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Africa Regional Forum on Sustainable Development
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Item 6 of the provisional agenda*

Parallel panel meetings on the subthemes
of the session: (b) Affordable and clean energy

Background paper on the subtheme “Affordable and clean energy”

I. Achieving Sustainable Development Goal 7 in Africa

A. Current status

1. In most analyses,¹ the progress made in many African countries since 1990 in increasing access to modern energy has been recognized. Africa’s energy situation, however, remains a paradox of scarcity amid plenty. The continent is highly endowed with all forms of fossil and renewable energy resources with technical and economic potential: more than 350 GW of hydropower; thousands of GW of solar power; more than 100 GW of wind power; some 15 GW of geothermal power; abundant biomass; and even some marine energy potential. Megatrends of population growth (1.3 billion people in 2017 increasing to 1.7 billion in 2030 and 2.5 billion in 2050), in addition to rapid urbanization and industrialization, will lead to dramatic increases in energy demand in Africa by 2030. The International Energy Agency projects 2 per cent annual growth in Africa’s total primary energy demand to 2030.²

2. While countries in North Africa have attained nearly universal access to electricity and clean cooking, and a few other countries, notably Equatorial Guinea, Ethiopia, Gabon, Ghana, Kenya, Senegal and Swaziland, are making good progress in achieving universal access to electricity by 2030, most of the continent is unlikely to achieve Sustainable Development Goal 7 with existing policies and commitments, which affects achieving the other Goals, notwithstanding the numerous programmes at the regional, subregional and national levels aimed at increasing access to modern energy.

*ECA/RFSD/2018/1

¹ See, for example, United Nations Conference on Trade and Development, *The Least Developed Countries Report 2017: Transformational Energy Access* (Geneva, 2017); Economic Commission for Africa, *Sustainable Energy for All Global Tracking: Report on Africa* (Addis Ababa, forthcoming); International Energy Agency, *Energy Access Outlook 2017: From Poverty to Prosperity* (Paris, 2017).

² See International Energy Agency, *Energy Access Outlook 2017: From Poverty to Prosperity* (Paris, 2017).

B. Energy access (target 7.1 of the Sustainable Development Goals)

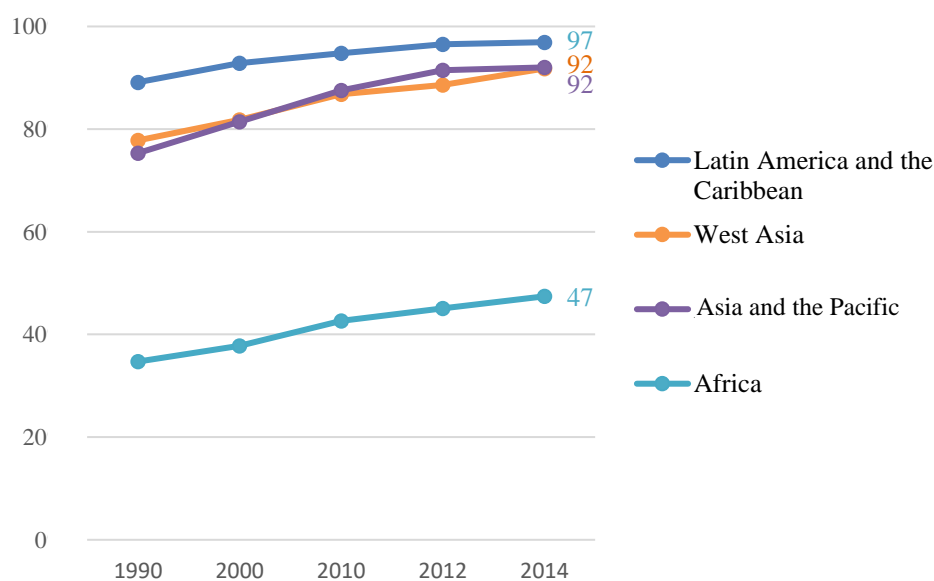
3. The electrification rate in Africa increased by 12.9 per cent, to 43 per cent, or from 186 million people to 444 million, during the period 1990-2010, with the addition of 12.8 million people annually. The total population during the same period, however, increased annually by 20.65 million, outpacing electrification efforts. Between 2010 and 2012, the rate increased to 45.1 per cent and the number of people gaining access to electricity annually doubled to 25 million, while the total population grew by 27.5 million annually. During the period 2012-2014, the rate continued to grow, reaching 46.9 per cent, while the global average was 85.6 per cent.³

4. According to the International Energy Agency, the electrification rate increased from 34 per cent in 2000 to 52 per cent in 2016, compared with 64 to-86 per cent on average for developing countries and 87 to 97 per cent for the Central and South America region during the same period.² While the number of people gaining access to electricity in Africa has been increasing over the years, the region is lagging behind, owing to population growth rates.

