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“Boosting regional integration, infrastructure,
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inclusive green industrialization in Africa”

Boosting regional integration, infrastructure, trade and technology towards prosperous and inclusive green industrialization in Africa

Issues paper

I. Introduction

1. By its adoption of resolution 70/1 of 25 September 2015, setting out the document “Transforming our world: the 2030 Agenda for Sustainable Development”, the General Assembly made a global pledge that “all human beings can enjoy prosperous and fulfilling lives” while protecting the planet from degradation, while, in the aspirations of Agenda 2063: the Africa We Want, of the African Union, adopted on 31 January 2015, the African Union expresses its desire for “shared prosperity and well-being, for unity and integration, for a continent of free citizens and expanded horizons, where the full potential of women and youth, boys and girls are realized, and with freedom from fear, disease and want”. There is a real danger, however, that these bold aspirations will not be attained for a large proportion of the population of Africa: for its 546 million people living in poverty in 2022; for one fourth of its young people, who are neither in employment nor in school;¹ and for the 110 million people affected by climate, water and weather-related events in 2022.²

2. Inclusive and green industrialization presents numerous opportunities for attaining both the goals of the 2030 Agenda and the aspirations of Agenda 2063. Inclusive green industrialization is viewed as an approach that reduces resource inputs and increases efficiency in the production process, reduces or eliminates harmful waste emissions and the environmental impacts of infrastructure development, and maintains or improves the natural resource base with a significant contribution to job creation and gross domestic product.

* E/ECA/CPRTIIT/3/1.

¹ See International Labour Organization, “African youth face pressing challenges in the transition from school to work” (Geneva, ILOstat, 2023). Available at <https://ilostat.ilo.org/african-youth-face-pressing-challenges-in-the-transition-from-school-to-work/>.

² See World Meteorological Organization, “State of the climate in Africa 2022” (Geneva, 2023). Available at <https://library.wmo.int/records/item/67761-state-of-the-climate-in-africa-2022>.



In this regard, boosting regional integration, enhancing infrastructure and increasing investment in research, innovation and industry could help African countries to unlock the potential of inclusive and green industrialization.

II. Challenges posed and opportunities presented by multiple threats

3. Africa is grappling with multiple complex challenges triggered by the coronavirus disease (COVID-19) pandemic, the conflict between the Russian Federation and Ukraine, climate crisis and internal conflicts, among others. Thus, the COVID-19 pandemic accelerated and deepened the reversal of the economic and social development gains made by Africa since 2000³ as a consequence of lockdowns, the collapse of global supply chains and losses in investment and trade, among other factors.⁴ At the same time, however, the pandemic also drove the rapid uptake of digital technologies, renewed interest in domestic production and the diversification of regional production and supply chains, and strengthened the overall focus on self-reliance.

4. For its part, in just its first three months, the conflict between the Russian Federation and Ukraine increased the oil import bill of African countries by an additional \$19 billion and pushed another 71 million people in developing countries into poverty.⁵ For instance, between January and June 2022, the monthly per capita local food basket of Eastern African countries increased by 51.1 per cent. Facing a high debt burden and limited fiscal space, African countries are looking to industrialization to build resilience, through such measures as commissioning fertilizer and petroleum refinery plants to overcome import reliance and increase exports, among others.

5. Climate change is perhaps one of the greatest challenges faced by Africa today. In September 2023, Storm Daniel caused two dams on the River Derna to collapse and the ensuing torrent of water devastated part of the city, destroying lives and livelihoods. This event highlights the need to ensure that early warning systems are improved and that urban planning and infrastructure are fit for the changing climate. Africa is estimated to lose about \$70 billion in economic activity annually as the number and frequency of severe and extreme storms, floods, droughts and fires increase and threaten communities and ecosystems.

