Chapter 3

Investing in renewable energies for Southern Africa's sustainable development

This chapter examines the development of sustainable investments with a focus on the renewable energy sector in Southern Africa (Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe). The first section shows that multiple global crises have exacerbated sustainable investment needs, while the region's sources of finance offer untapped potential to spur sustainable growth. The second section explores how investments in the region's renewable energy sector can generate social, economic and environmental development gains. It identifies major constraints hampering the investments that are needed to achieve energy security and a just energy transition. The third section proposes policy priorities to catalyse investments in Southern Africa's renewable energy sector.

IN BRIEF

The slow pace of public and private investments has contributed to sluggish gross domestic product (GDP) growth in Southern Africa, while global crises have exacerbated the region's investment needs. Southern Africa's domestic sources of finance hold untapped potential to catalyse sustainable investment. The regional pension fund market is the largest on the continent, and South African multinationals represent 75% of turnover and market capitalisation of Africa's listed companies. Despite available resources, investment is taking place, neither at the required scale, nor in sectors critical for sustainable development.

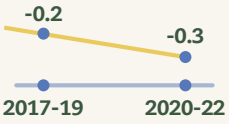
Energy is a case in point. Investments in renewable energy can help improve energy security, overcome energy poverty and generate sustainable development gains in Southern Africa. Renewable energies can significantly lower carbon dioxide (CO_2) emissions and generate positive social and economic returns on investments. For example, solar energy creates twice as many jobs in operations and maintenance as fossil fuels. Despite recent global shocks, the renewable energy sector has grown, but the investments needed to achieve universal clean energy access remain large. South Africa's energy transition alone will demand about USD 250 billion in the next three decades. In 2016-20, 79% of the Southern African population in urban areas had access to electricity compared to only 26% in rural areas. Improving access to affordable energy and accelerating the region's just energy transition will require mobilising public and private finance for renewable energy projects.

This chapter identifies three priorities for policy makers in Southern Africa to catalyse investments in renewable energies: strengthening regional co-operation to harmonise regulatory frameworks and scale up investments in renewable energy infrastructures; de-risking private sector investments in renewable energy projects, including through public-private partnerships and development finance; and adopting dedicated policies and financing solutions to increase clean energy access in rural areas.

Southern Africa

Decreasing investment → low growth

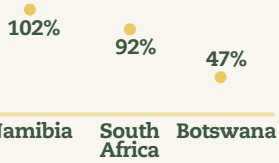
Annual GDP growth percentage points



Domestic sources of finance → untapped potential

Total turnover and market capitalisation of Africa's listed companies

Pension funds as % of GDP



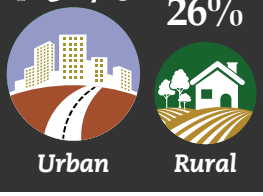
Renewable energy has potential for sustainable development

Southern Africa's share of the continent's installed electricity capacity:

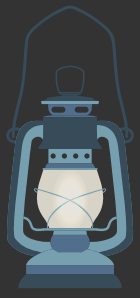
Solar energy creates twice as many jobs in operations and maintenance as fossil fuels

More investments can achieve energy security and universal clean energy access

Access to electricity (% of population), 2016-20



Electricity **blackouts** in South Africa's coal-based energy system are estimated to drag growth by **2 percentage points** in 2023

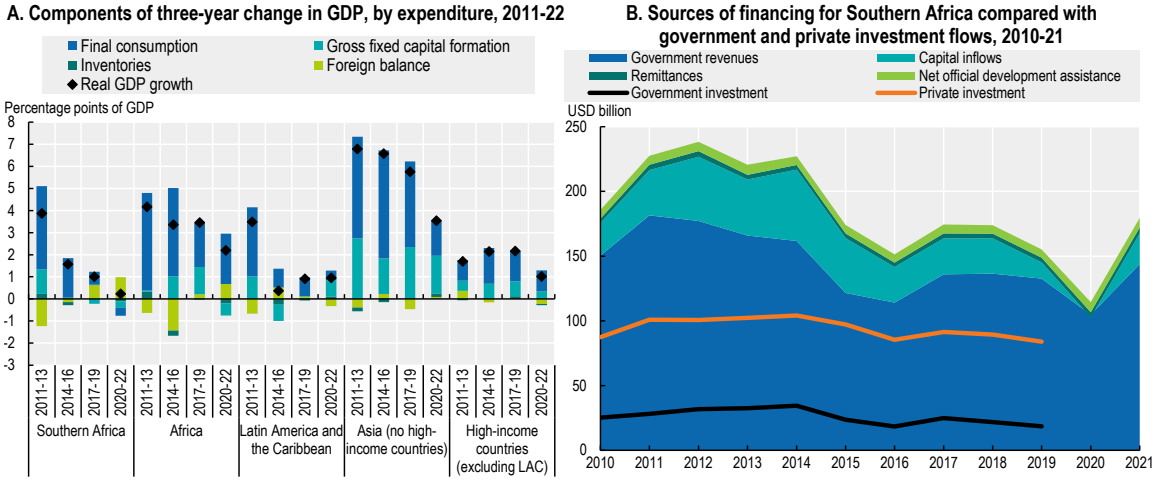


What's next?

- **Harmonise regulatory frameworks and accelerate regional initiatives** on renewable energy infrastructures
- **Enhance public-private alliances and development finance** based on national energy priorities
- **Adopt targeted policy solutions** to scale up off-grid renewable energy projects **in rural areas**

Southern Africa regional profile

Figure 3.1. **Components of economic growth and sources of financing in Southern Africa**



Note: The components of GDP growth are calculated on an annual basis by using real annual GDP growth to estimate the increase in real US dollars. Aggregate figures are calculated by taking the average of the national figures weighted by GDP in purchasing-power-parity dollars. The components of GDP growth over three-year periods were calculated by taking the difference between the geometric average of the annual real GDP growth over the period and the real GDP growth when setting each component to zero for individual years. Foreign balance is the difference between imports and exports. Imports contribute negatively to GDP. "High-income countries" refers to countries classified as "high-income" according to the World Bank Country and Lending Groups outside of Latin America and the Caribbean. Government revenues include all tax and non-tax government revenues minus debt service and grants received. Capital inflows include foreign direct investment (FDI), portfolio investment and other investment inflows reported by the International Monetary Fund under asset/liability accounting. Figures for capital inflows should be interpreted with some caution as some figures for 2021 and for portfolio inflows are missing.

Sources: Authors' calculations based on IMF (2022a), *World Economic Outlook Database*, www.imf.org/en/Publications/WEO/weo-database/2022/October; OECD (2022a), *OECD Development Assistance Committee* (database), https://stats-1.oecd.org/Index.aspx?DataSetCode=TABLE2A; World Bank (2022a), *World Development Indicators* (database), https://data.worldbank.org/products/wdi; IMF (2022b), *Balance of Payments and International Investment Position Statistics (BOP/IIP)* (database), https://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52; IMF (2022c), *Investment and Capital Stock Dataset (ICSD)* (database), https://data.imf.org/?sk=1CE8A55F-CFA7-4BC0-BCE2-256EE65AC0E4; and World Bank-KNOMAD (2022), *Remittances* (database), www.knomad.org/data/remittances.

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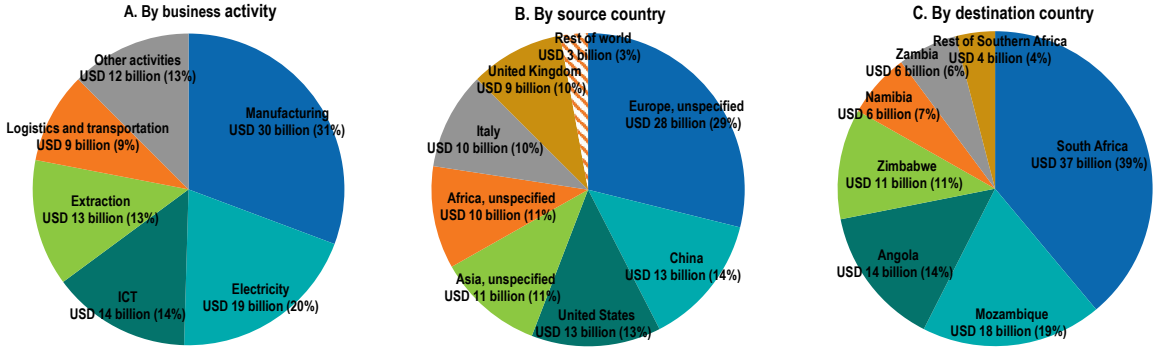
Figure 3.2. **Greenfield foreign direct investment flows into Southern Africa, by activity, source and destination, 2017-22**



Note: The *fDi Markets* database is used only for comparative analysis. Actual investment amounts should not be inferred, as *fDi Markets* data are based on upfront announcements of investment projects, including a share of projects that do not actually materialise. ICT = information and communications technology.

Source: Authors' calculations based on fDi Intelligence (2022), *fDi Markets* (database), www.fdiintelligence.com/fdi-markets.

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Southern Africa needs to mobilise more and better investments for sustainable development

Current global crises are exacerbating Southern Africa's investment needs

In recent years, decreasing investments have contributed to sluggish GDP growth in Southern Africa. The average GDP growth[1] for Southern Africa over the 2020-22 period was the lowest in Africa (0.3%, compared to 2.3% for Africa as a whole). Mostly driven by South Africa, which made up 68% of the region's GDP in 2021, the regional annual GDP growth stagnated around 1% over 2017-19 and plummeted to -5.7% in 2020 during the COVID-19 pandemic. Decreasing investment reduced Southern Africa's annual GDP growth by 0.2 percentage points over the 2017-19 period, and 0.3 percentage points over the 2020-22 period (Figure 3.1, Panel A). During the pandemic – between 2019 and 2020 – gross fixed capital formation in the region dropped by 23%, reaching its lowest level since 2006, mostly due to lower investments in South Africa (64%), Zambia (14%) and Angola (13%). The projected real GDP growth for Southern Africa is 1.4% for 2023 and 2.4% for 2024 (IMF, 2023a).