Figure I

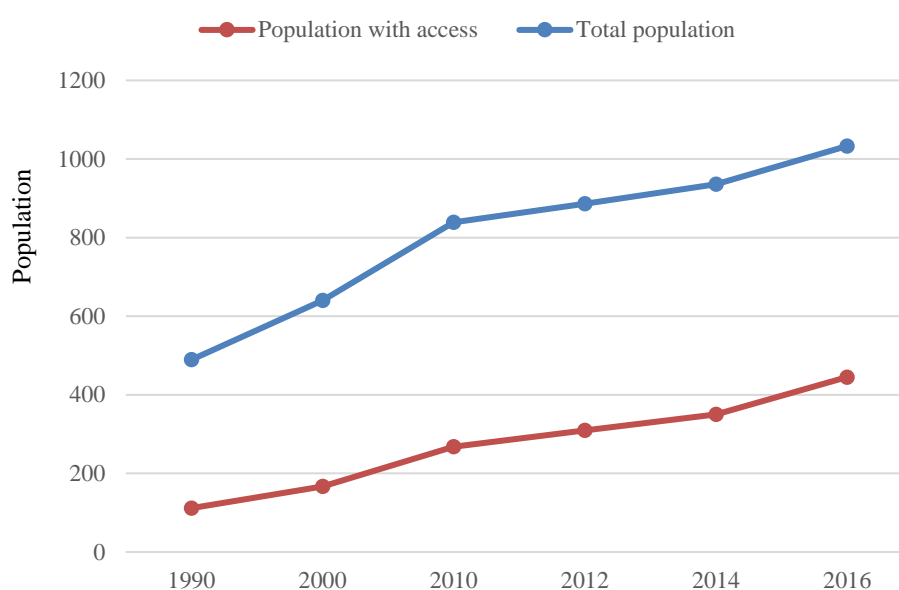
Access to electricity, 1990-2014

(a) Electrification in Africa, compared with other regions (Per cent)

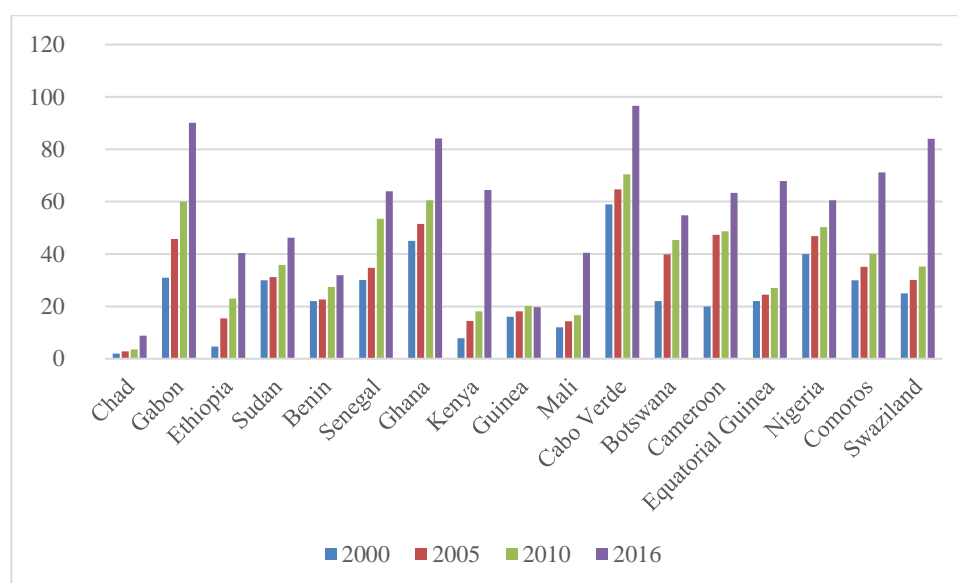


³ See Economic Commission for Africa, *Sustainable Energy for All Global Tracking: Report on Africa* (Addis Ababa, forthcoming).

(b) Population without electricity access in sub-Saharan Africa (Millions)



(c) Electrification rate in selected African countries, including those doing voluntary national reviews of Sustainable Development Goals in 2018 (Per cent)



Source: International Energy Agency and World Bank, *Sustainable Energy for All Global Tracking Framework: Progress toward Sustainable Energy* (2017); International Energy Agency, *Energy Access Outlook 2017: From Poverty to Prosperity* (2017).

5. Since 2013, the rate of access to electricity has surpassed the rate of population growth in Africa. The number of people lacking access to electricity decreased from 640 million in 2013 to 590 million in 2016, with average urban and rural electrification rates of 77 per cent and 32 per cent, respectively. North African countries have close to 100 per cent electrification. In sub-Saharan Africa, urban electrification rates range from as low as 4 per cent in the Central African Republic and South Sudan to 100 per cent in Cabo Verde and Mauritius, while rural electrification rates range from 1 per cent (Burkina Faso, the Central African Republic, Chad, the Democratic Republic of the Congo, Djibouti, Guinea, Guinea-Bissau, the Niger and South Sudan) to 71 per cent in Ghana and Swaziland, 89 per cent in Cabo Verde, 99 per cent in Seychelles and 100

per cent in Mauritius (see figure I). The average per capita consumption of 200 kWh annually in sub-Saharan Africa remains the lowest in the world. This compares unfavourably to 4,066 kWh in China, 1,600 kWh in the European Union and 1,075 kWh in India.

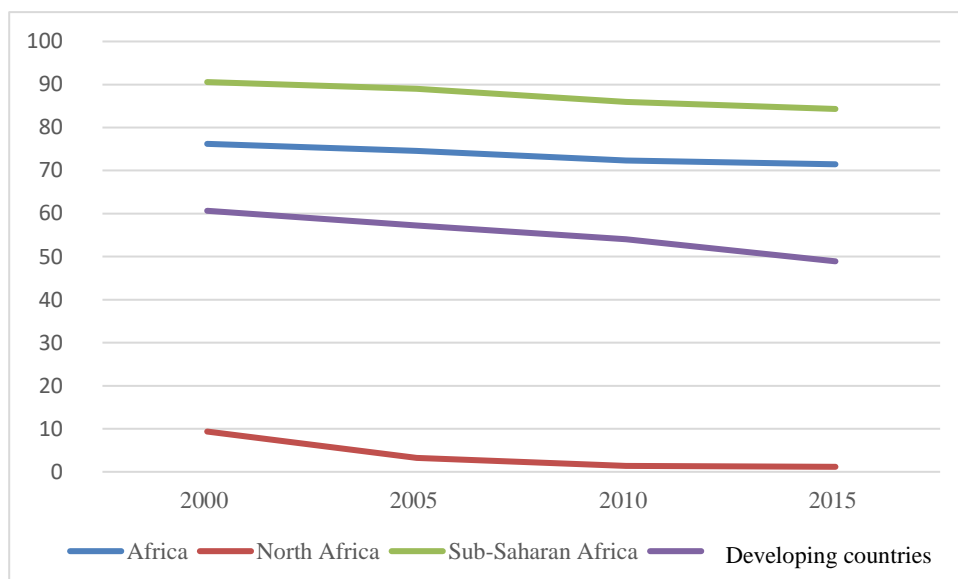
6. Although the resource potential and demand are high, the current total electricity installed capacity in Africa is approximately only 170 GW. The electricity supply mix is dominated by coal, at approximately 35 per cent, reflecting the dominance of South Africa, where 90 per cent of electricity comes from coal, notwithstanding that more than 50 per cent of the coal power plant units are more than 40 years old. While it has huge potential, hydropower contributes only 23 per cent of electricity supply.