6. An industrialization that is both inclusive and green can be achieved by building the capacity to participate in emerging green industries and by greening existing industries, thereby potentially creating additional revenues and sustainable jobs. For instance, in Namibia, Hyphen Hydrogen Energy – a \$10 billion collaborative project with the Government – is building a green hydrogen production and export plant, while the \$4 billion Benban Solar Park in Egypt, which powers a million homes, employed 20,000 people during its construction and an additional 6,000 people and 28 firms to run the park. To encourage wide adoption with a view to achieving greater impact, countries and regions may have to develop green industrialization policies, plans and strategies.

³ See Eduardo Olaberria and Carmen Reinhart, “The reversal problem: development going backwards”. *Let’s Talk Development*, World Bank blogs, 15 April 2022. Available at <https://blogs.worldbank.org/developmenttalk/reversal-problem-development-going-backwards>.

⁴ See Seko Sia and others, “The economic impact of COVID-19 on Africa and the countermeasures”, *Open Journal of Business and Management*, vol. 11, No. 2, March 2023, pp. 416–436. Available at [10.4236/ojbm.2023.112023](https://doi.org/10.4236/ojbm.2023.112023).

⁵ See United Nations Development Programme, (2022) “Global cost-of-living crisis catalyzed by war in Ukraine sending tens of millions into poverty, warns UN Development Programme”, press release, 7 July 2022. Available at <https://www.undp.org/press-releases/global-cost-living-crisis-catalyzed-war-ukraine-sending-tens-millions-poverty-warns-un-development-programme>.

7. The present paper has been prepared to provide countries with an overview of the opportunities presented by inclusive and green industrialization, highlighting some of the challenges and bottlenecks that countries need to overcome to attain shared prosperity. To this end, it offers options for boosting regional integration, infrastructure, investment and emerging technologies in their pursuit of this goal. The conclusion highlights several key issues that the Committee may wish to address.

III. Unlocking opportunities in regional value chains and greening the economic transformation of Africa through the Agreement Establishing the African Continental Free Trade Area

8. The Agreement establishing the African Continental Free Trade Area is a landmark agreement for Africa. Of the 55 member States of the African Union 54 have signed the Agreement and 47 of those signatories have ratified it.⁶ The Agreement aims to integrate African markets and enable the free flow of goods and services throughout the continent. It also seeks to facilitate the free movement of persons and capital, lay the foundations for a continental customs union, promote sustainable and inclusive socioeconomic development, and promote industrialization, diversification and regional value chain development.⁷

9. When fully implemented, the Agreement will benefit all Africans. Modelling by the Economic Commission for Africa (ECA) shows that, in 2045, and compared to the situation without the Agreement, intra-African trade under the Agreement will be 33.5 per cent higher, measuring \$196.4 billion, with the most significant gains accruing to agrifood, services and industry sector, sectors which Africa needs most to build its resilience to global shocks and drive sustainable industrialization.⁸ Industrialization and development under the Agreement Establishing the African Continental Free Trade Area do not, however, have to proceed along the lines established in the past. The Agreement can help to drive the continent's green transition and sustainable industrialization. While Africa currently accounts for less than 4 per cent of global greenhouse gas emissions yearly, climate change and the environment cannot be ignored at any stage of development planning for Africa.⁹

10. Estimates suggest that, if the Agreement Establishing the African Continental Free Trade Area is implemented and African countries meet 100 per cent of their unconditional nationally determined contributions, along with 25 per cent of their conditional nationally determined contributions, greenhouse gas emissions will fall by 17.6 per cent in 2045 relative to a business-as-usual situation, while intra-African trade will still rise by 32.5 per cent.¹⁰ These estimates, strengthened by the institutional structure of the Agreement with its exceptional and distinct protocols on investment, intellectual property rights, competition, digital trade and women and youth in trade, offer early evidence

⁶ As of August 2023, 46 of the 47 instruments of ratification had been deposited with the African Union Commission. The forty-seventh, that of Mozambique, is pending see <https://au-afcfta.org/about/>.

⁷ See the text of the Agreement Establishing the African Continental Free Trade Area at https://au.int/sites/default/files/treaties/36437-treaty-consolidated_text_on_cfta_-_en.pdf.