The COVID-19 pandemic further lowered investment flows and heightened sovereign debt risk. Public and private investments were already on a downward trend before the COVID-19 pandemic (Figure 3.1, Panel B). In 2020-21, South Africa, the region's largest recipient of foreign direct investment (FDI) (receiving 48% of total FDI to the region in 2015-19),[2] witnessed large capital outflows. Due to rising global risk aversion (see Chapter 1), net sales of local currency-denominated sovereign bonds by non-residents drove down portfolio investment flows; FDI decreased by 39% in 2020, but rose to a record high in 2021, mirroring developments in domestic growth (Goel and Miyajima, 2021; UNCTAD 2022a, 2021). Further, the region attracted higher official development assistance (ODA) and remittance flows during the pandemic: in 2020, ODA increased by 27% on an annual basis, mostly due to higher flows to Malawi, Mozambique and South Africa, while higher remittances mostly benefited Zimbabwe. Government revenues rebounded in 2021 and averaged 25% of GDP in 2020-21, in line with the pre-pandemic period. However, rising government expenditures to address the effects of the pandemic contributed to an increase of 13 percentage points in the average debt-to-GDP ratio of the region between 2019 and 2020. According to the International Monetary Fund, as of February 2023, four of the eight African countries in debt distress are in Southern Africa (i.e. Malawi, Mozambique, Zambia and Zimbabwe) (IMF, 2023b).

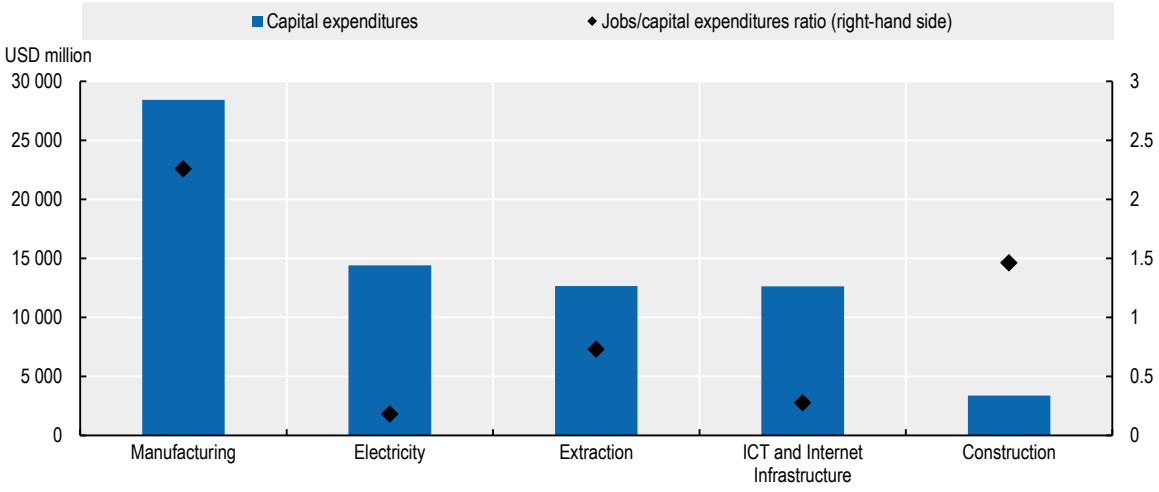
The ramifications of international conflicts exacerbate the vulnerability of some countries to external shocks. International conflicts have contributed to rising global food and energy prices, which has in turn created deep economic uncertainty across the region: net imports of food and fuel account for over 5% of GDP in Botswana, Lesotho and Zimbabwe (IEA, 2022a) while Malawi, Mozambique, Namibia and South Africa import more than 30% of their wheat directly from Russia and Ukraine (UNCTAD, 2022b). Even in Angola, the region's largest oil exporter, increased public revenues due to rising global oil prices have been partly offset by the country's dependency on imported refined petroleum and high costs of fuel subsidies (Kozul-Wright, 2023; Ver Angola, 2023).

Investments in climate change adaptation and mitigation and in clean energy access are needed to improve resilience. Malawi, Mozambique and Zimbabwe ranked among the five countries in the world most affected by extreme weather events in 2019 (Eckstein, Künzel and Schäfer, 2021). South Africa's coal-based economy is the leading CO_2 emitter on the continent: in 2020 the country accounted for 4.8% of the African population, 11% of African GDP and 32.7% of continental CO_2 emissions (IEA, 2022a). Estimates show that the economic costs associated with frequent electricity outages have reduced South Africa's GDP by 1% to 1.3% annually since 2007 (Gbadamosi, 2023).

Foreign and domestic sources of finance can be better allocated to support sustainable development

South Africa's information and communications technology (ICT) sector is highly attractive to foreign investors, but more productive investments across the region are needed to drive sustainable growth. In 2017-22, Angola, Mozambique and South Africa attracted more than 70% of the region's greenfield FDI capital expenditures (Figure 3.2, Panel C). ICT received the largest share of FDI to South Africa, while most of the FDI flows in Angola and Mozambique went to manufacturing, energy and extraction. On average, foreign investment into manufacturing showed the highest job creation potential in the region, with more than two jobs created for every USD 1 million invested (Figure 3.3). However, this ratio is about three times lower than in East Africa and two times lower than in North Africa. The automotive sector in South Africa shows high potential for creating jobs, thanks to its important linkages with neighbouring countries (AUC/OECD, 2022, Chapter 3). Investments in other countries (such as Angola, Mozambique and Zimbabwe) mostly target the processing of coal, oil and gas, and chemicals, resulting in lower job creation and a higher environmental footprint (see also Chapter 1).

Figure 3.3. **Greenfield foreign direct investment to Southern Africa, capital expenditures and job creation, by business activity, 2017-21**



Note: ICT = information and communications technology. The figure shows the top five business activities by capital expenditure in 2017-21.

Source: Authors' calculations based on fDi Intelligence (2022), *fDi Markets* (database), www.fdiintelligence.com/fdi-markets.

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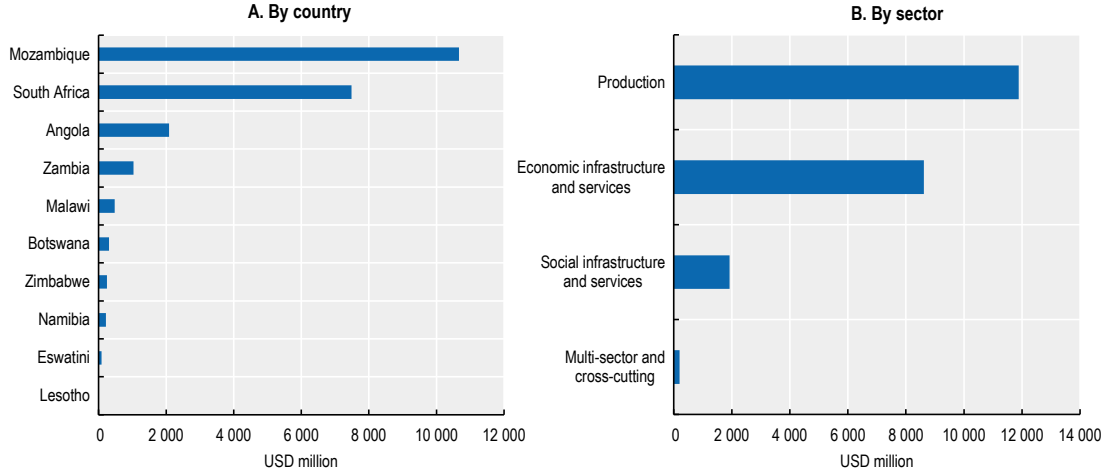
ODA can support social sustainability, but its capacity to mobilise private finance in the most vulnerable countries remains limited. In 2020, during the COVID-19 pandemic, 75% of ODA flows to the region targeted social infrastructure and services (such as health and education), and ODA registered a 58% increase compared to 2019.[3] However, between 2012 and 2020, ODA mobilised the largest share of private finance in Southern Africa's infrastructure and productive sectors (Figure 3.4). In 2018-20, Mozambique was the only Least Developed Country among the top 20 recipients of mobilised private finance; in 2020, the largest volumes of the country's private finance mobilised through ODA were concentrated in a few large-scale liquefied natural gas projects (Bartz-Zuccala et al., 2022). Today, only around 30% of ODA reaches the 20 countries with the highest electricity access deficit; thus, aligning ODA with climate action would require increased efforts towards clean energy projects in low-income countries (Moreira Da Silva, 2021; OECD, 2019).

Figure 3.4. **Private finance mobilised through official development assistance in Southern Africa, 2012-20, USD million**



Source: Authors' calculations based on OECD (2022b), "Mobilisation", *OECD.Stat* (dataset), https://stats.oecd.org/Index.aspx?DataSetCode=DV_DCD_MOBILISATION.

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Impact investing[4] is highly concentrated in South Africa, and the country has introduced enabling environmental, social and governance (ESG) policies. According to the latest available data (GIIN, 2016), nearly three-quarters of all impact capital invested in the region has been disbursed to South Africa (mostly in energy and finance), amounting to USD 29.1 billion (of which more than USD 24.2 billion originated from development finance institutions). This is close to 15 times the amount deployed in Zambia, which ranks second in the region in terms of impact capital disbursed. South Africa has implemented substantial enabling policies over the past decade to encourage institutional investors to incorporate ESG factors into their investment strategies (GIIN, 2020).

Large domestic institutional investors such as pension funds offer untapped potential for impact investing in the region. The regional pension fund market is the largest on the continent, with total assets in retirement savings plans accounting for 102% of GDP in Namibia (2020), 92% in South Africa (2018) and 47% in Botswana (2019).[5] However, regulatory and market barriers hold back institutional investors, including in the most developed markets. A recent survey of 139 pension funds in South Africa, representing 74% of assets under management in the country, shows that most pension funds identify a lack of both impact investing products and an impact investment pipeline as a top constraint in directing investments to green and climate-focused assets, followed by difficulty in monitoring and reporting on impacts of investments (IFC, 2020a).