7. Africa is also the worst-performing region in terms of access to clean fuels and technologies. According to the Sustainable Energy for All Global Tracking Framework 2017,³ between 2000 and 2010, the share of the population using clean cooking solutions barely increased, rising from 24.4 to 25.6 per cent, representing an annual increase of only 6.9 million new users. The population increased annually by 23 million during the same period. Between 2010 and 2012, the share remained almost flat, at 25.7 per cent, given that there were only 7.5 million new users of clean fuels and technologies annually, while the total population increased by 27.5 million people annually. The pace of adoption of clean fuels and technologies remained almost stagnant, at 0.1 per cent, during the period 2012-2014. The share reached 25.8 per cent, with 8 million new users annually, against an additional 29 million people annually. To reach universal access by 2030, the rate of adoption of clean cooking solutions needs to increase dramatically (see figure II).

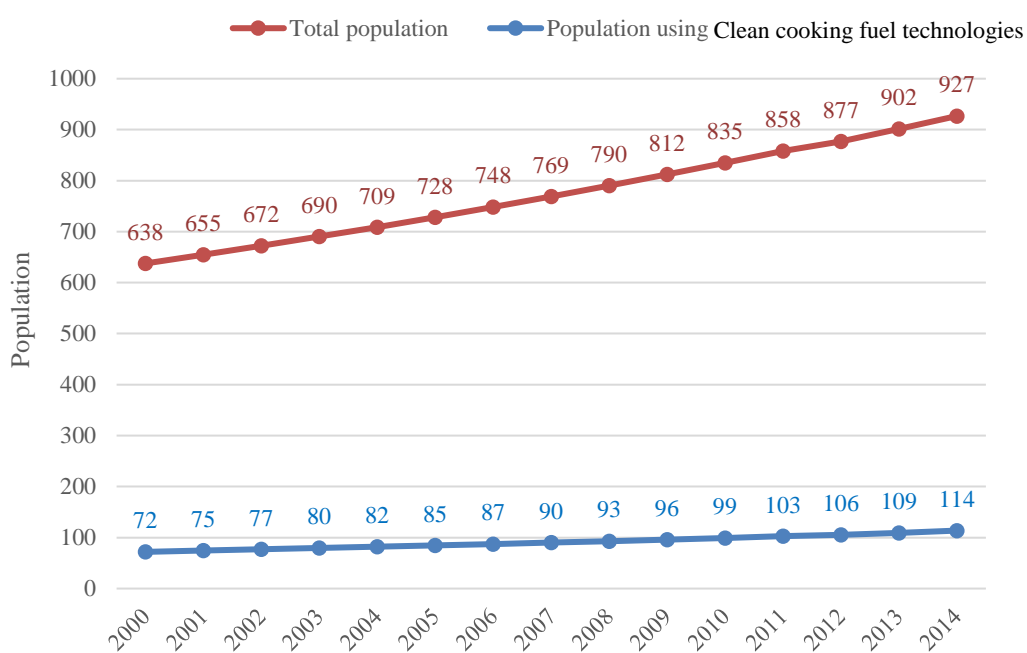
8. The International Energy Agency shows that the share of the population without access to clean cooking solutions in North Africa was less than 1 per cent in 2015, compared with 84 per cent in sub-Saharan Africa, where no-access levels ranged from 95 per cent in some countries (e.g., Burundi, the Central African Republic, the Democratic Republic of the Congo, Djibouti, Malawi, Nigeria, Rwanda and the United Republic of Tanzania) to 2 per cent in Mauritius and Seychelles.² Although the share of the population without access to clean cooking solutions has been decreasing, the total number of people without access actually increased, from 610 million to 846 million between 2000 and 2015, with 783 million depending entirely on solid biomass for cooking in 2015. As a result of the low level of access to clean cooking solutions on the continent, approximately 500,000 premature deaths annually in the region are attributable to poor indoor air pollution resulting from biomass combustion, more than the annual number of deaths from malaria.²

Figure II
Access to clean cooking fuel technologies, 2000-2015

(a) Share of population with access to clean cooking (Per cent)



(b) Population using clean cooking fuel technologies (Millions)



Source: International Energy Agency and World Bank, *Sustainable Energy for All Global Tracking Framework: Progress toward Sustainable Energy* (2017); International Energy Agency, *Energy Access Outlook 2017: From Poverty to Prosperity* (2017).

