable recipients of these funds to invest them in the catalytic areas. For this to happen, ministries of environment could work with those of finance to put in place policy incentives for banks to develop loan products for enterprises based on the catalytic sectors and targeted at recipients of diaspora remittances. Such loan facilities should be competitively priced and at low interest to recipients of these funds, based on their remittance transaction records. Such targeted attraction of diaspora funds will also complement the risk-sharing facilities proposed above.

37. Mobilization by the Government of Ethiopia of national and diaspora financing and investment for construction of the Grand Ethiopian Renaissance Dam – without taking loans from international development and investment banks – could be a good example of innovative financing for power and other infrastructure development in Africa.

6. Influence on public sector budget allocations

38. Domestic public financial resources are central to the achievement of sustainable development, and their mobilization and effective use are increasingly a priority for stimulating and catalysing environmental innovations. This was reflected by the global commitments made in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development. In Rwanda, since the financial year 2011–2012, the Ministry of Finance and Economic Planning Annual Budget Call Circular issued to all public sector institutions has required sectors and districts to plan and budget for implementing environmentally sustainable and climate change-resilient programmes and projects. This is reflected in overall budget allocations, where the environment-related budget totalled approximately 12.7 billion Rwanda francs in 2012–2013, and increased to 39.4 billion Rwanda francs the following year. The corresponding increase registered rose from 0.4 per cent to 2.5 per cent of the total government budget. Since 2014, 14 sector and 30 district development annual plans and budgets have included pro-poor environmental sustainability projects.

B. Policy harmonization towards Africa's catalytic sectors

39. Policy is the biggest driver of change, and maximizing productivity of the catalytic areas will need harmonization of policies across multiple sectors. For example, in ecosystem-based adaptation-driven agriculture, the agriculture sector will need to work with the environment and forestry sectors to ensure that relevant ecosystem-based adaptation techniques such as agroforestry are integrated into mainstream agriculture policies. To catalyse investment in clean energy-powered value addition, agriculture policies will need to be reconciled with those of industry, energy, land and private investment. This will ensure that relevant cross-cutting policies that create incentives for investment by both State and non-State actors in plants and clean processing industries enable their location near high potential agro-production areas. Infrastructure policies, especially roads, need to be synchronized to ensure prioritized investments in rural roads for efficient connection of production areas and value addition centres to markets and collection points. Lands policies will need to be similarly synchronized to facilitate setting aside appropriate areas for small, medium and large enterprise development, thereby creating incentives for investors to set up processing plants. Trade policies will need to facilitate access to raw materials as well as access of products to both local and export markets.

40. With the growing middle class exhibiting preference for high-value consumer products, such harmonization will contribute towards the region, earning an extra \$20 billion annually in the agribusiness area alone to capitalize other sectors of the economy.

41. A number of member States have recently integrated the goals and targets of Agenda 2063 and the 2030 Agenda for Sustainable Development in new five-year macroeconomic development plans (e.g., Burkina Faso in 2016, Mauritania in 2017, and the United Republic of Tanzania in 2016). They have also strengthened the integration of environmental sustainability in national development objectives and priorities. For instance, Burkina Faso's overall vision in its five-year plan is to become

“a democratic, unified and united nation, transforming the structure of its economy and achieving a strong and inclusive growth, through patterns of sustainable consumption and production”. This clearly reflects a strong commitment to achieve the interconnectedness of the three dimensions of sustainable development. The macroeconomic planning document further puts a strong cross-cutting emphasis on “strengthening environmental governance and integration of the green economy in development policies” as an approach to bridging cross-sectoral policies through integrated approaches. Similarly, integration of pro-poor environmental sustainability has been harmonized in sectoral policies in Malawi (agriculture) and Rwanda (14 sectors), among others.

42. Countries implementing the SWITCH Africa Green project (Burkina Faso, Ghana, Kenya, Mauritius, South Africa and Uganda) have reviewed and harmonized their policies to ensure the promotion of green business development by micro, small and medium-sized enterprises. For example, in Uganda, emphasis on promoting organic agriculture will enable the country to further enhance food security and reduce the use of chemical fertilizers, which currently stands at 1 kg/hectare (the African average is 8–9 kg/hectare), to exploit the growing demand for sustainable products.

