Africa in an evolving global context

Today's global energy crisis has underscored the urgency, as well as the benefits, of an accelerated scale-up of cheaper and cleaner sources of energy. Russia's invasion of Ukraine has sent food, energy and other commodity prices soaring, increasing the strains on African economies already hard hit by the Covid-19 pandemic. The overlapping crises are affecting many parts of Africa's energy systems, including reversing positive trends in improving access to modern energy, with 4% more people living without electricity in 2021 than in 2019. They are also deepening financial difficulties of utilities, increasing risks of blackouts and rationing. These problems are contributing to a sharp increase in extreme poverty in sub-Saharan Africa, with the number of people affected by food crises quadrupling in some areas.

Africa is already facing more severe climate change than most other parts of the world, despite bearing the least responsibility for the problem. With nearly one-fifth of the world's population today, Africa accounts for less than 3% of the world's energy-related carbon dioxide (CO_2) emissions to date and has the lowest emissions per capita of any region. Africans are already disproportionately experiencing the negative effects of climate change, including water stress, reduced food production, increased frequency of extreme weather events and lower economic growth – all of which are fuelling mass migration and regional instability.

For all of these difficulties, the global clean energy transition holds new promise for Africa's economic and social development. As of May 2022, countries representing more than 70% of global CO_2 emissions have committed to reach net zero emissions by around mid-century. This includes 12 African countries that represent over 40% of the continent's total CO_2 emissions. These ambitions are helping set a new course for the global energy sector amid declining clean technology costs and shifting global investment. African countries – nearly all of which are party to the Paris Agreement on Climate Change – are poised to capture the technology spillovers of these changes and attract increasing flows of climate finance.

This *Outlook* explores a Sustainable Africa Scenario (SAS) in which Africa rides these shifting tides to achieve all African energy-related development goals on time and in full. This includes universal access to modern energy services by 2030 and the full implementation of all African climate pledges. Realising all of these goals is a formidable undertaking. African countries need to take the lead with clear strategies and policies, while international institutions must reinforce their commitment to significantly increase their levels of support.

Affordable energy for all Africans is the immediate and absolute priority

Universal access to affordable electricity, achieved by 2030 in the SAS, requires bringing connections to 90 million people a year, triple the rate of recent years. At present, 600 million people, or 43% of the total population, lack access to electricity, most of them in sub-Saharan Africa. Countries such as Ghana, Kenya and Rwanda are on track for full access by 2030, offering success stories other countries can follow. Our detailed analysis shows that extending national grids is the least costly and most prudent option for almost 45% of those

gaining access to 2030. In rural areas, where over 80% of the electricity-deprived live, mini-grids and stand-alone systems, mostly solar based, are the most viable solutions.

Achieving universal access to clean cooking fuels and technologies by 2030 requires shifting 130 million people away from dirty cooking fuels each year. Today, 970 million Africans lack access to clean cooking. Liquefied petroleum gas (LPG) is the leading solution in urban areas, but recent price spikes are making it unaffordable for 30 million people across Africa, pushing many to revert to traditional use of biomass. Countries are re-evaluating clean fuel subsidy schemes and exploring alternatives such as improved biomass cook stoves, electric cooking and biodigesters. The improvement rates needed for universal clean cooking access by 2030 are unprecedented, but the benefits are huge: reducing premature deaths by about 500 000 a year by 2030, drastically cutting time spent gathering fuel and cooking, and allowing millions of women to pursue education, employment and civic involvement.

The goal of universal access to modern energy calls for investment of USD 25 billion per year. This is around 1% of global energy investment today, and similar to the cost of building just one large liquefied natural gas (LNG) terminal. Stimulating more investment requires international support aided by stronger national institutions on the ground laying out clear access strategies – only around 25 African countries have them today.

As Africa's demand for modern energy grows, efficiency keeps it affordable

Demand for energy services in Africa is set to grow rapidly; maintaining affordability remains an urgent priority. Africa has the world's lowest levels of per capita use of modern energy. As its population and incomes grow, demand for modern energy expands by a third between 2020 and 2030 in the SAS. However, under existing subsidy schemes, current price spikes risk doubling energy subsidy burdens in African countries in 2022 – an untenable outcome for many facing debt distress. Some countries, including Egypt, Ethiopia and Uganda, are being driven to halt or reduce subsidies, or to reinstate fuel taxes due to growing financial burdens. International support must play a role in the near term to manage prices, but better targeting of subsidies to the households most in need is essential.