C. Renewable energy (target 7.2 of the Sustainable Development Goals)

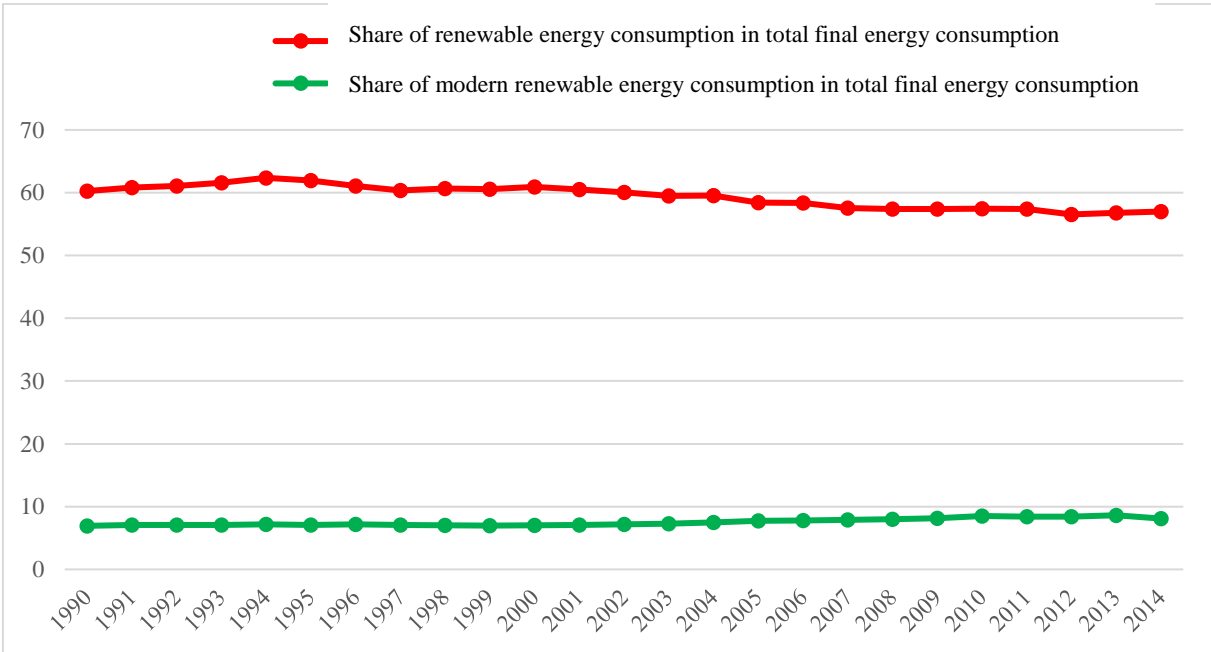
9. The share of renewable energy in total energy consumption in Africa was the highest in the world in 2014, at 57 per cent, comprising mainly traditional biomass consumption. The continent also recorded the highest share of total energy consumption in the world, at 48.9 per cent, in 2014. The share of renewable energy in the total energy consumption in Africa decreased slightly between 1990 and 2012, from 60.2 per cent in 1990 to 57.5 per cent in 2010 and 56.5 per cent in 2012. It peaked at 62.4 per cent in 1994 (see figure III).

10. Most renewable energy in Africa is derived from biomass. According to the International Energy Agency, some 780 million people in sub-Saharan Africa rely on solid biomass for cooking, and this number has grown by 44 per cent since 2000.² The penetration of modern renewables is lower than the world average, and it is modest, except for large hydropower plants.

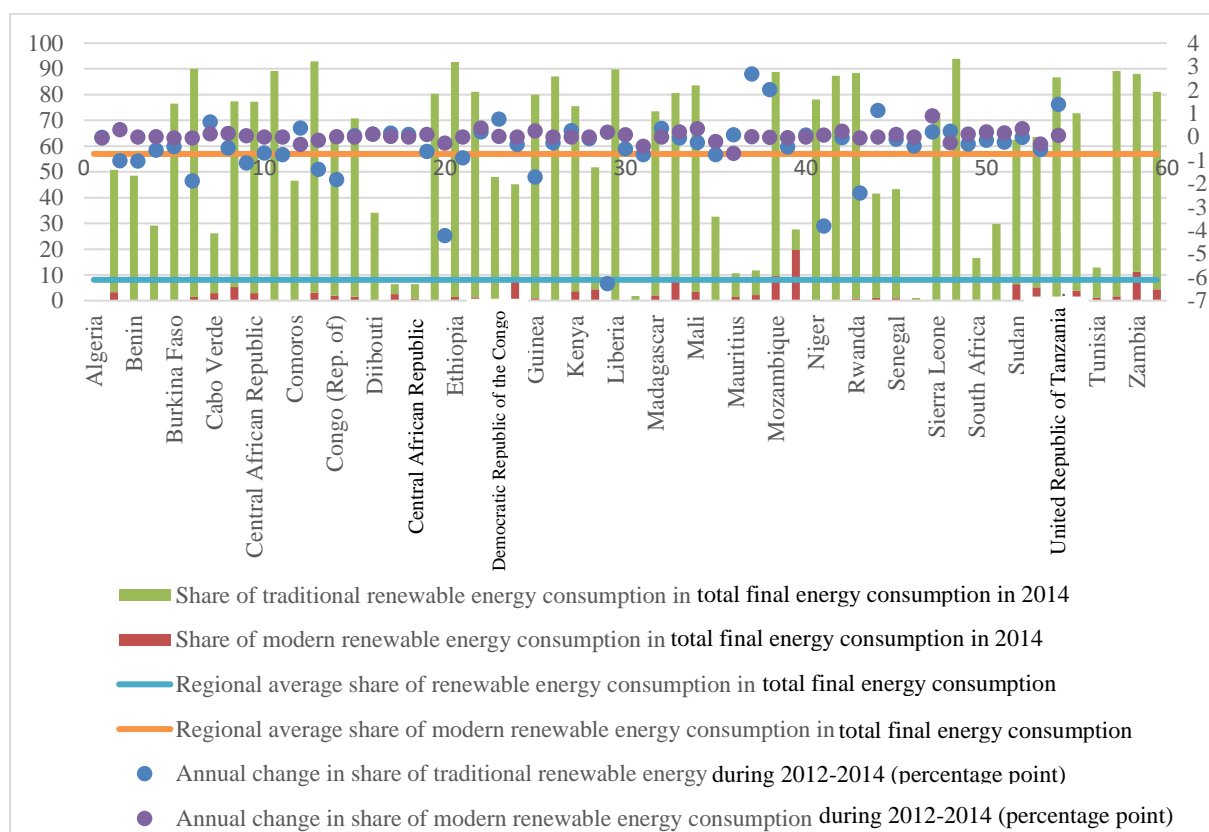
Figure III

Total renewable energy and modern renewable energy share in Africa, 1990-2014 (Per cent)

(a) Share of renewable energy and modern renewable energy in total final energy consumption



(b) Share of renewable energy and modern renewable energy in total final energy consumption in selected African countries



Source: International Energy Agency 2016 energy balances and United Nations statistics.