43. The adoption of policies that promote the circular economy approach to build a resource-conserving and environmentally-friendly society offers an opportunity for innovative solutions to the achievement of the Sustainable Development Goals and Agenda 2063. A circular economy can greatly contribute to material efficiency, job creation and waste utilization. Indeed, the second United Nations Environment Assembly, held in 2016, invited all stakeholders to engage in environmentally sound management of waste to prevent, reduce, reuse, recycle and recover waste, including food waste. Methodologies such as industrial symbiosis and introduction of waste exchange platforms are now being used to promote the circular economy.

44. In Africa, the Resource Efficient and Cleaner Production programme, Poverty–Environment Initiative and SWITCH Africa Green project have triggered a number of entrepreneurs to implement the concept. For it to be successful, various government ministries and sectors need to work together to ensure better synergies. More importantly, there is need for involvement of the ministries responsible for finance and planning, so that a circular economy is fully integrated in national planning and budgetary processes.

C. Education and capacity-building to empower youths to engage in Africa’s catalytic areas: Reaping demographic dividends

45. Adequately empowered human capacity to seize opportunities in the catalytic areas remains an urgent imperative. The lack of alignment of the education sector to the catalytic areas is limiting optimization for the implementation of the Sustainable Development Goals. By extension, the region is losing out on an opportunity to reap its demographic dividend, with 60 per cent of its population being youths. For example, lack of skilled manpower has limited the success of renewable energy technology development on the continent.

46. It is documented that Africa is not performing well in this sector because there are very few African institutions of higher learning offering renewable energy programmes. Africa’s higher education system needs to be reformed to empower youths with skills aligned to opportunities in the catalytic sectors, while not compromising the competitiveness of its scholars. Such targeted education will ensure that Africa reaps its demographic dividend and directs it towards making a contribution to the realization of the Sustainable Development Goals. Environment ministers should work with the education sector to foster the much-needed education reforms that will ensure prioritization of technical capacity-building in these catalytic areas.

47. As an example of targeted curriculum developments for youth capacity-building to engage in the catalytic sectors, the United Nations Environment Programme-led Africa Geothermal Centre of Excellence is being established in Kenya in collaboration with the African Union Commission, African countries and other development partners. This initiative aims to create a critical mass of young geothermal scientists, engineers, drillers, technicians and financiers, among others, to support sustainable renewable energy (geothermal) development in Africa. The United Nations Environment Programme Skill Gap Analysis conducted in the East African region in 2015 revealed that this initiative would train about 12,000 young African university graduates required for the development of 10 gigawatts of power from geothermal energy by 2030. The Centre will provide both theory and hands-on experience, including research and development, to improve the skills and knowledge of these African youths, thereby supporting the needs of the geothermal energy development job market. The Centre will also promote gender equality and empower women and girls.

D. Market standardization as enabler to maximize Africa's catalytic sectors

48. Quality standardization is a critical market enabler for building a competitive industry. The agro-processing sector again provides good data to illustrate the value of market standardization. In Africa, while 80 per cent of food producers use nature-based approaches that are organic, the continent continues to miss out on the billions of dollars of the global organic foods industry. This industry, valued at \$84 billion in 2014, is projected to grow to \$212 billion by 2020.

49. However, this situation can change with the introduction of quality standards and certifications targeted at formalizing the region's products and production processes in the catalytic areas. This will provide market-driven incentives to catalyse realization of multiple Sustainable Development Goals. Environment and agriculture ministers should work with standards regulators in each country to develop formal standards that formalize production processes and products in this catalytic area. Such standardization will improve the market potential of Africa's agricultural produce and enhance the region's earning capacity. The resulting increased earnings will augment existing efforts to capitalize on the implementation of the Sustainable Development Goals.

E. Infrastructure development towards catalytic sectors

50. Less than 50 per cent of the population in rural Africa that produces 80 per cent of food is connected to roads. Lack of adequate road infrastructure translates into high transportation costs and trade barriers, and compounds the challenge of post-harvest losses curtailing the potential of the catalytic agriculture sector to support achievement of multiple Sustainable Development Goals. Efficient road networks linking production areas to markets are an imperative for Africa to realize the additional \$20 billion from trade in agricultural and other products.

