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Fifth African Science, Technology and Innovation Forum

Niamey (hybrid), 26 and 27 February 2023

Accelerating development and diffusion of emerging technologies for a green, inclusive and resilient Africa

I. Background and mandate

1. The collaborative multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals was established pursuant to the 2030 Agenda for Sustainable Development as part of the Technology Facilitation Mechanism. The Mechanism was established under the Addis Ababa Action Agenda and was launched under the aegis of the 2030 Agenda to support the implementation of the Sustainable Development Goals. The global forum is organized by the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals, with the support of a 10-member group appointed by the Secretary-General drawn from the private sector, the scientific community and civil society.

2. The global multi-stakeholder forum is convened once a year, as indicated in paragraph 70 of the 2030 Agenda, "to discuss science, technology and innovation cooperation around thematic areas for the implementation of the Sustainable Development Goals, congregating all relevant stakeholders to actively contribute in their area of expertise", and to "provide a venue for facilitating interaction, matchmaking and the establishment of networks between relevant stakeholders and multi-stakeholder partnerships in order to identify and examine technology needs and gaps, including on scientific cooperation, innovation and capacity-building". All these measures are expected to facilitate the development, transfer and dissemination of relevant technologies for the Sustainable Development Goals.

3. The African Science, Technology and Innovation Forum was established by the Conference of Ministers, in its resolution 961 (LI) of 15 May 2018, calling on the Economic Commission for Africa (ECA), in collaboration with the African Union Commission and other partners, to take all steps necessary to organize on a regular basis a multi-stakeholder forum on science, technology and innovation as an input into the work of the Africa Regional Forum on Sustainable Development.

4. The first African Science, Technology and Innovation Forum was held in Marrakech, Morocco, on 16 April 2019; the second on 24 February 2020 in Victoria Falls, Zimbabwe; the third Forum was hosted by the Congo in Brazzaville on 25 and 26 February 2021; and the Fourth Forum was held in Rwanda on 1 – 2 March 2022. The forums are co-organized with the United Nations, Educational, Scientific and Cultural Organization (UNESCO) and the Department of Science and Innovation of South Africa, together with the host country. Other key partners of the fourth Forum included the Technology Bank for the Least Developed Countries, the International Atomic Energy Agency, the African Materials Research Society and the African Biomedical Engineering Consortium.

5. The Forum has grown into the pre-eminent continental platform for the exploration of complex and innovative issues of science and technology, showcasing emerging developments in that area, instilling technical and entrepreneurial skills in young people and forging long-lasting partnerships and alliances. Since 2020, the Forum attracts over 800 delegates representing African member States, United Nations agencies, the academic sector, civil society, youth, marginalized groups, the private sector and people living with disabilities each year to share experiences and forge partnerships.

6. Since 2020, a youth innovation bootcamp has been organized as part of the Forum. The bootcamp attracts young people from across the continent and beyond to collaborate in the design and development of innovative solutions, and to learn new technologies, such as rapid prototyping using 3D printing, genomics, robotics, artificial intelligence, and nanotechnology, and to introduce them to entrepreneurship concepts and competencies.

II. Fifth African Science, Technology and Innovation Forum

7. The fifth African Science, Technology and Innovation Forum will be held from 27 to 28 February 2023, in a hybrid format, in Niamey, Niger. The Forum is co-organized with UNESCO, the African Union Commission and the Department of Science and Innovation of South Africa. Other key partners include the Technology Bank for the Least Developed Countries, the International Atomic Energy Agency, the African Materials Research Society and the African Biomedical Engineering Consortium. The Forum is designed to fulfil both global and continental mandates.

8. To meet the mandate to provide inputs to the ninth session of the Africa Regional Forum on Sustainable Development (ARSFD), the African Science, Technology and Innovation Forum will consider how science, technology and innovation could help the continent in its efforts to respond and contribute to the realization of the theme of the Africa Regional Forum on Sustainable Development: "***Accelerating the inclusive and green recovery from multiple crises and the integrated and full implementation of the 2030 Agenda for Sustainable Development and Agenda 2063***" with a focus on five selected Sustainable Development Goals, namely Goals 6 (clean water and sanitation); 7 (affordable and clean energy); 9 (industry, innovation, and infrastructure); 11 (sustainable cities and communities); and 17 (partnerships for the Goals) and the corresponding goals of Agenda 2063.

