United Nations ECA/STIF/2023/1

Economic and Social Council

Distr.: General
1 December 2022

Original: English

Economic Commission for Africa
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 of the Third International Conference on Financing for Development and was launched under the auspices 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 and drawn from the private sector, the scientific community and civil society.

2. The global multi-stakeholder forum is convened once a year, pursuant to paragraph 70 of the 2030 Agenda, to discuss cooperation on science, technology and innovation around thematic areas for the implementation of the Sustainable Development Goals. The forum aims to bring together all relevant stakeholders to contribute actively in their respective areas of expertise. The annual forum also provides a venue to facilitate interaction, matchmaking and the establishment of networks among relevant stakeholders and multi-stakeholder partnerships to identify and examine technology needs and gaps, including in respect of 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, in which it called upon 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 Forum on Sustainable Development.

4. The first African Science, Technology and Innovation Forum was held in Marrakech, Morocco, on 16 April 2019; the second at Victoria Falls, Zimbabwe, on 24 February 2020; the third in Brazzaville on 25 and 26 February 2021; and

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the fourth in Kigali on 1 and 2 March 2022. The fifth Forum is being co-organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the African Union, the Department of Science and Innovation of the Government of South Africa, the Technology Bank for the Least Developed Countries, the International Atomic Energy Agency, the African Materials Research Society and the African Biomedical Engineering Consortium, and is being hosted by the Government of the Niger.

5. The Forum has grown into the pre-eminent continental platform for the exploration of complex and cutting-edge issues related to science and technology, showcasing emerging developments in the area, instilling technical and entrepreneurial skills in young people and forging long-lasting partnerships and alliances. Every year since 2020, more than 800 representatives of African member States, United Nations agencies, academia, civil society, the private sector, young people, persons with disabilities and other marginalized groups have attended the Forum to share their experiences and forge partnerships.

6. Since 2020, a youth innovation boot camp has been organized as part of the Forum. Young people from across the continent and beyond participate in the boot camp to collaborate in designing and developing innovative solutions and in learning new technologies, such as rapid prototyping using 3D printing, genomics, robotics, artificial intelligence and nanotechnology. Participants are introduced to entrepreneurship concepts and competencies.

II. Fifth African Science, Technology and Innovation Forum

7. The fifth Forum will be held on 27 and 28 February 2023 in Niamey and online. The Forum will be co-organized by 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 global and continental mandates.

8. To meet the mandate to provide inputs to the ninth session of the Africa Regional Forum on Sustainable Development, participants at the fifth 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 achieving the theme of the ninth session 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”. They will 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: The Africa We Want, of the African Union.

9. As such, the theme of the fifth Forum is “Accelerating the development and spread of emerging technologies for a green, inclusive and resilient Africa”, with a special focus on Goals 6, 7, 9, 11 and 17. There will be particular emphasis on Goal 7, given that almost half of the continent’s population has no access to electricity, forcing the continent to rely heavily on biomass, which provides about half of its energy needs.

10. Goal 6 is one of the few Goals for which some African countries are on track. Water and sanitation became particularly visible during the coronavirus disease (COVID-19) pandemic, as handwashing was taught by celebrities and politicians to their communities in a bid to combat the spread of the virus.

Access to reliable, clean and safe water, however, remains a challenge for millions of people in Africa who do not have enough water to meet their basic daily needs for drinking, preparing food and carrying out other household chores. In addition, clean and safe water is key to the proper functioning of such sectors as education, health care, agriculture, manufacturing, transport and hospitality. Science, technology and innovation have provided the tools needed to harvest, process, store, distribute, recycle and dispose of water safely, securely and efficiently in a way that is affordable for all. Indeed, those tools have helped cities such as Singapore to reduce their dependence on imported water by desalinating, recovering, recycling and reusing water.

11. Progress on industry, innovation and infrastructure (Goal 9) has been mixed. The number of science, technology and innovation support entities and mechanisms has grown rapidly. . For instance, the number of innovation hubs and the number of innovation funding entities in Africa have both grown in the last few years. However, the number of patents and novel products per population remains low. Moreover, the levels of trade in high-technology products and the levels of employment in innovative firms remain low. This was laid bare by the COVID-19 pandemic, during which countless innovative concepts were put forward by young people, researchers and business leaders, but only a handful of which reached the production stage.