⁸ See Economic Commission for Africa and Centre d'études prospectives et d'informations internationales, "Greening the African Continental Free Trade Area", (forthcoming).

⁹ See CDP, "Africa report: benchmarking progress towards climate safe cities, states, and regions" (Berlin, 2020). Available at <https://www.cdp.net/en/research/global-reports/africa-report>.

¹⁰ See Economic Commission for Africa and Centre d'études prospectives et d'informations internationales, "Greening the African Continental Free Trade Area".

that the Agreement can boost regional integration, trade, infrastructure, and technology via an industrialization that is both green and inclusive.

A. Understanding the African Continental Free Trade Area, deepening economic integration, and promoting inclusivity

11. Given the number of external shocks on African shores in recent decades, the fostering of intra-African trade and building of regional integration remain among the most potent and effective tools for achieving economic development and building sustainable African markets. The continent's participation in global value chains is currently low, measuring some \$190 billion as of 2018, or a mere 2 per cent of global value chains,¹¹ owing to the particular composition of African trade. African exports to the world are highly concentrated in the extractive industries. In 2022, 78.5 per cent of African exports, to a value of \$518.2 billion, were primary commodities, mainly fuel products.¹² Yet the continent's internal trade is much more balanced, with mineral fuels accounting for only 23 per cent of intra-African exports.¹³ It is imperative to begin to prepare African policymakers and other stakeholders for the next steps in the continent's integration journey to foster a more balanced intra-African trade.

12. To this end, ECA, in collaboration with the African Union Commission, the African Development Bank and the United Nations Conference on Trade and Development, has dedicated the eleventh edition of the report *Assessing Regional Integration in Africa* to an analysis of the conditions, requirements and modalities for the continent's progression toward a customs union and an African common market. In addition, for regional integration to happen, it must promote better living standards for all Africans. The Agreement Establishing the African Continental Free Trade Area, by advancing trade in value-added production, will help to ensure industrialization, economic growth and job creation, accelerating poverty reduction and boosting living standards across the continent.

13. In its article 3, the Agreement Establishing the African Continental Free Trade Area also recognizes the power of inclusivity among its objectives. Building upon this objective, the African Union Assembly has developed the protocol on women and youth in trade to provide an institutional framework for inclusiveness. Negotiations on the protocol are currently under way but are expected to be completed by the end of 2023. To further advance inclusivity, ECA has supported its members and the regional economic communities in mainstreaming gender and inclusivity into their national or regional strategies for implementation of the Agreement Establishing the African Continental Free Trade Area. To ensure that women and young people fully benefit from the Agreement, they must be equipped with the skills to leverage its tools. Policymakers must dedicate resources towards the dissemination of information on the Agreement, lowering both tariff and non-tariff barriers, and helping women and young people to take advantage of the vast provisions of the Agreements protocols.

¹¹ Data from the open-access dissemination platform of the United Nations Conference on Trade and Development, UNCTADstat. Available at <https://unctadstat.unctad.org/EN/> (accessed in August 2023).

¹² Ibid.

¹³ Ibid.

B. Unlocking opportunities in regional value chains and greening Africa's economic transformation through the Agreement Establishing the African Continental Free Trade Area

14. African investment, industrialization and regional integration are linked, and evidence of the successes of investment and integration is emerging. For example, in 2019, by leveraging the Agreement Establishing the African Continental Free Trade Area, the African Medicines Agency, ECA, the African Union Commission and other partners launched the Pharmaceutical Initiative, anchored on the African Continental Free Trade Area, to address the socioeconomic challenges that African countries face in gaining equitable access to safe and affordable medicines. Thus far, the initiative has produced a feasibility study on the framework for pooled procurement and made a case for the inclusion of 110 pharmacological products within its scope.

15. To build on these successes and to promote regional value chains and sustainable development, advantage can be taken of the protocols to the Agreement on investment, intellectual property rights and competition. For example, the Protocol on Investment is designed to be flexible, contains explicit provisions to promote sustainable investment and obliges investors to encourage and enforce regulations that protect human rights and the environment. The Protocol even includes an article dedicated to environmentally friendly investment, something found in very few investment treaties.