Efficiency helps temper demand growth, reduces fuel imports, strain on existing infrastructure and keeps consumer bills affordable. Energy and material efficiency reduces electricity demand by 230 terawatt-hours in 2030 – 30% of electricity demand today. Building codes and energy performance standards, which restrict the sale of the least efficient appliances and lighting, make up 60% of these savings. Energy demand for fans and air conditioning still quadruples over the decade as urbanisation and climate change rapidly increase the need for cooling in Africa, calling for a strong focus on efficient cooling solutions.

As Africa's industry, commerce and agriculture expand, so too does the need for productive uses of energy. In the SAS, energy demand in industry, freight and agriculture grows by almost 40% by 2030. Increased production of fertiliser, steel and cement – as well as manufacturing of appliances, vehicles and clean energy technologies – helps to reduce the burden of imports in Africa, which stands at over 20% of GDP today. Some parts of industry

expand their use of the latest, most efficient technologies. In agriculture, which represents one-fifth of Africa's GDP, irrigation pumps are electrified, reducing diesel generator use, and cold-chains (temperature-controlled supply chains) are extended, boosting agricultural productivity and the scope for these products to reach urban markets.

Electricity will underpin Africa's economic future, with solar leading the way

Electricity is the backbone of Africa's new energy systems, powered increasingly by renewables. Africa is home to 60% of the best solar resources globally, yet only 1% of installed solar PV capacity. Solar PV – already the cheapest source of power in many parts of Africa – outcompetes all sources continent-wide by 2030. Renewables, including solar, wind, hydropower and geothermal account for over 80% of new power generation capacity to 2030 in the SAS. Once coal-fired power plants currently under construction are completed, Africa builds no new ones, underpinned mainly by China's announcement to end support for coal plants abroad. If the investment initially intended for these discontinued coal plants were redirected to solar PV, it could cover half of the cost of all Africa's solar PV capacity additions to 2025 in the SAS.

Flexibility is key to integrating more variable renewables, with grid interconnections, hydropower and natural gas plants playing notable roles. Regional power pools contribute to improving reliability of supply – a major problem in Africa. Expanding and modernising Africa's electricity infrastructure requires a radical improvement in the financial health of public utilities, which have been battered by recent economic crises and longstanding under-pricing of electricity. Regulatory reforms are a priority, particularly cost-of-service electricity pricing reforms, which are in place or under discussion in 24 African countries to date.

Gas and oil production focuses on meeting Africa's own demand this decade

Africa's industrialisation relies in part on expanding natural gas use. Natural gas demand in Africa increases in the SAS, but it maintains the same share of modern energy use as today, with electricity generation from renewables outcompeting it in most cases. More than 5 000 billion cubic metres (bcm) of natural gas resources have been discovered to date in Africa, which have not yet been approved for development. These resources could provide an additional 90 bcm of gas a year by 2030, which may well be vital for the fertiliser, steel and cement industries and water desalination. Cumulative CO_2 emissions from the use of these gas resources over the next 30 years would be around 10 gigatonnes. If these emissions were added to Africa's cumulative total today, they would bring its share of global emissions to a mere 3.5%.

Production of oil and gas remains important to African economic and social development, but the focus shifts to meeting domestic demand. Global efforts to accelerate the clean energy transition in the SAS risks dwindling export revenues for Africa's oil and gas. Between now and 2030, Africa's domestic demand for both oil and gas accounts for around two-thirds of the continent's production. This puts greater emphasis on developing well-functioning infrastructure within Africa, such as storage and distribution infrastructure, to meet domestic

demand for transport fuels and LPG. In parallel, African countries focus on strengthening energy efficiency policies, and expanding renewables and other clean energy technologies.

Near-term market opportunities must not distract from declining oil and gas export revenues in the future. New projects benefit from speed to market, minimising project costs and delays, and reducing methane emissions. Current price surges are providing a short-term boon to African producers, with new deals signed to deliver Algerian gas to Europe, along with renewed momentum to develop and expand LNG terminals in Congo, Mauritania and Senegal. With the European Union aiming to halt Russian gas imports towards 2030, Africa in principle could supply an extra 30 bcm in 2030. Reducing flaring and venting could quickly make at least 10 bcm of African gas available for export without the development of new supply and transport infrastructure. New long lead time gas projects risk failing to recover their upfront costs if the world is successful in bringing down gas demand in line with reaching net zero emissions by mid-century.