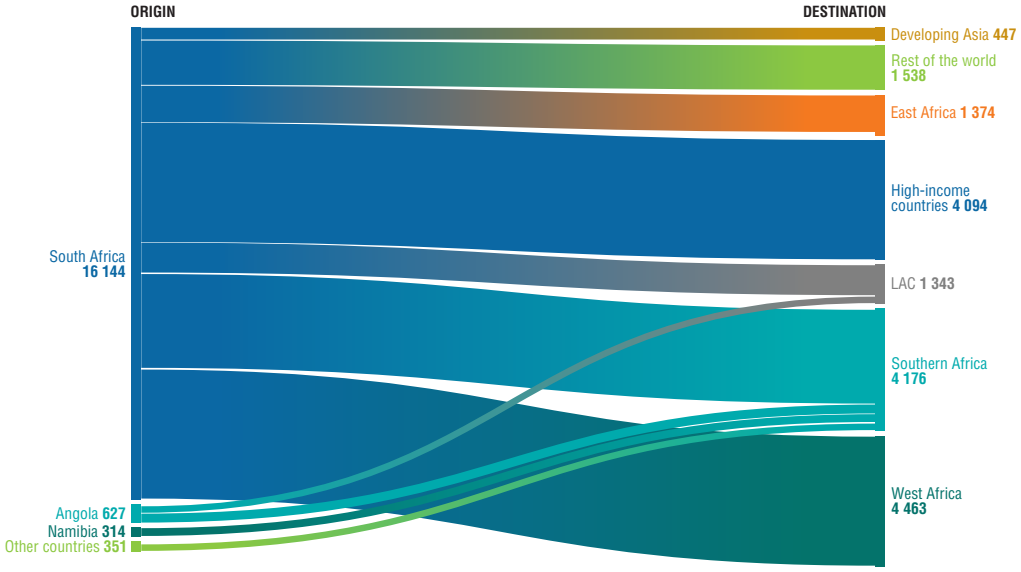
Intra-regional investment is limited, but South African multinationals can catalyse investments at scale

Most FDI in the region comes from high-income countries, while intra-regional FDI flows are limited. In 2017-21, high-income countries represent the largest share of greenfield FDI inflows to the region, mostly targeting South Africa, Angola and Mozambique (in that order). In line with continental figures, only 11% of greenfield FDI capital expenditures to Southern Africa comes from other African countries, which includes 5% from countries in the region.[6]

South Africa-based company groups active in finance, ICT and retail have the potential to drive sustainable investments at regional and continental scale. In terms of greenfield FDI outflows, South Africa is the largest African investor both on the continent (USD 9 billion and 31% of intra-African FDI in 2017-21) and outside the continent (USD 7 billion and 58% of African FDI outside the continent in 2017-21) thanks to the internationalisation activities

of its large company groups. In many cases, their FDI capital expenditures expand across other African countries, mostly in Southern and West Africa (Figure 3.5). South Africa-based companies represent 75% of the turnover and market capitalisation of listed companies on the continent[7] and are mostly active in finance, ICT and retail (Figure 3.6).

Figure 3.5. **Greenfield foreign direct investment outflows from Southern African countries, by destination regions, 2017-21, USD million**



Note: "Other countries" includes Botswana (USD 282 million), Zimbabwe (USD 66 million) and Zambia (USD 3.5 million) while "Rest of the world" includes countries in Central Africa (USD 94 million), North Africa (USD 82 million) and other regions not specified in the chart (USD 1 362 million).

Source: Authors' calculations based on fDi Intelligence (2022), *fDi Markets* (database), www.fdiintelligence.com/fdi-markets.

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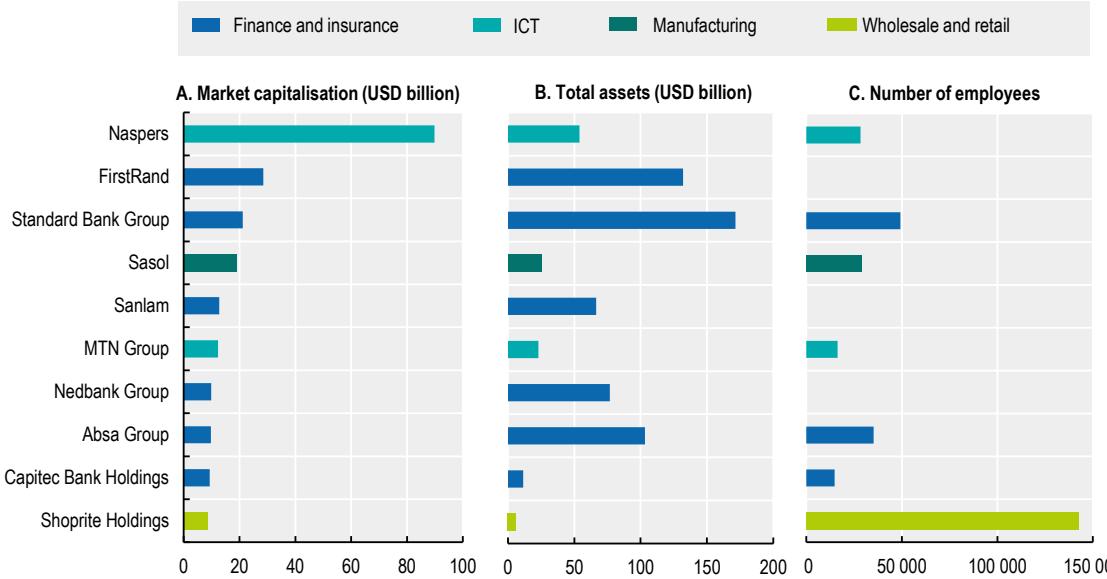
Figure 3.6. **The ten Southern African companies with the highest market capitalisation**



Note: ICT = Information and communications technology. Companies listed here are the ten publicly listed private companies with the highest market capitalisation reported within the *Orbis* database that are based within the region.

Source: Authors' calculations based on data from Bureau van Dijk (2022), *Orbis* (database), www.bvdinfo.com/en-gb/our-products/data/international/orbis.

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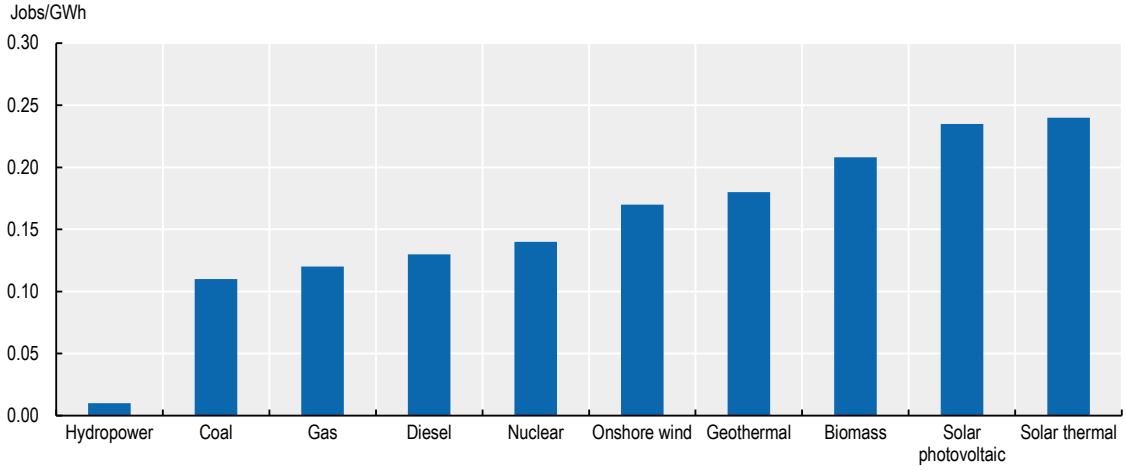
Investments in Southern Africa's renewable energy potential can generate inclusive and sustainable development

Investments in renewable energy can generate economic, social and environmental development gains in Southern Africa

Southern Africa's renewable energy market is growing fast and holds high potential. Southern Africa accounts for about 60% of Africa's installed solar energy capacity, 40% of the continent's installed wind power and 33% of its renewable hydropower capacity. In 2021, the total renewable electricity installed capacity in the region reached 21.4 gigawatts (GW), representing a 37% increase since 2017.[8] South Africa is leading the region's energy transition with large investments in solar, wind and green hydrogen, which will help reduce the country's high reliance on coal. Mozambique and Zambia are boosting their hydropower capacity. Namibia is investing in the solar, wind and green hydrogen industries. Botswana and Angola are starting solar deployments. The International Renewable Energy Agency estimates technical installable capacities in the region of 908 GW for solar and 53 GW for wind, assuming a 1% land-utilisation factor (IRENA/AfDB, 2022).

The renewable energy sector can become an important source of job creation. In 2021, the renewable energy sector in Southern Africa accounted for about 19% of total renewable energy jobs in Africa.[9] In South Africa, renewable energy technologies provide more jobs in operations and maintenance than fossil fuels (Figure 3.7). Following the country's Renewable Energy Independent Power Producer Procurement Programme, renewable energy jobs doubled from 31 207 in 2016-17 to 63 291 in 2021. However, 75% of these jobs were in the construction sector, which typically provides short-term employment, while only 25% were in more permanent operations and maintenance occupations (IRENA/ILO, 2022; AUC/OECD, 2022). Due to its linkages to other productive sectors, renewable energy investment can create jobs across several industrial sectors (such as the steel, fibreglass and electrical equipment industries) and support services (such as legal, financial and engineering design). According to a recent study, an injection of USD 4 billion into renewable energy production in South Africa can create more than 30 000 jobs by 2030 across the energy value chain (GreenCape, 2021).