9. As such the theme of the ASTI Forum is **"Accelerating development and diffusion of emerging technologies for a green, inclusive and resilient Africa"** with a special focus on the selected Goals (6, 7, 9, 11 and 17). While all the Goals will receive equal attention, the Forum will lay a greater emphasis on Goal 7 affordable and clean energy given that almost half of the continent's population has no access to electricity and the continent greatly relies on biomass that provides about half of its energy needs.

10. The Sustainable Development Goal 6 is one of the few SDGs for which some African countries are on track. Water and sanitation gained special visibility during the COVID-19 pandemic as handwashing became an art that was taught by celebrates and politicians to their communities in a bid to combat the spread of virus. Yet, access to reliable, clean and safe water remains a challenge for millions of people in Africa that do not have enough water to meet their basic daily needs such as that of food preparation, drinking and other household chores. In addition, clean and safe water is key to the proper functioning of other industries such as education, health, agriculture, manufacturing, transport, hospitality, etc. Science, technology and innovation is needed to harvest, process, store, distribute and recycle or dispose water safely, securely and efficiently and all at affordable levels for all. Technology has helped cities such as Singapore reduce their dependence on imported water through employment of technologies for water desalination, water recovery, recycle and reuse.

11. Progress on industry, innovation, and infrastructure (Goal 9) paints a mixed picture: the number of entities and enthusiasm among policy makers have all grown tremendously but evidence of growth remains patchy. For instance, number of innovation hubs and innovation funding entities have all grown but number of patents, novel products, trade in high technology products and employment in innovative firms remains low. This was laid bare by the COVID-19 pandemic with countless number of innovative concepts by young people, researchers and business leaders but only a handful reached the production stage and Africa was one of the largest regions that did not have its own vaccine candidates for COVID-19 in clinical trials.

12. Africa's innovation system is poorly developed, its R&D and manufacturing infrastructure remains weak, and its industrial base is too narrow. Similarly, most of Africa's key infrastructure is designed, developed, run and maintained by foreign firms. For instance, about 50% of Africa's 3G networks, 70% of 4G Networks in Africa were built by Huawei and another 20-30 3G Networks were designed and developed by ZTE[1][2]. The same goes for other major infrastructure projects from transport to energy. This trend is denying Africa the opportunities to learn to develop products needed to build its energy, water, transport and communication infrastructure fit for its environment.

13. In terms of Goal 11, cities play an important role as drivers of innovation and creativity in all countries. Estimates suggest that about 54% of the world's population lives in cities but generates about 80% of the world's GDP, making cities key drivers of economic, social and environmental development[3]. The cities of the future will have different demands influenced by technology as one report noted: "Cleaner energy technologies, new models of transportation, new kinds of water systems, building-construction innovation, low-water and soil-less agriculture, and clean and small-scale

[1] https://www.atlanticcouncil.org/blogs/africasource/the-digital-infrastructure-imperative-in-african-markets/ and https://www.cio.com/article/193170/made-in-china-africas-ict-infrastructure-backbone.html
[2] GSMA (2022) 5G in Africa: realising the potential, GSMA (https://www.gsma.com/subsaharanafrica/wp-content/uploads/2022/10/5G-IN-AFRICA-REPORT.pdf).
[3] https://www.worldbank.org/en/topic/urbandevelopment/overview

manufacturing are or will be available in the near future."[4] If Africa has to meet the Goals of the 2030 Agenda for Sustainable Development, special attention must be paid to the current and future needs of cities and communities to ensure they are liveable, competitive, efficient, safe and sustainable[5].

14. New and emerging technologies promise to provide new sources of affordable and clean energy that drive economic growth, democratize and decentralize energy production and supply with minimal impact on the environment. Currently, about 600 million African inhabitants do not have access to electricity and 900 million have no access to clean cooking fuels while 76% of the oil is consumed by transport sector and 86% of biomass is used by households[6]. Changing the current energy economy will require Africa to invest in development of skills, acquisition and upgrade of technologies that underpin the new sources of energy such as solar, wind, hydrogen and nuclear. On current trends, Africa is in danger of moving from an importer of traditional hydrocarbons to an importer of renewable energy technologies. The Forum will explore some of the emerging technologies and business models, and their potential to make a meaningful impact on fulfilling the 2030 Agenda for Sustainable Development.

15. In addition, the Forum will also provide a platform to identify and examine technology needs and institutional voids that should be addressed to enable African countries to fully harness and deploy science, technology and innovation to accelerate attainment of the Sustainable Development Goals and the corresponding goals of Agenda 2063. In this regard, ECA's STI Policy Design and Implementation Guide and the STI Roadmaps for the SDGs will be presented, reviewed and way forwards developed to ensure countries build or enhance their national systems of innovation.