16. The Protocol on intellectual property rights aims to cover all aspects of intellectual property and includes provisions on green elements, such as plant variety protection, geographical indications, marks, patents and models. It further institutionalizes a flexible patent system that incentivizes entrepreneurs and firms to invest in research and development to promote sustainable and inclusive growth.

17. Lastly, while aiming to reduce anti-competitive behaviour, the Protocol on Competition contains exemption provisions that kick in when environmental and other public interest considerations are at stake.

IV. Contribution of infrastructure, agriculture and financial markets to the green industrialization of Africa

A. Investments in the improvement of affordable and sustainable energy transition

18. In 2021, 43 per cent of the population of Africa, some 600 million people, did not have access to electricity, with a significant difference between urban and rural areas. Currently, electrification rates in urban areas average 82 per cent, and only 37 per cent in rural areas. If current policies and levels of ambition persist, by 2030, there will still be some 595 million people without access to electricity in Africa. Furthermore, the African share of contemporary renewable energy stands at a mere 7.6 per cent of total final energy consumption, despite the continent's abundant resources. The total installed renewable power capacity (including hydropower) increased, however, by 107 per cent between 2010 and 2020, rising from 27 to 56 gigawatts.

19. Estimates suggest that, to have a reliable and functional infrastructure by 2030, Africa will need to spend between \$90 billion and \$120 billion yearly, most of this on energy. An additional annual investment of between \$3.2 billion

and \$4.3 billion must be made in transmission and distribution infrastructure. The vast financial requirement for power on the continent suggests that the private sector's involvement will remain essential.

20. As energy is one of the infrastructure sectors most essential to the industrialization of Africa, considerable efforts should be expended on, first, increasing energy and power connectivity; second, boosting national and regional private sector participation in the clean energy supply; and, third, extending investment beyond renewable energy technologies.

B. Promoting better and safer transport in support of industrialization

21. The COVID-19 experience has demonstrated the key role played by essential infrastructure in the recovery of Africa. In particular, the continent will need sustainable transport infrastructure and increased services in the post-pandemic period, based on sound policies, rules, regulations and laws. The revival of the continent's railroads could lower transport costs, boost service safety and promote regional trade and economic development. Implementation of the African continental high-speed rail project, a priority project in Agenda 2063, could be essential for the economical and environmentally responsible movement of high volumes of commodities over great distances. It would therefore make sense for Governments to give rail operators the resources that they need to buy locomotives and carriages and to finance their purchases efficiently.

22. A clear vision and strategy for the future is required if road users, policymakers, regulators, infrastructure managers and logistics firms are to reap the most significant benefits from the digitalization of road infrastructure. Digitalization also holds the promise of significantly lowering transport costs and product prices in the context of ineffective road transport in Africa. Shorter travel times, cheaper vehicle operating expenses and lower company expenditures due to quicker and more efficient delivery of goods are just a few of the time-saving and efficiency benefits of digitalization to consumers and enterprises.

23. In the light of the global strategic signposts set out for the United Nations Decade of Action for Road Safety (2011–2020) and by resolution 74/299 of 31 August 2020, on improving global road safety, the African Union has embraced a set of post-2020 strategic directions for road safety in the continent. The primary goal of this initiative is to achieve a 50 per cent reduction in road fatalities and injuries by the year 2030. The stated target appears ambitious while the fundamental requisites for road safety are still lacking, along with the management competence necessary for the effective implementation of road safety interventions. The lack of robust road safety management capabilities is leading to disjointed and temporary initiatives that may only have limited effects confined to a local level, falling short of the goal of reducing road fatalities by 50 per cent by 2030.