12. Africa has a poorly developed innovation system, its research and development and manufacturing infrastructure remains weak, and its industrial base is too narrow. Similarly, most of the continent's key infrastructure is designed, developed, run and maintained largely by non-African firms. For instance, about half of the 3G networks in Africa and 70 per cent of the continent's 4G networks were built by a single Chinese company, and another 20–30 3G networks were designed and developed by another Chinese company.[1] The same goes for other major infrastructure projects. This trend denies Africa the opportunity to learn to develop the products it needs to build energy, water, transport and communication infrastructure that is suited to its environment.

13. In terms of Goal 11 (sustainable cities and communities), cities play an important role as drivers of innovation and creativity in all countries. An estimated 54 per cent of the world's population live in cities, but they generate about 80 per cent of the world's gross domestic product, making cities key drivers of economic, social and environmental development.[2] The cities of the future will have different demands, which will be influenced by technology. As noted by the authors of one report, "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 manufacturing are or will be available in the near future."[3] For Africa to achieve the Goals, it must pay special attention to the current and future needs of cities and communities to ensure that they are liveable, competitive, efficient, safe and sustainable.[4]

14. New and emerging technologies promise to provide new sources of affordable and clean energy that will drive economic growth and democratize

[1] See www.atlanticcouncil.org/blogs/africasource/the-digital-infrastructure-imperative-in-african-markets/, www.cio.com/article/193170/made-in-china-africas-ict-infrastructure-backbone.html and GSMA, *5G in Africa: Realizing the Potential*, 2022.

[2] World Bank, "Urban development overview", 6 October 2022. Available at www.worldbank.org/en/topic/urbandevelopment/overview.

[3] President's Council of Advisors on Science and Technology of the United States of America, *Report to the President: Technology and the Future of Cities*, February 2016, Executive Office of the President of the United States.

[4] Global Platform for Sustainable Cities, World Bank, *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change*, Technical paper, February 2020.

and decentralize energy production and supply with a minimal impact on the environment. About 600 million people living in Africa do not have access to electricity and 900 million have no access to clean cooking fuels. The transport sector accounts for 76 per cent of oil consumption and households account for 86 per cent of biomass consumption.[5] For Africa to change the composition of its current energy mix, it will have to invest in developing the skills and acquiring and upgrading the technologies that underpin new sources of energy, such as solar, wind, hydrogen and nuclear power. As for current trends, Africa is in danger of moving from being an importer of traditional hydrocarbons to being an importer of renewable energy technologies. At the Forum, participants will explore some of the emerging technologies and business models and their potential to have a meaningful impact on fulfilling the 2030 Agenda.

15. In addition, the Forum will 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, an ECA-devised guide for the design and implementation of science, technology and innovation policy and related road maps for the Sustainable Development Goals will be presented and reviewed and the way forward will be determined to ensure that countries build or enhance their national systems of innovation.

III. Theme of the fifth Forum

16. In the light of theme of the fifth Forum, "Accelerating development and diffusion of emerging technologies for a green, inclusive and resilient Africa", Goal 7 (affordable and clean energy) is particularly important for Africa, since the type of energy resources that a community depends upon is an indirect indicator of its level of technological development and industrial competitiveness. As one analyst wrote: "Fire made us human; fossil fuels made us modern. Now we need a new fire that makes us secure, safe, healthy, and durable."[6]

17. Although the focus on renewable energy resources and their value chains is important, most of the gains are to be derived from the innovations and industrial applications. For instance, innovations around electric mobility have created exciting new markets for electric batteries, recharging stations and a new generation of motorcars, electric scooters and drones. These technological masterpieces produce almost no emissions and produce less noise, since they do not use an internal combustion engine. The same can be said about the industrial opportunities presented by hydrogen technology value chains (such as electrolysers, pumps, compressors and converters) and solar technology (such as solar cells, inverters, home lighting and street lighting). The energy transition, therefore, is not just about climate change or air pollution, but also the development of an entirely new energy economy in which new players are likely to develop new technology products based on the advantages and opportunities created. The number of new products designed to use emerging sources of renewable energy is increasing every day, creating more opportunities for innovation, creativity, and job and wealth creation.

18. Frontier technologies can enable African countries to add value to their abundant reserves of minerals that are critical to renewable energy. For instance,

[5] Economic Commission for Africa, "New ECA study shows Africa may not meet SDG7 targets", 22 June 2021. Available at www.uneca.org/stories/new-eca-study-shows-africa-may-not-meet-sdg7-targets and Economic Commission for Africa, "Energy Prices in Africa: Transition Towards Clean Energy for Africa's Industrialization", 2021.