11. In terms of renewable electricity, the total installed capacity exceeded 38 GW in 2016 (approximately 23 per cent of total electricity capacity), driven mainly by developments in wind, solar photovoltaic power and geothermal and large hydropower in Ethiopia, Kenya, Morocco and South Africa, among others.

12. Under the Paris Agreement on climate change, all African countries have included renewable energy actions covering all technologies and end-use applications as commitments to tackle climate change and spur economic growth. The Africa Renewable Energy Initiative, launched at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, is an ambitious continental initiative that is aimed at adding 300 GW of new renewable electricity capacity on the continent by 2030. In a report on the Initiative,⁴ it was shown that doing so would require \$70 billion annually for generation, transmission and distribution. Mobilizing such volumes of investment would require substantial political will and innovative and ambitious policies, including an enabling environment for mobilizing private sector finance, both from foreign direct investment and domestic resources.

⁴ See International Renewable Energy Agency, *Africa 2030: Roadmap for a Renewable Energy Future* (Abu Dhabi, 2015).

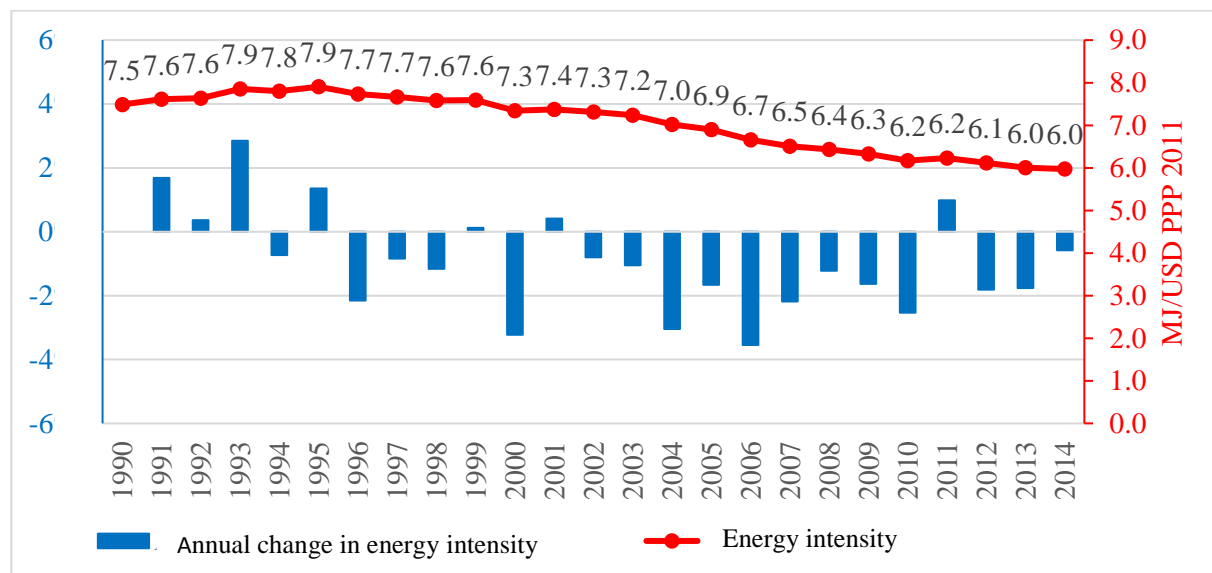
D. Energy efficiency (target 7.3 of the Sustainable Development Goals)

13. Africa reported comparatively high rates of energy intensity in 2014, of 6.0 MJ/\$ (i.e., megajoules per 2011 purchasing power parity dollar), compared with the global average of 5.5 MJ/\$. During the period 1990-2010, energy intensity in the region decreased from 7.9 MJ/\$ in 1993 to 6.2 MJ/\$ (see figure IV), with a compound average growth rate of -2 per cent between 1990 and 2000. The improvement in energy intensity was -1.7 per cent during the period 2000-2010, driven by gross domestic product (GDP) growth that coincided with a global surge in commodity prices, in particular for oil. Energy intensity declined during the period 2010-2012 by -0.4 per cent, owing mainly to a dip in oil prices in 2009, but accelerated again to -1.2 per cent during the period 2012-2014, given that GDP returned to higher levels when the oil prices recovered briefly until 2015.⁵

Figure IV

Energy intensity and annual change in intensity in the African region, 1990-2014 (Per cent)

(a)