III. Theme of the fifth African Science, Technology and Innovation Forum

16. The theme of the ASTI Forum is **"Accelerating development and diffusion of emerging technologies for a green, inclusive and resilient Africa"** with a focus on the selected Goals (6, 7, 9, 11 and 17) as discussed above. As stated earlier, Goal 7 (affordable and clean energy) is important to Africa as the type of energy resources a community depends on is an indirect indicator of its level of technological development and industrial competitiveness. One analyst put it simply: "Fire made us human; fossil fuels made us modern. Now we need a new fire that makes us secure, safe, healthy, and durable"[7].

17. While the focus on renewable energy resources and their value chains is important, most of the gains are derived from the innovations and industrial applications (e.g. electric mobility). For instance, the innovations around electric mobility have created exciting new markets for the electric batteries, recharging stations and new generation of cars, scooters and drones that are technological masterpieces with almost zero emissions and less noise (i.e. without an internal combustion engine) during operations. The same can be said about hydrogen (e.g,

[4] PCAST Cities Report FINAL.pdf
[5] A-Review-of-Integrated-Urban-Planning-Tools-for-Greenhouse-Gas-Mitigation-Linking-Land-Use-Infrastructure-Transition-Technology-and-Behavioral-Change-Technical-Paper.pdf
[6] https://www.uneca.org/stories/new-eca-study-shows-africa-may-not-meet-sdg7-targets (UNECA (2021) Energy Prices in Africa: Transition Towards Clean Energy for Africa's Industrialization, ECA)

[7] Amory Lovins (2014) Reinventing Fire: Bold Business Solutions for the New Energy Era also available online at Reinventing-Fire

electrolyzers, pumps, compressors, converters etc) and solar (e.g. solar cells, inverters, security, home and street lighting etc). Therefore, the energy transition is not just about climate change or air pollution but rather the development of entirely new energy economies likely to bring new players that will develop new technological products based on the advantages and opportunities created. The number of new products designed to use emerging renewable energy products are multiplying by the day- creating more opportunities for innovations, creativity and job and wealth creation.

18. Frontier technologies can enable African countries to add value to their abundant minerals that are critical to renewable energy. For instance, meeting the global demand for Lithium-ion batteries for electric vehicles by 2035 will need cobalt production to grow by 172%, nickel by 96%, natural graphite by 555% and synthetic graphite by 148%[8]. This may entail an additional 62 new mines and plants to process cobalt, 72 to process nickel and 162 to process graphite. Technologies can help countries add value to a large proportion of the raw materials produced in the region and move up the value chain.

19. In this regard, ECA along with Afreximbank and other key partners, is supporting an initiative to establish a battery mineral value chain in Africa, focusing on the significant mineral endowments in DRC and Zambia to spur cross-border research and production. As mineral processing and battery production are technology- and capital-intensive processes, vital first steps involve the building of technical expertise, partnerships with firms and universities for knowledge transfer and capacity building. This is culminating in the establishment of a Battery Centre of Excellence and a cross-border Battery Special Economic Zone. The Zone is expected to become a key hub for battery research, development and production.

20. Similar efforts are needed to enable Africa attain a greater share of the emerging global, regional and national trade in renewable energy and energy related products for transportation, electricity generation, home cooling and heating, agriculture, manufacturing and other industries. Just as in the current energy economy, countries rich in energy resources will not automatically reap the most of the benefits but rather those that make deliberate steps to invest in the science, technology and innovations that underpin the new energy technologies.

21. African countries need to build scientific, technological and industrial base in some of the emerging and maturing technologies such as biotechnologies, digital, energy and nanotechnologies that are core to the new and emerging energy technologies. For instance, advanced materials, biotechnology, digital technologies and nanotechnologies are needed in the for design of electrolyzers for water desalination (e.g. for household, industrial use or hydrogen production), bio-material filters for water treatment, batteries, thin-film and biological solar cells etc.

22. In this regard, ECA has supported the design of undergraduate and post-graduate curriculums for advanced materials and nanotechnology, artificial intelligence, pharmaceutical chemistry and manufacturing, and biomedical engineering that are available to all interested universities. ECA has also supported bootcamps, design schools and innovators summer schools and launched the Alliance of Entrepreneurial Universities in Africa to encourage innovation and entrepreneurship in knowledge-intensive sectors.