Figure 3.7. **Operations and maintenance jobs created per gigawatt hour by energy source in South Africa**



Source: COBENEFITS (2019), *Future Skills and Job Creation through Renewable Energy in South Africa: Assessing the Co-benefits of Decarbonising the Power Sector*, https://www.cobenefits.info/wp-content/uploads/2019/03/COBENEFITS-Study-South-Africa-Employment.pdf.

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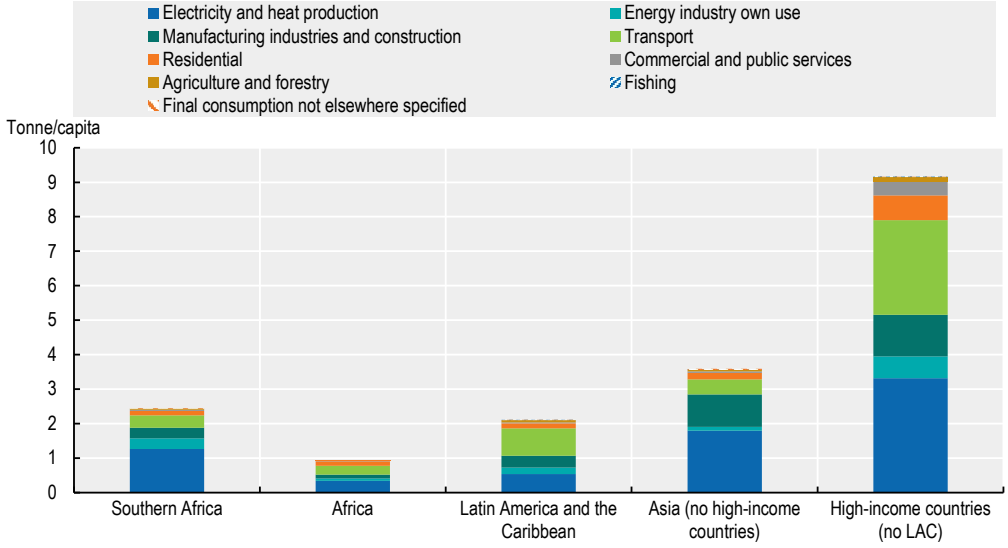
Southern Africa's energy sector is a major contributor to continental carbon emissions. Greenhouse gas emissions per capita in Southern Africa (2.5 tonnes of CO_2-equivalent per capita) are higher than in Africa as a whole (0.9) and Latin America and the Caribbean (2.1) but lower than in developing Asia (3.6) and high-income countries (9.2) (Figure 3.8). Relative to other African regions, Southern Africa has the largest share of CO_2-equivalent emissions in the energy sector (58.3%) and in electricity and heating (51.3%). Other energy-reliant sectors – such as commercial and public services (49.0%), manufacturing and construction (37.9%), and agriculture and forestry (37.8%) – are also major emitters at the continental level.[10]

Figure 3.8. **Southern Africa's greenhouse gas emissions, tonnes of CO_2-equivalent per capita, 2020**



Note: LAC = Latin America and the Caribbean.

Source: OECD (2022c), "GHG Emissions from fuel combustion (summary)", *IEA CO_2 Emissions from Fuel Combustion Statistics: Greenhouse Gas Emissions from Energy* (database), https://doi.org/10.1787/445ec5dd-en.

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Renewable energy use in the region is associated with lower CO_2 emissions. Researchers estimate that, in South Africa, a 1% increase in hydroelectricity consumption brings about a 0.52% reduction in CO_2 emissions (Udeagha and Ngepah, 2021). The Kangnas Wind Farm in the Northern Cape (South Africa) generates 513 gigawatt hours per year, which is sufficient to meet the energy consumption of 155 000 South African homes, saving 550 000 tonnes of carbon emissions annually (GWEC, 2022).

The development of non-combustion renewable energies and sustainable biofuels technologies must accelerate to significantly reduce carbon emissions, particularly in South Africa. The average share of non-combustion energy in renewable energy production in Southern Africa (21%) for the period 2010-20 is only second to that of East Africa (35%). However, despite experiencing an upward trend since 2010, the non-combustion energy share in total energy production was only 2% in 2020. That is slightly above the share for Africa as a whole (1.9%) but much lower than in Latin America and the Caribbean (10%) and developing Asia (6.3%).[11] Investments in non-combustion energy sources must be accompanied by the development of sustainable biofuels technologies to significantly reduce carbon emissions (Stafford et al., 2019).

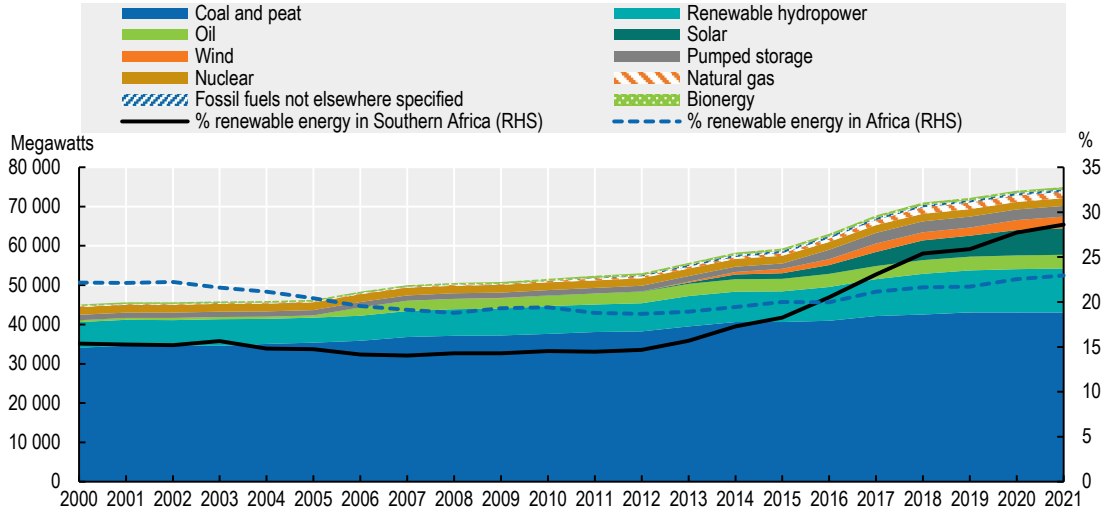
Renewable energy can underpin economic growth through positive returns on investments and resilience to economic shocks. Espoir, Sunge and Bannor (2023)

find that a 1% increase in renewable energy consumption in the Southern Africa Development Community (SADC) leads to a bigger impact (0.55%) on economic growth than a 1% increase in non-renewable energy consumption (0.47%). According to Wang et al. (2018), renewable energy's effect on economic growth is positive in countries with lower overall risks and more stable economic environments. Relatedly, a recent report shows higher long-term portfolio returns for renewable energy compared with non-renewable energy in emerging and developing economies, but large return differentials exist vis-à-vis advanced economies (IEA/CCFI, 2021). Investments in renewable energy were also far less impacted by the economic shocks due to COVID-19. For example, while total greenfield FDI capital expenditures to South Africa decreased by 19% between 2018-19 and 2020-21, they increased by 72% in the renewable energy sector.[12]

Unlocking public and private finance in renewable energy can improve energy security

South Africa is driving renewable energy investments in the region, but the country's inefficient coal-based energy system continues to cause socio-economic harm for the most vulnerable. Between 2012 and 2021, the renewable energy share in Southern Africa's total electricity capacity increased from 14.7% to 28.6%, above Africa's average (23%) (Figure 3.9). Southern Africa was the main recipient of renewable energy investment in Africa, having attracted over 40% (USD 22.4 billion) of total flows over the 2010-20 decade. Solar energy projects accounted for 60% of that investment (USD 13.5 billion) followed by wind at 35% (USD 7.8 billion). South Africa, through its Renewable Energy Independent Power Producer Procurement Programme, attracted 85% of the region's renewable energy investment between 2010 and 2020. In 2020, with 5.9 GW, the country represented 57% of Africa's installed solar generation capacity (IRENA/AfDB, 2022). Nonetheless, the country's outdated and mismanaged coal-based energy system continues to generate prolonged electricity blackouts, which are estimated to reduce South Africa's growth by 2 percentage points in 2023, with severe socio-economic consequences for the most vulnerable (Bhargav, Gumbi and Winning, 2023; De Jonghe, 2022).

Figure 3.9. **Installed electricity capacity in Southern Africa, by energy source, 2000-21**



Note: RHS = right-hand side.

Source: Authors' calculations based on IRENA (2022a), *IRENASTAT* (database), https://pxweb.irena.org/pxweb/en/IRENASTAT/IRENASTAT__Power%20Capacity%20and%20Generation/RECAP_2022_cycle2.px/.