51. Studies show that targeted investments will have a higher benefit-cost ratio (see footnote 37) of 50 to 1 on return on investment. There is need for the relevant sectors (environment, roads/infrastructure, agriculture) to work together to ensure that infrastructure development policies, especially for roads, are synchronized and harmonized with those of the other key sectors, to support prioritized investments that increase access to markets. The necessity of having efficient connection of production areas and clean value addition centres to markets and collection points cannot be overemphasized.

F. Targeted energy policy reform to upscale clean energy use

52. Upscaling clean energy use, a natural capital derivative, will catalyse the realization of multiple Sustainable Development Goals by reducing pollution. A key policy area for Governments to remedy is in oil subsidies. Currently, oil subsidy policies encourage continuous use of fossil fuels while creating disincentives for upscaling clean energy. These subsidies do not meet their intended social impact. For instance, some oil-rich countries in the region spend up to 30 per cent of their budgets, amounting to more than \$7 billion annually, on oil subsidies. Yet an estimated 65 per cent of the subsidies benefit the richest 40 per cent of households, defeating their otherwise noble social objectives. Such resources could, through appropriate policies, be rechannelled to speed up the development of a clean energy industry in Africa. This is vital for making these technologies affordable and catalysing the development of a clean energy ecosystem.

53. Examples of tax-based incentives to accelerate development of renewable energy sources include emissions reduction exemption policies that would give tax breaks to energy production and use that ensure carbon offsetting. Another is a policy that would give tax breaks to organizations that enhance the use of clean energy through research and development. In addition, a reduced tax rate, tax credits and exceptions could be offered to organizations that enhance the use of renewable energy, especially those facilitating technology transfer and research and development to customize these technologies to Africa.

54. Beyond tax-based incentives, countries can improve their feed-in tariff policies to ensure a higher rate and hence encourage increased generation of clean energy to power national grids. Some African countries have approached this through developing and implementing policies that make it mandatory for energy companies (or utilities) to purchase electricity from renewable energy sources at a predetermined price. This price is usually set at a level high enough to stimulate new investment in the renewable energy sector. This, in turn, ensures that those who produce electricity from renewable energy sources have a guaranteed market and an attractive return on investment. This covers electricity generated from wind, biomass, small hydropower, geothermal and biogas.

55. Governments could consider reprioritizing fossil fuel subsidies and directing them towards financing the upscaling of clean energy at the national level. Such reinvestments will greatly contribute to the realization of multiple Sustainable Development Goals.

G. New technological developments to address emerging issues

56. The world is alive to the economic, social and environmental costs of a deteriorating environment, and this is especially so in areas where this directly impacts human health. Technological innovations are being developed and implemented on a regular basis to make significant contributions in addressing emerging environmental challenges.

57. An example is found in the transport sector, which accounts for about 25 per cent of energy-related carbon dioxide emissions, and is set to grow to more than 30 per cent by 2050, growing faster than any other sector. It is also a major source of air pollution, affecting public health and climate change. The World Health Organization estimates that 176,000 deaths occur each year in Africa due to outdoor air pollution. The cost of air pollution to sub-Saharan Africa is estimated at \$43 billion per year. In the region, there are growing numbers of motorcycles, which serve as a primary transport mode and also provide a critical link to urban transport systems.

58. Compared to the emissions from a typical modern passenger car, a two-stroke internal combustion engine scooter emits twice the nitrogen oxides (NO_x), 300 times the hydrocarbons and 80 times the carbon monoxide emissions. In addition, a two-stroke scooter and a four-stroke motorcycle emit 250 and 50 times the particulate matter emission of a typical modern passenger car, respectively.

59. Innovative technological solutions can be used to achieve great gains in improved air quality, reduced carbon dioxide emissions and fuel savings. In addition to the cleaning up of fuels, Africa needs to shift to more fuel-efficient and cleaner vehicles. This can be achieved through transitioning from internal combustion engines to electric motorcycles, significantly improving air quality, especially in urban areas, where motorcycles are concentrated.