C. Transforming African agriculture through increased agribusiness

24. Demographic changes are creating a growing need for food throughout Africa. The increased demand for food and evolving consumption habits due to population growth, rapid urbanization and a growing proportion of middle-income earners are driving a greater need for fresh products and processed animals. The demand for food is expected at least to quadruple by 2050 and the African food industry will grow from \$300 billion in 2013 to \$1 trillion by 2030. As a result, massive imports of food and processed products will lead to annual food trade imbalances as high as \$50 billion, as traders move to fill the demand-supply gap. Growing trade deficits are a drain on the continent's meagre hard currency reserves. With 60 per cent of the world's uncultivated land, Africa has

the potential to achieve food self-sufficiency and contribute to global food security.

25. Agriculture is also a significant source of livelihood and agro-industry is widely regarded as a critical factor in its structural transformation towards greater industrialization and the attainment of socioeconomic goals of higher factor productivity, poverty reduction, employment generation, equality and food security. Africa has a comparative advantage in a range of agricultural products due to its enormous land mass, rich water resources and diverse climate zones. Restrictions caused by inadequate rural connectivity, with poor roads and lack of electrification, limited access to finance and better inputs and regional trade bottlenecks pose significant challenges to improving land and labour productivity and developing the strong value chains and market access necessary for viable agro-industries.

26. The above-listed shortcomings are of great concern as they are forcing agroprocessing businesses to locate themselves in and around metropolitan centres with considerably more dependable energy and public amenities. The geographical area from which processors can source their raw materials is further constrained by inadequate road and energy networks and high aggregation and transport costs, in particular from rural areas. To expand agroprocessing beyond urban centres and to place industrial platforms within production basins, many agropole programmes are focusing on the development of secondary and tertiary cities and the enhancement of connectivity to rural areas.

27. Most agroprocessing on the continent occurs in the informal sector and is conducted by micro firms, or cottage industries: at an industrial scale with simple technologies. The prevalence of this dynamic is a problem that Governments need to tackle. Some agropoles are strongly focused on foreign direct investment to promote technological transfer and leapfrogging. Other agropoles offer financial and technical support for small and medium-sized enterprises engaged in agricultural processing. Small businesses will become more formalized if agro-industrial value chains are encouraged to operate more efficiently.

28. African Governments have acknowledged the strategic significance of fostering the growth of the agro-industrial sector to take advantage of market opportunities and to realize economic goals. To avoid more extensive changes and necessary infrastructure investments, several have used national measures and strategies to spur private investment in agro-industries and build physical enclaves that foster favourable business environments. Agropole programmes have been interpreted in many ways, with a view to concentrating on scarce resources and producing measurable results in value chains or regions that have been prioritized. Most agropole launches have occurred in the last 10 years, with few earlier examples.

D. Improving African financial markets for industrializing Africa

29. Most African countries have limited access to international financial markets, rendering it much harder to finance the inclusive green industrialization and crucial infrastructure needed to foster economic progress. Poor sovereign credit ratings give foreign investors the impression that investing in Africa is risky. These ratings, which range from “highly speculative” to “substantial risks,” result in high overall financing costs for Governments and financial instability for African countries, jeopardizing the continent’s progress toward the Sustainable Development Goals and prosperity.

30. Africa needs to expand its domestic capital markets, which are now underdeveloped, constrained and illiquid. Efficient financial systems are seen as a cornerstone of economic progress. Capital markets must expand to finance

inclusive green industrialization and infrastructure, fostering growth. Suitable guarantee schemes against currency and other risks must be in place for this purpose.

31. Growing local currency bond markets can help to absorb capital flows and lessen the effects of financial crises on the domestic economy. Efficient such markets may aid in global rebalancing by offering domestic channels for the investment of substantial savings from emerging markets. This is because they can absorb huge and erratic capital flows. Recent financial crises have shown that effective local currency bond markets can improve financial resilience by reducing currency risk. In addition, these markets play a crucial role in expanding the capital market, improving investors' portfolio management, enabling risk to be priced more accurately, and speeding up monetary policy transmission, which support a country's long-term economic prosperity.