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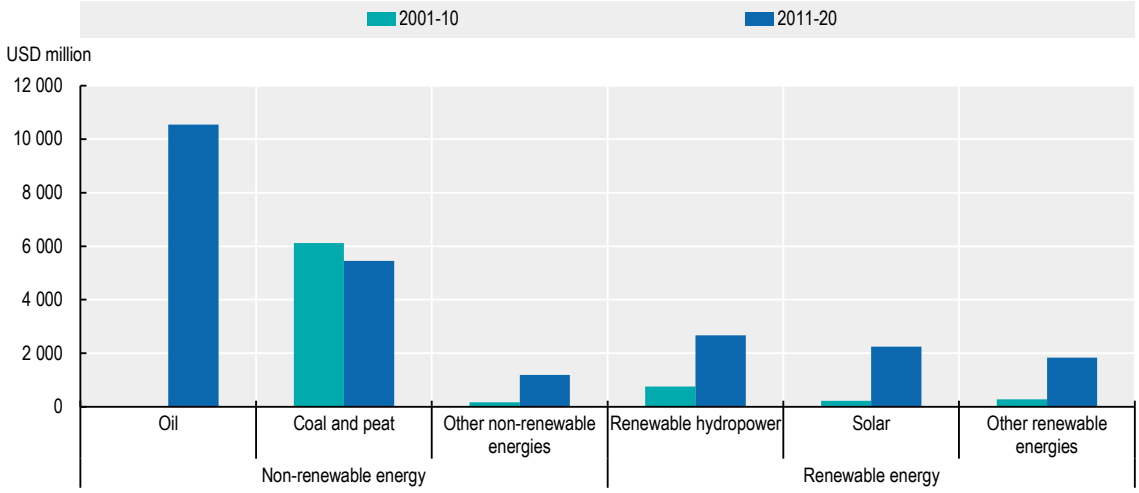
Public funds could be better allocated to accelerate Southern Africa's clean energy development. In the last decade, non-renewable energy has received more public funds than renewable energy, despite rising investments in solar energy production. Cumulative public investment flows into total energy production amounted to USD 23.9 billion, of which 44% went to the oil sector (in Angola) and only 28% to renewable energy across the region (mostly in hydropower and solar) (Figure 3.10). If Angola invested in its high potential in hydropower, solar and wind energy production, it would achieve its 60% electrification target by 2025 (Ayukegba, 2022). Sonangol – the former Angolan fuel concessionaire – seeks to diversify its energy sources as part of its new Energy Transition strategy, making the transition from an oil and gas company to an energy company (ITA, 2022).

The decreasing costs of renewable energy technologies represent an opportunity to reduce the region's reliance on hydropower and increase resilience to external shocks. The low diversification of public investments into renewables has contributed to a narrow energy technology mix in the region (Figure 3.10). Hydropower has been used in Africa for many decades owing to the presence of the continent's large rivers; the Zambezi River, for example, provides hydropower to Mozambique, South Africa, Zambia and Zimbabwe. In 2021, hydropower represented 15% of Southern Africa's total electricity capacity and 52% of its renewable electricity capacity. In Malawi, Mozambique and Zambia, hydropower's share in electricity generation exceeds 80% (IRENA/AfDB, 2022). Hydropower is increasingly vulnerable to climate shocks, which calls for comprehensive cost-benefit analyses of new and existing facilities (IEA, 2020). At the same time, the falling installation costs of alternative energy technologies such as wind and solar can be an opportunity to invest in diversifying the current renewable energy mix (Figure 3.11). For example, according to the International Energy Agency, "[w]ith 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 total energy supply today" (IEA, 2022a). Namibia's government recently launched a new strategy aimed at delivering up to 12 tonnes of green hydrogen annually by 2050 and making the country the first green hydrogen provider on the continent. The initiative will require up to USD 190 billion in investments and is expected to create 600 000 jobs by 2040 (Rust and Ossenbrink, 2022).

Figure 3.10. **Cumulative public investment flows into renewable and non-renewable energy in Southern Africa, 2001-20, USD million**



Source: Authors' calculations based on IRENA (2022a), *IRENASTAT* (database), https://pxweb.irena.org/pxweb/en/IRENASTAT/IRENASTAT__Power%20Capacity%20and%20Generation/RECAP_2022_cycle2.px/.

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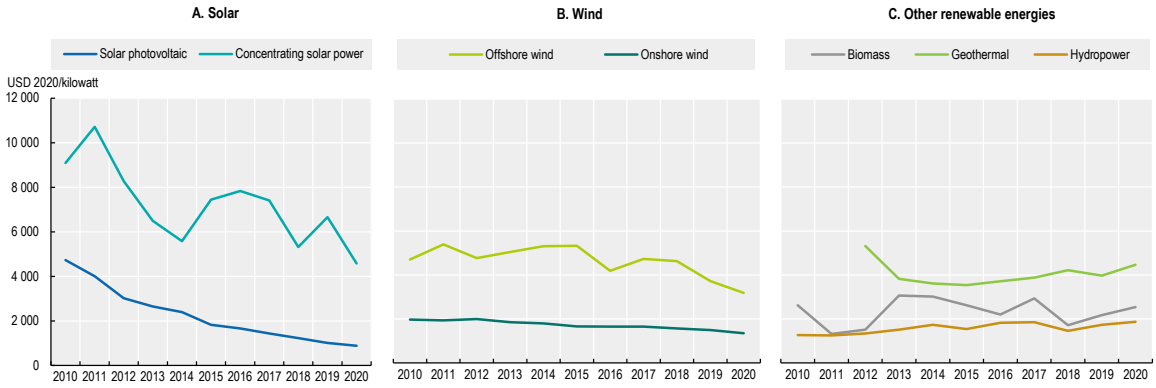
Figure 3.11. **Global weighted average total installed costs by energy source, 2010-20**



Source: IRENA (2021), *Renewable Power Generation Costs in 2020*, www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/IRENA_Power_Generation_Costs_2020.pdf?rev=c9e8dfcd1b2048e2b4d30fef671a5b84.

StatLink https://stat.link/kfc7jy

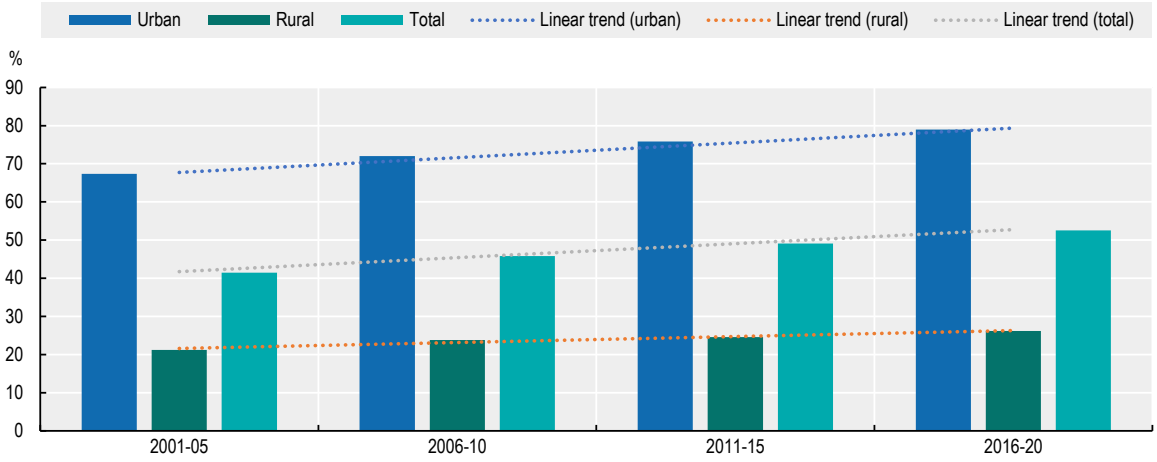
High risks and inefficient public utilities discourage private investment in many countries in the region. Public investment through state-owned enterprises plays a larger role in energy sector investment in Africa than in other world regions, as most of its projects are not able to attract private capital owing to political, legal and economic risks (IEA, 2022a; IRENA/AfDB, 2022; see also Chapters 1 and 5). Estimated operating losses among all African utilities exceeded USD 150 billion in 2020. Attracting private investment requires strengthening the capacity of local energy authorities through better governance, transparent regulations and effective incentives (IEA, 2022a).

A lack of capital market instruments and rigid regulations inhibit investments from large institutional investors based in the region. A recent survey shows that Africa-based institutional investors represent 3.6% of global institutional investors with direct investments in renewable energy projects compared to close to 0% of those with indirect investments in renewable energy funds. Capital market instruments needed for indirect portfolio investments (such as renewable energy funds or green bonds) are less available in African markets (IRENA, 2020). Moreover, rigid regulatory regimes are often identified as major obstacles to pension funds' investment in infrastructure. Botswana, Namibia and South Africa are Africa's largest pension fund markets as a share of GDP (see above and Chapter 1). South Africa's pension system is more advanced in terms of infrastructure finance, while Botswana and Namibia invest less in infrastructure, in part because of more constraining regulations (Sy, 2017).

Scaling up investments in off-grid renewable energy solutions can help reduce the rural-urban divide in energy access

Off-grid renewable energy solutions can increase electricity access in rural areas and create opportunities for small-scale entrepreneurship. On average, 53% of Southern Africa's population had access to electricity over the period 2016-20 compared to 41% in 2001-05, but large differences persist between urban (79%) and rural areas (26%) (Figure 3.12). Significant investments in small-scale and portable off-grid renewable energy solutions can help increase clean energy access in rural areas while creating opportunities for small-scale investors and entrepreneurs. For example, off-grid solutions can enable a shift away from wood and charcoal to cleaner energy sources for cooking (CCA, 2021), with large benefits in terms of reduced air pollution, fewer premature deaths and opportunities for small entrepreneurs (Box 3.1).

Figure 3.12. **Access to electricity in Southern Africa, five-year average share of population by location**



Source: Authors' compilation from World Bank (2022a), *World Development Indicators* (database), https://data.worldbank.org/products/wdi.