H. Leveraging environmental information to underpin decision-making

60. Timely and up-to-date information will consistently remain crucial to steady and firm progress towards the achievement of the Sustainable Development Goals and Agenda 2063. It should underpin every crucial decision made in any sector to avoid costly mistakes that would erode the progress made. In the era of rapidly evolving and affordable technology, the way environmental information is produced, managed and shared also needs to evolve to meet user expectations and circumstances. As decision makers become inundated with information, there is a need to rethink the way information is collected, processed and packaged for maximum impact in a short time.

61. An area where information technology is creating innovative solutions is the use of citizen science in the management of the environment. In citizen science, people who are not necessarily professional scientists, and act on a voluntary basis, take part in a number of scientific activities. These include the collection and analysis of data, development of technology, testing of natural phenomena, and dissemination of results from these activities. Thus, in simple terms, citizen science means public participation in scientific research, which enables researchers to obtain a wider perspective and deep data on environmental issues of public interest.

62. One of the advantages of citizen science is that large numbers of participants are able to provide enormous amounts of data, from far-flung locations, and the collection of these data can take place over long periods otherwise not possible through conventional means. The key benefits of this are that it enables more people to participate in the exploration of the environment around them, and brings them together, directly or through social networking. Citizen science not only enables people to raise awareness and have better access to information, it also makes it possible for them to be more motivated and to better influence policymaking and decision-making.

63. Technologies that are contributing to the growth of citizen science include satellites, global positioning systems and, more importantly, smartphones. With rapid growth in the penetration of mobile phones in Africa, citizen science can be used as an innovative solution to influence the way the region manages its resources, and to achieve greater environmental sustainability and human livelihood benefits.

V. Conclusion

64. Africa can seize the moment for the implementation of the Sustainable Development Goals and Agenda 2063 only if it targets complementary strengths towards optimizing productivity of catalytic areas.

65. The \$1.2 trillion financing gap needed to achieve the Sustainable Development Goals can be bridged directly and indirectly by leveraging innovative environmental solutions. These solutions contribute to closing this gap through direct fiscal resources (generation of additional incomes, jobs and macroeconomic expansion) through, among other catalytic areas, clean energy-powered ecosystem-based adaptation agro-value addition to the tune of \$1 trillion by 2030. Reversal of financial losses from inefficiencies in agro-value chains (e.g., post-harvest losses), land degradation and others, as well as unnecessary financial expenditures on fossil fuel subsidies and food imports, will also result in multiple dividends. Indirect fiscal resources will be leveraged through carbon offsetting and enhancing ecosystems and human health.

66. The following areas represent the key drivers for innovative environmental solutions aimed at achieving the Sustainable Development Goals and Agenda 2063 in Africa:

- (a) Innovative financing for catalytic sectors;
- (b) Policy harmonization towards maximizing productivity of catalytic sectors;
- (c) Reaping the region's demographic dividend through education and training targeted at prioritizing capacity-building in the catalytic areas;
- (d) Development of quality standardization as a critical market-based incentive to sustainably maximize productivity;
- (e) Reforming energy subsidy policies with a focus on providing incentives for clean energy uptake;
- (f) Instituting an approach which combines various environmental solutions in order to achieve even higher returns. Such an approach could earn Africa in excess of \$1.33 trillion generated annually by 2030.

VI. Questions

67. The following questions are intended to elicit discussion on this topic:

- (a) How does Africa practically unlock domestic and international innovative financing solutions for the environment and catalytic sectors to ensure that the environment innovatively finances the Sustainable Development Goals and Agenda 2063?
- (b) How can the region optimally foster policy harmonization and coherence between and within sectors towards maximizing productivity of catalytic sectors for the implementation of the Sustainable Development Goals and Agenda 2063?
- (c) What optimal innovative strategies can be used to reverse fossil fuel subsidies and direct resources towards creating incentives for clean energy uptake?
- (d) What needs to be done to practically ensure education and training is targeted to prioritize capacity-building for youths in Africa's catalytic sectors for employment and wealth creation?
- (e) What types of partnerships does Africa really need to foster to ensure that investments in "Innovative Environmental Solutions" actually accelerate the implementation of the Sustainable Development Goals and Agenda 2063?