Critical minerals present a major economic opportunity

Africa's vast resources of minerals that are critical for multiple clean energy technologies are set to create new export markets, but need to be managed well. Africa accounts for over 40% of global reserves of cobalt, manganese and platinum – key minerals for batteries and hydrogen technologies. South Africa, Democratic Republic of the Congo and Mozambique have a significant share of global production today, but many other countries may hold undiscovered deposits. In the SAS, Africa's revenues from critical mineral production more than double by 2030. However, investment in mineral exploration in Africa has been declining in recent years. Reversing this trend hinges on improved geological surveys, robust governance, improved transport infrastructure and a particularly strong focus on minimising the environmental and social impacts of mining operations.

Africa can become a leading player in hydrogen made from renewables

Africa has huge potential to produce hydrogen using its rich renewable resources. A number of low-carbon hydrogen projects are underway or under discussion in Egypt, Mauritania, Morocco, Namibia and South Africa. These are focused primarily on using renewables-based power to produce ammonia for fertiliser, which would strengthen Africa's food security. Global declines in the cost of hydrogen production could allow Africa to deliver renewables-produced hydrogen to Northern Europe at internationally competitive price points by 2030. With further cost declines, Africa has the potential to produce 5 000 megatonnes of hydrogen per year at less than USD 2 per kilogramme—equivalent to global energy supply today.

People must be at the centre of Africa's new energy economy

Home-grown energy industries can reduce imports, create jobs and build the local capital base. In the SAS, around 4 million additional energy-related jobs are needed across the continent by 2030, largely to reach universal energy access in sub-Saharan Africa. Many of

the jobs offer entry into the formal economy and increase entrepreneurial opportunities for women. African energy companies play an increasing part, with joint ventures and technology transfer helping develop local know-how. Implementing an African Continental Free Trade Area also helps broaden domestic markets for African energy firms.

Climate change calls for investment in adaptation

Africa will remain a minor contributor to global emissions, yet it needs to do far more to adapt to climate risks than the rest of the world. By 2050, Africa accounts for no more than 4% of cumulative global energy-related CO_2 emissions, regardless of the scenario. With today's policies, the global average temperature rise is likely to hit 2 °C around 2050, but this would probably result in a median temperature rise of 2.7 °C in North Africa. That would reduce African GDP by around 8% in 2050 relative to a baseline without any climate impacts. Losses in some regions such as East Africa would reach around 15%.

Urgent action to adapt to climate change would reduce the severity of these economic effects but require much more investment. Funding for climate adaptation could reach USD 30-50 billion per year by 2030 – a huge increase on the USD 7.8 billion that was provided by advanced economies for adaptation projects in 2019. Some of this will be needed to make Africa's energy systems more resilient against climate risks: three-fifths of Africa's thermal power plants are at high or very high risk of being disrupted by water stress and one-sixth of Africa's LNG capacity is vulnerable to coastal flooding.

Unlocking more finance remains key to Africa's energy future

Achieving Africa's energy and climate goals means more than doubling energy investment this decade. This would take it over USD 190 billion each year from 2026 to 2030, with two-thirds going to clean energy. The share of energy investment in Africa's GDP rises to 6.1% in the 2026-30 period, slightly above the average for emerging market and developing economies. But Africa's energy investment in that period is still only around 5% of the global total in the IEA's Net Zero Emissions by 2050 Scenario.

Multilateral development banks must make increasing financial flows to Africa an absolute priority. To mobilise the amount of investment envisioned in the SAS, they will need to increase concessional finance to Africa and use it more strategically to better leverage private capital. This includes domestic financial markets, which need to more than double in size by the second-half of this decade. New capital sources, such as climate finance and carbon credits, can bring more international financial flows to bear. However, cross-cutting investment risks such as high debt burdens remain a challenge.

Africa's energy future requires stronger efforts on the ground that are backed by global support. The COP27 Climate Change Conference in Egypt in late 2022 provides a crucial platform for African leaders to work globally to identify ways to drive these changes. This decade is critical, not only for global climate action, but also for the foundational investments that will allow Africa – home to the world's youngest population – to flourish in the decades to come.