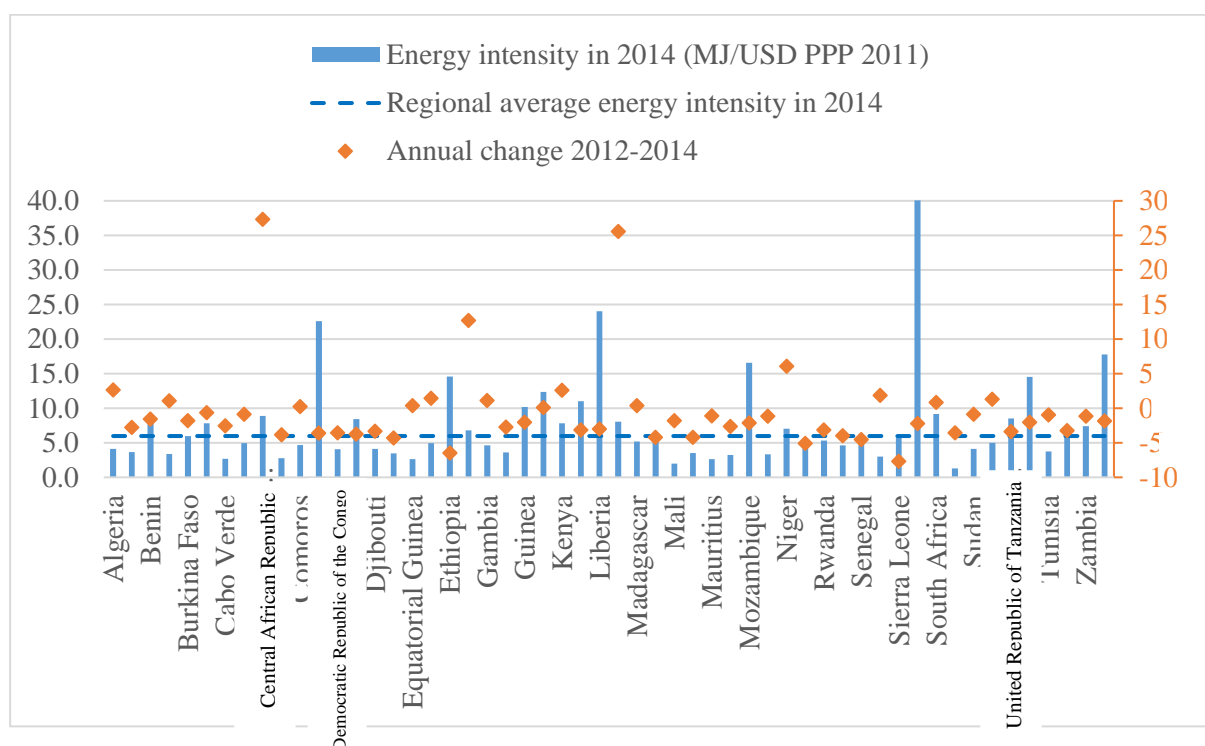


(b)

Compound Annual Growth Rate of energy intensity	
1990-2000	-1
2000-2010	-2
2010-2012	0
2012-2014	-4

⁵ See International Energy Agency and World Bank, *Sustainable Energy for All Global Tracking Framework: Progress toward Sustainable Energy* (Washington, D.C.: 2017); Economic Commission for Africa, *Sustainable Energy for All Global Tracking: Report on Africa* (Addis Ababa, forthcoming).

(c)



Source: International Energy Agency and World Bank, *Sustainable Energy for All Global Tracking Framework: Progress toward Sustainable Energy* (2017).

14. Energy intensity changes have varied by economic sector. Energy intensity in the industrial sector returned to a negative Compound Annual Growth Rate during the periods 2010-2012 and 2012-2014, after trending higher during 2000-2010. The lowest energy intensity was in the agricultural sector, at 0.5 MJ/\$ in 2014, although it never exceeded 0.76MJ/\$ from 1990 to 2014. Following two decades of declining trends, energy intensity in the services sector shot up during the periods 2010-2012 and 2012-2014, which can be attributed to improved infrastructure for information and communications technology. The residential sector had slight changes in energy intensity, which may be a combination of the poor capture of energy consumption and GDP data and a general shift to more efficient clean fuel technologies.⁵

On the road to achieving Sustainable Development Goal 7 in Africa

15. Africa is far from being on track to achieving the targets of Sustainable Development Goal 7. While a few countries, including Ethiopia and Kenya, are presently on a trajectory towards universal access to electricity, progress is uneven and 600 million people are still projected to be without electricity by 2030 on the basis of existing policies. Access to clean cooking solutions is even less promising, with the number of people without access to clean cooking solutions expected to increase to 900 million, 820 million of whom will rely primarily on biomass for cooking in 2030.²

16. Renewable energy is essential for delivering sustainable and clean electricity access, reducing air pollution and achieving climate goals. Strong growth in renewable electricity capacity is expected to result in its share in power generation to rise to 36 per cent in 2030 with current and planned policies, driven mainly by hydro, solar photovoltaic power and wind, up from 18 per cent in 2016. Limited policies targeting renewable heat and transport, however, means that the overall share of modern renewables in total final energy consumption would remain relatively low, at 11 per cent, in 2030, up from 7 per

cent in 2015.⁶ In order to deliver on sustainable development and climate objectives, the sustainable development scenario of the International Energy Agency shows that the renewable energy share in total final energy consumption needs to grow to 22 per cent in 2030 and to 32 per cent in 2040.² Progress in energy efficiency is also expected to be uneven and slower than the world average, with annual improvements anticipated to decline at a rate of 1.8 per cent under current policies, less than half the rate required to achieve sustainable development objectives.²

17. By 2030, most of the continent will not achieve all the targets of Sustainable Development Goal 7, especially universal access and energy efficiency targets, given the low base from which most countries began and the lack of meaningful investment. The greatest challenge is access to clean cooking, and it is clear that this target will not be reached by a majority of African countries, save for North African countries, where the share of population without access to clean cooking is less than 3 per cent. In sub-Saharan Africa, only Mauritius and Seychelles have almost universal access to clean cooking, followed by South Africa at more than 80 per cent.²

II. Key challenges

A. Low power generation capacity

18. The installed electricity capacity in Africa was 147 GW in 2012, reaching 168 GW in 2016,⁷ mostly from fossil fuels (i.e., coal, oil and gas). Excluding South Africa and North African countries, the rest of Africa has an installed capacity roughly equal to that of South Africa and is just under the 53 GW of solar photovoltaic power added in China in 2017 or a little more than the installed capacity in Thailand. Renewable energy, mainly large-scale hydropower, comprises one quarter of the electricity capacity.⁴ In most cases, the generation is very inefficient, with some of the generation assets nearing retirement age.