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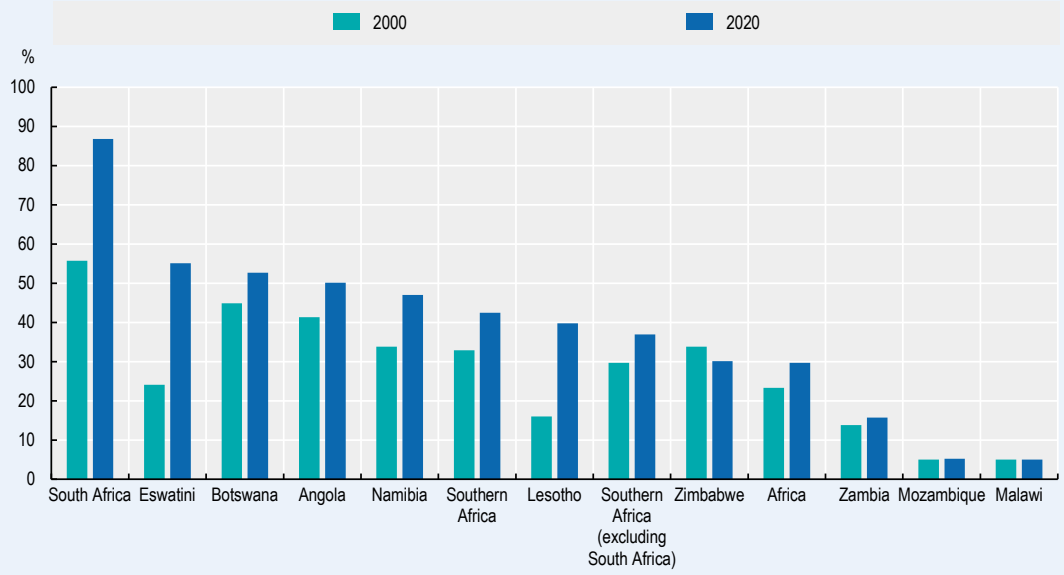
Box 3.1. **Access to clean cooking in Southern Africa**

Clean cooking – the use of modern stoves and clean fuels for cooking – is a cross-cutting solution to advance various sustainability objectives such as health and climate protection, affordable energy, and women's empowerment (CCA, n.d.). In Southern African countries excluding South Africa, the estimated welfare cost per capita of premature deaths from household air pollution in 2019 was approximately 2.5 times higher than in South Africa and 1.5 times higher than Africa's average.[13] Eighty-seven per cent of the South African population had access to clean cooking in 2020, compared to an average of 37% in other Southern African countries and 30% in Africa as a whole. Since 2000, the share increased by 31 percentage points in South Africa, compared to an average increase of only 7 percentage points in other Southern African countries over the same period (Figure 3.13).

Box 3.1. **Access to clean cooking in Southern Africa *(continued)***

Figure 3.13. **Share of the population with access to clean cooking in Southern Africa, 2000 and 2020**



Note: In Malawi and Mozambique, the reported share is less than 5%.

Source: IEA (2021a), *World Energy Outlook-2021*, www.iea.org/reports/world-energy-outlook-2021 based on WHO (2021), *Household Energy Database*, www.who.int/data/gho/data/themes/air-pollution/who-household-energy-db and IEA (2021b), *World Energy Balances 2021* (database), www.iea.org/data-and-statistics/data-product/world-energy-balances.

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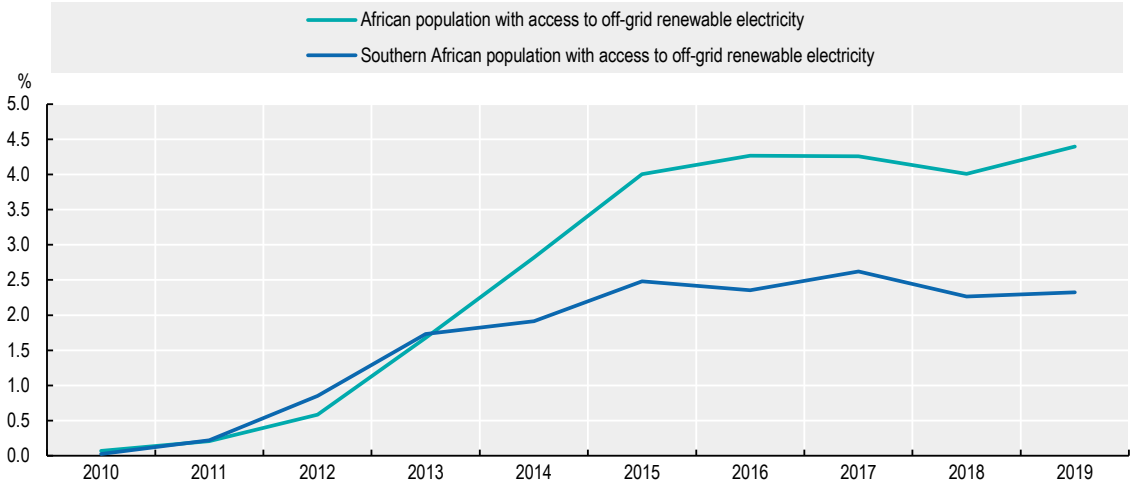
Investing in clean cooking solutions can contribute to social and environmental sustainability while creating opportunities for small entrepreneurs. Mozambique and Zambia provide examples:

- **Mozambique.** In 2012, CleanStar Mozambique (CSM), a small to medium-sized enterprise, designed a profitable ethanol-fuelled cooking stove to reduce indoor air pollution and deforestation from the use of wood and charcoal for cooking. The CSM project involves a value chain starting with a contract farming scheme that generates cash for smallholder farmers who supply raw materials to the CSM plant. Ethanol-based fuel and cook stoves are then produced and distributed. The CSM target of supplying 25 000 stoves annually is expected to prevent the deforestation of 14 000 hectares of forest and save 169 000 tonnes of carbon (CCA, 2022).
- **Zambia.** In 2019, Emerging Cooking Solutions Zambia, a social enterprise, received EUR 1 million in funding from Energy and Environment Partnership Africa to scale up the use of its pay-as-you-go clean cooking stove in Zambia. Each stove saves 4 tonnes of CO_2 and EUR 50 per year while improving family health. The project aims at substituting charcoal with sustainably produced biomass pellets for 20 000 households and is expected to create 100 direct jobs (EEP Africa, 2021).

Due to lower investments into off-grid renewable electricity capacity, access to off-grid electricity in Southern Africa has grown sluggishly compared to the rest of Africa (Figure 3.14). In 2010-20, Southern Africa attracted only 3% (USD 52 million) of total investment in off-grid renewables in Africa. Mozambique and Zambia received 65% of all commitments to the region (IRENA/AfDB, 2022). In South Africa, prohibitive energy and installation costs and a lack of specific contracting solutions (e.g. green power purchase agreements) for energy providers are slowing down the uptake of off-grid systems (Engineering News, 2022).

Figure 3.14. **Share of the population with access to off-grid renewable electricity in Africa and Southern Africa, 2010-19**



Note: Off-grid renewable electricity includes electricity through mini-grids, solar home systems, solar lights, hydropower, and biogas (IRENA, 2022a).

Source: Authors' calculations based on IRENA (2022a), *IRENASTAT* (database), https://pxweb.irena.org/pxweb/en/IRENASTAT/IRENASTAT__Power%20Capacity%20and%20Generation/RECAP_2022_cycle2.px/ and UN DESA (2022), "World Population Prospects: The 2022 Revision", *United Nations* (database), https://population.un.org/dataportal/data/indicators/67/locations/903/start/2000/end/2030/table/pivotbylocation.

StatLink https://stat.link/71cxl6

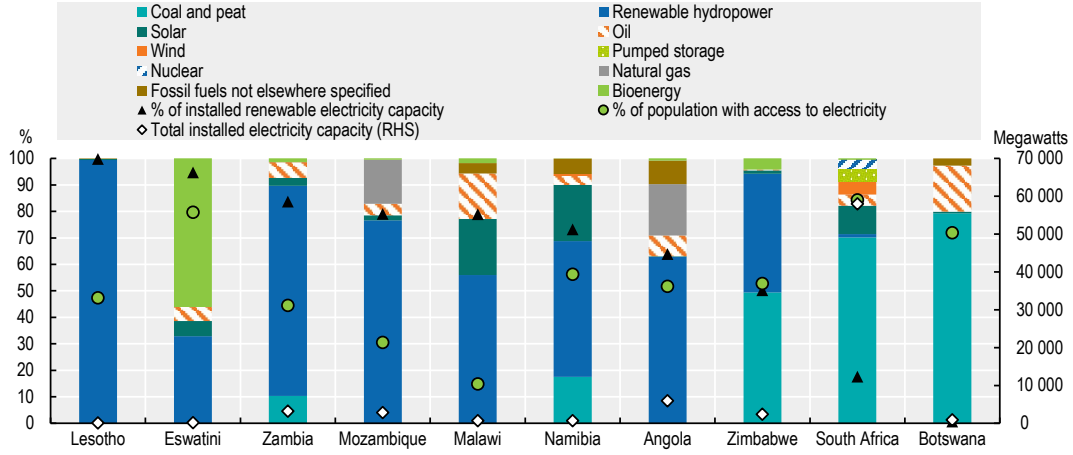
Public policies can catalyse investments in Southern Africa's renewable energy sector

Advancing energy security and a just energy transition in Southern Africa requires co-ordinated policies based on national and local contexts. As shown in the previous sections, investments in renewable energies have the potential to enhance energy security and reduce carbon emissions in Southern Africa. They can increase access to clean energy for the most vulnerable, hence generating social and economic returns. However, each country in the region is unique in terms of energy access and production capacity (Figure 3.15). Different policy solutions are needed to address challenges and opportunities at the national level. Taking that into account, this section discusses three priority areas for policy makers to catalyse renewable energy investments in the region:

- **Strengthening regional co-operation to harmonise regulatory frameworks and scale up investments in renewable energy infrastructures.** Closer co-operation among all countries in Southern Africa is key to setting realistic energy transition objectives, assessing investment needs, harmonising regulatory procedures and ensuring effective policy implementation and monitoring. Regional initiatives on cross-border infrastructures can accelerate renewable energy uptake.

- **De-risking private sector investments in renewable energy projects, including through public-private partnerships and development finance.** For example, countries relying on large fossil fuel production capacity and more advanced regulatory frameworks (e.g. Angola and South Africa) can make the best use of public-private partnerships to accelerate the transition towards clean energy production. Through development finance institutions, international co-operation can play a major role in mobilising private capital in more vulnerable countries with significant renewable energy potential, low access to electricity and lower regulatory capacity (e.g. Malawi, Mozambique, Zambia and Zimbabwe).
- **Dedicating specific policies and financing solutions to increase access to clean energy in rural areas.** Less than 15% of the rural population has access to electricity in Angola, Malawi, Mozambique and Zambia (World Bank, 2022a). Dedicated policies and financing instruments can help scale up off-grid renewable energy solutions (e.g. mini-grids or stand-alone systems) and accelerate access to clean energy while creating opportunities for small entrepreneurs in rural areas.