[6] Amory Lovins, *Reinventing Fire: Bold Business Solutions for the New Energy Era*, White River Junction, Vermont, Chelsea Green Publishing, 2011.

to meet global demand for lithium-ion batteries for electric vehicles by 2035, cobalt production will need to increase by 172 per cent, nickel by 96 per cent, natural graphite by 555 per cent and synthetic graphite by 148 per cent.[7] This may require as many as 62 new mines and plants to extract and process cobalt, 72 for nickel and 162 for graphite. Technology can help African countries to add value to a large proportion of the raw materials that they produce and to move up the value chain.

19. In that regard, ECA, the African Export-Import Bank and other key partners are supporting an initiative to establish a battery mineral value chain in Africa, with a focus on the significant mineral endowments in the Democratic Republic of the Congo 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, and partnerships with firms and universities for knowledge transfer and capacity-building. This reality has been the impetus behind the establishment of a centre of excellence for batteries and a cross-border special economic zone for batteries. The zone is expected to become a key hub for battery research, development and production.

20. Similar efforts are needed to enable Africa to attain a greater share of the emerging global, regional and national trade in renewable energy and energy-related products for transport, electricity generation, agriculture, manufacturing, home cooling and heating, and other industries. Like in the current energy economy, in the new energy economy countries that are rich in energy resources will not automatically reap most of the benefits; instead, it will be those that take deliberate steps to invest in the science, technology and innovation that underpin the new energy technologies.

21. African countries need to build a scientific, technological and industrial base in certain emerging and maturing technologies that are essential for new and emerging energy, such as biotechnology, digital technology, advanced energy technology and nanotechnology, which, along with advanced materials, are used in electrolysers for water desalination (such as for household use, industrial use or hydrogen production), biomaterial filters for water treatment, batteries, thin film and biological solar cells.

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

IV. Objective of the fifth Forum

23. The overall objective of the fifth Forum is to conduct the regional follow-up and review of progress made since the fourth Forum to identify potential mechanisms and measures that countries can deploy to scale up action, facilitate peer learning and promote transformative solutions to accelerate achievement of the Sustainable Development Goals and the goals of Agenda 2063. The mechanisms and measures include:

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

[7] Benchmark Source, “More than 300 new mines required to meet battery demand by 2035”.

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

(c) Identifying the technological opportunities, gaps and challenges and 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 investment in science, technology and innovation and to accelerate implementation of the two agendas over the period 2020–2030.

V. Format of the fifth Forum

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

(a) At least four high-level policy dialogues will be organized involving senior government officials, ministers, heads of United Nations agencies, chief executive officers of companies, 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) At least five panel sessions will be held in which panellists will address the progress made towards realizing the 2030 Agenda and Agenda 2063, including on the specific Goals under review by the Africa Regional Forum on Sustainable Development. These panels will assess the contribution of science, technology and innovation to the progress already made and will propose actions that are needed to amplify the impact of science, technology and innovation as part of efforts to achieve the Sustainable Development Goals. All panel sessions may include key presentations and a discussion in a town-hall format to encourage open interaction;

(c) Several special sessions and events will be organized by partners and ECA to inform participants at the Forum. These will include a youth bootcamp on technologies and innovations of the future, a session on the road maps for science, technology and innovation for the Goals, and a session on entrepreneurship promotion through education and research and development;

(d) A session for stakeholders to review, propose amendments to and adopt the key messages of the Forum. The key messages will inform both the inter-agency task team on science, technology and innovation for the Sustainable Development Goals and the global 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) A report of the fifth Forum, which will inform the Africa Regional Forum on Sustainable Development and the global multi-stakeholder forum;

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

(c) A general guide for setting up research and innovation labs as part of the Origin Innovation Challenge and for putting in place organizational arrangements within the framework of the Alliance for Entrepreneurial Universities in Africa.

VII. Expected outcomes

26. The fifth Forum is specifically designed to foster collaboration, the diffusion of technology and innovation, and the scaling up of policy and operational efforts to accelerate the contribution of science, technology and innovation to the achievement of the 2030 Agenda. In particular, the key tangible and intangible outcomes of the Forum will be as follows:

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

(b) Establishment of platforms, in collaboration with partners, for the exchange of information on research, funding, innovation and institutions intended to accelerate technology transfer, collaboration and co-creation among key science, technology and innovation partners in Africa;

(c) Increased partnership and collaboration to strengthen institutional arrangements on science, technology and innovation to drive policy implementation.

VIII. Participants

27. The meeting will be attended by representatives of all African Member States of the United Nations, and also by representatives of 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, other international agencies and organizations and development partners.

IX. Working languages

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

X. Dates and venue

29. The fifth Forum will be held on 26 and 27 February 2023 in Niamey.

XI. Contacts

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