B. Cost of rural electrification

19. Many countries have rural electrification programmes, including rural electrification agencies and, sometimes, dedicated funds, to accelerate electrification in rural areas, where the majority of the population lives and lacks electricity access. For example, all Southern African countries have such agencies or units, except Mauritius and Seychelles (which are already fully electrified).

20. Limited grid coverage inhibits further growth in rural electrification. The focus has in large part been on grid electricity for urban areas. For the majority of countries, between 80 and 95 per cent of the unserved communities are targeted to receive electricity supply through grid extension.⁸ There is a growing realization of the cost implications of grid connection as the mechanism for rural electrification. The investment required to extend grid coverage in rural areas is significant, and the investment gap is wide. Off-grid technology options, such as mini-grids and individual systems, are increasingly being considered as cheaper supply options for small consumers residing far from the grid network.

⁶ Including traditional biomass, the share of renewable energy in total final energy consumption is expected to decline from 58 per cent in 2015 to 54 per cent in 2030. See International Energy Agency, *Energy Access Outlook 2017: From Poverty to Prosperity* (Paris, 2017).

⁷ See African Development Bank, *Annual Development Effectiveness Review 2017: Transforming Africa—Unlocking Agriculture's Potential* (Abidjan, 2017).

⁸ Vivien Foster and Cecilia Briceño-Garmendia, eds., *Africa's Infrastructure: A Time for Transformation*, (Washington, D.C., World Bank, 2010).

21. Rural electrification is also viewed more as a social service. Accordingly, demand in rural areas is, in most cases, suppressed. Eventually, most rural electrification initiatives end up being rural lighting projects. There is a need to make a shift towards stimulating productive uses of electricity and energy services as options for stimulating economic growth using decentralized power systems.

C. Financing gap

22. There is a huge financing gap. In sub-Saharan Africa, the International Energy Agency estimates that an investment of \$34.2 billion annually is needed to ensure energy access for all by 2030. This amount consists of \$32.5 billion for electricity access and \$1.7 billion for clean cooking.² In the case of renewables, the global trends in renewable energy investment show that, of the \$242 billion invested in renewables in 2016, only approximately \$3.5 billion was in Africa (e.g., \$894 million in South Africa, \$745 million in Egypt, \$660 million in Morocco and \$648 million in Kenya).⁹ Most African countries are not tapping the huge potential of domestic resource mobilization to finance their energy transformation. Nevertheless, domestic resource mobilization for Ethiopia's \$4.7 billion Grand Renaissance dam was expected to raise approximately \$550 million from the public through domestic and diaspora bonds. To date, more than three quarters of that amount has been raised. In South Africa, domestic resources constitute well over 70 per cent of the investment in the renewable energy procurement programme. This programme also demonstrates how investment transformation can happen when the political will and right policies are in place. To date, more than \$14 billion in investment has been committed to renewable energy procurement in the country. More than 6 GW of renewable electricity capacity has already been contracted, with 3.27 GW dispatched to the grid in 2017.

III. Interlinkages with other Sustainable Development Goals

23. The importance of Sustainable Development Goal 7 is not only confined solely to access to clean and affordable energy, renewable energy and energy efficiency, but also central to the achievement of all of the other Goals, as discussed below.

A. Industrialization (Sustainable Development Goal 9)

24. Renewable energy has a critical role to play in powering Africa's industries and in creating industries along the low-carbon, climate-resilient and inclusive development pathway. With rapidly declining renewable technology prices, especially solar and wind power, the potential for renewables to transform industrialization is great. In Ethiopia, for example, industrial parks, such as the eco-friendly Hawassa industrial park,¹⁰ are being developed and powered with renewable power sources and are promoting cleaner production.

B. Climate change (Sustainable Development Goal 13)

25. Renewable energy and energy efficiency are key to the decarbonization of the energy sector. ECA has been analysing and reviewing the nationally

⁹ See Frankfurt School-UNEP Collaborating Centre for Climate and Sustainable Energy Finance, *Global Trends in Renewable Energy Investment 2017* (Frankfurt, 2017).

¹⁰ See, for example, Ethiopian News Agency, "Hawassa industrial park to be fully operational", 16 June 2017. Available from www.ena.gov.et/en/index.php/economy/item/3345-hawassa-industrial-park-to-be-fully-operational.

determined contributions to climate action of all African countries under the framework of the Paris Agreement. These contributions all include renewable energy and energy efficiency action for climate change mitigation and adaptation. For example, as indicated by the International Renewable Energy Agency, adding 300 GW of renewable electricity in Africa by 2030 from hydropower, wind and solar would result in a climate benefit of a 310 megaton reduction in carbon dioxide emissions by 2030, compared with the baseline business-as-usual scenario.⁴

C. Gender and health (Sustainable Development Goals 3 and 5)

26. There are strong linkages between gender-based constraints and structural transformation.¹¹ Gender-based roles at the household level, especially in rural areas, presuppose that women should do the work of fetching water and firewood, cooking, nurturing children and doing the general upkeep of households. An effective framework was put forward for mainstreaming gender into the energy sector and practice in a way that ensures gender equity and leads to an inclusive development framework that empowers women and girls and gives them more time for productive and self-interest activities, thereby contributing to the accelerated achievement of Sustainable Development Goal 5.¹² With regard to Goal 3 on health, access to modern energy forms and services could cut the number of premature deaths from indoor smoke and air quality by up to 500,000 according to estimates by the International Energy Agency.²