V. Advancing energy and digital technologies for a prosperous and inclusive green industrialization

A. Overview

32. The abundant renewable and green mineral resources of Africa present many opportunities to eradicate energy poverty, promote energy efficiency, ensure universal internet connectivity and develop high tech industries. From a technology perspective, Africa has an abundance of critical minerals, for high-tech and green product development, such as the copper, cobalt and lithium needed in solar systems and batteries. It could seek to develop energy solutions that can be used in electric vehicles, drones, mobile devices, bioelectronics and nanodevices, among other applications. Similarly, Africa has access to vast renewable energy resources, such as solar, wind and water power, almost all year round. With suitable investments in people, institutions and technologies, Africa can move from being a net exporter of petroleum and minerals to a key player in renewable and green energy production and export.

33. To fully realize these opportunities, however, Africa must overcome significant challenges in attaining the goals of universal internet connectivity and universal access to electricity, while simultaneously reducing reliance on traditional sources of energy, such as coal and petroleum, and increasing energy efficiency.

B. Advanced renewable energy technologies in inclusive green industrialization

1. Technologies for renewable energy storage and generation

34. The prevailing reliance by Africa on biomass represents a significant challenge and necessitates increased efforts to diminish this dependence – a major contributor to deforestation. The solution lies in elevating the continent's commitment to embracing emerging energy technologies that facilitate the adoption of renewable sources, providing energy that is not only more cost-effective and accessible but also environmentally sustainable. For example, life cycle greenhouse gas emissions from solar photovoltaic and wind energy are 4 and 1.5 per cent those of fossil fuel, respectively.¹⁴ Such technologies play an essential role in reducing greenhouse gas emissions and mitigating climate change. Photovoltaic systems, such as those using crystalline silicon and cadmium telluride, are now being produced on an industrial scale and many

¹⁴ See Thomas Bruckner and others, "Energy systems".

more such technologies are in development. In addition, geothermal steam can be used to generate electricity.

35. There are several emerging energy storage technologies, but the most advanced include those using lithium ion, lead acid; redox flow, sodium sulfur, sodium metal halide, zinc hybrid and cathode batteries, and storage types such as hydropower pumped, flywheels, compressed air energy and ultracapacitors. Each of these has its advantages and disadvantages. The lithium battery is perhaps the one most commonly used in laptops, mobile phones and electric mobility, such as electric vehicles, scooters and bicycles. Africa is a key producer of many of these so-called “green minerals”, and its mineral reserves for potential future production are high. The Democratic Republic of the Congo alone produces over 70 per cent of the world’s cobalt. But a key priority for African countries, policymakers, mining communities and citizens is that this boom should serve the continent’s aspirations for inclusive and sustainable growth and transformation. Currently, 70 per cent of the continent’s exports are of raw, un-processed commodities.

36. The African continent is also exceptionally well positioned to become a leader in green hydrogen production. Green hydrogen, which is produced with the help of renewable energy inputs, is becoming an increasingly important decarbonization tool and could establish Africa as a major exporter to Europe and beyond. The Africa Green Hydrogen Alliance, launched at the twenty-sixth meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change by Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa, is aimed at connecting up existing initiatives and leadership efforts, with the potential to generate new industry awareness, opportunities and action on the continent.

C. Distributed energy generation

37. Africa is a large continent with a population widely dispersed in small, rural and often isolated communities that may be hard to reach. Even in countries with higher population density, geography may pose a challenge to the extension of national electricity grids. Renewable energy technologies, such as solar-powered microgrids, can provide high-quality uninterrupted electricity to nearly half a billion people in unpowered or underserved communities and be a least-cost solution to close the energy access gap by 2030.¹⁵

38. Renewable energy microgrids are rapidly expanding in Africa, with homegrown companies such as PowerGen attracting international investments and partners.¹⁶ Microgrids have also been used to provide power to small businesses in Africa – for example, small businesses that need to refrigerate food, or those involved in carpentry, water treatment and sales, or milling maize, cassava and sorghum.¹⁷

D. Digital technologies for a prosperous and inclusive green industrialization

39. The fourth industrial revolution presents Africa with an invaluable opportunity to accelerate its industrialization objectives by leveraging emerging digital technologies. Advances in artificial intelligence, additive

¹⁵ See Energy Sector Management Assistance Program, *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers* (Washington, D.C.: World Bank, 2022). Available at www.esmap.org/mini_grids_for_half_a_billion_people.