Figure 3.15. **Installed electricity capacity and access to electricity in Southern African countries, 2020-21**



Note: RHS = right-hand side. Data on installed electricity capacity refer to 2021, while data on access to electricity refer to 2020.

Source: Authors' calculations based on IRENA (2022a), *IRENASTAT* (database), https://pxweb.irena.org/pxweb/en/IRENASTAT/IRENASTAT__Power%20Capacity%20and%20Generation/RECAP_2022_cycle2.px/ and World Bank (2022a), *World Development Indicators* (database), https://data.worldbank.org/products/wdi.

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Regional co-operation is key to harmonise regulatory frameworks and scale up investments in renewable energy infrastructures

Harmonising regulatory frameworks and implementing action plans at the regional level can help reduce constraints on investment, such as high cost of capital, across countries. As seen in Chapter 1, the weighted average cost of capital for energy projects can be up to seven times higher in Africa than in Europe and North America (IEA, 2022a). Almost all renewable energy policies of countries in Southern Africa (Table 3.1) highlight the high initial cost of capital as the major constraint to renewable energy investment. Other key constraints are inadequate regulatory frameworks on renewable energy procurement, limited funding options and the lack of skilled personnel to design, install and maintain renewable energy systems. Hence, there is a large scope for regional co-ordination on these matters. The 2016-2030 Renewable Energy and

Energy Efficiency Strategy and Action Plan (REEESAP) was adopted in July 2017 in Eswatini by the SADC ministers responsible for energy. The plan provides a framework for SADC member states to develop their own strategies and action plans for renewable energy and energy efficiency, through common strategic guidelines on regulatory and institutional frameworks, financing mechanisms and capacity building, among others. The SADC Centre for Renewable Energy and Energy Efficiency was formed as part of the implementation of the REEESAP to lead the development and implementation of a holistic regional renewable energy and energy efficiency programme (SACREEE, 2019). Ensuring a coordinated and effective implementation of the REEESAP at national level will be crucial to improve the renewable energy investment landscape across the region.

Most Southern African countries have set renewable energy targets within their national policies. Most countries in Southern Africa included renewable energy targets within their national policies, but their timeframes and specifications vary (Table 3.1). All 16 countries in the SADC submitted nationally determined contributions (NDCs) in the context of the Paris Agreement. Of the 16 NDCs, all but Botswana's include renewable energy objectives, but only 11 are quantifiable. The SADC-aggregated quantifiable NDC renewable energy targets amount to 29.6 GW of renewable energy installed capacity by 2030 (Muñoz Cabré et al., 2020).

Table 3.1. **Renewable energy targets in national policies of selected Southern African countries**

Country	Energy transition targets	National policy
Angola	By 2025: 5 000 megawatts (MW) of large hydropower, 500 MW of biomass, 100 MW of solar, 100 MW of wind and 100 MW of small hydropower.	2014 Angola Renewable Energy Strategy
Botswana	By 2025: 100 MW of solar photovoltaics (PV). By 2030: 25% renewable energy.	2007 and 2016 National Development Plans (NDP 10 and 11)
Eswatini	By 2030: 50% renewable energy penetration in the electricity mix.	Energy Masterplan 2034
Mozambique	By 2043: 4 900 ca. MW hydropower, 530-980 MW solar and 150-270 MW wind.	2018 Integrated Master Plan of Energy Infrastructures
Namibia	By 2030: 49% to 70% renewable electricity. Under the 70% scenario: 530 MW of solar PV, 349 MW of wind, 347 MW of hydropower, 150 MW of concentrated solar power and 40 MW of biomass.	2016 National Renewable Energy Policy
South Africa	By 2030: 39.7% of renewable generation capacity, 17 742 MW of wind, 8 288 MW of solar PV, 4 600 MW of hydropower and 600 MW of concentrated solar power.	2019 Integrated Resource Plan for Electricity
Zambia	By 2030: 2 015 MW of grid-connected renewable energy and 1 886 gigawatt hours of off-grid renewable energy provided by PV mini-grids and solar home systems.	Renewable Energy Strategy and Action Plan 2022
Zimbabwe	By 2030: 26.5% renewable electricity, 1 575 MW of solar PV, 275 MW of bioenergy, 150 MW of small hydropower, 100 MW of wind, 250 000 solar water heaters, 8 000 domestic bio-digesters and 288 institutional bio-digesters.	2019 National Renewable Energy Policy

Source: Authors' compilation based on Muñoz Cabré et al. (2020), *Expanding Renewable Energy for Access and Development: The Role of Development Finance Institutions in Southern Africa*, and desk research.

Policy makers can increase cooperation at the regional level to accelerate the transition towards renewable energy. The Southern Africa Power Pool Plan 2017 includes a "high renewables" scenario with 53% renewables in the energy mix by 2040, which has been set as a feasible high-level policy target for the SADC region (Muñoz Cabré et al., 2020). Under this scenario, the SADC region would need an estimated annual investment of USD 2.4 billion to add 2.8 GW per year until 2040. Southern African countries can plan co-ordinated actions, such as the Africa Clean Energy Corridor (Box 3.2), to better attract investment into clean energy regional power pools.

Box 3.2. **The Africa Clean Energy Corridor**

The Africa Clean Energy Corridor (ACEC) is a regional initiative that aims to accelerate the development of renewable energy and cross-border trade of renewable power within the Eastern Africa Power Pool and Southern African Power Pool. The initiative was launched in 2014 by 19 African countries in Eastern and Southern Africa and has since involved more than 30 governments, regional organisations, development partners and financial institutions. Following the successes achieved in East and Southern Africa, the West Africa Clean Energy Corridor was initiated in 2016.

The ACEC spans five main pillars:

i) Zoning and Resource Assessment to identify sites for renewable power generation in areas with high resource potential and suitable transmission routes

ii) National and Regional Planning to fully consider cost-effective renewable power options

iii) Enabling Frameworks for Investment to open markets and reduce financing costs

iv) Capacity Building to plan, operate, maintain and govern power grids and markets with higher shares of renewable electricity generation

v) Public Information and Awareness Raising on how the corridor can provide secure, sustainable and affordable energy.

By creating a larger regional electricity market, the ACEC could attract investments of up to USD 25 billion per year in generation and USD 15 billion in grid infrastructure by 2030. The full operationalisation of the initiative could meet 40-50% of the power needs in East and Southern Africa by 2030, increase the electricity supply by 2.5 times and cut the annual CO_2 emission level by 310 megatonnes.

Sources: AU/IRENA (n.d.), "Africa Clean Energy Corridor / West Africa Clean Energy Corridor", *Working Document*, https://au.int/sites/default/files/newsevents/workingdocuments/33313-wd-africa_clean_energy_corridor_west_africa_clean_energy_corridor_e.pdf and UNEP (2020), "Clean Energy Corridors in Africa", https://climateinitiativesplatform.org/index.php/Clean_Energy_Corridors_in_Africa.

Public-private partnerships and development finance can help de-risk investments in renewable energies

Public-private partnerships can help mobilise the resources needed for renewable energy projects. The amount of funds needed to decarbonise the energy sector is beyond the financial capacity of governments in the region. For example, South Africa's energy transition requires about USD 250 billion in the next three decades (Reuters, 2022). This translates to USD 8.3 billion per year, which the South African government cannot raise on its own. Public-private partnerships can allow governments to access private sector finance, technology and skill expertise which can lead to a better allocation of risk between public and private entities (World Bank, 2022b). Joint ventures between government-owned public utilities and private players are emerging as effective solutions to finance renewable energy projects across the region. In November 2022, during COP27, SkyPower Global and the government of Zimbabwe signed an agreement on a 500-megawatt solar photovoltaic project worth USD 400 million. The project is expected to generate a USD 1.5 billion stimulus to Zimbabwe's GDP and 14 000 job years (Khaleej Times, 2022).

Countries can use various policy instruments to promote private investments in renewable energy. Examples from Southern Africa appear in Table 3.2.

Table 3.2. **Examples of policy instruments to promote private investments in renewable energy in Southern African countries**

Policy instrument	Brief description	Example
Renewable Energy Feed-in Tariffs (REFiTs)	Long-term contracts with renewable energy producers, typically based on the cost of generating the renewable energy technology (Couture et al., 2010)	In Namibia, an interim Feed-In Tariff programme was announced in September 2015 that aimed at increasing investment in non-hydro sources. Fourteen projects rated at 5 MW were awarded and reached commercial operation within 12 to 24 months (IRENA/AfDB, 2022).
Public tenders	A government power purchase agreement with the successful bidder of a call for tenders to install a certain capacity of renewable energy-based electricity. The final selection follows the evaluation of all offers on the basis of the price and other criteria (IRENA, 2013)	Established in 2010, South Africa's Renewable Energy Independent Power Producer Procurement Programme is a competitive, market-based tender procedure that expedites private sector investment into renewable energy production. As of 2021, the programme had procured and signed agreements with 93 independent power producers for 7.308 GW of total capacity (TaiyangNews, 2021).
Net metering	A billing mechanism that credits solar energy system owners for the electricity they add to the grid (SEIA, n.d.)	Zimbabwe's 2022 regulation on net metering allows households and corporations to feed back up to 5 MW of their excess electricity into the grid (RenewAfrica.Biz, 2022).
Investment incentives	Fiscal, financial and other incentives to promote private sector investment in renewable energies	In 2022, Angola introduced fiscal incentives for companies engaged in the production and sale of renewable energy. The incentives include a 35% reduction of the corporate income tax and a 60% reduction of the investment income tax (PLMJ, 2022).

Source: Authors' compilation based on desk research.