IV. Policy implications

A. Creating an investment climate, in particular for decentralized energy systems

27. In many African countries, energy provision is seen as a public good, and the public sector provides funds and implements most energy programmes, with little private sector financing and participation. There are, however, some significant shifts. For example, energy projects under the Programme for Infrastructure Development in Africa are expected to count on substantial private sector participation. Through political will and policy reforms that create the enabling environment and investor confidence in most African countries, there have been significant public-private partnerships in the energy sector, in particular in the power sector. Beginning with countries such as Kenya, Morocco and South Africa and, more recently, Ethiopia, there has been significant private sector investment in grid-based renewable energy projects. There is, however, still a long way to go in mobilizing such investment to drive accelerated energy access on the continent, unless concerted and urgent action is taken by policymakers, in partnership with development partners, to boost investor interest and create the enabling environment and framework for a return on investment.

28. Connecting the grid to most rural areas, especially the sparsely populated areas far away from urban centres, is, in general, not financially viable. Urgent action to support and provide incentives to the accelerated deployment of decentralized technologies is crucial if the energy access target of Sustainable Development Goal 7 is to be achieved in Africa. A number of African countries are deploying solar home systems in their rural electrification programmes, and these are supported mainly by development partners. Notwithstanding the fact

¹¹ See United Nations Conference on Trade and Development, *The Least Developed Countries Report 2017: Transformational Energy Access* (Geneva, 2017).

¹² See Enerгия, *Mainstreaming Gender in Energy Sector Practice and Policy: Lessons from the Enerгия International Network* (2016).

that these systems provide alternative power, their impact on improving livelihoods is limited. In general, such systems are costly, provide only minimal power and are not suited for higher valued-added stages of production.¹⁰ Recognizing that the private sector is not the panacea for achieving Goal 7 in Africa, it is in rural energy access that innovations in business models, supported by carefully designed public interventions, are most needed to spur new investment to promote access to modern energy. In the past, investing in renewable energy technologies deployed in rural areas was risky, owing to regulatory and policy uncertainties and an impoverished market. Nevertheless, there has recently been an emergence of digitized and decentralized energy service business models¹³ that are already having a transformative impact on access to clean and affordable energy on the continent.

29. A number of countries are creating a good environment for rural-based energy, but these reforms remain nascent and need to be accelerated. The renewable energy space is still dominated by international firms and finance in partnership with public institutions. There is little participation by local project developers or independent power producers because the latter often do not have access to credit, compared with their international counterparts. International firms are crowding out local firms in supplying renewable energy options, as is the case in Zambia, South Africa and a host of other African countries. In a recent 100 MW bid in Zambia, only 1 of 11 firms that qualified was African, and that company was from South Africa.¹⁴ The formation of special credit facilities at the national level will assist local project developers. One example is the Ugandan Energy Credit Capitalization Company, supported by the German development bank KfW, which is offering advisory services and funding for renewable projects in the country.

B. Training energy service providers

30. Soft and hard skills development should be at the centre of interventions to promote and accelerate energy access. This ensures sustainability and the localization of technologies and practices. Special funds are needed for strategic programmes aimed at improving the capacity of energy services providers in both the public and private arena at the national and local levels. This is an area that has been identified as a serious impediment in rolling out energy interventions in Africa. Both established and new regional centres of excellence are embarking on supporting their member States with policies and human and institutional capacity to enhance the provision of energy services. These institutions include the African Institute for Economic Development and Planning, which is developing a comprehensive capacity development programme for energy supply and demand management and planning, and subregional institutions.¹⁵

¹³ For example, M-KOPA in Kenya, which has connected more than 600,000 homes with solar power in the past six years. See, for example, <http://solar.m-kopa.com/about/our-impact/>.

¹⁴ See Liz McDaid, *Opportunities for Investing in Renewable Energy Sector in Africa* (2016).

¹⁵ For example, the ECOWAS Centre for Renewable Energy and Energy Efficiency, the SADC Centre for Renewable Energy and Energy Efficiency, the Regional Centre for Renewable Energy and Energy Efficiency in North Africa and the East Africa Centre for Renewable Energy and Energy Efficiency.

V. Priority actions

31. The following are the priority actions that need to be taken to achieve Sustainable Development Goal 7:

- (a) Put in place coherent policies and an enabling environment to leverage limited public resources in order to mobilize the investment necessary from the private sector, including from domestic resources, capitalizing on falling technology costs for renewable energy;
 - (b) Address data gaps and reliability, especially on biomass, to inform investment planning, develop greater capacity to collect and analyse energy data, harmonize data-collection methodologies and strengthen existing data-collection systems;
 - (c) Develop in-country human and institutional capacities for energy planning and management and greater engagement with the private sector;
 - (d) Ensure that climate resilience is fully integrated into the planning and implementation of energy infrastructure and investment, especially for hydropower systems, which are at risk owing to climate change and variability;
 - (e) Promote the sharing of good practices and experiences with both grid and off-grid systems, including business models and instruments to attract private sector investment, and promote the coordination of the various regional and subregional programmes on energy access to create synergies and share experiences;
 - (f) Systematically prioritize energy efficiency in all sectors and capitalize on quick wins in energy efficiency in cities, industries, buildings and transportation, recognizing that energy efficiency gains enhance access;
 - (g) Promote investment in strengthening the grid for greater efficiency and increased penetration of variable renewable power and promote cross-border interconnections to accelerate access to electricity;
 - (h) Promote local content enhancement throughout the full renewable energy value chain as a catalyst for longer-term enhanced deployment of renewables with wider socioeconomic benefits;
 - (i) Accelerate efforts to encourage innovation in energy services and promote collaborative research and development at the regional level.
-