¹⁶ See PowerGen, “Microgrids”, available at www.powergen-renewable-energy.com/microgrids/.

¹⁷ See Samuel Booth and others, “Productive use of energy in African micro-grids: technical and business considerations”, National Renewable Energy Laboratory and Energy for Impact.

manufacturing, machine learning, blockchain, automation and robotics mean that Africa can create high-tech innovative industries geared towards the continent's economic and social needs.

1. Digital innovation for agriculture

40. Emerging digital technologies such as precision agriculture, drone technology and remote sensing can improve crop yields, reduce waste, and enhance the overall efficiency of the agricultural supply chain. As the continent has the largest area of arable uncultivated land in the world and a youthful population, almost 60 per cent of whom are under the age of 25, emerging digital technologies can be employed to double or even triple its agricultural productivity.¹⁸ According to the International Federation of Accountants, in Africa, 33 million smallholder farms contribute as much as 70 per cent of the food supply, yet many of them still rely on traditional methods for cultivating their crops.

2. Artificial intelligence and data analytics

41. By 2030, artificial intelligence is projected to contribute a staggering \$15.7 trillion to global gross domestic product, with \$6.6 trillion coming from increased productivity and \$9.1 trillion from consumption effects.¹⁹ There are already a number of applications of artificial intelligence in Africa, in particular in the sectors of health, agriculture, city planning, water supply, clean energy forecasting, climate change predictions, economics and finance, and also in governance. These include the Tumaini application, which uses artificial intelligence to diagnose diseases and pests from pictures uploaded by farmers. While artificial intelligence carries big promise for the development of Africa, such technologies also lack basic guardrails and government entities, which have insufficient finance and human resources, struggle to support safe and equitable digital transformation.

3. Additive manufacturing

42. Additive manufacturing, also known as three-dimensional printing, is revolutionizing the way in which product manufacturing works and is proving to be a game-changer for Africa. With its ability to foster complex geometries, faster prototyping and more customization, it is helping to streamline the manufacturing process, making it more efficient and cost-effective. This is particularly important in regions with limited access to traditional manufacturing infrastructure. South Africa, for example, has one of the most comprehensive additive manufacturing strategies on the continent and has recently announced the launch of a project on three-dimensional construction printing for sustainable human settlements to combat the shortage of housing in the country.²⁰

4. Financial technology

43. Financial technology, known as “fintech”, can drive financial inclusion, enable secure transactions and facilitate access to credit for small and medium-sized enterprises. As more than half of all Africans have insufficient or no access to banking services, fintech companies are moving in to digitize payments. Furthermore, cash is still used in around 90 per cent of transactions

¹⁸ See Food and Agriculture Organization of the United Nations and International Telecommunication Union, *Status of Digital Agriculture in 47 Sub-Saharan African Countries* (Rome, 2022). Available at <https://doi.org/10.4060/cb7943en>.

¹⁹ See Price Waterhouse Coopers International, “Sizing the prize: What’s the real value of AI for your business and how can you capitalise?” (2017). Available at <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>.