Procurement programmes from independent power producers[14] (IPPs) can promote investments in renewable energy but necessitate effective regulatory frameworks. IPPs are becoming Africa's fastest-growing solution to mobilise private investment in renewable energy. However, these procurement schemes require established regulatory and institutional frameworks and remain concentrated in a few countries. South Africa's Renewable Energy Independent Power Producer Procurement Programme is the headline renewable investment promotion strategy in Southern Africa, attracting 80% of the total IPP investments in the region in 2020 (IRENA/AfDB, 2022).

Shifting from Renewable Energy Feed-in Tariffs (REFiTs) to auctions can reduce the risk related to renewable energy investments for governments, but using both can be more beneficial in some cases. Many countries are shifting away from the use of REFiTs to auctions. REFiTs impose a higher risk to governments and may not reflect a true market price. While auctions are suited for established projects, they transfer most of the risk to investors (IRENA, 2018). South Africa has switched its focus from REFiTs to auctions with significant success (Eberhard and Kåberger, 2016). However, most of its peers in the region do not have the same financial, legal and regulatory environment nor the advantages stemming from the country's size that would give them similar results. Hence, most countries in Southern Africa would benefit from REFiTs as a complement to auctions rather than as a substitute for them.

Net metering can respond to the demand for small-scale renewable energy projects but requires clear regulations at the local level. The growing population and the increasing share of small to medium-sized enterprises in Southern Africa have amplified the demand for small-scale decentralised renewable energy projects. Net metering – which allows the owners of renewable energy systems to receive credit for the energy they add to the grid (SEIA, n.d.) – not only can boost investment in renewables but can also encourage energy efficiency. Namibia and South Africa were the first Southern African countries to use net metering as a renewable energy policy (IFC, 2020b). Research shows that clear national regulations are necessary to prevent challenges related to the management of net metering solutions at the local level (Roux and Shanker, 2018).

Development finance institutions can be instrumental in de-risking renewable energy investments. The COVID-19 pandemic has exacerbated Southern African countries'

debt situation, thereby increasing the financial risk of renewable energy investments. Development finance institutions can serve to spearhead the mobilisation of private sector players and institutional investors into renewable energy investments. To address credit and currency risks, among many others, development finance institutions can offer financial instruments such as guarantees for renewable energy projects, co-investments, co-financing and subordinated debts (Masamba et al., 2022; OECD, 2021b). Furthermore, development finance institutions can provide technical support and capacity building to catalyse the development of less risky bankable projects. For example, the World Bank Group's Scaling Solar programme implemented in Zambia in 2015-16 offered a standardised and replicable solar photovoltaics procurement model with significant risk mitigation products that translated into low tariffs and rapid project implementation (IRENA/AfDB, 2022).

Collaborative relationships between institutional investors and development finance providers at the local level can help mobilise capital for investments in renewable energies. The successful mobilisation of private capital for sustainable investments – including from institutional investors – has mostly taken place through collaborative initiatives at the local level, often in the form of strategic investment funds and green banks (Halland et al., 2021). One example is the Climate Finance Facility (CFF) of the Development Bank of Southern Africa (DBSA), launched in 2019 as a specialised lending facility designed to increase private investment in climate-related infrastructure projects (including off-grid power, mini-grids and urban distributed solar systems, energy and water efficiency) in Eswatini, Lesotho, Namibia and South Africa. It is the first example of a green bank applied to an emerging market. The project raised an initial USD 110 million through the DBSA and the United Nations' Green Climate Fund. During its 20-year lifespan, the CFF is expected to generate a reduction of about 30 million tonnes of CO_2-equivalent, save approximately 23 000 jobs through the installation of efficient water systems and reach more than 400 000 indirect beneficiaries (Convergence, 2019).

Dedicated policies and financing solutions can increase access to clean energy in rural areas

Scaling up off-grid and mini-grid renewable energy solutions requires dedicated policies and regulations. Key regulatory issues to address off-grid renewable energy solutions include licensing and permitting requirements (including quality standards), tariff-setting frameworks and the implications of the arrival of the main grid (IRENA, 2016). A growing number of countries in Africa have introduced dedicated mini-grid policies (UNIDO, 2020). Specific policy initiatives have been less prevalent in Southern Africa (IRENA/AfDB, 2022), but some promising exceptions exist, such as in Mozambique (Box 3.3), and could be adapted to other countries in the region.

Box 3.3. Policy initiatives to scale up off-grid renewable energy projects in Mozambique

In 2021, only 40% of the population in Mozambique had access to electricity, 36% from the grid and 4% via off-grid projects (AfDB, 2021). The government's target is 100% access by 2030, with 68% of Mozambicans connected to the national grid and 32% accessing energy off-grid (Zitamar, 2022).

In September 2021, the Mozambican government approved a new policy regulating energy provision through off-grid solutions. The policy offers an improved regime

Box 3.3. **Policy initiatives to scale up off-grid renewable energy projects in Mozambique *(continued)***

to attract private investments in solar home systems and other standalone energy solutions in rural areas. Besides promoting interest from the private sector, the policy aims to mobilise several existing incentive schemes from international partners (Laakso and Petric, 2022). Two examples of such schemes follow:

- Founded in 2019, BRILHO is a USD 35.5 million programme mandated to catalyse energy access through solar home systems, green mini-grids and improved cooking solutions, to benefit 1.9 million Mozambicans and 17 000 small businesses by 2024. In the first quarter of 2022, the BRILHO programme connected more than 80 000 homes in Mozambique to solar-powered systems (Zitamar, 2022).
- The Beyond the Grid Fund for Africa (BGFA) is an international multi-donor initiative to incentivise energy service providers to scale up innovative sustainable businesses and accelerate access to affordable and clean off-grid energy in peri-urban and rural areas. Launched in 2021, BGFA's second financing round will offer a total of EUR 6.7 million in results-based financing to private off-grid energy providers (Beyond the Grid, 2021).

Source: Authors' compilation.

Supportive policies can help scale up the use of sustainable and affordable biogas in rural areas. Biogas production relies on agricultural waste such as forest and crop residues, and animal manure from rural areas. It is one of the means to reduce the consumption of fossil fuels and contribute to the transition towards a net zero energy system (IEA, 2022c). At the end of 2019, 410 000 Africans were using biogas for residential cooking. Over the past decade, the annual growth rate of biogas production declined continuously until it became negative in 2019. The decline in growth has been attributed to a lack of maintenance, a shortage of feedstock or the upfront initial cost of installing a biodigester (IRENA/AfDB, 2022). Communicating and promoting the use of biogas through low-cost digesters, setting up appropriate policies and institutional frameworks, and offering financing solutions can facilitate the diffusion of biogas technologies and help increase energy security in Southern Africa (Kaifa and Parawira, 2019).

Flexible renewable energy policies can serve clean energy and rural development goals. Reducing the use of spatially blind incentives, introducing a flexible policy framework and taking into account the characteristics and specific needs of rural communities are key policy considerations to promote clean energy access and economic development in rural areas (OECD, 2012). For example, land-use conflicts can often slow down the uptake of renewable energies in rural areas (Groenendaal, 2018). Agrovoltaics – the simultaneous use of areas of land for both solar photovoltaic power generation and agriculture (Dinesh and Pearce, 2016) – can provide innovative solutions to address these conflicts and serve both clean energy and food security objectives. Since 2014, the SUNfarming Food and Energy (F&E) Plant in South Africa undertakes scientific research on food plants and herbs that grow underneath solar modules. Today, the plant facilities are also used to develop joint certified training programmes for local students and to produce healthy food (vegetables, fruit, medicinal herbs) for low-income communities in the area while generating carbon-neutral solar energy (Matich, 2022).

There is a strong case for developing the capacity of local investors and financial intermediaries to engage in much-needed off-grid renewable energy projects. Over the 2007-19 period, investments from developed countries accounted for 85% of commitments

to off-grid renewable energy in most African countries (IRENA/CPI, 2020). Launched in June 2019, the Southern African Renewable Energy Investment and Growth Programme is implementing a prototype approach to enable small and medium-sized enterprises in rural areas that are leveraging solar energy to access climate finance, especially local currency financing: the programme is now supporting four participating local financing institutions in Tanzania and three in Zambia to deploy climate finance to green small and medium-sized enterprises (REEEP, n.d.).

Energy communities would benefit from policies that increase local ownership of energy projects. Energy communities are grassroots innovations that diffuse the local production and use of renewable energy at the community level (Hargreaves et al., 2013). A study on energy communities in 46 African countries shows that, overall, these communities are not sufficiently empowered to institute and manage their own energy projects. Currently, ownership of community energy projects is a challenge, as most projects are owned by the government solely or in partnership with elitist groups. Enabling policies are necessary to provide platforms for participatory stakeholder engagement that allow the involvement of citizens in the planning, implementation and management of energy communities (Ambole et al., 2021).

Notes

1. This refers to the geometric average of the 2020, 2021, and 2022 growth rates, or the annualised change between 2019 and 2022.
2. Authors' calculations based on UNCTADstats (2022).
3. Authors' calculations based on OECD (2022b).
4. Impact investing refers to "investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return" (GIIN, 2023).
5. Authors' calculations based on OECD (2021a).
6. Authors' calculations based on fDi Intelligence (2022).
7. Authors' calculations based on Bureau van Dijk (2022). See Annex 1.B in Chapter 1 for methodological information.
8. Authors' calculations based on IRENA (2022a).
9. Authors' calculations based on IRENA (2022b).
10. Authors' calculations based on OECD (2022c).
11. Authors' calculations based on IEA (2022b). Non-combustion energy sources include energy sources reported as renewable within the *International Energy Agency* database but exclude energy sources relying on fuel combustion, such as biofuels and municipal waste. Data reported for Southern Africa do not include Lesotho and Malawi.
12. Authors' calculations based on fDi Intelligence (2022).
13. Authors' calculation based on Roy (forthcoming).
14. "An Independent Power Producer is an entity, which is not a public electricity utility, which owns and or operates facilities to generate electric power for sale to a utility, central government buyer and end users" (SAIPPA, n.d.).

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