[8] https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-battery-demand-by-2035/

IV. Objective of the African Science, Technology and Innovation Forum

23. The overall objective of the fifth African Science, Technology and Innovation Forum is to conduct the regional follow-up and review of progress made, in order to identify potential mechanisms and measures that countries can deploy to scale up actions, facilitate peer learning and advance transformative solutions to accelerate achievement of the Sustainable Development Goals and the goals of Agenda 2063. These include:

(a) Conducting a regional follow-up to, and review of, the implementation of the key messages and measures recommended at the previous Forum;

(b) Providing a platform for peer learning and sharing experiences, approaches, good practices and lessons learned, in order to accelerate the realization of the aspirations of the 2030 Agenda and Agenda 2063;

(c) Identifying the technological opportunities, gaps and challenges, and also the institutional voids, with a view to driving innovation and development;

(d) Identifying realistic mechanisms for collaboration and matchmaking, to strengthen regional and international partnerships and investments in science, technology and innovation, to accelerate implementation of the two agendas over the decade 2020–2030.

V. Format of the fifth African Science, Technology and Innovation Forum

24. The fifth African Science, Technology and Innovation Forum will comprise the following activities, high-level policy dialogues, panel discussions and showcasing events:

(a) High-level policy dialogues: At least four high-level policy dialogues will be organized, comprising senior government officials, ministers, heads of United Nations agencies and chief executive officers of firms, along with vice-chancellors of universities and heads of research and technology organizations. The interactive high-level policy dialogues will focus on broad and cross-cutting issues and strategic direction, including opportunities and transformative levers, partnerships, commitments, actions and other measures to accelerate implementation;

(b) Panel sessions to assess progress on the 2030 Agenda and Agenda 2063: At least five sessions addressing each of the specific Goals under review by the ARFSD and the High-Level Panel will be held to assess the contribution of science, technology and innovation in the progress registered to date, and the actions needed to amplify the impact of science, technology and innovation in efforts to achieve the Sustainable Development Goals. All panel sessions may include key presentations and discussion in a town-hall format, to encourage free interactions;

(c) Special sessions: There will be several special sessions and events organized by partners and ECA, with the aim of informing the Forum. These shall include a youth bootcamp on technologies and innovations of the future, the STI Roadmaps for the SDGs and entrepreneurship promotion through education and R&D;

(d) Review and adoption of key messages of the Forum: During this part of the Forum, all stakeholders will review, propose amendments to and adopt the key messages of the Forum. These are aimed at accelerating implementation and are to be submitted to the Africa Regional Forum on Sustainable Development at its 2022 session and to inform the inter-agency task team on science, technology and innovation for the Sustainable Development Goals and the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals.

VI. Expected outputs

25. The fifth Forum is expected to generate the following key outputs:

(a) Report of the fifth African Science, Technology and Innovation Forum, which will inform the Africa Regional Forum on Sustainable Development and the multi-stakeholder forum on science, technology and innovation;

(b) Outcome documents of special sessions and events, such as the youth bootcamp;

(c) General guide for implementing Origin Research and Innovation Labs and Organizational Arrangements of Entrepreneurial Universities.

VII. Expected outcomes

26. The fifth African Science, Technology and Innovation Forum is specifically designed to foster collaboration, the diffusion of technology and innovation, and scaling up of policy and operational efforts needed to accelerate the contribution of science, technology and innovation to fulfil the 2030 Agenda for Sustainable Development. In particular, the following will be the key tangible and intangible outcomes of the Forum:

(a) Establishment of collaborative arrangements and partnerships between African universities and their partners inside and outside Africa;

(b) In collaboration with partners, platforms for exchanging information on research, funding, innovations and institutions launched to accelerate technology transfer, collaboration and co-creation among key science, technology and innovation partners in Africa; and

(c) Increased partners and collaboration to strengthen science, technology and innovation institutional arrangements to drive policy implementation, improve funding mechanisms formed and/or launched.

VIII. Participants

27. The meeting will be attended by representatives of all African Member States of the United Nations, the African Union Commission, the African Development Bank, the regional economic communities, civil society, business and industry organizations, academic and research institutions, agencies and organizations of the United Nations system, and other international agencies and organizations, together with all development partners.

IX. Working languages

28. The meeting will be conducted in English and French, with simultaneous interpretation in both languages.

X. Dates and venue

(b) The fifth African Science, Technology and Innovation Forum will be held in Niamey, Niger on 26 and 27 February 2023.

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