²⁰ See South Africa, “Minister Blade Nzimande: launch of 3D construction printing for sustainable human settlements project”, 27 January 2023. Available at <https://www.gov.za/speeches/launch-3d-construction-printing-sustainable-human-settlements-27-jan-2023-0000>.

in Africa, which means that fintech revenues have huge growth potential.²¹ According to expert estimates, the African electronic payments market is expected to continue to grow by 20 per cent every year, reaching \$40 billion by 2025, compared to an average growth of 7 per cent for the sector globally.²²

VI. Conclusion

44. The present paper has highlighted critical issues in African economic, social and environmental development in the face of multiple threats to the attainment of inclusive and green industrialization. It has explored the role of regional integration, infrastructure development, markets and emerging technologies in addressing these issues and achieving a prosperous Africa. Based on the analysis in the paper, the following questions are proposed for consideration by the Committee:

(a) Unlocking opportunities in regional value chains and greening the economic transformation of Africa through the Agreement Establishing the African Continental Free Trade Area:

(i) Can African countries use the Agreement Establishing the African Continental Free Trade Area as leverage to drive sustainable development by promoting and expanding the production of environmentally friendly goods and services?

(ii) Can the Protocol on Investment to the Agreement, which includes exemption provisions for sustainable considerations and an exceptional environmental article, be promoted as a foundational pillar of the green industrialization of Africa?

(iii) The protocols on competition and intellectual property rights have similar exemption provisions: can these be leveraged to create a friendlier atmosphere for sustainable development?

(iv) Should the Committee endorse and support a proposal for States parties to the Agreement Establishing the African Continental Free Trade Area to develop a stand-alone protocol on the African Continental Free Trade Area and the environment, in order to maximize the potential contribution by the Area to the green industrialization agenda for Africa?

(v) Can policymakers build on the successful experiences of regional economic communities that have already considered climate and environmental policy within their own policymaking structures?

(vi) Should the Committee consider endorsing continuing research by ECA, the African Union Commission, the African Development Bank and the United Nations Conference on Trade and Development based on the eleventh edition of the report *Assessing Regional Integration in Africa*, which will support Africa in its integration journey?

(vii) Should the Committee commit itself to and strongly support efforts to promote ratification and implementation of the Protocol Relating to the Free Movement of Persons, Right of Residence and

²¹ See McKinsey and Company, "Fintech in Africa: the end of the beginning", 30 August 2022. Available at <https://www.mckinsey.com/industries/financial-services/our-insights/fintech-in-africa-the-end-of-the-beginning>.

²² See Mastercard, "Future of fintech – Africa: rapid growth attracts smart capital" (Mastercard, October 2022). Available at <https://mastercardcontentexchange.com/news/media/ulehwbwr/mastercard-future-of-fintech-in-africa.pdf>.

Right of Establishment, considering its critical complementarities for the successful implementation of the Agreement Establishing the African Continental Free Trade Area?

(b) Contribution by infrastructure, agriculture and financial markets to the green industrialization of Africa:

(i) How should ECA align its work on energy with the African Union position on a just energy transition to achieve greater complementarities and a more significant impact?

(ii) How should ECA support individual African countries in their use of such technology as satellite imagery and artificial intelligence, with a view to digitalizing the management of development corridors?

(iii) How can countries build consensus about the strategic significance of fostering the growth of the agro-industrial sector to take advantage of market opportunities and realize economic goals?

(iv) How can countries grow their local currency bond markets as an essential tool to absorb capital flows and lessen the effects of financial crises on the domestic economy?

(c) Advancing energy and digital technologies for a prosperous and inclusive green industrialization:

(i) What policy measures and market mechanism could be deployed to reduce private financing costs in Africa and ensure adequate and affordable financing for green energy and digital technology solutions?

(ii) What policies and strategies should African countries put in place to build local capacity to develop emerging green energy and digital technology products and services to create wealth and achieve inclusive green industrialization?

(iii) What steps should African countries take to harness and scale up green energy technologies, such as green hydrogen production?

(iv) What policy measures can Governments deploy in regulating emerging technologies, such as artificial intelligence and machine learning, in a manner that balances public interests with the promotion of innovation and knowledge generation?

(v) How will national energy and infrastructure regulation affect the pace of private sector investment participation and what regulatory reforms would speed up private investment?

(vi) What steps should countries take to strengthen their science, technology and innovation institutional arrangements to support emerging digital and energy technology?

(vii) How can Africa leverage strategic partnerships to boost green energy and digital technology solutions, eliminate energy poverty, close digital divides and close the usage gap?